



Washington County Pedestrian & Bicycle Plan



August 2010

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Introduction

Washington County adopted the current pedestrian and bicycle elements as part of the 2020 Transportation Plan in October 2002. These elements include policies, strategies and system maps that define and support the development of the pedestrian and bicycle systems in Washington County through the year 2020.

The policies, strategies and maps included in each element were developed during a multi-year process that resulted in the adoption of the Plan. Research and information gathered during the Plan update process was compiled into three documents: The 2020 Transportation Plan adopted by ordinance, and the Technical Appendix and Background Report documents, which were adopted by resolution and order.

The Technical Appendix and Background Report contained a significant amount of data that helped inform the development of the pedestrian and bicycle elements of the 2020 Transportation Plan. This document, the Washington County Pedestrian and Bicycle Plan, brings together the relevant information from all three documents to provide a comprehensive record that includes information about existing conditions, facility maps, system needs, project lists and cost estimates.

This plan is generally organized by mode, with policies, strategies, maps and associated information for the pedestrian network located in Chapter 1. Chapter 2 contains similar information relating to the county's bicycle network. Policies, strategies and system maps are provided at the beginning of each chapter, followed by needs analyses and technical data and guidelines, and concluding with existing conditions and additional background information.

Context Information

Relevant Legislation, Plans, and Criteria

State, regional, and local plans set forth the regulatory and planning context for determining the needs anticipated for Washington County's pedestrian and bikeway system. Provided below is a description of the various plans that provide guidance for and link into the 2020 Transportation Plan.

Transportation Planning Rule

In 1991, the State Department of Land Conservation and Development (DLCD) adopted the Transportation Planning Rule (TPR) to implement Goal 12, the Transportation Goal adopted in 1974. Goal 12 seeks to “reduce reliance on the automobile and assure that the planned transportation system supports a pattern of travel and land use in urban areas which will avoid the air pollution, traffic and livability problems faced by other areas of the country.”

The Oregon Transportation Planning Rule (TPR) requires a Transportation System Plan to contain: “A bicycle and pedestrian plan for a network of bicycle and pedestrian routes throughout the planning area. The network and list of facility improvements shall be consistent with the requirements of ORS 366.514...” The TPR also requires local governments to adopt regulations that ensure construction of bikeways along arterials and major collector streets and to provide bicycle parking facilities as part of new multi-family residential developments of four units or more, new retail, office and institutional developments, and all transit transfer stations and park-and-ride lots¹.

¹Oregon Transportation Planning Rule – OAR 660-012-0045

Additionally, the TPR requires that local jurisdictions' pedestrian plans consider improvements in developed areas to provide for more direct, convenient and safe pedestrian travel within and between residential areas and neighborhood activity centers, and gives the example of providing walkways between cul-de-sacs. The pedestrian plan must include a financing plan for the improvements it lists, along with policies to guide the selection of projects that give preference to “mixed use, pedestrian-friendly development.”

Regional Transportation Plan and Regional Urban Growth Goals and Objectives

The Washington County Transportation Plan is required to be consistent with Metro’s Regional Transportation Plan (RTP) and Regional Urban Growth Goals and Objectives (RUGGOs). Metro has established a number of recommended practices through the RTP process. These include an interconnected urban form for new development, ensuring safe and convenient bicycle and pedestrian access; barrier-free access for all; use of regional street design guidelines and consistency with the identified regional pedestrian system. In addition, the RTP sets a policy of increasing walking for short trips, and “makes it a priority” to invest regional resources in those projects most likely to increase pedestrian travel, with the highest priority on regional centers, inter-modal connections and industrial areas, and a high priority on station communities, town centers, main streets and corridors.

The RTP sets design guidelines that are relevant to the Pedestrian Element, including a standard for street connection spacing no more than 530 feet, except where barriers prevent connectivity; narrower roadways and rights-of-way; and direct and logical crossings at transit stops, with marked crosswalks at major transit stops.

The RTP also calls for a continuous regional network of safe and convenient bikeways connected to other transportation modes and local bikeway systems, consistent with regional street design guidelines. The RTP bicycle system includes both on-street bicycle lanes and off-street, multi-use paths. While Washington County does not currently plan, develop, operate or maintain off-street paths, it does assist in obtaining necessary easements or right-of-way to facilitate development of these facilities through the land development process when possible. The County also recognizes the value of these facilities as part of the overall pedestrian and bicycle system networks. These off-street connections are shown in the 2020 Transportation Plan on the ‘Off-Street Trails Map’.

Many Washington County arterial streets, as well as several off-street bikeway corridors as mapped in the RTP as part of a regional bicycle system.

Pedestrian Element



Policy 14: Pedestrian Policy

Introduction

Washington County residents historically have recognized walking as an important form of transportation. Walking provides access to a variety of destinations, including schools, transit, shopping and employment. The 2020 Transportation Plan dramatically elevates the importance of and the need to support pedestrian travel from the 1988 County Transportation Plan, in part because of strengthened pedestrian policies at the state and regional levels, but also to implement Comprehensive Plan changes that have created and will continue to create mixed-use environments well-suited to pedestrian travel. Light Rail Station Communities, Regional and Town Centers, Transit Corridors and Main Streets are among the areas that are or will be in the future most amenable to pedestrian travel.

Pedestrian Background

Washington County's urban pedestrian system consists of sidewalks along streets, off-street trails, and off-street neighborhood connections built through the development process. In the rural area, the pedestrian system consists of an on-street pedestrian network consisting of wide shoulders along County and State roads. These wide shoulders also are intended for use by bicyclists and slow-moving farm equipment.



Key elements of the urban pedestrian system are on-street sidewalks, off-street trails, crossing locations, connectivity, illumination and streetscape amenities. On-street sidewalks form most of the pedestrian system in urban Washington County.

In the rural area, due to the low population density and the lack of pedestrian destinations, the Pedestrian System Map (*Figures 1.1a-f*) identifies specific areas where pedestrian improvements are called for. The rural pedestrian activity areas are locations where there is a pedestrian destination(s) and nearby residences within walking distance. Within these areas, wide shoulders are called for in order to provide for safe pedestrian travel.

The off-street pedestrian network consists of existing and planned paved multi-use trails and pathways that are generally located within drainage and utility corridors, parks and other public rights of way (See *Figures 1.1a-f*). In unincorporated Washington County, off-street trails are constructed and maintained by trail providers and homeowners' associations. Trail providers include THPRD and cities. Trails and pathways constructed as part of private development are often maintained by homeowner's associations. The trails and pathways shown on the Off-Street Trail System includes trails from the RTP's Regional Pedestrian System, Metro's Greenspaces Master Plan, THPRD's Trails Master Plan, and Special Area Off-Street Pathways and Trails identified through light rail station area and regional and town center planning efforts. All trail alignments are generalized. Specific alignments will be determined through the development review process or a specific planning process for a trail.

Gaps in the existing sidewalk system constitute the major deficiency in the urban pedestrian system. The February 2001 sidewalk inventory shows there are approximately 211 miles of missing sidewalks along urban county Arterial, Collector and Neighborhood Route streets. There are also approximately nine miles of missing sidewalks on state arterials. The missing sidewalks will be constructed over time as part of public roadway projects, private development of adjacent land and as infill pedestrian improvement projects. The majority of sidewalk improvements will be made as infill sidewalk improvement projects, independent of roadway projects.

There are a number of state and regional pedestrian provisions that are addressed in the Pedestrian Policy's strategies, including the state Transportation Planning Rule and the Regional Transportation Plan (RTP). Key requirements include constructing sidewalks along new urban streets and providing sidewalks along existing streets when they are reconstructed. New state legislation also requires the identification of safe routes to schools in order to increase pedestrian safety to and from schools. Strategy 8.6 in Policy 8 of the 2020 Transportation Plan, Roadway Safety, addresses this legislation. The RTP also identifies key pedestrian-oriented areas and streets that are to have enhanced pedestrian amenities. The Pedestrian policy's strategies identify other key actions needed to guide continued development of the pedestrian system over time, which will result in significant improvements to Washington County's pedestrian system. These strategies define a program that, over time, will result in a much more complete pedestrian system that is safe, convenient and attractive, making it easier for the public to walk to their destinations.

POLICY 14: PEDESTRIAN POLICY

IT IS THE POLICY OF WASHINGTON COUNTY TO ENCOURAGE AND SUPPORT GREATER PEDESTRIAN ACTIVITY IN THE COUNTY BY PROVIDING AND MAINTAINING AN ENVIRONMENT WHERE WALKING IS A SAFE, CONVENIENT AND PLEASANT MODE OF TRAVEL.

Strategies:

- 14.1 Foster a safe, convenient and pleasant pedestrian environment by providing for the development of a well designed, efficient and interconnected system of pedestrian facilities consisting primarily of sidewalks on the street system but utilizing separate accessways for pedestrians and bicycles when street connections are impractical or unavailable.
- 14.2 Construct pedestrian facilities on all new streets as provided in the Community Development Code and/or Community Plans. Provide pedestrian facilities and appropriate illumination on all new or reconstructed urban Arterials, Collectors, Neighborhood Routes, and Local and Special Area streets, including intersection improvements.
- 14.3 Consider activities on adjacent existing and planned land uses when determining appropriate pedestrian supportive features to be included with Arterial, Collector, and Neighborhood Route roadway improvements.
- 14.4 Construct pedestrian facilities, as appropriate, to full or interim standards on existing streets that are not built to ultimate standards. Develop standards for interim pedestrian improvements, including asphalt pathways.
- 14.5 Require that new urban development provide for safe, convenient and pleasant pedestrian travel as provided through the Transportation Plan, the Community Plans and/or the Community Development Code.
- 14.6 Identify and prioritize in the Transportation Capital Improvement Program and the Operations and Maintenance Annual Work Program the construction of missing pedestrian facilities, reconstruction of substandard pedestrian facilities and the provision of crossing and streetscape improvements on Arterials, Collectors, and Neighborhood Routes.
- 14.7 Work, as appropriate, with Metro, Tualatin Hills Park and Recreation District (THPRD), cities, other agencies and organizations, and private development to plan, map, and construct an off-street system of multi-use trails and pathways.
- 14.8 Develop and utilize standards for pedestrian facilities and amenities that adequately address pedestrian safety, sidewalk width, ease of street crossing, illumination, connectivity and streetscape improvements and amenities. In Pedestrian Districts and along Transit Corridors, Main Streets and Streetscape Improvement Areas shown on the Pedestrian System Map and roadways and intersections identified on the Regional Street Design Overlay Map, develop standards for enhanced pedestrian facilities and amenities that support the planned pedestrian environment. In areas where pedestrians are expected during non-day-light hours, such as transit routes, Main Streets and Pedestrian

Districts, standards for pedestrian-scale lighting shall be developed. Appropriate improvements, based upon these standards, shall be included in new urban development and urban road projects. (See *Figures 1.9, 1.10 and 1.11* for examples of specific types of improvements.)

- 14.9 Until such time as the standards contemplated in Strategy 14.8 are developed and adopted, consider the pedestrian enhancements set forth in the County's Pedestrian Enhancements Design Guidelines Booklet when development or redevelopment, including roadway construction or reconstruction, is proposed in Pedestrian Districts, along Transit Corridors, Main Streets and in Streetscape Improvement Areas shown on the Pedestrian System Map as well as on roadways and intersections identified on the *Regional Street Design Overlay Map*.
- 14.10 Employ the following pedestrian classification definitions:
- A. Major Bus Stops:** Major bus stops are all stops on rapid bus lines and major bus stops designated in the Regional Transportation Plan. Development in close proximity of major bus stops shall comply with the standards of Community Development Code Section 380, Convenient Access to Transit Overlay District. Major bus stops are identified on the Transit System Map and in the Community Plans.
 - B. Off-Street Pathways (includes special area off-street pathways):** These paved, multi-use pathways serve an important circulation function in areas not well served by the street system and provide short cuts between origins and destinations. An accessway, which provides a short connection between two roadways, is an example of a pathway serving a circulation function. Special area off-street pathways are pathways that are located in a transit-oriented district. Off-street pathways are identified on the Off-Street Trail System Map and the Community Plans.
 - C. Pedestrian Connectivity Areas:** Pedestrian connectivity areas are locations in the urban, unincorporated area where pedestrian facilities are needed to enhance local pedestrian connectivity. Generally, these are areas where the pedestrian facilities will connect neighborhoods and/or provide a more direct route for pedestrians to use. Pedestrian connectivity areas identify the specific locations that are to be connected. Appropriate types of pedestrian improvements include sidewalks along streets, accessways, off-street trails, or a combination of two or more of these improvements. In some instances, a particular type of improvement may be identified for construction, such as an accessway or off-street trail. The appropriate type(s) of pedestrian facilities and their location will be identified through the development review process, except in those areas where a specific facility is shown, and constructed as part of development within these areas. Pedestrian connectivity areas are identified in the Community Plans.
 - D. Pedestrian District:** Pedestrian districts are Regional and Town Centers and Light Rail Station Communities. These areas are planned for dense, mixed-use development and are served by transit. All streets within these areas are important pedestrian connections. These areas shall be developed in a manner that makes walking a safe, convenient and interesting travel mode. These areas will be characterized by buildings oriented to the street, wide sidewalks, marked street crossings (with special crossing amenities at some locations), pedestrian-scale lighting, benches, bus shelters, awnings and street trees. The

Pedestrian Districts located within urban, unincorporated Washington County are identified on the *Trails and Pedestrian System Map*. Regional and Town Centers and Light Rail Station Communities located within Washington County cities are shown in city comprehensive plans.

E. Pedestrian Focus Area: Pedestrian focus areas are located within pedestrian districts. They have nearby transit service and will exhibit the characteristics of a pedestrian district. Walking is promoted as the preferred transportation mode choice by developing a strong pedestrian scale and emphasizing pedestrian access and activities. Generally, these areas will have the highest level of pedestrian amenities and pedestrian-scale design. Pedestrian focus areas are identified in the Community Plans.

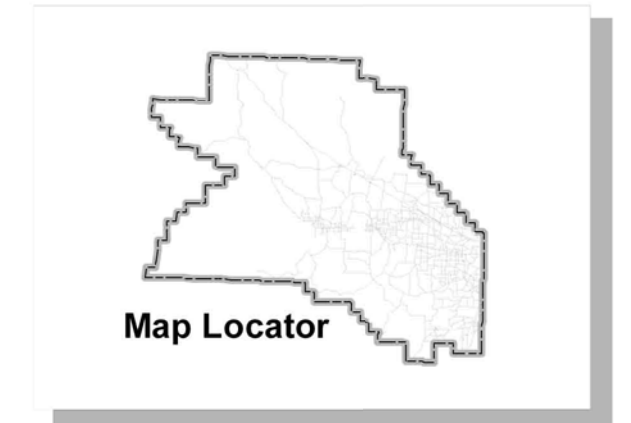
F. Pedestrian Plaza: A pedestrian plaza is a small semi-enclosed area which provides a place for pedestrians to sit, stand or rest. They are generally located at a transit stop, a building entrance or an intersection. They connect directly to adjacent sidewalks, walkways, transit stops and buildings. Pedestrian plazas have amenities, such as pedestrian scale lighting and seating.

G. Special Area Trails: Special area trails are located in transit oriented districts and are intended to serve recreational walking trips (for example, along a stream or through a park). Special area trails are identified on the *Off-Street Trail System Maps (Figures 1.13 and 1.14)* and in the Community Plans.

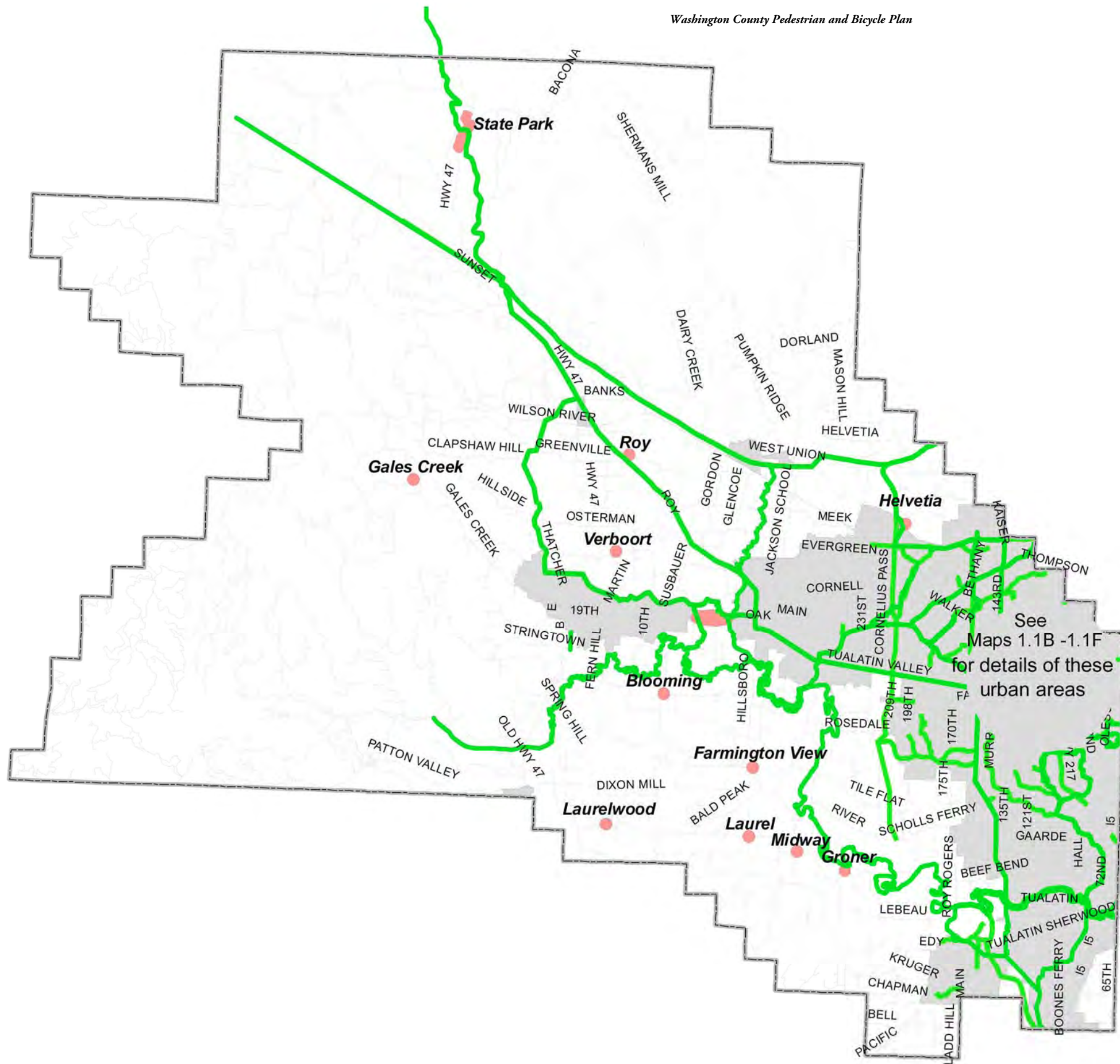
- 14.11 Provide four-to six-foot wide shoulders along Arterials, Collectors and Neighborhood Routes in Rural Pedestrian Activity Areas to provide for safe pedestrian travel. Shoulder width will be dependent upon the functional classification of a roadway and if it is designated as a rural bike route.
- 14.12 Develop criteria to prioritize the construction of needed pedestrian facilities, including crossing, connectivity and streetscape improvements.
- 14.13 Update the pedestrian inventory map and pedestrian accident data on a periodic basis to assist in the identification of needed improvements.
- 14.14 Review and modify as appropriate minimum landscaping and irrigation standards for the construction or reconstruction of Arterials, Collectors and Neighborhood Routes.
- 14.15 In addition to the pedestrian improvements required by the Community Development Code, development shall provide needed pedestrian improvements as part of future development in Pedestrian Connectivity Areas. The type and location of the pedestrian facility (ies) in these areas will be determined through the development review process unless a specific improvement is called for. Pedestrian facilities may include sidewalks along streets, accessways or off-street trails.

Figure 1.1A




Washington County **2020** Transportation Plan



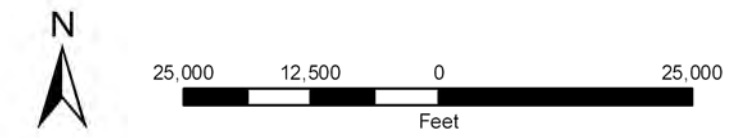
Trails and Pedestrian System



See Maps 1.1B -1.1F for details of these urban areas

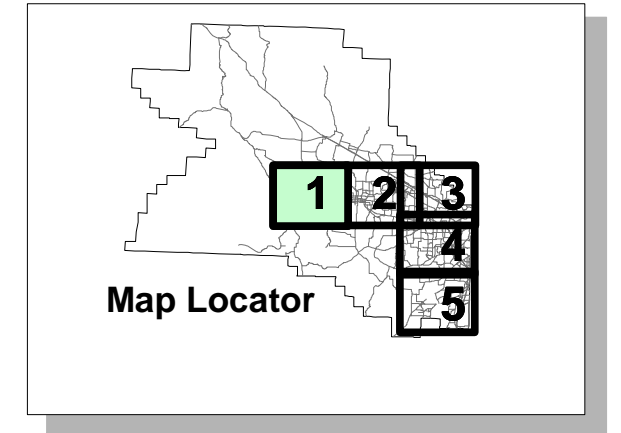
-  Off Street Trails (existing and planned)
-  Rural Pedestrian Activity Areas
-  Area inside the Urban Growth Boundary

NOTE:
Designations applied to roads or other facilities not under County jurisdiction should be considered recommendations to the state, city or other jurisdiction with primary responsibility for the facility.

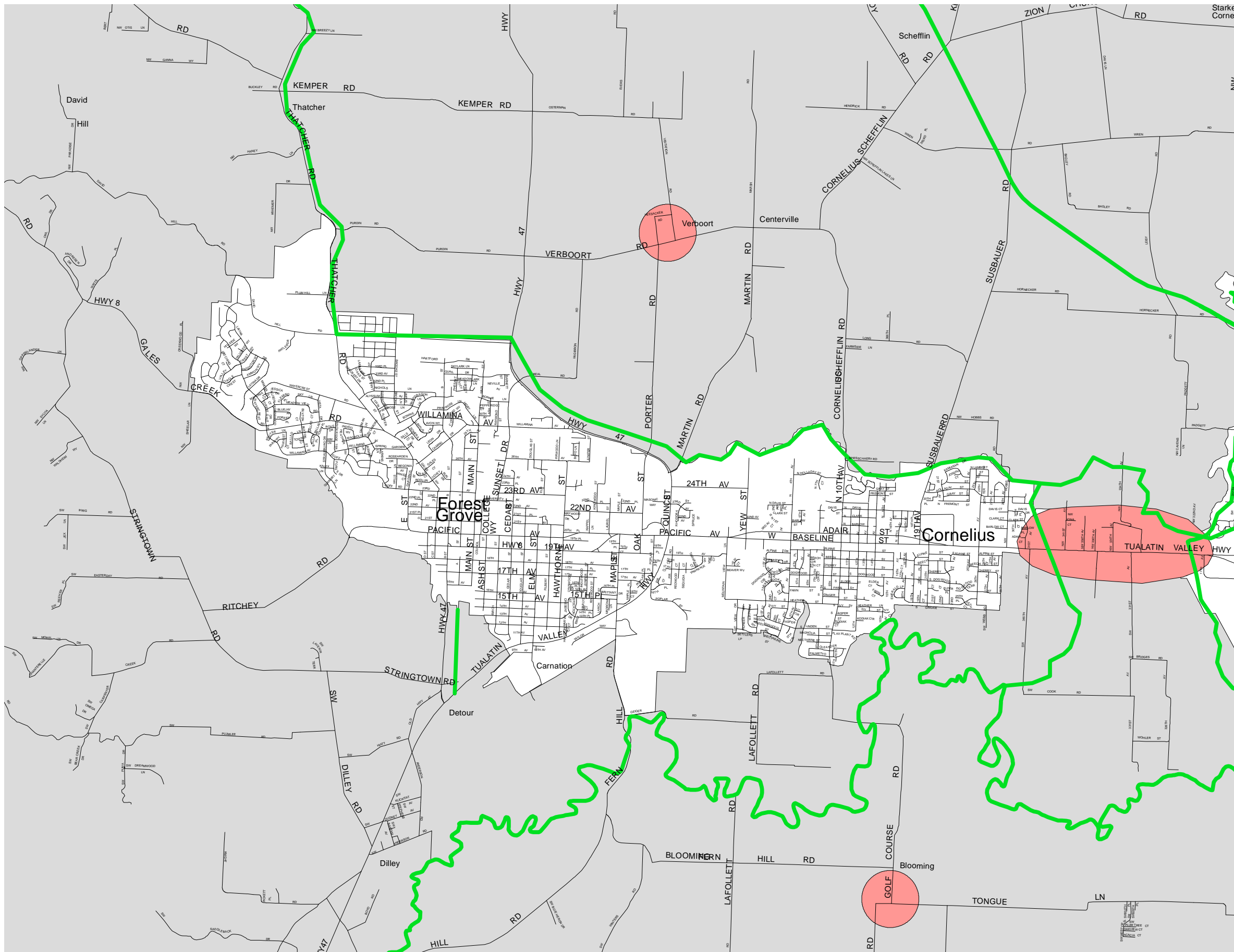













Updated 8/7/09

Figure 1.1B



Trails and Pedestrian System



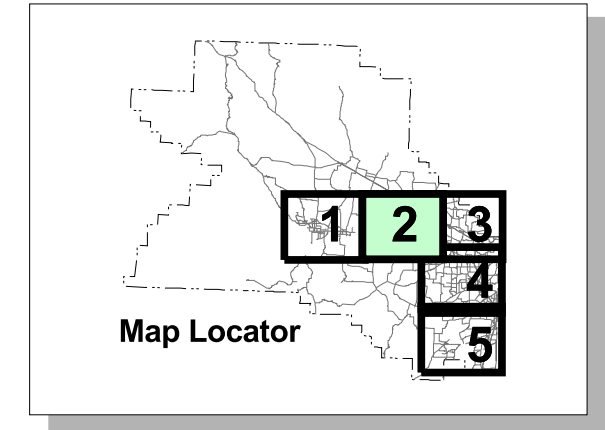
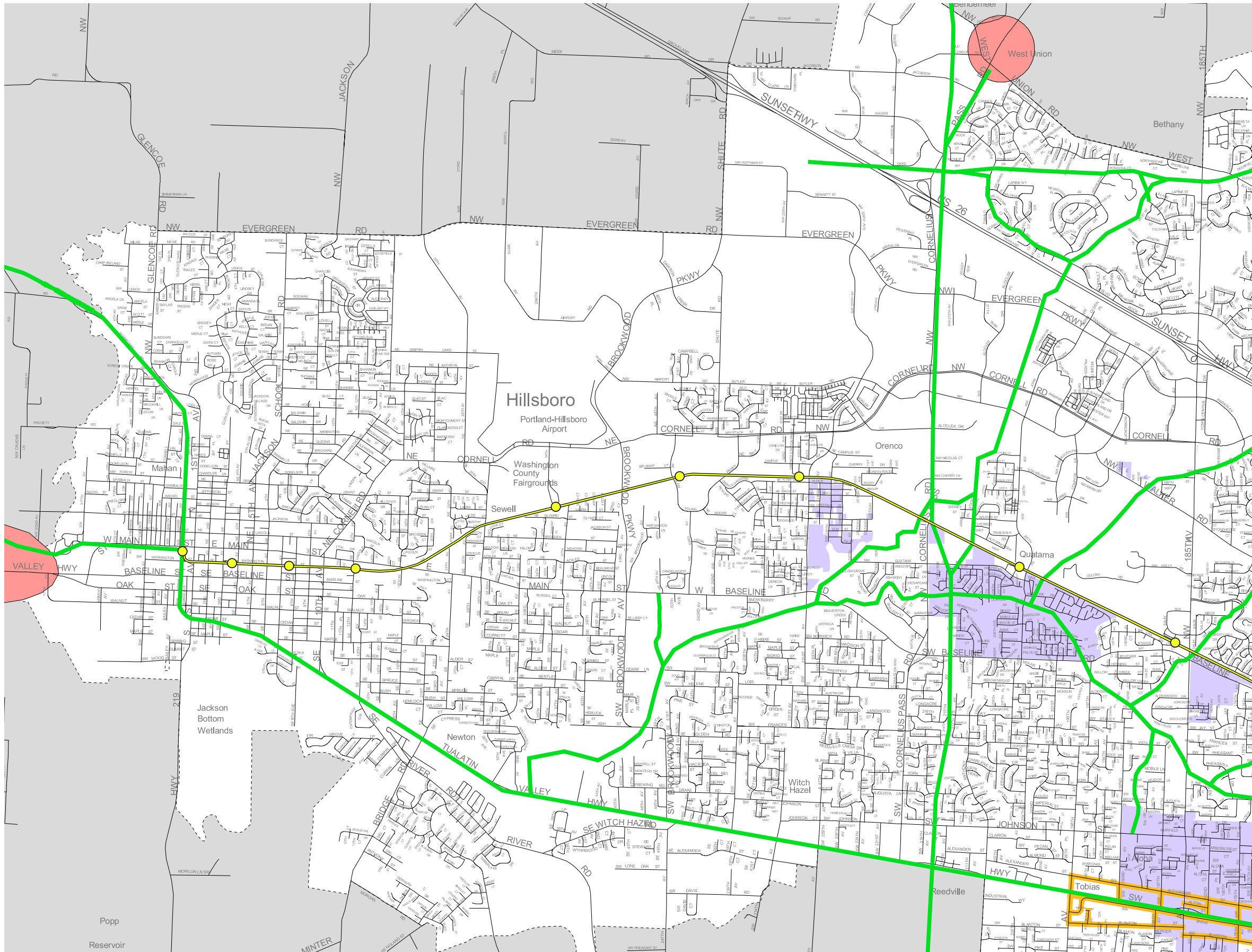
-  MAX Line
-  MAX Station
-  Proposed Commuter Rail Line
-  Proposed Commuter Rail Station
-  Off Street Trails (existing and planned)
-  Streetscape Improvement Areas
-  Pedestrian District
-  Rural Pedestrian Activity Areas
-  Street System
-  Urban Growth Boundary
-  Area outside the Urban Growth Boundary

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



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Figure 1.1C



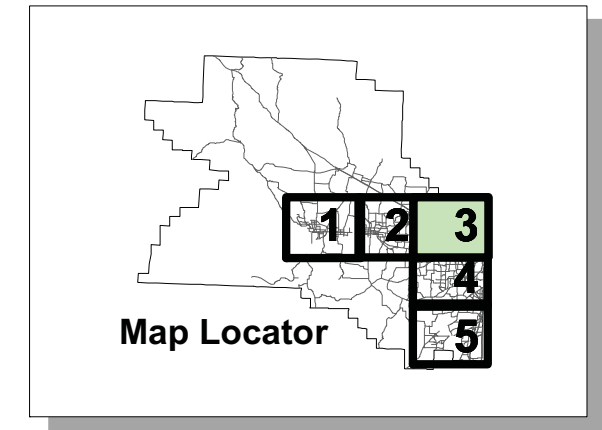
Trails and Pedestrian System

-  MAX Line
-  MAX Station
-  Proposed Commuter Rail Line
-  Proposed Commuter Rail Station
-  Off Street Trails (existing and planned)
-  Streetscape Improvement Areas
-  Pedestrian District
-  Rural Pedestrian Activity Areas
-  Street System
-  Urban Growth Boundary
-  Area outside the Urban Growth Boundary

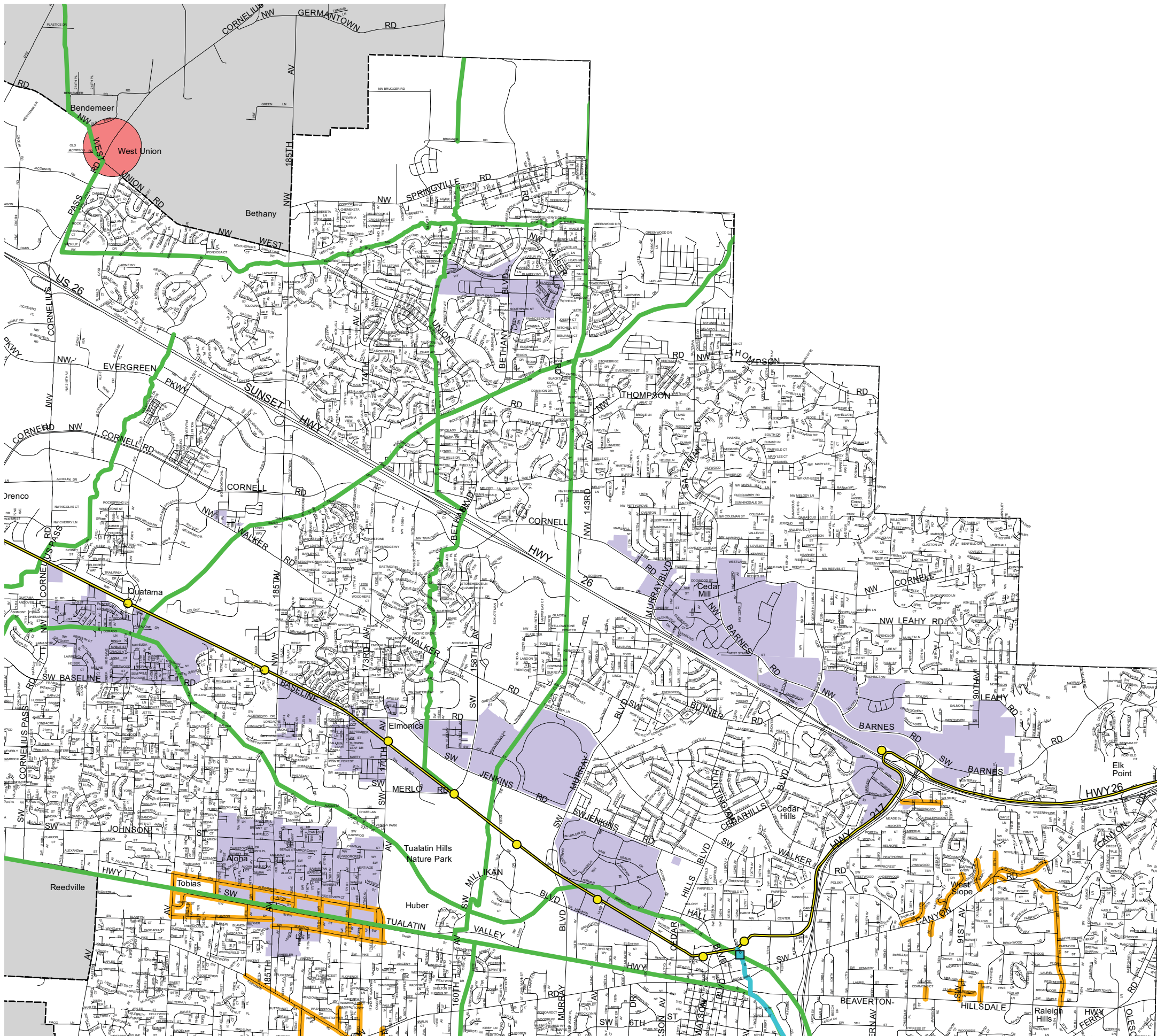
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Figure 1.1D



Trails and Pedestrian System



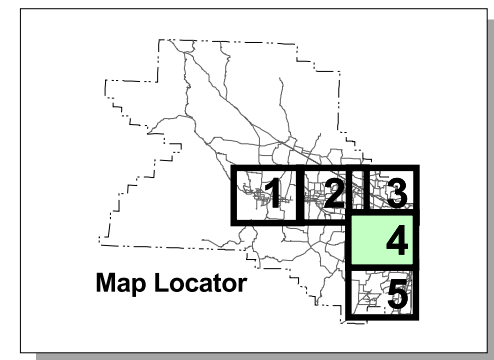
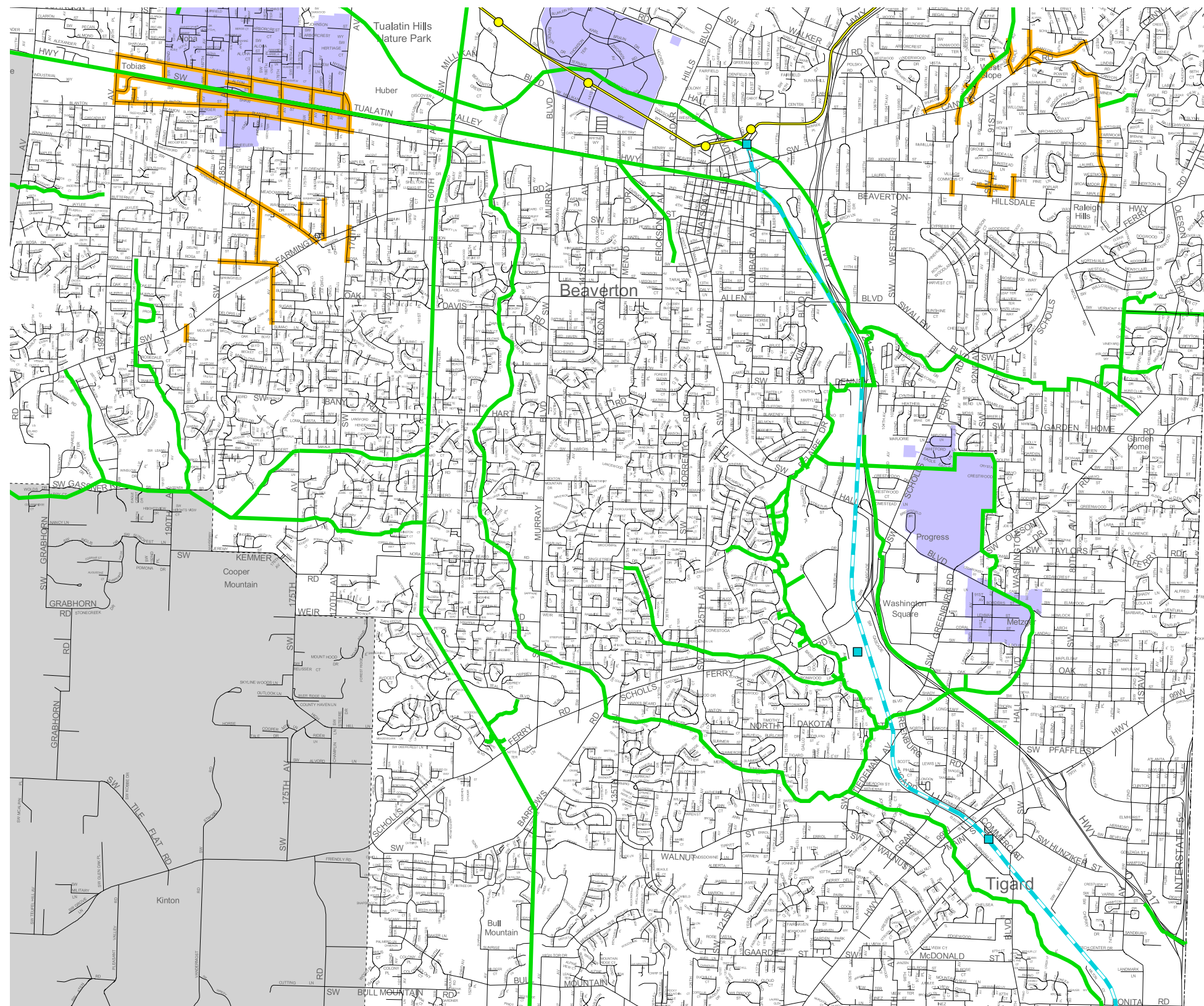
-  MAX Line
-  MAX Station
-  Proposed Commuter Rail Line
-  Proposed Commuter Rail Station
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-  Streetscape Improvement Areas
-  Pedestrian District
-  Rural Pedestrian Activity Areas
-  Street System
-  Urban Growth Boundary
-  Area outside the Urban Growth Boundary

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Updated 2/7/12

Figure 1.1E



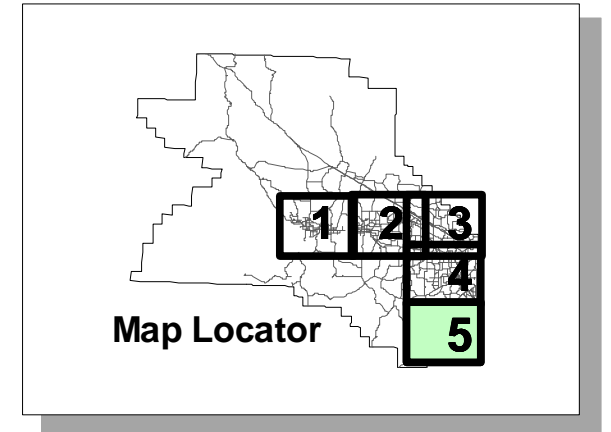
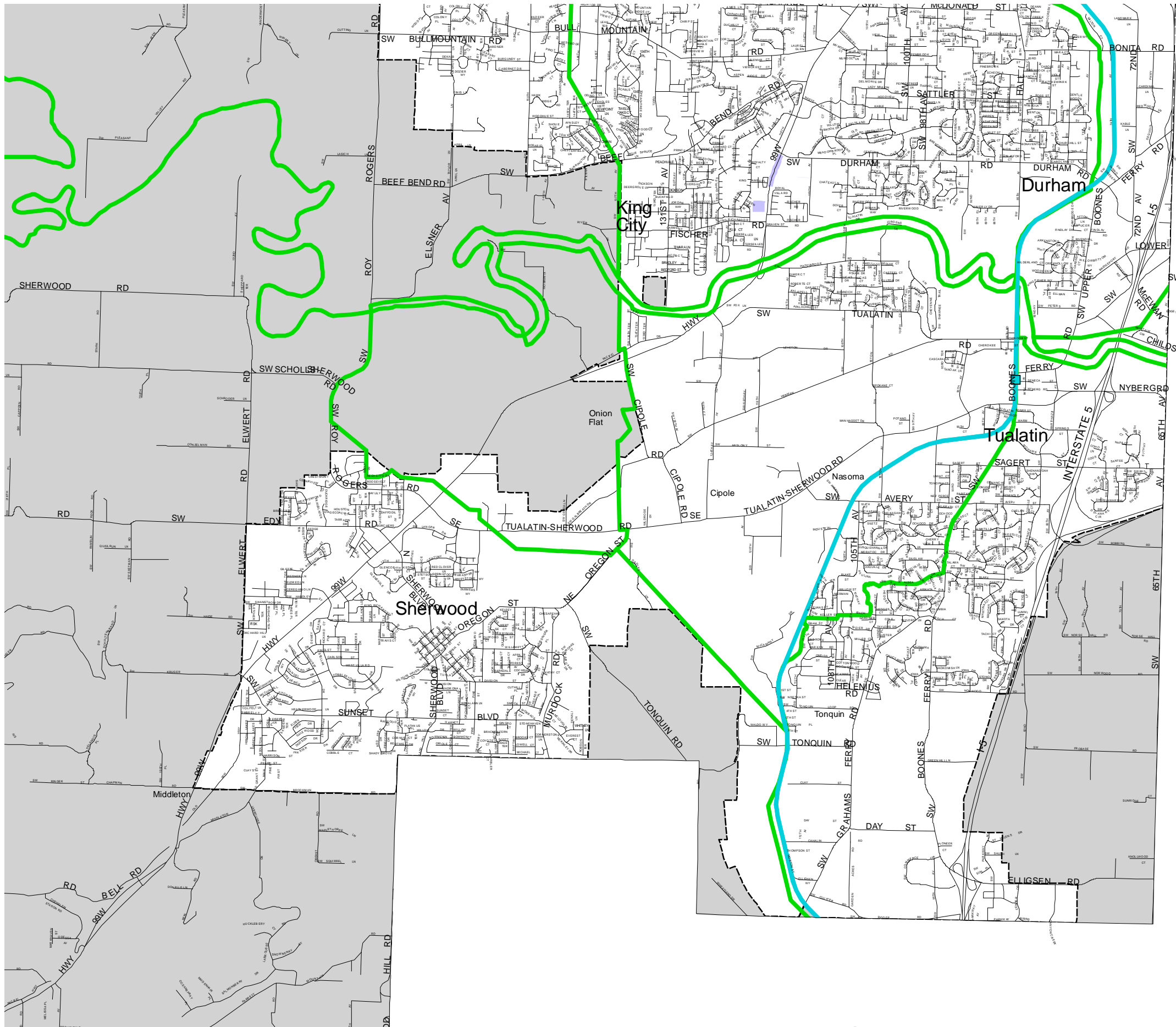
Trails and Pedestrian System

-  MAX Line
-  MAX Station
-  Proposed Commuter Rail Line
-  Proposed Commuter Rail Station
-  Off Street Tr
-  Streetscape Improvement Areas
-  Pedestrian District
-  Rural Pedestrian Activity Areas
-  Street System
-  Urban Growth Boundary
-  Area outside the Urban Growth Boundary












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Figure 1.1F



Trails and Pedestrian System

-  MAX Line
-  MAX Station
-  Proposed Commuter Rail Line
-  Proposed Commuter Rail Station
-  Off Street Trails (existing and planned)
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Updated 8/6/09

Pedestrian Network Needs Analysis

Background

Walking is an integral part of urban transportation. In Washington County, where eighteen percent of all trips are less than a mile long, walking has the potential to be an essential element of an effective and sustainable transportation system. Walkers enjoy many advantages: travel times are predictable, expenses are minimal, and health benefits are immediate and quantifiable. For the County, a shift to more walking trips could reduce the need for roadway improvements and parking facilities and contribute to better air quality and quality of life. Compared to facilities for other modes, walkways are easy to maintain and inexpensive to install. Finally, a good pedestrian network supports and leverages investments in transit.

However, travelers cannot be expected to choose to walk, even for short trips, unless the walking environment is perceived as safe, direct, convenient and attractive. Despite the fact that the County has consistently required walkways as a condition of development since the 1980's, and has systematically rebuilt many roadways to include sidewalks, much of the pedestrian network in the urban parts of the County remains discontinuous and disconnected. In these conditions, walking is inconvenient and can be unsafe.



An analysis of the existing conditions indicates that the Pedestrian Element of the Transportation Plan must address those areas where the County's current pedestrian network is most deficient: connectivity, safety, and quality of the walking experience.

The purpose of this analysis is to address the deficiencies of the pedestrian network, including the needs of pedestrians, and address the State Transportation Planning Rule's (TPR) requirements for the pedestrian system and applicable requirements from the Regional Transportation Plan (RTP).

The first part of this Technical Appendix summarizes the state and regional requirements applicable to the Pedestrian Element, lists the elements of the pedestrian network and examines the general attributes of these elements as they relate to defining improvement needs. The second part details the specific needs in unincorporated Washington County and describes how they have been identified by integrating the general attributes of pedestrian improvements with data on existing conditions, pedestrian fatality and injury data, performance measures for pedestrian facilities, and community input. Project improvement information is described in *Figures 1.2, 1.3 and 1.4.*

State and Regional Requirements

The TPR, adopted in 1991, requires that the county complete a pedestrian plan that includes an inventory of existing and committed pedestrian facilities, together with a mapped system of planned facility and major improvements. The TPR requires improvements to provide for more direct, convenient and safe pedestrian travel, as well as a financing plan for those improvements and policies to guide the selection of projects to give preference to “mixed use, pedestrian-friendly development.”

The TPR also establishes guidelines for implementation that include sidewalks along arterials, collectors, neighborhood routes and most local streets; pedestrian oriented development and transit improvements at major transit stops; and pedestrian access to transit.

At the regional level, Metro has established a number of recommended practices through the RTP process. These include an interconnected urban form for new development, ensuring safe and convenient bicycle and pedestrian access; barrier-free access for all; use of regional street design guidelines and consistency with the identified regional pedestrian system. In addition, the RTP sets a policy of increasing walking for short trips, and ”makes it a priority” to invest regional resources in those projects most likely to increase pedestrian travel, with the highest priority on regional centers, inter-modal connections and industrial areas, and a high priority on station communities, town centers, main streets and corridors.

The RTP sets some design standards that are relevant to the Pedestrian Element, including a standard for new street connection spacing at no more than 530 feet in specific areas, except where barriers prevent connectivity; narrower roadways and rights-of-way; and direct and logical crossings at transit stops, with marked crosswalks at major transit stops.

Table 1.1 Pedestrian System Performance Measures

Category	Criteria
Accessibility	Access zones for schools, major employment centers, transit hubs. (See Table 1.2).
Connectivity	Compliance with 330 or 400-foot spacing requirement for accessways.
Minimum Facility	Gaps in sidewalk system.
Mobility	N/A
Maximum Peak Usage	N/A
System Coverage	Percent of sidewalks provided along arterial and major collectors overall and within the walking zones.

Evaluation Criteria

The performance of the pedestrian network can be evaluated through a series of performance measures. The measures are divided into three general categories: System Level, Facility Design, and Operations and Maintenance.

At the System Level, there are four measures of the pedestrian network:

Accessibility measures the proximity to pedestrian attractors such as schools and parks, commercial centers and major transit stops by establishing a series of pedestrian access zones, based on typical walking distances to these attractors (*Table 1.2*).

Connectivity measures the degree to which the pedestrian network is connected, using the standards of the Community Development Code (Code), which are applicable to new development. In the Local Street Connectivity areas identified in the community plans, the Code requires a 530 foot spacing for new streets and a 330 foot spacing for accessways. In other urban areas, the spacing standard for new streets is 600 feet and 400 feet for accessways.

Minimum Facility measures whether or not there is a continuous sidewalk.

System Coverage measures the percent of sidewalks provided along arterials, collectors and neighborhood routes overall and within the access zones.

At the *Facility Design* level of measures, the pedestrian network is evaluated on the extent to which it provides ADA access in accordance with the standards set out by the U.S. Department of Justice for the Americans with Disabilities Act of 1990.

In terms of *Operation and Maintenance*, there are three measures for the pedestrian network:

Ease of Street Crossing is measured by looking at the frequency of crossing opportunities, roadway capacity, travel speeds, presence of signals, and presence of refuge areas.

Maintenance tracks the surface quality and width of sidewalks.

Safety evaluates pedestrian/automobile crash patterns and type as well as streetlight illumination.

Table 1.2: Pedestrian Access Zones

Activity Center/Facility	Radii of Attraction for Pedestrian Access
Elementary school	0.5 mile
Middle & high school	1.0 mile
Active park	0.5 mile
Special recreation facility	1.0 mile
Library	0.25 mile
Neighborhood commercial center	0.25 mile
Major bus stop	0.5 mile
LRT stop	0.5 mile
Major commercial designation	its boundary
Major employment designation	its boundary
Regional center	its boundary, plus 1/4 mi. from commercial designations in the center
Town center	its boundary, plus 1/4 mi. from commercial designations in the center
LRT station community	its boundary, plus 1/2 mile from station & 1/4 mile from commercial designations in station community
Main street	its boundary
Corridor	its boundary

Types of Pedestrian Improvements

A safe and functional pedestrian environment that attracts people to walk consists of several elements. At a minimum, to function, there must be a connected network of continuous

pedestrian ways. These continuous ways, in turn, are made up of linear elements, such as sidewalks along streets or multi-use trails, linked by pedestrian street crossings. The connected network must provide access to the uses that attract pedestrian travel, such as schools and parks, neighborhood shopping, transit stops, and public uses, such as libraries and post offices. To be safe and attractive, pedestrian facilities must be adequately illuminated, and sidewalks may be buffered from adjacent traffic by a planting strip to provide streetscape amenities for walkers' comfort.

This section discusses the types of improvements that can be made to enhance each of these elements of the pedestrian environment.

Sidewalk Improvements

The sidewalk is the most obvious element of the pedestrian network. Where sidewalks are lacking, people must either share the roadway with vehicles, choose a different route or use another mode of travel. Pedestrians vary in their ability to safely share the roadway with vehicles, so sidewalks are an important element. County standards require sidewalks on both sides of all urban roadways.

The sidewalk must have a clear width wide enough to accommodate the widest mobility device and wide enough for the expected volume of pedestrian traffic. In most parts of unincorporated Washington County, this would be satisfied by having a sidewalk wide enough for two people to walk together comfortably, about 1.9 m. or six feet wide (wider than the current County standard of five feet). In areas where there are businesses or other pedestrian attractors, the sidewalk should accommodate two wheelchairs traveling together, or two people walking together passing a third person comfortably, a minimum clear width² of about 2.2 m or seven feet. Where high pedestrian use is expected, such as in Town Centers and Light Rail Station Areas, even wider clear widths will be needed.

The sidewalk typically lies within an area sometimes called the “sidewalk corridor,” or “border area” between the edge of the roadway and the edge of the right-of-way. In addition to the sidewalk, this corridor often houses items like signs, mailboxes, utilities, traffic signals, fire hydrants, streetlights, street trees and landscaping. It is important to provide sufficient space for these uses in addition to the clear sidewalk width needed for pedestrian travel. Ideally, many of these uses can be placed between the sidewalk and the curb in a buffer zone or planting strip that helps to separate pedestrians from automobile traffic. The advantages of such a buffer zone are spelled out in the Oregon Bicycle and Pedestrian Plan³, the Washington State Pedestrian Facilities Guidebook⁴ and the Metro Livable Streets⁵ document, among many others. Washington County should review its current standards to ensure that design guidance for future construction includes guidance on maintaining the separate zones within the sidewalk corridor and the appropriate width for each zone.

It is essential that sidewalk improvements provide accessibility to all users. For pedestrians who use wheelchairs, this means having a minimal cross slope along the sidewalk, especially at

² City of Beaverton Engineering Design Manual and Standard Drawings, Adopted December 1997 (Res. 3434), Revised October 1999 (Ord. 4060), Chapter IV.

³ Oregon Department of Transportation (ODOT), Oregon Bicycle and Pedestrian Plan: An Element of the Oregon Transportation Plan, June 1995.

⁴ Washington State Department of Transportation (WSDOT), Pedestrian Facilities Guidebook: Incorporating Pedestrians Into Washington's Transportation System, prepared by OTAK for WSDOT, Puget Sound Regional Council, County Road Administration Board and Association of Washington Cities, September 1997.

⁵ Metro, Creating Livable Streets: Street Design Guidelines for 2040, November 1997.

driveway crossings, and having appropriate ramps to the street at every crosswalk. Ramps must have level landings. For pedestrians who are blind or have low vision, accessibility is enhanced by having a clear path of travel and tactile warnings at curb ramps. Guidelines for accessibility are developed and maintained by the federal Architectural and Transportation Barriers Compliance Board, better known as the Access Board, and are enforced as standards by the Department of Justice. The latest recommendations on making facilities in the public right-of-way accessible were published by the Access Board in the form of a report⁶ from the Public Rights-of-Way Access Advisory Committee in January 2001.

Pedestrian Crossing Improvements

Street crossings are the critical links in a connected pedestrian network, yet crossing the street is the most dangerous aspect of pedestrian travel. That danger is evident in the pedestrian collision data, which shows that 84% of pedestrian/automobile collisions recorded in Washington County in the period 1997-1999 occurred when pedestrians were crossing the street. Of these collisions, 56% occurred in a crosswalk, and 44% between intersections where there was no crosswalk.

Oregon law defines a crosswalk as the extension of a curb, sidewalk or shoulder across an intersection, whether it is marked or not. Outside of intersections, crosswalks are created by markings on the road. Under Oregon law, motorists have a duty to stop and yield to pedestrians in the crosswalk. Pedestrians are permitted to cross at other locations, but must yield to motorists.

In addition to the danger factor for pedestrians, crossing the street often adds delay to a pedestrian trip. Signals may provide a greater degree of safety for pedestrians at the intersection of multi-lane roadways, but may result in significant waiting or out-of-direction travel.

Pedestrian crossing safety is reduced when the speed and volume of traffic are high; and the wider the street, the more likely that speed and volume of traffic will be high. Safe pedestrian crossings for arterials and collectors are especially critical for transit riders, who nearly always must cross at one end of a round trip. It will be important to identify crossing improvements in association with walkway improvements in order to address crossing needs and create continuous, connected pedestrian network.



Crossing improvements may include such measures as pedestrian refuge islands and curb extensions.

It is essential for the function of the pedestrian network that adequate crossing opportunities be provided. The desire to move traffic without impediment must be balanced against the fact that

⁶ Public Rights-of-Way Access Advisory Committee (PROWAAC), *Building a True Community: Final Report of the Public Rights-of-Way Access Advisory Committee to the Access Board, January 2001.*

pedestrians will tend to take the shortest route if they can. Where strong pedestrian attractors generate pedestrian crossing activity but inadequate consideration has been given to providing safe crossing opportunities, a high incidence of pedestrian/automobile collisions can be expected.

The most straightforward approach to increasing pedestrian safety and convenience at crossings is to reduce the number of lanes to be crossed, shorten the crossing distance, slow the approaching traffic and increase the extent to which the pedestrian can see and be seen. *Table 1.3* lays out a number of potential improvements that can help to accomplish this basic approach.

Table 1.3 Types of Pedestrian Crossing Improvements

Improvement	Purpose	Where to use	Considerations
Pedestrian Refuge Island	To minimize pedestrian exposure during crossing by shortening crossing distance and increasing the number of gaps available for crossing.	Appropriate where roadway crossing is greater than 15 m (50 ft) or where more than three lanes; can be used anywhere to increase number of gaps. Can be used at unsignalized or signalized crosswalks.	At signalized locations with pedestrian actuation, provide push buttons at refuge. At right-turn slip lanes, provide pedestrian signalization
Curb Extensions See <i>Attachment "D"</i> for Standard Drawing	To minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing.	Appropriate for any crosswalk where there is a parking lane adjacent to the curb. Sometimes used to accommodate bus stops, with bus stopping in travel lane.	Unless there is a parking lane, curb extensions can be a problem for bicycle travel and truck or bus turning movements.
Mid-block Crosswalk	To provide a crossing opportunity where there is no nearby intersection.	Use where there is a demand for crossing and there is no nearby crossing. Consider using when protected intersections are spaced greater than 600 feet.	May present additional hazards to pedestrians on multi-lane roadways when not signalized.
Raised Crosswalk	To eliminate grade changes from the pedestrian route and give pedestrians greater prominence as they cross the street.	In business districts, near schools and other areas with significant pedestrian travel.	Provide tactile warnings to alert blind pedestrians when they are leaving the sidewalk and entering the roadway.
Flashing Beacons or In-Roadway Lights	To alert motorists to the presence of pedestrians in a crosswalk.	Used to warn road users that they are approaching a condition on or adjacent to the roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop. Use only at marked crosswalks with no traffic control devices.	Most successful when the flashing corresponds closely to actual pedestrian use, which calls for best available pedestrian detection.
Signal or Pedestrian Signal	To allocate relative time at an intersection to conflicting vehicular and pedestrian movements.	MUTCD gives warrants for installing signals based on relatively high pedestrian volumes. Consideration can be given to installing signals in locations where a demonstrated need for crossing cannot be safely accommodated with other design elements.	Recommended that the time allocated to pedestrian crossing be calculated using a design walking speed of 3.5 to 4.0 feet per second. Recommended that all pedestrian-actuated signals be accessible with audible and tactile information provided.
Colored or Textured Pavements	To better delineate crossing area boundaries to motorists and pedestrians.	At intersections of high pedestrian activity.	Maintenance and repair after utility cuts or other damage, costs.
Illumination	To ensure that pedestrians can	On collectors and arterial	Streetlights should not "wash"

Table 1.3 Types of Pedestrian Crossing Improvements

Improvement	Purpose	Where to use	Considerations
	be seen as they cross the street.	streets, with particular emphasis on crosswalks.	the crosswalk but should be located at least 25 feet on either side to best illuminate or backlight a crossing pedestrian. The spectrum of light ideally should render colors well (high-pressure sodium does not).
Grade-separated Crossing Structure	To provide a crossing opportunity in which the pedestrian is completely separated from traffic.	Use only where it is not feasible to provide an at-grade pedestrian crosswalk (such as at an interstate highway, expressway, or very wide busy major arterial).	A high cost option. Recommended that all grade-separated crossing structures be accessible with elevator access, not just ramps. Excessive added travel distance will discourage pedestrians who want to take a more direct route.
Four Lane To Three Lane Conversion	To reduce the number of travel lanes to cross and provide space for pedestrian refuges.	Where a facility with four travel lanes has significant left-turn activity, a three-lane configuration can perform as well or better.	The conversion may permit adding bicycle lanes or curb extensions if there are none at present.
Traffic Calming	To slow the speed of traffic as it approaches the crosswalk.	Where to use varies with types of traffic calming measures. Some examples include mini-traffic circles, slow points, traffic diverters, chicanes, etc.	Vertical and horizontal deflection devices can slow emergency response vehicles and cause pain to people with spinal injuries (as passengers in para-transit vehicles, for example)
Reduced Curb Return Radii	To reduce crossing distance, increase queuing area for pedestrians waiting to cross, and slow vehicles as they travel through the intersection.	Where pedestrian use is high and truck and bus turning movements are low. Very short radii (1.5 m or 5 ft) can be used where a parking lane or bike lane provides an "effective turning radius" that is larger than the curb return, or on one-way streets where there are no turning movements possible.	Balance the needs of pedestrians with the need to accommodate the types of vehicles that turn at the intersection.
Parking Control	To improve visibility in the vicinity of a crosswalk.	"No Parking" may be signed for some distance back from the intersection to improve visibility.	State law prohibits parking within intersections and crosswalks unless specifically signed.
No Pedestrian Crossing	To avoid conflicts between pedestrians and traffic in situations that are particularly dangerous.	Prohibiting crossing should be considered only in very limited circumstances, such as where it would be dangerous for pedestrians to cross because visibility is obstructed, or where there are unique considerations at an intersection.	Prohibiting crossing can significantly reduce pedestrian level of service and mobility. Careful consideration should be given to pedestrian travel patterns and other solutions to improve safety before this measure is implemented.

Resource notes:

Metro, Creating Livable Streets: Street Design Guidelines for 2040, November 1997.

Zegeer, Charles V., Stewart, J. Richard and Huang, Herman, "Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and Recommended Guidelines," University of North Carolina Highway Safety Research Center for Federal Highway Administration, July 2000.

Public Rights-of-Way Access Advisory Committee (PROWAAC), Building a True Community: Final Report of the Public Rights-of-Way Access Advisory Committee to the Access Board, January 2001.

Federal Highway Administration, Manual on Uniform Traffic Control Devices (MUTCD), Millennium Edition, December 2000.

Oregon Department of Transportation (ODOT), Oregon Bicycle and Pedestrian Plan: An Element of the Oregon Transportation Plan, June 1995.

Washington State Department of Transportation (WSDOT), Pedestrian Facilities Guidebook: Incorporating Pedestrians Into Washington's Transportation System, prepared by OTAK for WSDOT, Puget Sound Regional Council, County Road Administration Board and Association of Washington Cities, September 1997.

Pedestrian Connectivity Improvements

Development patterns in which the only through routes are arterials and collectors tend to discourage pedestrian travel, in part because out-of-direction travel makes trips longer, and in part because the concentration of traffic onto a few streets can make them less pleasant for walking. In many parts of Washington County, creeks and stream corridors reinforce the separation of local streets.

Improvements that enhance connectivity can take the form of new street connections, pedestrian connections, or multi-use trails. In 1994, Washington County adopted connectivity standards requiring maximum street block lengths of 600 feet and accessway spacing every 400 feet for new development. (“Accessway” means any off-street way which is intended for the primary use of pedestrians and/or bicycles) In July 2000, Washington County amended the Transportation Plan, the Community Development Code (Code), and seven Community Plans to include required and potential future street connections and accessways for areas with five acres or more of developable land. Within these areas, the maximum block length for new development is now 530 feet and accessways are to be provided every 330 feet. New street connections and accessways will be implemented as a condition of future development as it occurs. The amended Code language includes design standards for accessways in Section 408-9.

In existing neighborhoods, there may be some opportunities to increase access to neighborhood schools and other nearby pedestrian attractors by making connections. An example of such an existing connection is the pedestrian bridge over Butternut Creek that provides access for children attending Butternut Creek School in the Hillsboro School District. Such local connections can also increase the route options for longer distance walking trips.

Streetscape Improvements

In some areas, such as the Town Centers, Light Rail Station Areas, and Main Streets identified in Policy 41 of Washington County’s *Comprehensive Framework Plan for The urban Area*, a higher level of attention to the details of the pedestrian environment is justified by expected high pedestrian use and to encourage pedestrian use. Streetscape improvements have the potential to change the relationship between automobiles and pedestrians by allocating more space to pedestrian travel. Streetscapes where the elements are scaled to human size rather than vehicle size are attractive to pedestrians. Amenities such as benches, drinking fountains, trash receptacles, special transit shelters, pedestrian-scaled lighting fixtures and public art can all be incorporated into coordinated streetscape improvements.

Metro’s *Creating Livable Streets: Street Design Guidelines for 2040* suggests specific guidelines for new streets and streetscape improvements. Discussion of streetscape elements can also be found in the Washington State Pedestrian Facilities Guidebook. Many municipalities around North America have also created streetscape manuals that are particular to their local community or downtown area.

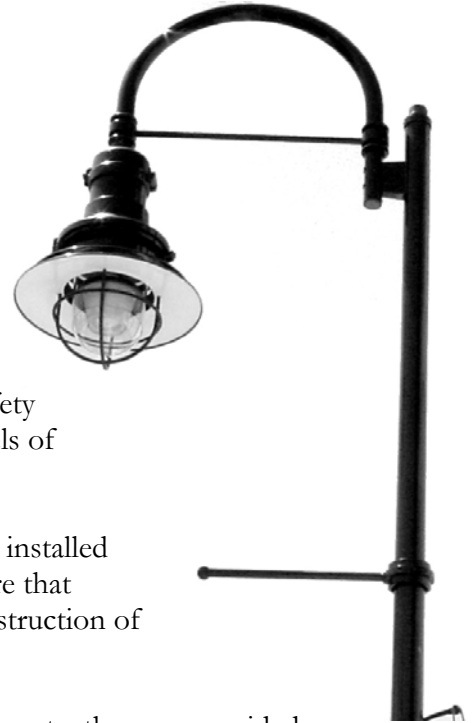
Off-Street Trail Improvements

The off-street trail system includes facilities that are shared by bicycles and pedestrians, as well as pathways providing neighborhood pedestrian circulation. These facilities are located off the roadway rights-of-way. Although the County’s policy is that streets are the preferred location of the pedestrian network, the trail system should be considered as an integrated part of a connected pedestrian network. Trails play a role in providing neighborhood circulation, necessary recreational opportunities, and can add to the route choices for longer distance walks.

Trail improvements are typically multi-use projects that allow for all non-motorized modes of travel. In urban and suburban areas, multi-use trails and pedestrian trails should be accessible to all users. The latest recommendations on making trails accessible can be found in the Final Report of the Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas to the Access Board, issued September 30, 1999.

Illumination of Pedestrian Path of Travel

At the beginning of 2001, there were approximately 10,000 street lights in place on all roadways maintained by Washington County. Approximately six percent of those street lights are on the major roadway system with the remainder on localized streets. Currently, there are several miles of streets within existing neighborhoods without illumination, particularly neighborhoods built before the 1990s. There are also significant segments of the major roadway system (neighborhood routes and higher) without lighting. Generally, arterials have the highest degree of roadway illumination due to improvements made to these streets to address capacity and safety issues. Collectors and then neighborhood routes have lowest levels of illumination.



While the cities in Washington County require streets lights to be installed along all new streets, the county's current standards do not require that streetlights be installed in new developments or as part the reconstruction of existing roads.

When street lights are provided in unincorporated Washington County, they are provided through either the Washington County Road Fund or the Service District for Lighting (SDL). New streetlights may be installed on major roads when the road is reconstructed to ultimate standards, or when an adjacent property is developed and illumination is needed at the development's access to a major road or it is needed to address safety problem that can be corrected by lighting. Along local streets, illumination is provided through the SDL at the request of developers or property owners. All costs associated with providing illumination along local streets is paid by property owners.

Pedestrian Safety

In the years 1997 to 1999 there were 190 pedestrian/automobile collisions in Washington County. Of these, fourteen were fatal. Nine out of ten collisions took place within the urban area. Sixty percent of the collisions took place in an intersection or less than 60 feet from an intersection. Of the pedestrians struck at intersections, 74% were in the crosswalk. In 76% of the cases at intersections, the driver failed to yield to the pedestrian.

Of those struck in the roadway mid-block, 81% were crossing mid-block and 12% were walking in the street where no sidewalk was available, half in the same direction and half in the opposite direction as the car involved. In three mid-block incidents on sidewalks, an automobile using a driveway struck each pedestrian. Just under half of the accidents occurred in daylight, nine percent were at dawn or dusk, and the rest were divided equally between dark without streetlights and dark with streetlights. Although 33% of the collisions occurred on local streets, it

is clear from the accident map (*see Background Report, Pedestrian Collisions Map*) that almost all the collisions are in the vicinity of neighborhood routes or higher classification roadways.

Washington County should consider updating the accident data on a periodic basis to help identify needed safety improvements. Safety improvements may include signage, marked cross walks, signals and sidewalks.

Safe Routes to Schools

There are approximately thirty public schools located in urban Washington County outside of city boundaries. Most of these are elementary schools. Several of these schools have Supplemental Plans on file with the State Department of Education, allowing them to be partly reimbursed for busing children who live within walking distance of the school due to hazardous conditions. Typical of conditions cited in the Supplemental Plans are the following: “No sidewalks either side; speed limit 35-40 mph,” “High volume street without sidewalks,” “Must cross 198th with no light or posted crosswalk.”

In 2001, the State Legislature passed legislation for safe routes to schools. House Bill 3712 requires counties and cities to work with schools districts to identify barriers and hazards to students walking or bicycling to and from school. Counties, cities and school districts may develop a plan for the funding or improvements designed to reduce the identified barriers and hazards.

Access to Transit

Many transit riders are pedestrians who walk to nearby transit stops, including nearby bus stops and MAX stations. It is well documented that travelers will generally walk a half-mile to get to a fixed transit station, such as a MAX station, while they will walk only about a quarter-mile to get to an ordinary bus stop. An important component to increasing transit ridership is providing adequate pedestrian facilities so that pedestrians can walk to nearby transit stops.

Needed pedestrian improvements to provide convenient and safe access to transit include a continuous and connected pedestrian system near transit (one-half mile to MAX stations and major bus stops and one-quarter mile to all other bus stops), street lighting so that pedestrians feel safe walking during non-day-light hours, and crossing improvements. Providing a buffer between pedestrians and roadways with high traffic volumes and speeds and streetscape amenities are improvements that make a pedestrian route more pleasant and enjoyable to walk along.

Safe pedestrian crossings on arterials and collectors are very important for transit riders who generally must cross a street at one end of a round trip. The RTP requires that marked crossings be provided at all major transit stops (MAX stations and major bus stops). Designated major transit stops that do not have nearby crosswalks or signalized intersections indicate locations with a need for improvements.

Pedestrian Facilities on Rural Roads

Although pedestrian travel is less concentrated on rural roads, people do sometimes walk in rural areas. The Oregon Bicycle and Pedestrian Plan recommends that shoulders to accommodate pedestrian and bicycle travel on State roads be a minimum of 1.8 m (6 ft) wide, and further notes that “high pedestrian use indicates sidewalks are necessary⁷.”

⁷ Oregon Department of Transportation (ODOT), *Oregon Bicycle and Pedestrian Plan: An Element of the Oregon Transportation Plan*, June 1995.

Assessment of Pedestrian Needs in Washington County

The complexity of assessing pedestrian improvement needs varies for different types of improvements. For example, assessing the need for sidewalk improvements is relatively simple, since sidewalks are needed on all urban streets, and the inventory shows clearly where sidewalks are missing. Although sidewalks are needed along all streets, and are required as a condition of development on all streets, the February 2002 Existing and Committed Sidewalk and Pathways Maps (*Figure 1.12*) show the missing segments on urban streets classified as arterials, collectors or neighborhood routes. This reflects an understanding that the County's resources for retrofitting the missing sidewalks in already-developed areas will be directed to these higher classification streets.

An analysis of the 2002 inventory data shows that walkways are more predominant the higher functional classification of the roadway. This is primarily the result of improvements to arterial streets during the past several years to address needed safety and capacity deficiencies. The 2002 pedestrian inventory shows there are 121 miles of streets with walkways on both sides of the street (45% of inventoried streets), 68 miles had a sidewalk on at least one side (25% of streets), and 80 miles of streets had no sidewalks on either street side (30%). An analysis of the sidewalk inventory collected in 1995 shows that 74% of county major arterials had a sidewalk on at least one side, compared to 49% for minor arterials and 24% for major collectors.

In the case of connectivity improvements and street crossing improvements, the analysis is more complex, and requires scrutiny of conditions at a finer scale. In order to view conditions at that finer scale, all the unincorporated portions of Washington County within the Urban Growth Boundary have been subdivided into five study areas. These five study areas correspond roughly with the Community Planning Areas of Aloha-Reedville-Cooper Mountain, Bethany, Cedar Hills-Cedar Mill, Raleigh Hills-Garden Home and Metzger, and Bull Mountain (*maps of the study area are in Chapter 4 of the background report*). Because some collector and arterial streets within the city boundaries are maintained by the County, the need for street crossing improvements was also assessed for those roadways.

Outside the UGB, some areas were also identified as having sufficient pedestrian activity to warrant some analysis. Those areas are identified on the Rural Areas with *Pedestrian Activity Map* in Chapter 4 of the Background Report.

In assessing needs, attention was given to the pedestrian access zones previously discussed and in the Background Report, on the assumption that the need for pedestrian facilities is greatest in those areas where people are most likely to walk.

In choosing whether to walk or use another mode for a given trip, people are influenced by a number of factors. At a personal level, the choice will be influenced by what other modes are available. With respect to variables in the pedestrian environment, the length of the trip is a key factor. People are also more likely to choose to walk in areas where there is a reasonable balance between relatively dense land uses and where the scale of development results in good connectivity in the pedestrian network⁸.

⁸ Oregon Department of Transportation (ODOT), *Oregon Bicycle and Pedestrian Plan: An Element of the Oregon Transportation Plan*, June 1995.

The concept of pedestrian access zones is based on this propensity of people to walk to nearby attractors such as schools, parks, libraries, transit and neighborhood shopping. For each type of use included in the access zones a reasonable walking radius has been assigned (*see Table 1.2*).

Needs Identified by the Community

In February and March 2001, County staff held three open houses to solicit input on the Transportation Plan update. Ninety-eight respondents returned surveys during the three open houses. Traffic congestion was rated the number one problem by a majority of respondents. The need for pedestrian connections and filling the gaps in the pedestrian network, while typically ranked below traffic congestion, traffic safety, condition of the roads, and transit service deficiencies, received significant public acknowledgment.

In an exercise designed to identify community priorities for funding, respondents were asked to allocate \$10 million to transportation improvements of all kinds. Pedestrian improvements averaged just over \$1 million in this exercise.

Public open houses are one way to collect public input, but sidewalk needs can also be identified where the community “votes with their feet.” Where a “demand” path is worn along a street by constant foot traffic, the need for a sidewalk is present and real. SW Park Way between Cedar Hills Blvd. and the Sunset MAX station is an example of a street where the need for a sidewalk is demonstrated in this way, and there are many others.

Sidewalk Needs

County-maintained arterial, collector and neighborhood route streets within the Urban Growth Boundary where sidewalks are missing are shown on the February 2002 Existing and Committed Sidewalk Map in the Background Report. Approximately 211 miles of county arterial, collector and neighborhood streets are missing sidewalks. Of those roads, approximately eight miles are missing sidewalks on both sides, and another 68 miles are missing sidewalk on one side.

As a ballpark figure, assuming an average cost of \$30 per lineal foot of five-foot wide sidewalk, the cost of completing all the missing sidewalks in today’s dollars is in the neighborhood of \$33 million. (This order-of-magnitude estimate includes a factor for the cost of engineering, inspection and construction administration but does not take into account the cost of any retaining walls or structures, storm drainage or right-of-way acquisition that might be required to install sidewalks.)

Since most of these county streets do not have curbs or an underground storm drainage system, it will be necessary in many locations to provide storm drainage in order to construct the sidewalk. The total cost estimate to provide sidewalks and storm drainage to the 210 miles of missing roads is around \$66 million. For Special Area Collector streets, the total cost estimate to provide required sidewalks and amenities to the four miles of Special Area Collectors without sidewalks \$4 million. Again, the order-of-magnitude of these estimates includes a factor for the cost of engineering, inspection and construction administration but does not take into account the cost of any right-of-way acquisition or retaining walls or structures that might be required to install sidewalks. It should also be noted that because most county streets do not have sufficient right-of-way to allow the construction of sidewalks, an additional cost for right-of-way acquisition will be needed.

Pedestrian Safety and Street Crossing Needs

To identify the need for pedestrian crossing improvements, roadways were assessed for ease of crossing. This measure integrates the capacity of the roadway (the higher the capacity, generally the more difficult the crossing), the frequency of crossing opportunities (that is, the length of the blocks) and the incidence of signalized crossing opportunities. Ease of crossing was then compared to the pedestrian crash map and to the expected pedestrian travel, as indicated by the location of transit stops and by the areas with the greatest pedestrian potential as indicated by the pedestrian access zones.

The result of the analysis is shown on the Pedestrian Crossing Improvement Study Areas Map (*Figure 1.2*). This map identifies areas of interest as a high or a moderate crossing need or as a corridor study area. Corridor study areas are arterial street segments where all intersections should be evaluated. These road segments are also transit routes. Crossing need was rated high where the roadway capacity is highest and there is some combination of reported crashes, transit stops and infrequent signalized intersections. Generally, locations that are currently signalized were not considered to have a crossing need, except where crashes have occurred. However, many existing signals can probably be improved to increase pedestrian safety and convenience, such as increasing the signal crossing time for pedestrians. Note that, using this assessment process, crossing needs were not found in all areas of the county. Further evaluation of these study areas should be done whenever pedestrian, transit or roadway improvements are proposed to be made near these locations so that appropriate crossing improvements can also be made.

Connectivity Needs

To identify the need for connectivity improvements, the current level of pedestrian connectivity was assessed for each community planning area study map, whether on existing public streets, future connections or on existing or future off-street trails. The analysis focused on where new pedestrian or multi-use connections might allow for continuous travel on less busy streets. Particular attention was given to areas within the pedestrian access zones, especially access to elementary schools. Areas where connectivity for non-motorized travel could be enhanced are shown on the connectivity study area maps in *Chapter 4 of the Background Report*.

It should be noted that in many cases connectivity is discontinuous in these identified areas because of creeks, wetlands or other environmental constraints. Any future assessment of whether to develop a connection to meet an identified need would need to balance the environmental issues and the potential cost and impact of the connection against the possible benefit.

Access to Transit

Important elements of the pedestrian system that are needed for pedestrians to walk to transit include a continuous and connected pedestrian system near transit (one-half mile to MAX stations and major bus stops and one-quarter mile to all other bus stops), street lighting so that pedestrians feel safe walking during non-day-light hours, and crossing improvements, particularly along arterials and collectors. Providing a buffer between pedestrians and roadways with high traffic volumes and speeds and streetscape amenities are improvements that make a pedestrian route more pleasant and enjoyable to walk along.

The sidewalk inventory in the Background Document shows those areas near transit that are missing sidewalks. The *streetscape study areas, figure 1.3*, also show the location of streets where buffered sidewalks and other pedestrian amenities are needed. Many of these locations are along

transit routes. To identify the need for pedestrian crossing improvements, roadways near MAX stations and major bus stops were assessed for ease of crossing. The analysis examined the locations where these transit stops have nearby crosswalks or signalized intersections. Designated major transit stops that do not have nearby crosswalks or signalized intersections indicate locations with a need for improvements.

Pedestrian accidents along transit routes were also examined. Approximately 70% of accidents are in the vicinity of arterials and collectors. Accidents on TV Highway, which is a major transit route, account for 16% of all accidents. Murray Road, Farmington Road, Walker Road and Scholls Ferry Road, which are all transit routes, stand out as problem areas. The Pedestrian Crossing Improvement Study Areas Map (*figure 1.2*) indicate areas of interest along transit routes.

As part of its ongoing work to improve the pedestrian system, Washington County should work with Tri-Met and ODOT to identify and make necessary improvements to the pedestrian system near transit to more effectively link the pedestrian system to the transit system.

Streetlighting Needs

Good street lighting is one key to pedestrian safety when the sun is down. Both personal safety and safety with respect to traffic are improved when proper lighting is provided. Good lighting of pedestrian facilities also increases the comfort and perception of personal safety of pedestrian travelers when it is dark out, and these factors can influence their choice of route or their decision whether or not to walk.

Street lighting that provides these benefits for pedestrians has several key attributes. Appropriate lighting levels should be provided, particularly at corners and intersections and at key crossing locations, such as transit stops. Generally, industry standards⁹ call for lighting levels for pedestrian facilities to be between 0.5 and 2.0 footcandles, using the lowest level that is appropriate to the conditions¹⁰.

At crosswalks, the source of the illumination should not be directly above the crosswalk, where it can “wash out” a crossing pedestrian, but rather at least twenty-five feet before or after the crossing, or both, in order to provide the greatest conspicuity of a crossing pedestrian to a motorist.

Lighting should be provided on sidewalks, not just roadways. Glare and uplighting should be minimized. The light source should show colors well at night. The latter property is measured as the value of the Color Rendering Index (CRI) for any given type of lamp. Typical CRI values range from 20 for high-pressure sodium lamps to 100 for incandescent lamps. Generally, for pedestrian safety, the CRI should be at least 50, and lamps in the blue range (such as metal halide) provide better color rendition than lamps in the orange-yellow range¹¹.

Washington County should consider requiring the provision of street lighting when new streets are constructed or reconstructed.

⁹ City of Beaverton Engineering Design Manual and Standard Drawings, Adopted December 1997 (Res. 3434), Revised October 1999 (Ord. 4060), Chapter IV.

¹⁰ Holden, Alfred, “The case for more humane lighting of city streets,” a paper presented to the National Pedestrian Conference, Washington, D.C., September 5, 1997 (available online at <http://www.uvm.edu/~histpres/HPJ/streetlights/index.html> on May 10, 2001.)

¹¹ Knisely, Joseph, “A Guide to Lamps and Controls,” *Architectural Record Lighting*, August 1990.

Streetscape Improvement Needs

It is harder to describe streetscape improvements in terms of “needs” since these improvements tend to focus on the quality and amenities of the pedestrian environment that encourage pedestrian travel, rather than simply make it possible. The areas most appropriate for future streetscape improvements are those areas where the pedestrian potential is highest, as indicated by the pedestrian access zones, the streetscape improvement needs maps in the pedestrian chapter of the Background Report, and in the Light Rail Station Areas, Main Streets, Regional and Town Centers and Transit Corridors. Generally, these latter areas are not shown on the *streetscape improvement needs maps* in Chapter 4 of the Background Report because they are already identified in Policy 41 of the Comprehensive Framework Plan For The Urban Area. Many of the previously described areas are developed areas where streetscape improvements can be made over time by retrofitting through redevelopment and specific improvement projects. Other areas have the opportunity for enhanced streetscape improvements through the initial development process, particularly areas with transit-oriented land use designations. Candidate streetscape priority areas are shown in *figure 1.5*.

Recreational/Utilitarian Needs and Opportunities

Trails for pedestrians and other non-motorized users can serve both recreational and utilitarian travel purposes. Given the extent to which development patterns in the county are lacking connectivity, there are many opportunities to enhance connectivity and create route choices by enhancing the trail network in Washington County. Examples of trails providing a transportation function include several trails in the Tualatin Hills Park and Recreation District’s (THPRD) trail system. “Neighborhood” off-street trails in the THPRD system have a transportation function because they connect neighborhoods to specific uses and other neighborhoods. Other trails are identified in the RTP’s Regional Pedestrian System because they provide a regional transportation function.

There are significant opportunities ahead. For example, THPRD has completed a Trails Master Plan that was adopted by reference into the Beaverton Transportation System Plan. There has been discussion of linking the THPRD trail system to the State’s Banks-Vernonia trail and other rural trails. Metro through its Greenspaces Plan, has identified a number of trails, both within the urban and rural areas. Metro, through the RTP, has also designated certain regional trails that serve a pedestrian or bicycle transportation function for the urban area. The majority of the RTP and Greenspaces trails and THPRD’s regional and community trails overlap or connect to each other. Together they form a comprehensive trail system for the urban, unincorporated areas. Metro, through its Greenspaces program has also acquired a number of open spaces and future park land in Washington County, and is just beginning discussions about how it will develop and manage these assets. It is possible that there will be opportunities for additional trails on these lands.

The THPRD Trails Master Plan provides a vision for a connected trail system in most of the urban part of the county, and Metro’s RTP and Greenspaces trails augment the vision for the remaining unincorporated areas Washington County. These trails, together with city trail designations in incorporated areas, create a connected network of trails for all of Washington County. Many trail segments have been completed or are underway. Trail segments that have been identified but have not yet been funded for construction are shown in the Off-Street Trail System Map in the Background Report. What is lacking at this time is the funding needed to construct this trail system.

Rural Pedestrian Needs

There are several areas outside the urban growth boundary where there is some small concentration of uses that would indicate the need for a more detailed analysis of pedestrian facilities and crossing improvements. They are shown on the Rural Areas with Pedestrian Activity Map Chapter 4 of the Background Report. The initial study areas correspond roughly to the rural communities of Helvetia, Verboort, Roy, Dilley, Blooming, Farmington, Laurel, Midway, Groner, and the area around Farmington View School.

Maintenance Needs

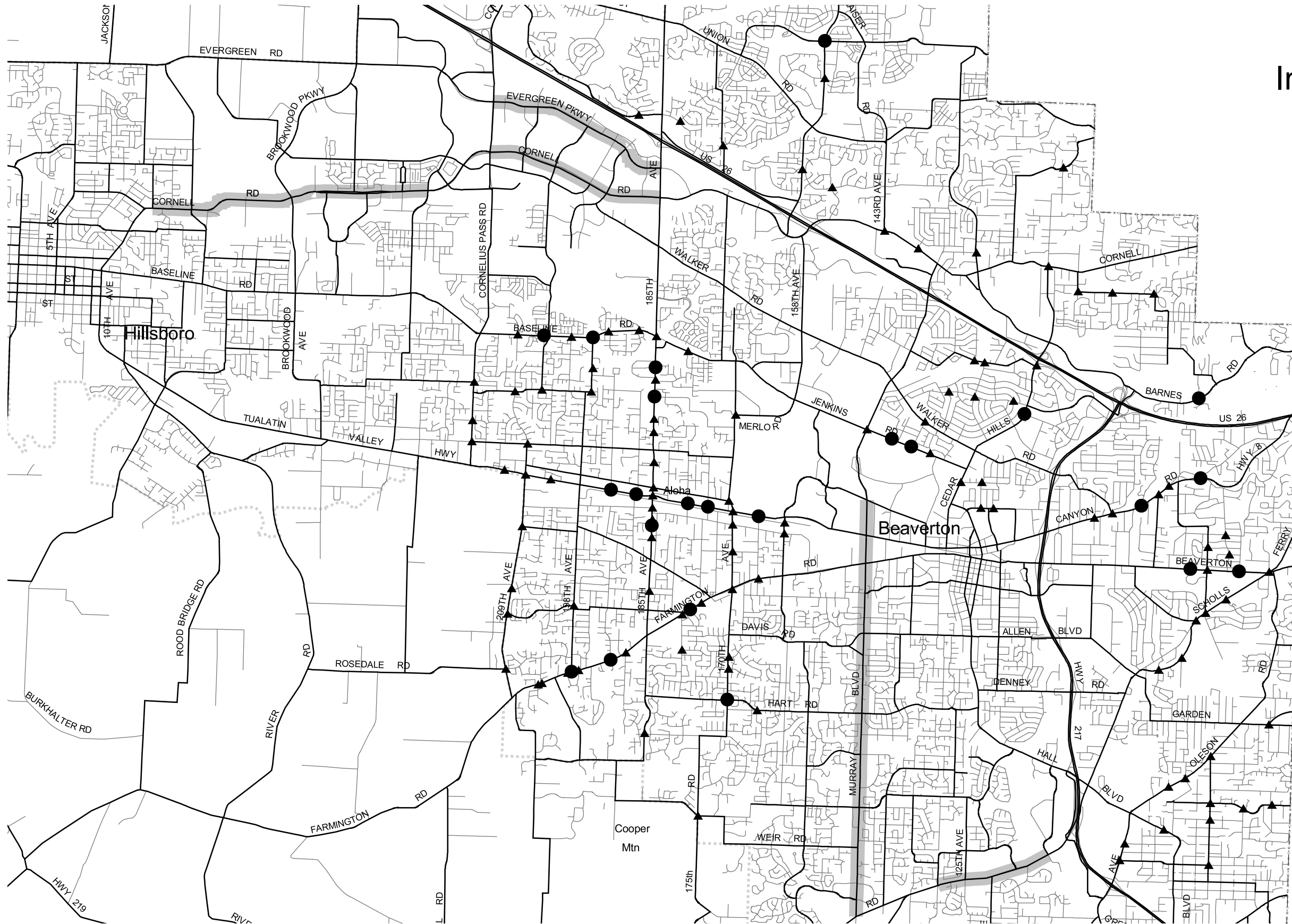
The cost of maintaining sidewalks is the responsibility of the adjacent property owner. The current status of the sidewalk inventory in the county is that most sidewalks are relatively new and in good repair. There are several miles of asphalt pathways along county roads that have also been constructed over time. Sections of these pathways are in need of repair at this time. A long-term systematic approach to maintaining sidewalk and roadside pathways in good repair is needed. The county may want to consider regular inspection and maintenance of walkways along streets in order to protect its investment in these facilities and continue to provide safe and convenient access for pedestrians. The addition of more elements in the roadway to enhance pedestrian safety can also add to the maintenance budget needs. It is crucial that maintenance budgets be increased to handle this additional maintenance as new measures are constructed.

Multi-use trails located either within THPRD's boundary or the cities are built and maintained by those jurisdictions. Outside of these areas, the responsibility for maintaining new trails will need to be determined as trails in these areas are built.



Figure 1.2

Pedestrian Crossing Improvement Study Areas

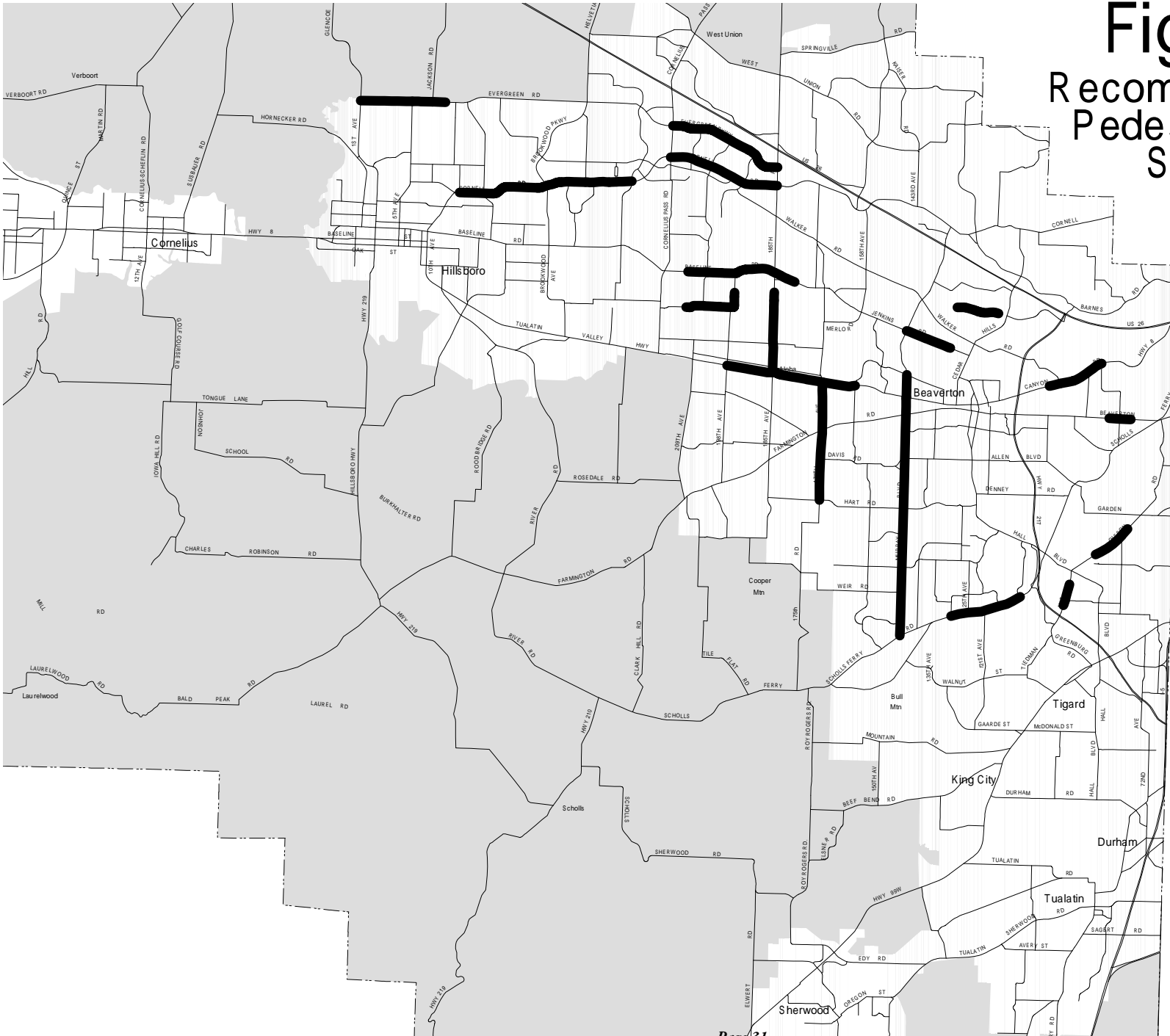


- High Crossing Need
- ▲ Moderate Crossing Need
- Roads
- ▬ Study Corridor
- ⋯ Urban Growth Boundary
- - - County Boundary



Figure 1.3

Recommended Priority Pedestrian Crossing Study Areas




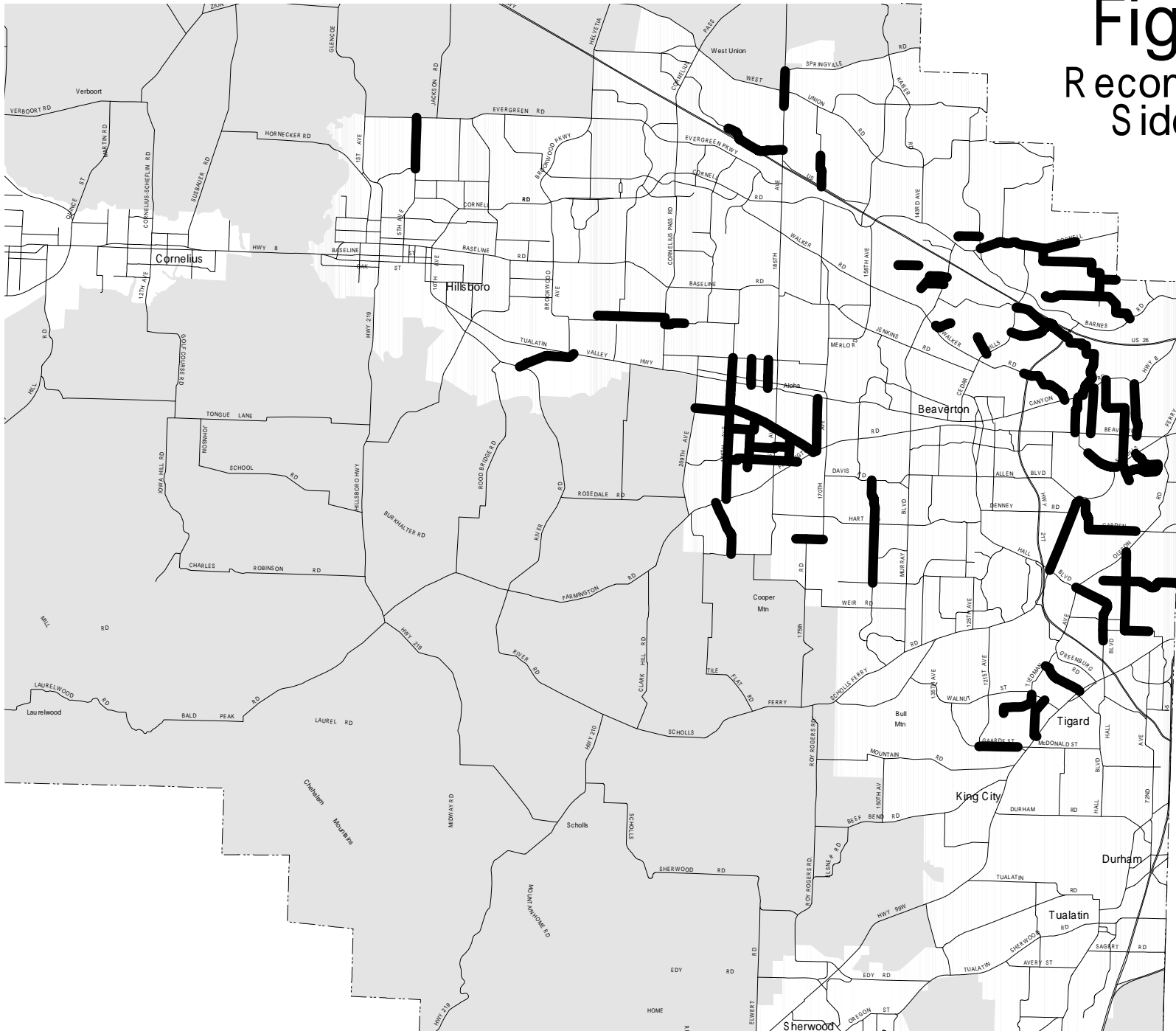
 Recommended Crossing Projects



Figure 1.4

Recommended Priority Sidewalk Projects




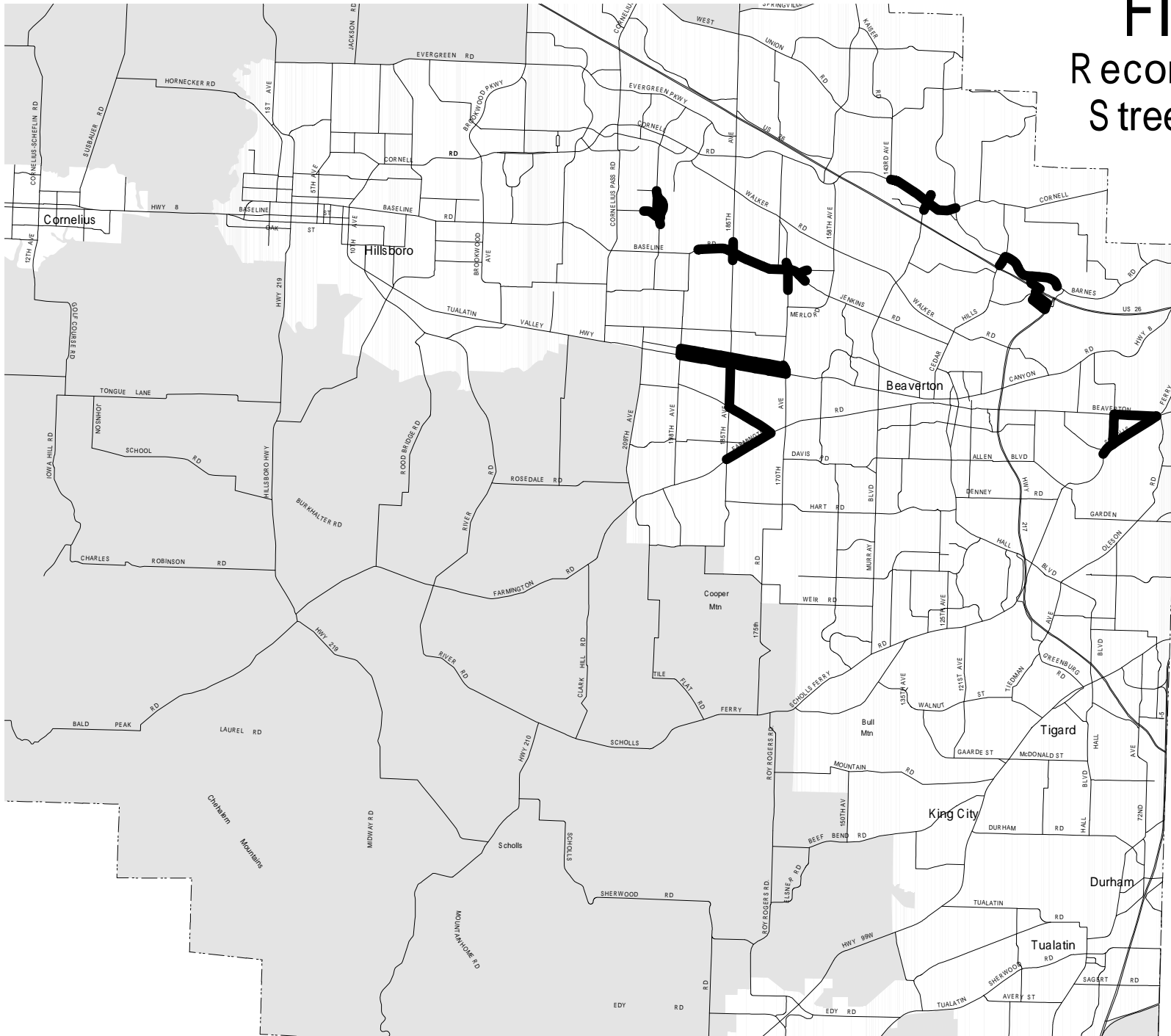
 Recommended Sidewalk Projects



Figure 1.5

Recommended Priority Streetscape Projects



 Recommended Streetscape Projects



Table 1.4 Near-Term In-Fill Pedestrian Project

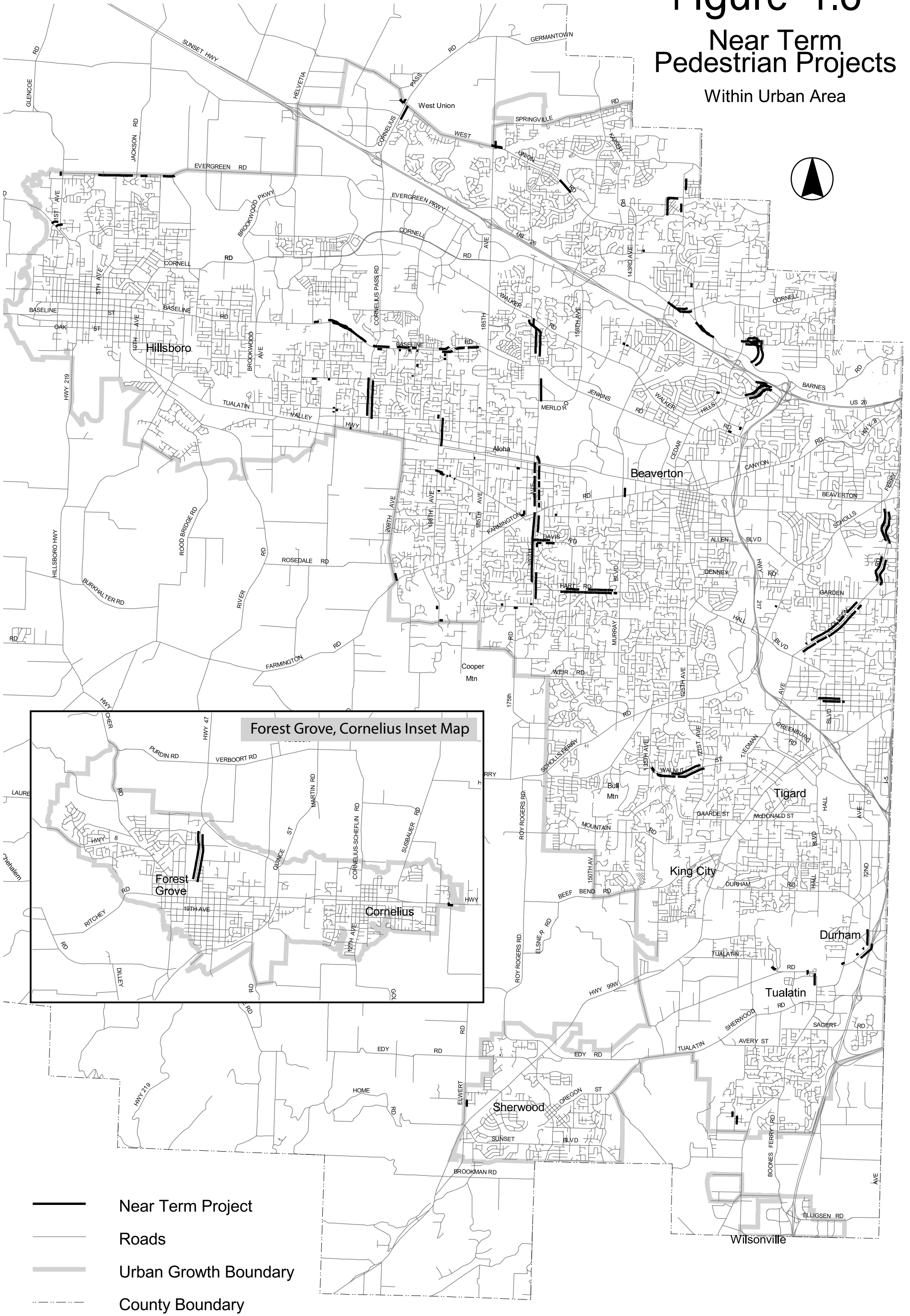
Street	Description	Cost
Evergreen	Concrete sidewalk	\$700,000
Glencoe	Concrete sidewalk	\$9300
Cory/Connell	Concrete sidewalk	\$170,800
Saltzman	Concrete sidewalk	\$7,750
Burton	Concrete sidewalk	\$6200
Cornell west	Concrete sidewalk	\$398,160
Cornell east	Concrete sidewalk	\$29,890
Barnes	Concrete sidewalk	\$459,410
Butner	Concrete sidewalk	\$224,986
Park Way east	Concrete sidewalk	\$292,807
Park Way west	Concrete sidewalk	\$6,200
Baseline	Concrete sidewalk	\$1,255,730
198th	Concrete sidewalk	\$212,288
170th/173rd	Concrete sidewalk	\$569,762
170th @ MAX station	Concrete sidewalk	\$300,000
170th south	Concrete sidewalk	\$2,150,540
Hart	Concrete sidewalk	\$557,480
Oleson	Concrete sidewalk	\$1,034,810
Murray	Concrete sidewalk	\$148,430
Oak west	Concrete sidewalk	\$159,390
Oak east	Concrete sidewalk	\$40,950
206th north	Asphalt pathway	\$4,600
206th south	Concrete sidewalk	\$3100
Kinnaman	Asphalt pathway	\$14,000
Cornelius Pass	Concrete sidewalk	\$434,280
Walnut	Concrete sidewalk	\$400,190
Edy	Asphalt pathway	\$12,300
Lower Boones Ferry	Concrete sidewalk	\$405,090
Milikan	Concrete sidewalk	\$364,980
Oregon	Concrete sidewalk	\$503,860
Thompson	Concrete sidewalk	\$210,000
231st	Concrete sidewalk	\$728,000
Sunset	Concrete sidewalk	\$404,600
Farmington	Concrete sidewalk	\$271,880
Total Cost		\$12,325,393

Note: All other near-term projects shown on the attached map are sidewalk improvements to be made in conjunction with private development. Costs for these improvements are not shown.

Figure 1.6

Near Term Pedestrian Projects

Within Urban Area



**Table 1.5 Far-Term Sidewalk Projects
Provided in Conjunction with Roadway Improvements**

Project	Road	Limits	Cost
5	170th Avenue	Merlo to TV Highway	\$861,000
6	173rd	Bronson to Cornell under US 26	\$770,000
7	173rd	Bronson to Meadowgrass	\$973,000
9	185th Avenue	North of Westview High School to Springville Rd	\$644,000
12	209th Avenue	TV Highway to Farmington Road	\$1,470,000
14	231st/234th Avenues	Baseline Road to Evergreen	\$1,260,000
21	Baseline Road	185th to Brookwood	\$2,436,000
23	Bethany Boulevard	West Union Rd to Cornell/Bethany Interchange (US 26)	\$581,000
27	Brookwood	Baseline to TV Highway	\$875,000
31	Cornell Road	119th to Leahy	\$350,000
32	Cornell Road	Murray to 179th	\$1,827,000
35	Durham Road	ORE 99W to Boones Ferry Road	\$2,023,000
40	Farmington Road	170th to 185th Avenue	\$630,000
43	Garden Home Road	92nd to Scholls Ferry Road	\$287,000
55	Jenkins Road	Murray to 158th	\$511,000
56	Johnson Street	185th to 170th Connection	\$532,000
57	Kaiser Road	Bethany Boulevard to Cornell Road	\$1,302,000
59	Kaiser Road	Springville to Bethany Boulevard	\$322,000
63	Murray Boulevard	Cornell Road to Science Park	\$84,000
72	175th	Realign 175th to Beef Bend Road at Scholls Ferry Rd	\$1,078,000
74	Springville Road	185th Avenue to PCC Access	\$266,000
76	Springville Road	PCC Access to Kaiser Road	\$672,000
79	Taylor's Ferry Road	Washington Drive to Oleson Road	\$140,000
80	Tualatin-Sherwood Road	ORE 99W to Teton	\$2,240,000
87	Walker Road	185th Avenue to Stucki	\$602,000
88	Walker Road	185th to ORE 217	\$3,668,000
93	West Union Road	Springville Ext to 143rd	\$1,491,000
94	103rd Ext	Beaverton/Hillsdale HWY to Walker Road	\$490,000
100	Barnes Road	Hospital to Leahy	\$280,000
101	Barnes Road	Leahy to County Line	\$525,000
102	Bethany Boulevard	West Union to Kaiser	\$588,000
103	Farmington Road	185th to 209th	\$784,000
104	West Union Road	Cornelius Pass to Springville Ext	\$868,000
106	Saltzman	Cornell to Burton	\$511,000
107	Scholls Ferry	Allen to Beaverton-Hillsdale	\$931,000
108	Laidlaw	West Union to Kaiser	\$770,000
111	Glencoe	Highway 26 to Commercial	\$301,000
112	Merlo / 158th	170th to Walker/158th	\$889,000
113	Millikan	Hocken to Murray	\$336,000
114	Barnes Road	Highway 217 to 119th	\$966,000
116	Butner	Murray to Cedar Hills	\$721,000
117	Brookwood	TV HWY to Alexander	\$140,000
118	185th Avenue	TV HWY to Farmington	\$861,000
119	185th Avenue	Farmington to Bany	\$658,000
121	Alexander	170th to 209th	\$1,071,000
122	Johnson Street	185th to Cornelius Pass	\$945,000
123	198th/197th	TV HWY to Baseline	\$973,000

**Table 1.5 Far-Term Sidewalk Projects
Provided in Conjunction with Roadway Improvements**

Project	Road	Limits	Cost
124	170th/173rd	Baseline to Merlo	\$700,000
125	175th	Outlook LN to Horse Tale Dr	\$280,000
128	Cornelius Pass Road	Amberwood to TV HWY	\$2,058,000
131	Grahams Ferry	Tonquin to Cutter Rd	\$588,000
132	Day	Grahams Ferry to Boones Ferry	\$315,000
133	Clutter / Ridder	Grahams Ferry to Boones Ferry	\$574,000
135	95th Extension	Barnes to Leahy	\$392,000
138	Tonquin Rd	Grahams Ferry to Oregon St	\$1,400,000
153	Glencoe	Evergreen Parkway to Jackson	\$1,036,000
156	205th/206th	Baseline to Quatama	\$462,000
200	Kinnaman Road	Farmington to 209th	\$1,078,000
201	Greenburg Road	Hall to North Dakota	\$1,043,000
202	Hall Blvd	Locust St to Durham Rd	\$2,912,000
203	Bonita Road	Hall to Bangy	\$980,000
204	Upper Boones Ferry Road	I-5 to Durham Rd	\$574,000
205	Dartmouth St Ext	Construct extension over HWY 217 to Hunziker Rd.	\$329,000
206	Dartmouth St	72nd Ave to 68th Pkwy	\$224,000
212	Scholls Ferry	ORE 217 to 121st	\$931,000
TOTAL			\$57,379,000

Figure 1.7

Far-Term Sidewalk Projects Provided In Conjunction With Roadway Improvements Projects

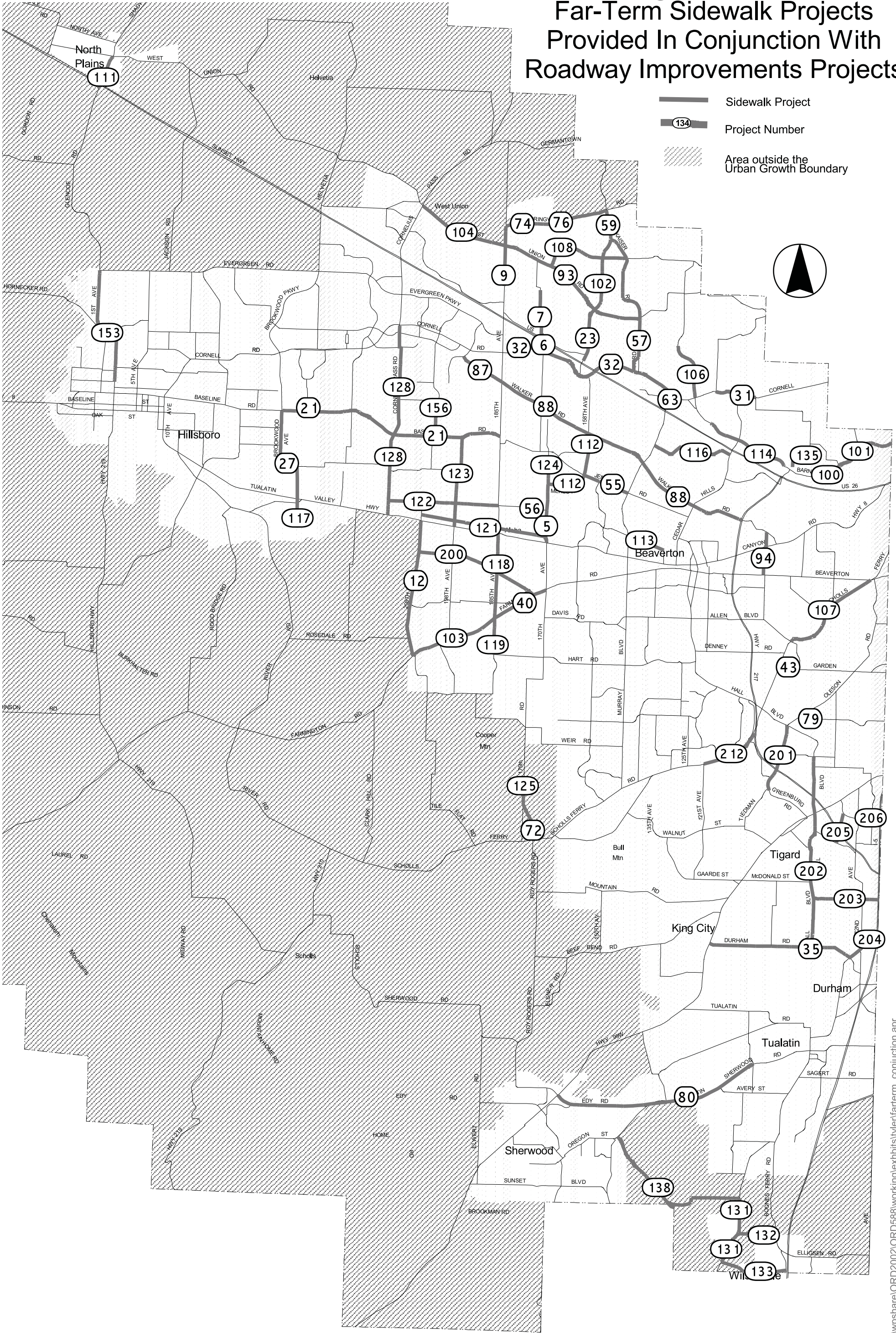
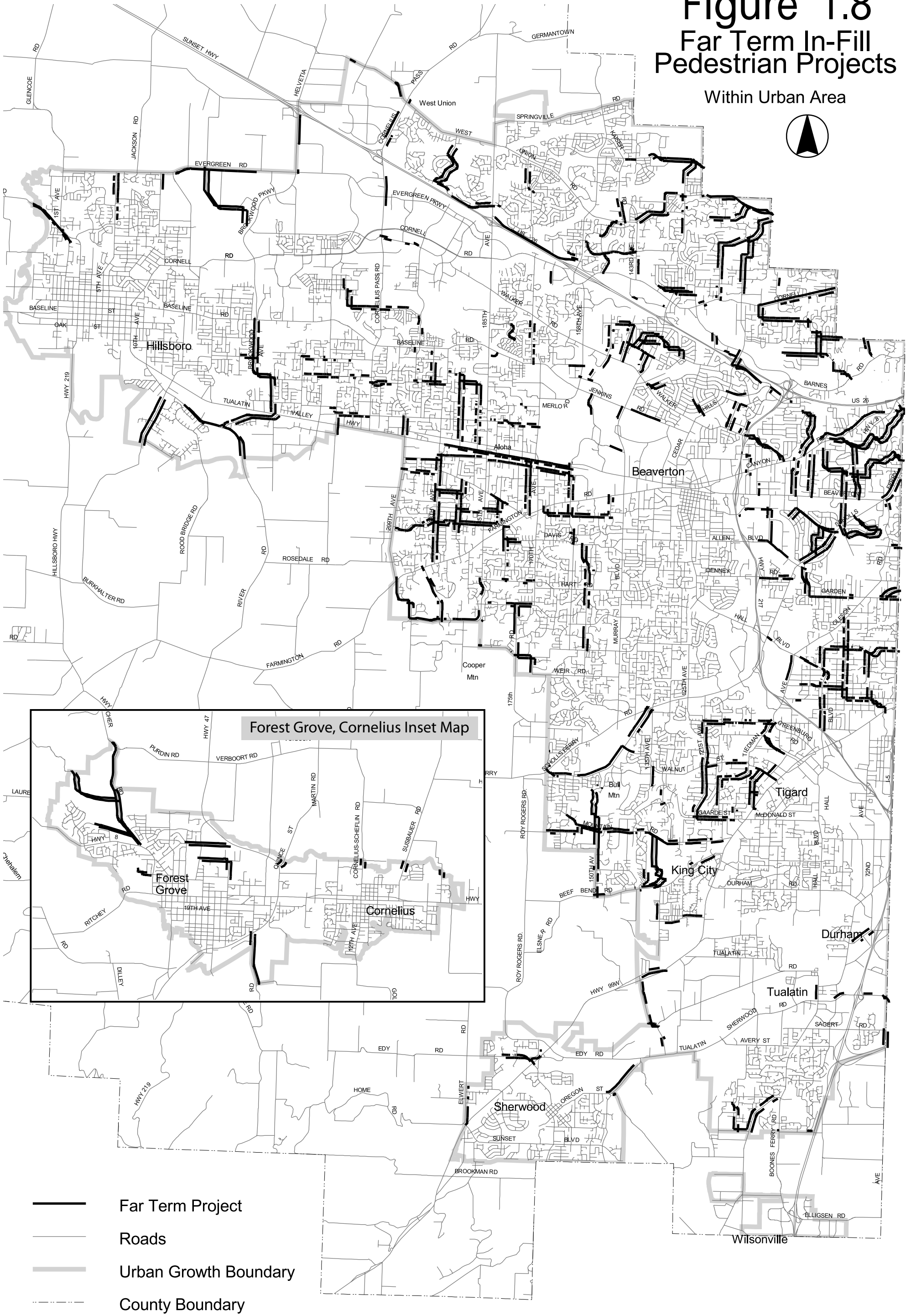


Table 1.6 Far Term In-Fill Pedestrian Projects

102ND	198TH	BENTLEY	FRANCES	MCDANIEL	SCENIC
107TH	201ST	BERKSHIRE	GAARDE	MEADOW	SCHOLLS FERRY
108TH	205TH	BIRCHWOOD	GABLE	MENLOR	SCIENCE PARK
110TH	206TH	BLANTON	GABLE PARK	MILLER	SHAW
111TH	209TH	BORCHERS	GARDEN HOME	MILLER HILL	SHUTE
113TH	227TH	BRENTWOOD	GARDEN VIEW	MINTER BRIDGE	SOUTH
115TH	229TH	BRIDGEPORT	GOFF	MONTCLAIR	STACEY
119TH	268TH	BRONSON	GRABHORN	MULTNOMAH	STARK
121ST	26TH	BROOKWOOD	GRAHAMS FERRY	MURRAY	SUNRISE
130TH	5TH	BULL MOUNTAIN	HALL	NEAKAHNIE	SUSBAUER
133RD	65TH	BUTNER	HAWTHORNE	NICOL	TAYLOR
135TH	69TH	CABOT	HERITAGE	NORTH DAKOTA	TAYLORS FERRY
137TH	70TH	CANYON	HOBBS	NYBERG	THATCHER
143RD	71ST	CEDAR HILLS	HORNECKER	OAK	THOMPSON
147TH	72ND	CHOBAN	HUNTINGTON	OAK HILLS	TIEDEMAN
148TH	74TH	CIPOLE	JACKSON SCHOOL	OLD SCHOLLS FERRY	TIGARD
149TH	78TH	CONNELL	JAMIESON	OLESON	TODD
150TH	80TH	CORBY	JOHNSON	PACIFIC	VERMONT
153RD	87TH	CORNELIUS PASS	KEMMER	PARK	VISTA
155TH	88TH	CORNELIUS SCHEFFLIN	KINNAMAN	PEACHTREE	WALKER
15TH	90TH	CORNELL	KNOLLCREST	PINE	WALNUT
160TH	91ST	DAVID HILL	KOLL	PINEHURST	WASHINGTON
167TH	92ND	DENNEY	LIDLAW	PIONEER	WATERCREST
170TH	96TH	DEVONSHIRE	LAUREL LEAF	QUATAMA	WATKINS
173RD	AIRPORT	DEVONWOOD	LAURELWOOD	RAINMONT	WEST
174TH	ALLEN	DIVISION	LEAHY	RIDGEWOOD	WEST UNION
175TH	AMBERWOOD	DOGWOOD	LINDA	RIGERT	WESTERN
178TH	ANDERSON	DOWNING	LOCUST	RITA	WESTLAWN
179TH	AUGUSTA	EDY	LOIS	RIVER	WILLAMINA
180TH	AVONDALE	ELWERT	LOON	ROCK	WILLOWMERE
185TH	BANY	EVERGREEN	MADELINE	ROCK CREEK	WITCH HAZEL
187TH	BARROWS	FERN HILL	MALHEUR	ROSA	
191ST	BASELINE	FILBERT	MARLOW	ROSHAK	
192ND	BEEF BEND	FISCHER	MARTIN	ROXBURY	
196TH	BENCHVIEW	FONNER	MAYFIELD	SALTZMAN	

Figure 1.8 Far Term In-Fill Pedestrian Projects

Within Urban Area



Pedestrian Enhancements Design Guidelines

Introduction

Washington County adopted its 2020 Transportation Plan in October of 2002. The plan greatly elevates the importance of pedestrian travel when compared with the previous (1988) Transportation Plan. The 2020 Transportation Plan emphasizes development of an urban pedestrian network that will help support Comprehensive Plan policies that are intended to create mixed-use environments that are well suited to pedestrian travel.

To help achieve this goal, the 2020 Transportation Plan identifies Light Rail Station Communities, Regional and Town Centers, Transit Corridors and Main Streets as areas where enhanced pedestrian facilities are appropriate (*see section 3 – Pedestrian Element of Washington County’s 2020 Transportation Plan for additional detail*). The adopted policies and strategies of the 2020 Transportation Plan were developed with extensive public involvement. This Design Guideline is intended to help facilitate implementation of the concepts outlined in the Plan.



At the time this design guideline booklet was developed, land use planning had been completed in unincorporated Washington County for the Cedar Mill Town Center, the Washington Square Regional Center and Light Rail Station Communities. Some areas in unincorporated Washington County that are planned for enhanced pedestrian facilities in the 2020 Transportation Plan, such as Transit Corridors, Main

Streets and the remaining Town and Regional Centers, do not yet have adopted land-use plans that implement these 2040 designations.

Areas of unincorporated Washington County with adopted land use plans implementing 2040 guidelines are subject to provisions of the Community Development Code, Community Plans and County Road standards that require various pedestrian amenities in conjunction with new development. In most cases these amenities are referenced in general terms such as ‘pedestrian-scale lighting’ or ‘street furniture’.

This Pedestrian Enhancements Design Guideline Booklet provides for a greater degree of continuity for pedestrian enhancements on a community-wide basis. Additionally, the design recommendations included herein are intended to facilitate ease of maintenance, resistance to vandalism, and cost effectiveness.

Intent & Purpose

This design reference is intended as a guideline for pedestrian enhancements called for by provisions of the 2020 Transportation Plan and the Community Development Code. The designs included in this booklet are intended as recommendations for improvements in public easements and rights-of-way and are not intended to be used as prescriptive standards.

The design guidelines must be flexible so that designs can be tailored to unique circumstances and accommodate new technologies as they continue to emerge. At the same time, continuity of design is an important consideration because it often supports the following desired principles: Safety, cost-effectiveness, community identity, ease of maintenance, practicality in implementation and resistance to vandalism. With these principles in mind, the County Engineer will have the authority to approve design proposals other than those outlined in these guidelines when they are consistent with one or more of these principles.

Design of improvements on state highways must address ODOT's Oregon Highway Design Manual standards. All proposed improvements on state highways must be reviewed and approved by the Oregon Department of Transportation.

As mentioned previously, these guidelines are intended to provide designs that will help foster a safer, more convenient and more attractive pedestrian environment as provided for in the County's Comprehensive Framework Plan and the 2020 Transportation Plan. From time to time, these guidelines may be revised or amended in order to provide for changing circumstances and innovative design technologies as they continue to emerge.

Using the Guidelines

These design guidelines include recommendations for use of the pedestrian realm generally (sidewalk zones) as well as landscaping, sidewalk design, crossing treatments, street furniture and lighting. For some features, there are existing minimum requirements in the Community Development Code and the Washington County Uniform Road Improvement Design Standards. The design guidelines that follow may be used to help identify and implement various treatments that are required by the Code but where specific, prescriptive standards are not adopted. In all cases, plans must be reviewed through the County Engineering Division's design review process and treatments not included in these guidelines that are consistent with the previously stated principles may be considered.

Pedestrian Environment – Guidelines

Pedestrian Environment: General Principles

Policy 14.0 (*The Pedestrian Element in section 3 of this document*) of the Washington County 2020 Transportation Plan and its accompanying strategies together with *the Pedestrian Network Needs and Analysis* of the Plan describe the priorities for the overall pedestrian network. Important considerations that are identified include the following:

- Safety – including illumination
- Connectivity
- System coverage
- Ease of street crossing
- Providing continuity in community design
- Providing for ease of maintenance, resistance to vandalism, value and durability
- Accessibility – providing connections to pedestrian attractors

These factors should always be kept in mind in considering any pedestrian enhancement designs.

As described in the Pedestrian Element of the Plan (*Strategies 14.8 and 14.9*) in areas where pedestrian enhancements are called for, wider sidewalks are appropriate. *Pedestrian Network Needs and Analysis* calls for sidewalks of at least seven feet in areas with businesses or other pedestrian attractors (such as a transit line) and in 2040 centers and Station Communities widths in excess of seven feet. The plan also calls for consideration of crossing improvements in areas with strong pedestrian attractors, streetscape improvements (landscaping, street furniture and other features) as suggested in Metro’s *Creating Livable Streets: Street Design Guidelines for 2040*. Metro’s guidelines have been given strong consideration in developing the recommendations in this design booklet.

The Pedestrian Realm – Zonal Attributes

Generally, pedestrian zones have the following sub-zones:

- **The curb zone:** Area where the curb is set. Curb standards are found in the Washington County Uniform Road Improvement Design Standards (WCURIDS).
- **The landscaping & furnishings zone:** Located immediately behind the curb, this is a minimum 4-foot wide area where landscaping (landscape strips or planters such as tree wells) and various street furnishings (bus shelters, benches, controller boxes, etc.) should be placed.
- **The pedestrian travelway (i.e., sidewalk) zone:** Located between the landscape/furnishings zone and the ‘frontage zone’ (see below), this is the unobstructed area intended for pedestrian travel.
- **The frontage zone:** Located between the pedestrian travelway zone and the property line/back of sidewalk. In areas where no landscaping/furnishings zone exists, elements that would be sited in that zone may be placed in the frontage zone except where such elements would block access to existing or future buildings. Private temporary uses, such as outdoor seating for restaurants, where permitted, may occupy the frontage zone provided the pedestrian travelway zone is maintained.

The roadway cross-section drawings included as *Figures 3.1-3.4* in this Plan (taken from Appendix B-8 of the Washington County 2020 Transportation Plan) can be used to help identify the above zones.

Constraints

In many cases, constraints exist within the pedestrian zones that limit the accommodation of various elements. In some cases, these constraints can be minimized through design. Constraints include topographic features, pre-existing development, wetlands, utilities, etc. Limited right-of-way is not intended to be considered a constraint when additional dedication is legally justifiable.

For example, street trees in tree wells can be used in place of a continuous planter strip to allow for siting of street furnishings and a wider sidewalk. Other constrained areas will require different solutions such as siting a bench or other desired street furnishing at the back of the walkway (in the frontage zone), in an easement or on private property. Because so many variables exist in constrained situations, it may not be possible to accommodate all the desired uses or attributes in the pedestrian realm. The County Engineer shall have ultimate discretion to approve design proposals.



Pedestrian Enhancements

Landscaping

Street trees are a valuable part of an attractive, inviting pedestrian environment. Inside the Urban Growth Boundary, street trees are required in conjunction with most types of new development by CDC Sections 407-7 and 431-5.1B.(2), which include placement and spacing requirements.

For all new road projects landscaping should be considered along streets located within Pedestrian Districts, Transit Corridors, Main Streets, and Streetscape Improvement Areas shown on the Washington County 2020 Transportation Plan Pedestrian System Map (Figures 1.1A through 1.1E) as well as along roadways and intersections identified on the Regional Street Design Overlay Map of the 2020 Transportation Plan.

Table 1.8 is a list of recommended street trees that may be used in areas that are slated for enhanced pedestrian facilities. Other street trees, including conifers, may be used upon approval of the County Engineer. Where conditions permit, use of broad canopy trees, rather than columnar or sentry trees should be considered.



Pedestrian Scale Lighting

Adequate street lighting is important to pedestrian safety. Lighting should be provided on sidewalks as well as streets, particularly at intersections and key crossing locations. Pedestrian scale lighting characteristics and recommendations include the following:

- Lower than ‘Cobra Head’ (CH) lights, pedestrian scale lighting should be less than 20 feet in height, should be located below tree canopy and should provide more continuous and uniform lighting of pedestrian facilities than traditional ‘CH’ lights. Designs for poles and fixtures to provide for consistency in lighting (i.e., uniform design will be required locally) and must be consistent with Portland General Electric (PGE) Option “B” materials, installation requirements and workmanship.
- Use only lighting that meets PGE’s Approved Street Lighting Equipment and that is consistent with PGE’s Statement of Streetlight Installation Responsibilities.
- Avoid over-lighting, light trespass and glare – consider lighting levels of 2.5 foot-candles in commercial areas to 0.20 foot-candles on streets abutting residential uses.
- Provision of lighting plans that show coverage and type of illumination, lighting levels, fixture type and design is recommended.
- Overall illumination requirements for streets and roadways need to be met but may be satisfied with pedestrian scale lighting provided it meets overall illumination requirements.

- Placement of pedestrian scale lighting should generally be centered in the landscaping and furnishings zone; there may be instances where supplemental pedestrian scale lighting, such as bollard-type lights, may be placed elsewhere, such as behind the sidewalk. Poles and lights should be aligned along street corridors.
- Consider light color (bulb type) and favor lighting with higher color rendition index when possible.

Streetscape Furnishings

Streetscape furnishings should be provided in areas of existing or expected high pedestrian use. Such areas are identified in the Washington County 2020 Transportation Plan as Pedestrian Districts and Streetscape Improvement Areas (see Figures 1.1B through 1.1E). Streetscape elements provide a human-scale to the environment and encourage walking. Streetscape furnishings include features such as benches, trash receptacles, drinking fountains, bus shelters, and information kiosks. Recommended placement of streetscape furnishings should be determined in conjunction with the land development review process. In order to maximize design continuity, facilitate ease of maintenance and maximize cost-effectiveness, Washington County has developed the following design recommendations and principles for Streetscape Furnishings:

Table 1.7 Street Furniture Requirements

Item	Specifications	Approved Products
Bench (see Attachment "B" for drawing)	Flat-bar slats, welded, length 6'-0", surface-mounted bolts, powder-coated with polyester, black color	Cascadia bench by Creative Pipe, RB-28 by Victor Stanley, Promenade by Urban Accessories, or approved equal.
Litter receptacle (see Attachment "C" for drawing) Bike Rack	Flat-bar slats, 36-gallon, flat steel top with elevated canopy, surface-mounted bolts, powder-coated with polyester, black color Surface-mounted bolts, polyester powder-coated, black color	Cascadia trash receptacle by Creative pipe, S-42 or RB-36 by Victor Stanley, RR-SS Trash by Urban Accessories WU20-30" by Creative Pipe, BK-3 by Victor Stanley, Bike Rail by Urban Accessories, or approved equal.
Tree Grate	Cast iron, ADA compliant	STA 4872 by FairWeather, Sunrise by Ironsmith, or approved equal.
Bollard	Cast iron or aluminum 35: height, 6" diameter minimum, removable, locking, black color	Omni-Stop by Coral Sales, Salem by Ironsmith, or approved equal.

Design Principles

- Benches should be constructed of vandalism resistant materials such as those identified above or in the drawing that is included as Figure 1.9. Center armrests should be considered to discourage use of benches for sleeping.
- Trash receptacles should be centered within the landscaping and furnishings zone when this zone is at least 3'0" wide. Consider alternative design style to maintain necessary clearances. Figure 1.10
- Drinking fountains are permissible and should be maintained by the adjacent property owner. Maintenance/operation agreements with property owners

- Kiosks are permissible and should be maintained by the adjacent property owner. Maintenance/operation agreements between the property owner/operator of kiosk and the county should be required. Placement should not interfere with required clear zones, sight distances, etc.
- Furnishings should be placed in the landscaping and furnishings zone and should not interfere with the pedestrian travelway zone. Maintenance of furnishings should typically be the responsibility of the adjacent property owner.

Crossing Treatments

Safe street crossings are an essential component of a pedestrian network. They are especially important in Light Rail Station Communities, Regional and Town Centers, Transit Corridors and Main Streets, all of which are areas identified for pedestrian enhancements in the Transportation Plan.

While traditional marked crosswalks can be used in many locations, there are a number of alternative crossing treatments that improve pedestrian safety as well as the attractiveness of the pedestrian environment that may be employed in Pedestrian Districts.

A number of enhanced crossing treatments are identified below; because of the many variables in circumstances, no single ‘standard’ for pedestrian crossings is appropriate in all situations. Relevant considerations include safety, ease of maintenance, driver expectations, utility access, roadway functional classification and design speed.

The Institute of Transportation Engineers report entitled *Alternative Treatments for At-Grade Pedestrian Crossings* (Nazir Lalani and the ITE Pedestrian and Bicycle Task Force) includes a number of important considerations for assessing crossing treatment options. The county may use this report to evaluate potential crossing treatments and in considering other treatments in addition to those listed in Table 1.3.

Sidewalk Widths and Designs

Pedestrian Districts, as set forth in *Policy 14.0* of the Washington County 2020 Transportation Plan are intended to have ‘wide sidewalks’. Sidewalk width should be based on expected usage. Some areas that are designated for enhanced pedestrian facilities, such as Town Centers or Station Community areas with Transit Oriented Development plan designations would be expected to have high levels of pedestrian use. Such areas would consequently warrant use of the widest sidewalks as shown on the street cross-section drawings that are included in this section.

The street cross-sections are included in this Plan as *Figures 3.1 to 3.4*. Areas with ‘Special Area Street’ designations should use the Special Area Street Design Standards that have been incorporated into the Washington County Uniform Road Improvement Design Standards. Other areas, that are within Pedestrian Districts that are designated in the 2020 Transportation Plan, that would be expected to have lower levels of pedestrian

activity, such as along a residential neighborhood route, do not require as wide a sidewalk. The following principles should be considered in determining sidewalk widths:

- Existing neighborhood design and the feasibility for design continuity.
- Americans with Disabilities Act (ADA) design standards.
- Protection and incorporation of large trees in project design.
- Level of near-term and long-term pedestrian usage in determination of sidewalk widths. This consideration should take into account existing and planned land uses and the likelihood of redevelopment. The greater the potential for heavy pedestrian use, the wider the sidewalk should be.
- The use of alternative pavement treatments or materials.
- On sidewalks that incorporate tree wells in the furnishings zone, rather than a continuously landscaped strip, the County encourages the use of the following type of grates. Use of standard grates eases maintenance and reduces costs.
- On sidewalks that incorporate tree wells in the furnishings zone, rather than a continuously landscaped strip, the County encourages the use of cast iron, ADA-compliant tree grates similar to STA 4872 by FairWeather, Sunrise by Ironsmith or approved equal. Use of standard grates eases maintenance and reduces costs.



The following pages provide detailed information and drawings of pedestrian enhancements such as street trees, curb extensions and street furniture.

Table 1.8 is a listing of street trees that may be planted along roadways when new development or new roadway construction occurs. The specific standards for installation of street trees are found in Section 407, Landscape Design, of the Community Development Code. *Figure 1.9* illustrates a recommended bench design, *Figure 1.10* provides a diagram for a trash receptacle, and *Figure 1.11* addresses curb extensions used for pedestrian environment enhancement.

Table 1.8 List of Recommended Street Trees

Botanical/Common	Height	Spread	Shape	Tree Wells	4' Planter	6' Planter	8' Planter	PGE / Powerline	Fruit / Hazard	Prune up 6'	Drought Tolerance	Native	Irrig. Required	City of Tualatin	City of Beaverton	City of Portland	Metro-Greenstreets	Comments
Acer buergeranum/Trident Maple														X	X			
Acer campestre/Maple, English Hedge				X	X										X			
Acer campstre/Hedge Maple								X							X			
Acer ginnala 'Flame'/Maple, Flame Amur				X	X										X			
Acer ginnala/Amur Maple								X						X	X			
Acer griseum/Maple, Paperbark	25	20		X	X			X							X			
Acer nigrum 'Greencolumn'/Maple, Greencolumn Black						X									X			
Acer pseedoplatanus 'Atropurpureum'/Maple, Spaethii Sycamore							X								X			
Acer platanoides 'Cavalier'/Maple, Cavalier Norway						X									X			
Acer platanoides 'Cleveland'/Maple, Cleveland Norway	55	25	upright				X								X			
Acer platanoides 'Columnarbrood'/Maple, Parkway Norway						X									X			
Acer platanoides 'Columnar'/Columnar Norway Maple						X								X	X			
Acer platanoides 'Crimson King'/Maple, Crimson King Norway						X									X			
Acer platanoides 'Crimson Sentry'/Crimson Sentry Maple				X	X									X	X			
Acer platanoides 'Emerald Queen'/Maple, Emerald Queen Norway							X								X			
Acer platanoides 'Globosum'/Maple, Globe Norway				X	X										X			
Acer platanoides 'Schwedleri'/Maple, Schwedleri Norway							X								X			
Acer platanoides 'Superform'/Maple, Superform Norway							X								X			
Acer rubrum 'Armstrong'/Armstrong Maple														X	X			
Acer rubrum 'Autumn Flame'/Maple, Autumn Flame Red						X									X			

This is a listing of street trees that may be planted along roadways when new development or new roadway construction occurs. The specific standards for installation of street trees are found in Section 407-8 of the Community Development Code.

Table 1.8 List of Recommended Street Trees

Botanical/Common	Height	Spread	Shape	Tree Wells	4' Planter	6' Planter	8' Planter	PGE / Powerline	Fruit / Hazard	Prune up 6'	Drought Tolerance	Native	Irrig. Required	City of Tualatin	City of Beaverton	City of Portland	Metro-Greenstreets	Comments
Acer rubrum 'Bowhall'/Scanlon, Bowhall Maple						X							X	X	X			
Acer rubrum 'Doric'/Maple, Doric Red				X	X										X			
Acer rubrum 'Karpick'/Maple, Karpick Red	45	20	upright			X									X			
Acer rubrum 'October Glory'/Maple, October Glory Red							X								X			
Acer rubrum 'Red Sunset'/Maple, Red Sunset Red	45	35	oval			X								X	X			
Acer rubrum 'Scanlon'/Maple, Scanlon Red						X									X			
Acer rubrum x A. saccharinum 'Autumn Blaze'/Maple, Autumn Blaze							X								X			
Acer saccharum 'Arrowhead'/Maple, Arrowhead Sugar							X								X			
Acer saccharum 'Green Mountain'/Maple, Green Mountain Sugar						X									X			
Acer saccharum 'Legacy'/Maple, Legacy Sugar						X									X			
Acer tataricum/Maple, Tatarian				X	X										X			
Acer truncatum x A. platanoides 'Keithsform'/Maple, Norwegian Sunset				X											X			
Acer truncatum x A. platanoides 'Warrenred'/Maple, Pacific Sunset				X											X			
Acer x freemanii 'Armstrong'/Maple, Armstrong						X							X					
Acer x freemanii 'Celzam'/Maple, Celebration							X								X			
Aesculus x carnea 'Briotii'/Horsechestnut, Briotti Red						X									X			
Aesculus x carnea 'Ruby Red'						X									X			
Amelanchier canadensis 'Pyradidalis'/Serviceberry, Pyramidal Shadblow				X	X										X			
Amelanchier canadensis/Shadblow								X							X			

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Table 1.8 List of Recommended Street Trees

Botanical/Common	Height	Spread	Shape	Tree Wells	4' Planter	6' Planter	8' Planter	PGE / Powerline	Fruit / Hazard	Prune up 6'	Drought Tolerance	Native	Irrig. Required	City of Tualatin	City of Beaverton	City of Portland	Metro-Greenstreets	Comments	
Service Berry																			
Amelanchier laevis x grandiflora 'Cumulus'/Serviceberry, Cumulus				X	X										X				
Amelanchier x grandiflora 'Robin Hill'/Serviceberry, Robin Hill Apple				X	X										X				
Amelanchier/Apple Service Berry								X							X				
Betula jacquemontii/Birch, Jacquemontii								X							X				
Betula nigra/Birch, River								X							X				
Carpinus betulus 'Fastigiata'/European Hornbeam	40	15	upright	X	X						?		X	X	X				
Celtis occidentalis/Hackberry, Common							X								X				
Cercis canadensis/Eastern Redbud					X			X							X				
Cercis canadensis/Redbud, Eastern				X											X				
Cercidiphyllum Japonicum/Katsura	60	40				X									X				
Cladrastis kentuckia/Yellow Wood						X									X				
Clerodendrum trichotomum/Glorybower					X			X							X				
Clerodendrum trichotomum/Glorybower, Harlequin				X											X				
Cleveland select' - pyrus calleryana/Flowering Pear								X							X				
Cornus florida/Dogwood, Eastern				X											X				
Cornus florida/Flowering Dogwood								X							X				
Cornus kousa chinesid/Dogwood, Kousa				X											X				
Cornus kousa/Japanese Dogwood								X							X				
Cornus mas/Dogwood/Cornelian Cherry				X											X				
Corylus/Filbert, Turkish							X								X				
Crataegue phaenopyrum/Washington Hawthorn								X							X				
Crataegus monogyna 'Stricta'/Hawthorn,				X	X										X				

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Table 1.8 List of Recommended Street Trees

Botanical/Common	Height	Spread	Shape	Tree Wells	4' Planter	6' Planter	8' Planter	PGE / Powerline	Fruit / Hazard	Prune up 6'	Drought Tolerance	Native	Irrig. Required	City of Tualatin	City of Beaverton	City of Portland	Metro-Greenstreets	Comments
Columnar																		
Crataegus x lavallei/Hawthorn, Lavalley				X	X			X							X			
Crataegus phaenopyrum/Hawthorn, Washington	30	15		X	X										X			
Elaeagnus angustifolia/Olive, Russian				X	X										X			
Eucommia ulmoides/Rubber Tree, Hardy	50	45					X								X			
Fagus sylvatica 'Purpurea Tricolor'/Beech, Tricolor European						X									X			
Fraxinus americana 'Autumn Applause'/Ash, Autumn Applause White						X	X							X	X			
Fraxinus americana 'Autumn Purple'/Ash, Autumn Purple White							X								X			
Fraxinus excelsior 'Globosum'/Ash, Globe European				X	X										X			
Fraxinus excelsior globosum/Globe-Headed European Ash								X							X			
Fraxinus ornus/Ash, Flowering				X											X			
Fraxinus ornus/Flowering Ash					X			X							X			
Fraxinus oxycarpa aureaefolia 'Golden Desert'/Ash, Golden Desert				X	X										X			
Fraxinus osycarpa 'Flame'/Ash, Flame						X									X			
Fraxinus osycarpa 'Raywood'/Ash, Raywood						X									X			
Fraxinus excelsior 'Aureaefolia'/Golden Desert Ash								X							X			
Fraxinus pennsylvanica 'Bergeson'/Ash, Bergeson Green							X								X			
Fraxinus pennsylvanica 'Patmore'/Ash, Patmore Green							X								X			
Fraxinus pennsylvanica 'Summit'/Ash, Summit Green	60	30					X								X			
Ginkgo biloba 'Autumn Gold'/Ginkgo, Autumn Gold						X									X			
Ginkgo biloba						X									X			

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Table 1.8 List of Recommended Street Trees

Botanical/Common	Height	Spread	Shape	Tree Wells	4' Planter	6' Planter	8' Planter	PGE / Powerline	Fruit / Hazard	Prune up 6'	Drought Tolerance	Native	Irrig. Required	City of Tualatin	City of Beaverton	City of Portland	Metro-Greenstreets	Comments
'Fairmont'/Ginkgo, Fairmont																		
Ginkgo biloba 'Princeton Sentry'/Ginkgo, Princeton Sentry	75	20	columnar			X									X			
Ginkgo biloba 'Shangri-la'/Ginkgo, Shangri-la						X									X			
Ginkgo biloba/Ginkgo						X									X			
Ginkgobiloba 'Mayfield'/Ginkgo, Mayfield				X	X										X			
Gymnocladus dioicus/Coffeetree, Kentucky							X								X			
Honeylocust, Skyline/Gleditsia triacanthos 'Skyline'						X									X			
Koelreuteria paniculata 'Fastigiata'/Goldenrain, Columnar				X	X								X		X			
Koelreuteria paniculata/Golden Rain Tree				X	X			X							X			
Laburnum x waterii/Golden Chain Tree								X							X			
Liquidambar sturaciflua/Sweetgum							X								X			
Liquidambar styraciflua aurea 'Golden'/Sweetgum, Golden							X								X			
Liquidambar styraciflua 'Festival'/Sweetgum, Festival							X								X			
Liriodendron tulipifera 'Fastigiatum'/Tuliptree, Arnold						X	X								X			
Liriodendron tulipifera/Poplar, Yellow or Tuliptree						X									X			
Liriodendron tulipifera/Tuliptree or Yellow Poplar															X			
Magnolia grandiflora/Magnolia, Southern	70	40				X									X			needs room, fruit pods
Malus 'Profusion'/Crabapple, Profusion				X	X										X			
Malus 'Red Baron'/Crabapple, Red Baron				X	X										X			
Malus 'Royalty'/Crabapple, Royalty				X	X										X			
Malus 'Spring				X	X										X			

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Table 1.8 List of Recommended Street Trees

Botanical/Common	Height	Spread	Shape	Tree Wells	4' Planter	6' Planter	8' Planter	PGE / Powerline	Fruit / Hazard	Prune up 6'	Drought Tolerance	Native	Irrig. Required	City of Tualatin	City of Beaverton	City of Portland	Metro-Greenstreets	Comments
Snow/Crabapple, Spring Snow																		
Malus 'Sugar Tyme'/Crabapple, Sugar Tyme	18	15	upright	X	X										X			
Morus alba 'Kingan'/Mulberry, Kingan Fruitless							X								X			
Mt. Fuji' - prunus/Flowering Cherry								X							X			
Nyssa sylvatica/Tupelo, Black, Blackgum or Sourgum	90	35	pyramidal				X								X			
Ostrya virginiana/Hophornbeam, American							X								X			
Phellodendron amurense/Cork Tree, Amur								X							X			
Prunus cerasifera 'Krauter's Vesuvius'/Plum, Krauter's Vesuvius Flowering				X											X			
Prunus cerasifera 'Newport'/Plum, Newport Flowering				X											X			
Prunus cerasifera 'Thundercloud'/Plu, Thundercloud Flowering				X											X			
Prunus sargentii 'Columnaris'/Cherry, Columnar Sargent Flowering				X											X			
Prunus virginiana 'shubert'/Cherry, Shubert Select Flowering or Canada Red Chokecherry				X	X										X			
Prunus x yedoensis/Cherry, Yoshino Flowering				X	X										X			
Pyrus calleryana 'Aristocrat'/Pear, Aristocrat Flowering	35	25		X											X			
Pyrus calleryana 'Capital'/Pear, Capital Flowering				X											X			
Pyrus calleryana 'Glen's Form'/Chanticleer Pear													X	X				
Pyrus calleryana 'Chanticleer'/Pear, Autumn Blaze Flowering				X											X			
Pyrus calleryana 'Chanticleer'/Pear, Chanticleer Flowering				X	X									X	X			
Pyrus calleryana 'Cleveland Select'/Pear, Cleveland Select				X	X										X			

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Table 1.8 List of Recommended Street Trees

Botanical/Common	Height	Spread	Shape	Tree Wells	4' Planter	6' Planter	8' Planter	PGE / Powerline	Fruit / Hazard	Prune up 6'	Drought Tolerance	Native	Irrig. Required	City of Tualatin	City of Beaverton	City of Portland	Metro-Greenstreets	Comments	
Flowering																			
Pyrus calleryana 'Princess'/Pear, Princess Flowering				X											X				
Pyrus calleryana 'Princess'/Pear, Redspire Flowering				X											X				
Pyrus calleryana 'Trinity'/Pear, Trinity Flowering				X	X										X				
Quercus acutissima/Oak, Sawtooth							X								X				
Quercus bicolor/Oak, Swamp White							X								X				
Quercus coccinea/Oak, Scarlet							X								X				
Quercus frainetto 'Schmidt'/Oak, Forest Green Hungarian or Italian							X								X				
Quercus imbricaria/Oak, Shingle							X								X				
Quercus macrocarpa/Oak, Burr							X								X				
Quercus palustris/Oak, Pin							X								X				
quercus robur /Oak, English							X								X				
Quercus robur 'Fastigiata'/Oak, Skyrocket English				X											X				
Quercus robur 'Michround'/Oak, Westminster Globe							X								X				
Quercus robur 'Pyramich'/Oak, Skymaster English					X										X				
Quercus rubra/Oak, Northern Red	75						X								X				
Quercus shumardii/Oak, Shumard							X								X				
Robinia pseudocacia 'Umbraculifera'/Locust, Globe						X									X				
Sophora japonica 'Regent'/Pagoda Tree, Regent Japanese						X									X				
Spring snow' or 'indian magic' - malus/Flowering Crabapple								X							X				
Stewartia pseudocamellia/Stewartia, Japanese						X									X				
Styrax japonica/Snowbell,				X	X			X							X				

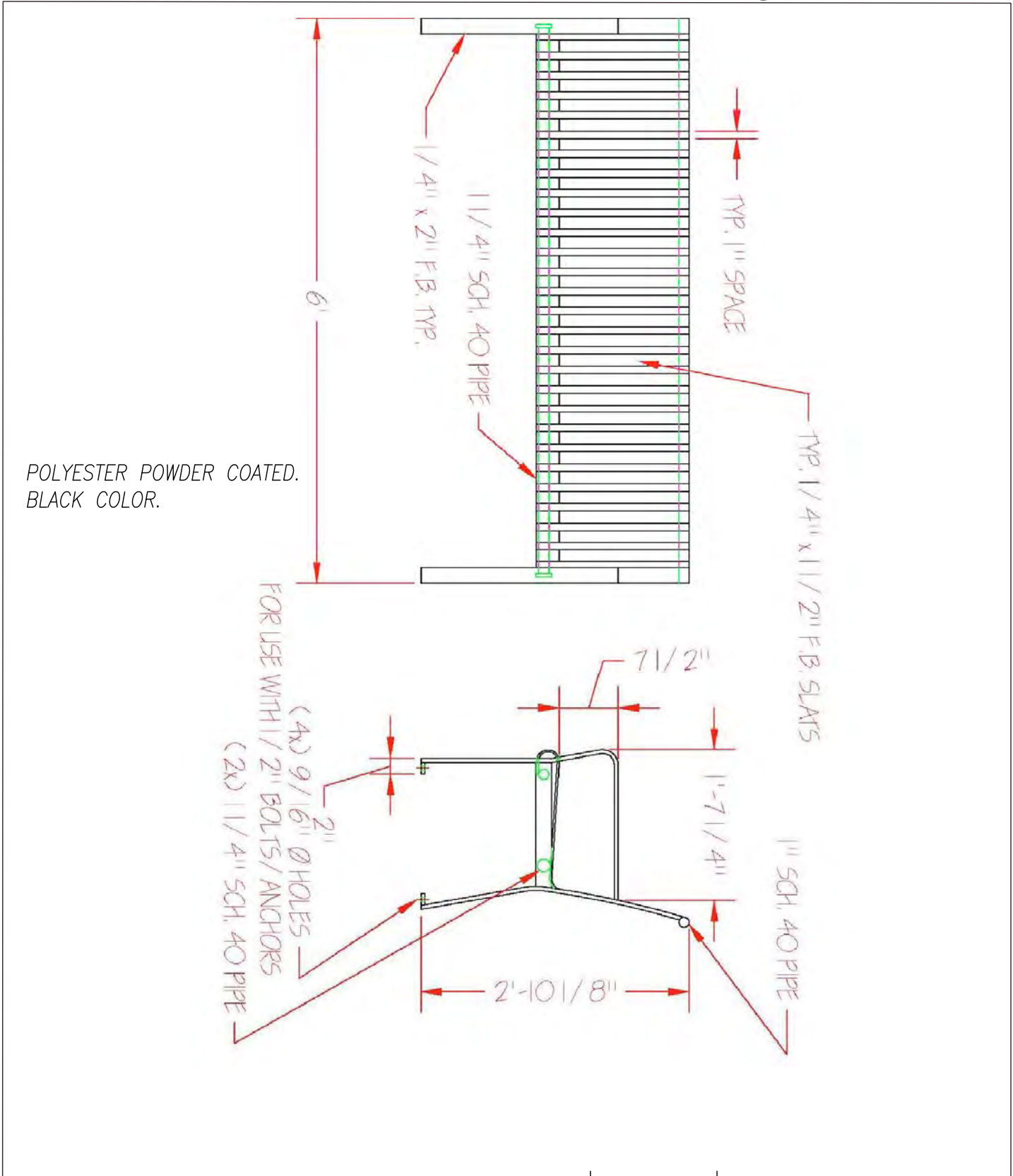
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Japanese																			
Syringa reticulata 'Ivory Silk'/Japanese Tree Lilac	30	15	oval	X	X								X		X				
Tilia americana 'Redmond'/Linden, Redmond								X							X				
Tilia cordata 'DeGroot'/Linden, DeGroot Littleleaf						X									X				
Tilia cordata 'Glenleven'/Linden, Glenleven Littleleaf						X									X				
Tilia cordata 'Greenspire'/Linden, Redmond Crimean						X									X				
Tilia euchlora 'Redmond'/Linden, Redmond Crimean								X							X				
Tilia tomentosa 'Green Mountain'/Linden, Green Mountain Silver							X								X				
Tilia tomentosa 'Sterling'/Linden, Sterling Silver	45	30	round					X							X				
Ulmus 'Homestead'/Elm, Homestead							X								X				
Ulmus parvifolia/Elm, Chinese Elm or Lacebark							X								X				
Zelkova serrata 'Green Vase'/Zelkova, Green Vase							X							?	X				
Zelkova serrata 'Musashino'/Zelkova Musashino													X		X				
Zelkova serrata 'Village Green'/Zelkova, Village Green							X								X				

This is a listing of street trees that may be planted along roadways when new development or new roadway construction occurs. The specific standards for installation of street trees are found in Section 407-8 of the Community Development Code.

Figure 1.9



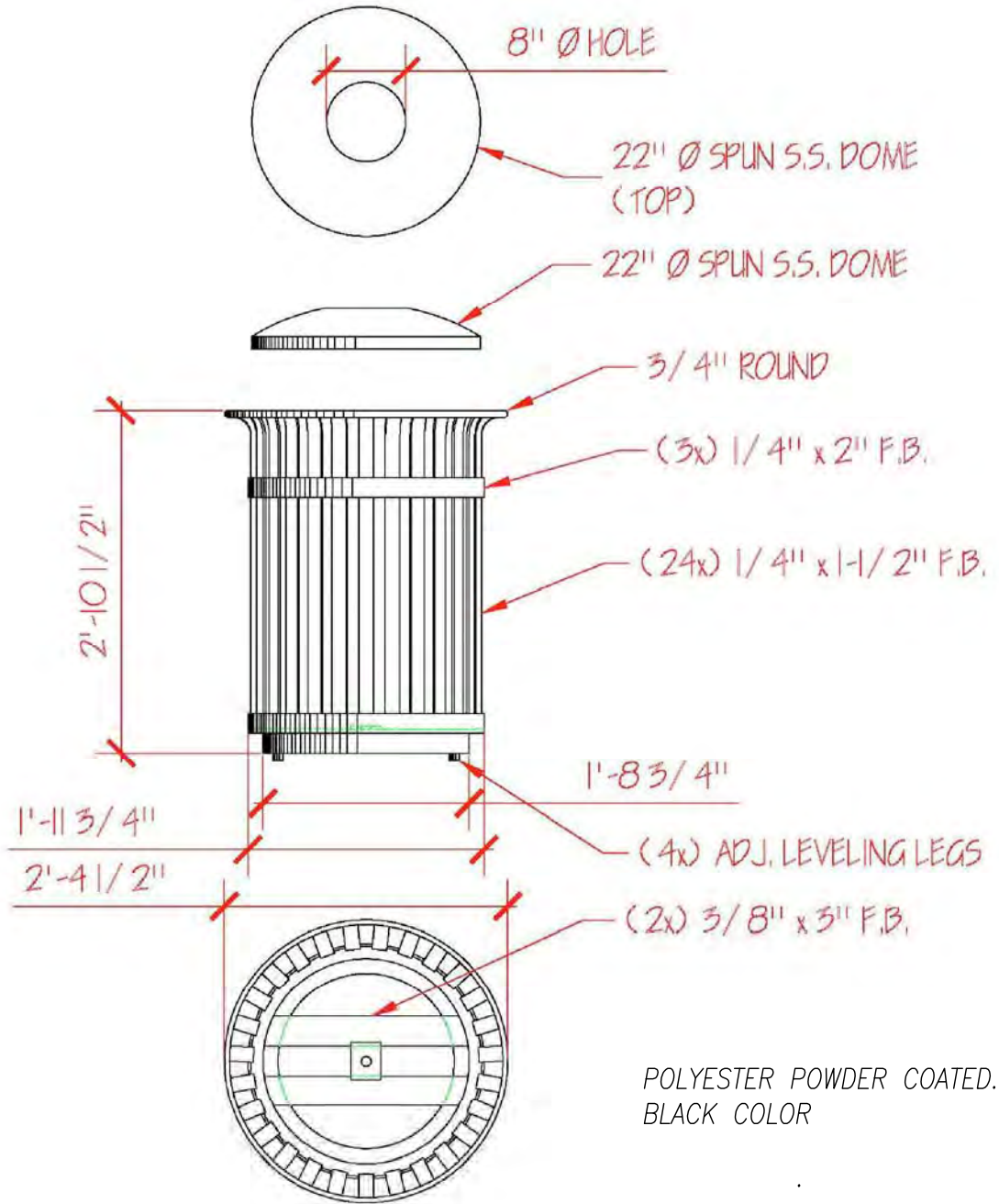
6' BENCH

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BY	DATE
DRWN: KAE	3/05
DSGN: RBR	3/05
CHKD:	



DEPARTMENT OF
 LAND USE &
 TRANSPORTATION
 ENGINEERING



TRASH RECEPTACLE

PLOT STAMP: 07/22/10 1:33P KELLYE
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DSGN: RBR	3/05
CHKD:	

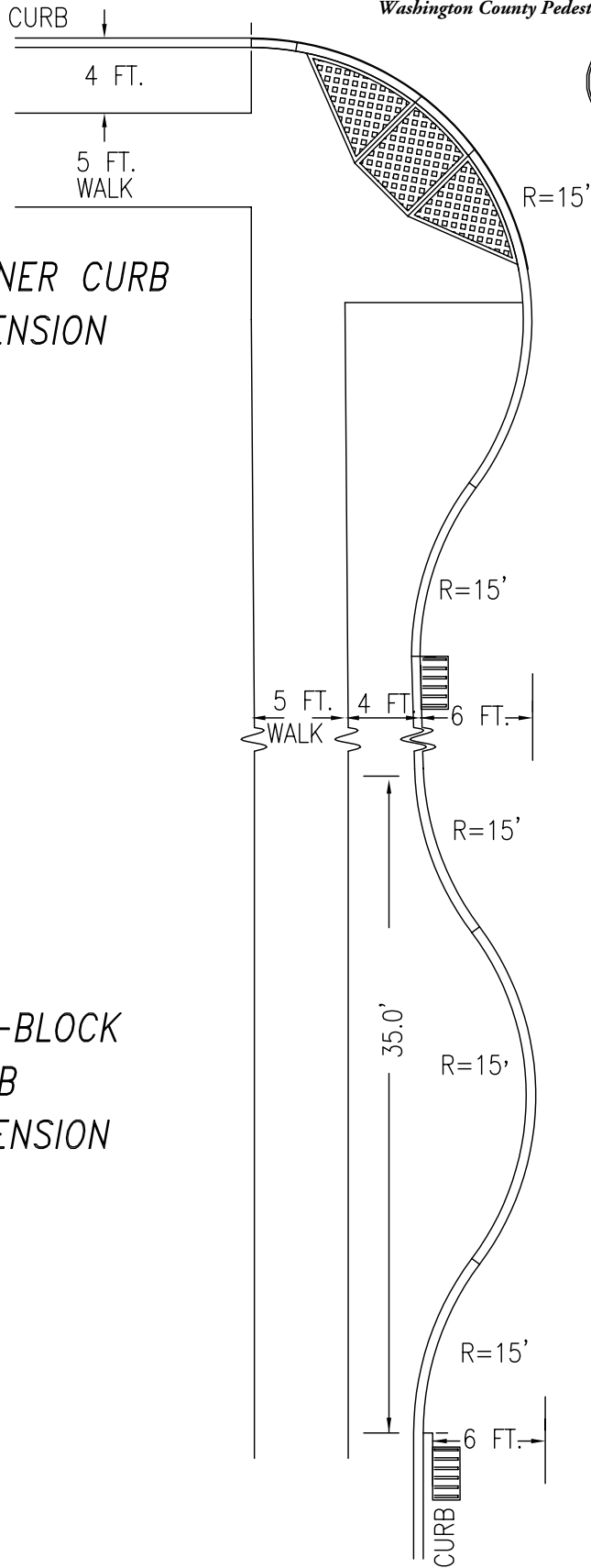


DEPARTMENT OF
 LAND USE &
 TRANSPORTATION
 ENGINEERING

CURB EXTENSION

CORNER CURB
EXTENSION

MID-BLOCK
CURB
EXTENSION



NOTES:

- 1) EXTENSIONS ARE INTENDED TO SIMULATE A PARKED VEHICLE, THEREFORE SHALL ONLY BE ALLOWED IN CONJUNCTION WITH ON-STREET PARKING.
- 2) EXTENSIONS SHALL BE LANDSCAPED WITH LOW GROWING VEGETATION SO AS TO NOT RESTRICT SIGHT DISTANCE.
- 3) INTERSECTION RADII SHALL BE CHECKED TO ASSURE SAFE PASSAGE OF THE DESIGN VEHICLE. IN ALL CASES, EMERGENCY VEHICLES SHALL BE ACCOMODATED.
- 4) DRAINAGE SHALL BE ADDRESSED WITH THE APPROPRIATE AGENCY
- 5) ON 28 FT. WIDE STREETS, CURB EXTENSIONS WILL NOT BE ALLOWED WITHIN 50 FT. OF THE INTERSECTION DUE TO THE TURNING RADIUS FOR EMERGENCY VEHICLES.
- 6) FOR THE SPECIAL AREA STREETS, CURB EXTENTION REQUIREMENTS ARE NOTED IN SECTION 215.7
- 7) SECTION 210.21 PROVIDES GUIDELINES FOR THE INSTALLATION OF MID-BLOCK CURB EXTENSIONS.



WASHINGTON COUNTY
DEPARTMENT OF LAND USE
AND TRANSPORTATION

CURB EXTENSION

REVISION	DATE

Existing Conditions of Pedestrian Facilities

Inventory Description

An inventory of existing and committed on-street walkways was conducted in the spring of 1996. Detailed information was collected for streets classified as collectors (neighborhood routes) and higher. Several characteristics were recorded, including walkway width, type, condition, and placement. Hazardous locations were identified.

The walkway inventory was updated and augmented by County staff in the fall of 2000. Additionally, new sidewalks that were either constructed through a county road improvement project or became committed for future construction between 2000 and February 2002 were also added to the sidewalk inventory. The following information was collected regarding existing and committed walkway coverage along the countywide road system for arterials, major collectors, and minor collectors (neighborhood routes):



- No walkway
- Standard walkway (concrete that is at least 5 ft wide)
- Committed project for a standard walkway
- Substandard (adjacent to shoulder (define width); asphalt paths; widths less than 5 ft.)
- Type of pavement - concrete or asphalt
- Width – less than 5 ft. or equal to or greater than 5 ft.

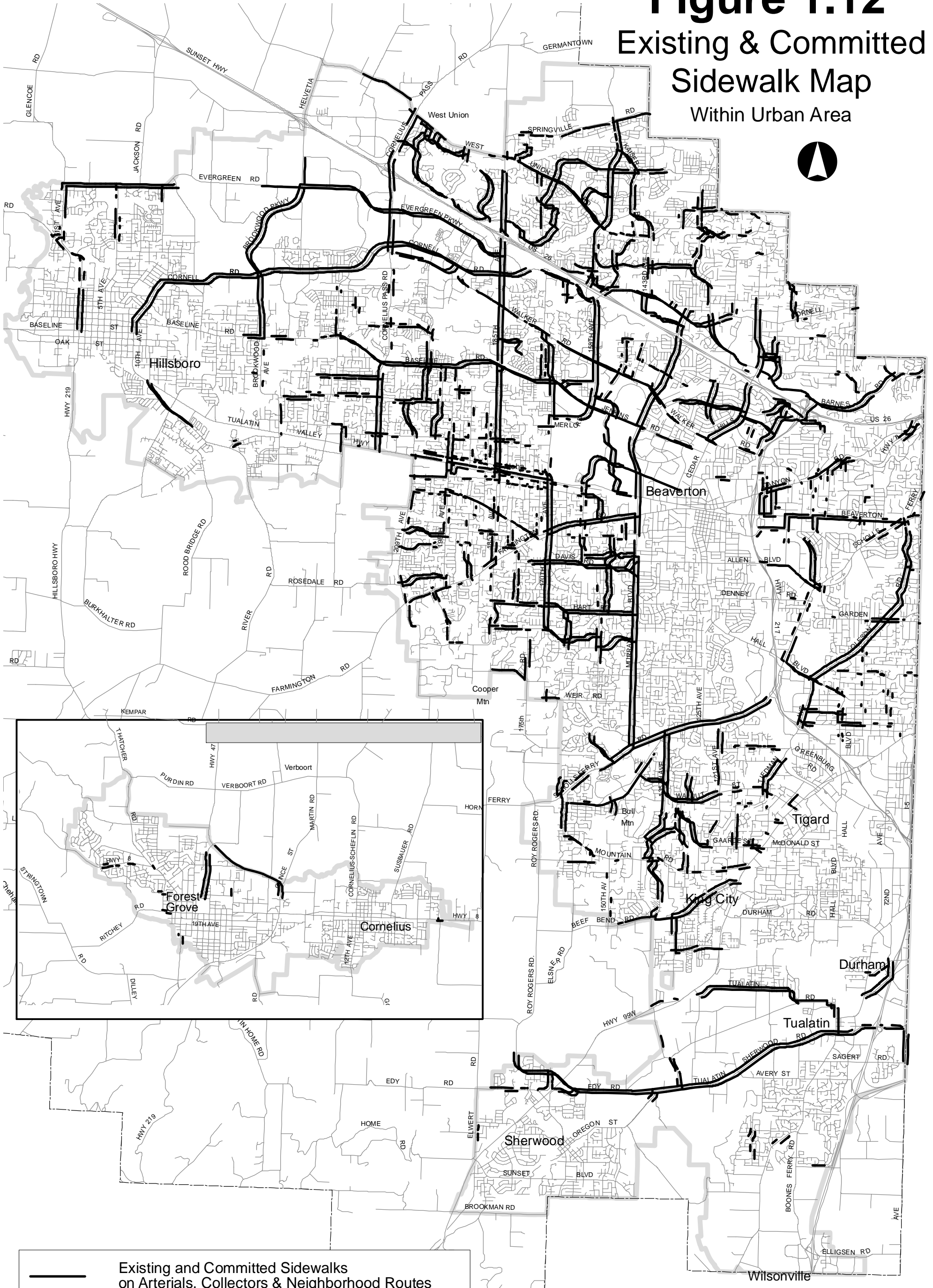
Information was also collected regarding existing off-street trails that are paved in asphalt or concrete.

Figure 1.12 shows the location of the existing and committed on-street facilities. *Figure 1.13* and *Figure 1.14* show the location of existing and committed trails and future off-street trails mapped in 2002. An examination of the facilities reveals an incomplete network, but a form that is beginning to suggest a real network, nevertheless. The form suggests the importance of completing the identified future off-street walkways as well as constructing new on-street walkways that “connect the dots.” It appears that a phase transition point may be within reach. Once across the transition boundary, the County will enter the state of having a connected network of pedestrian ways that is missing a few pieces, rather than just having a lot of disconnected pieces.

Figure 1.12

Existing & Committed Sidewalk Map

Within Urban Area







	Existing and Committed Sidewalks on Arterials, Collectors & Neighborhood Routes
	Roads
	Urban Growth Boundary
	County Boundary

\\NUTD\LRPLAN\SHARED\PLNG\WPSHARE\2002ord\Ordinance588\Working\Exhibits\Tyler_A_Engrossed\ExistingCommittedSidewalks_Fig2_18.mxd 7/21/2010 modified by DM

Off-Street Trail System

(See the Accompanying Off-Street Trail System Map)



-  Proposed Changes
-  Off Street Trails
-  Urban Growth Boundary
-  Countyline

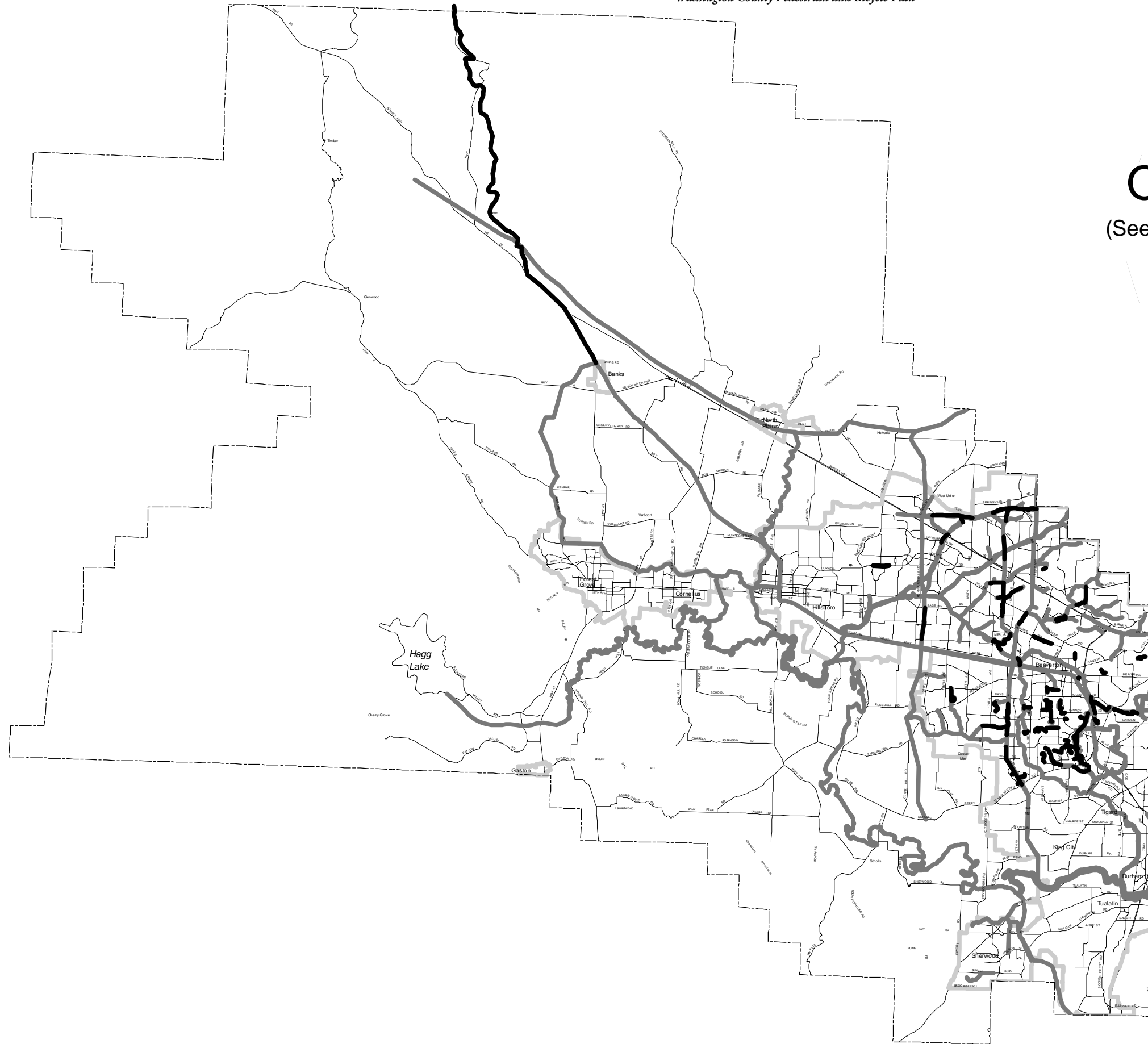
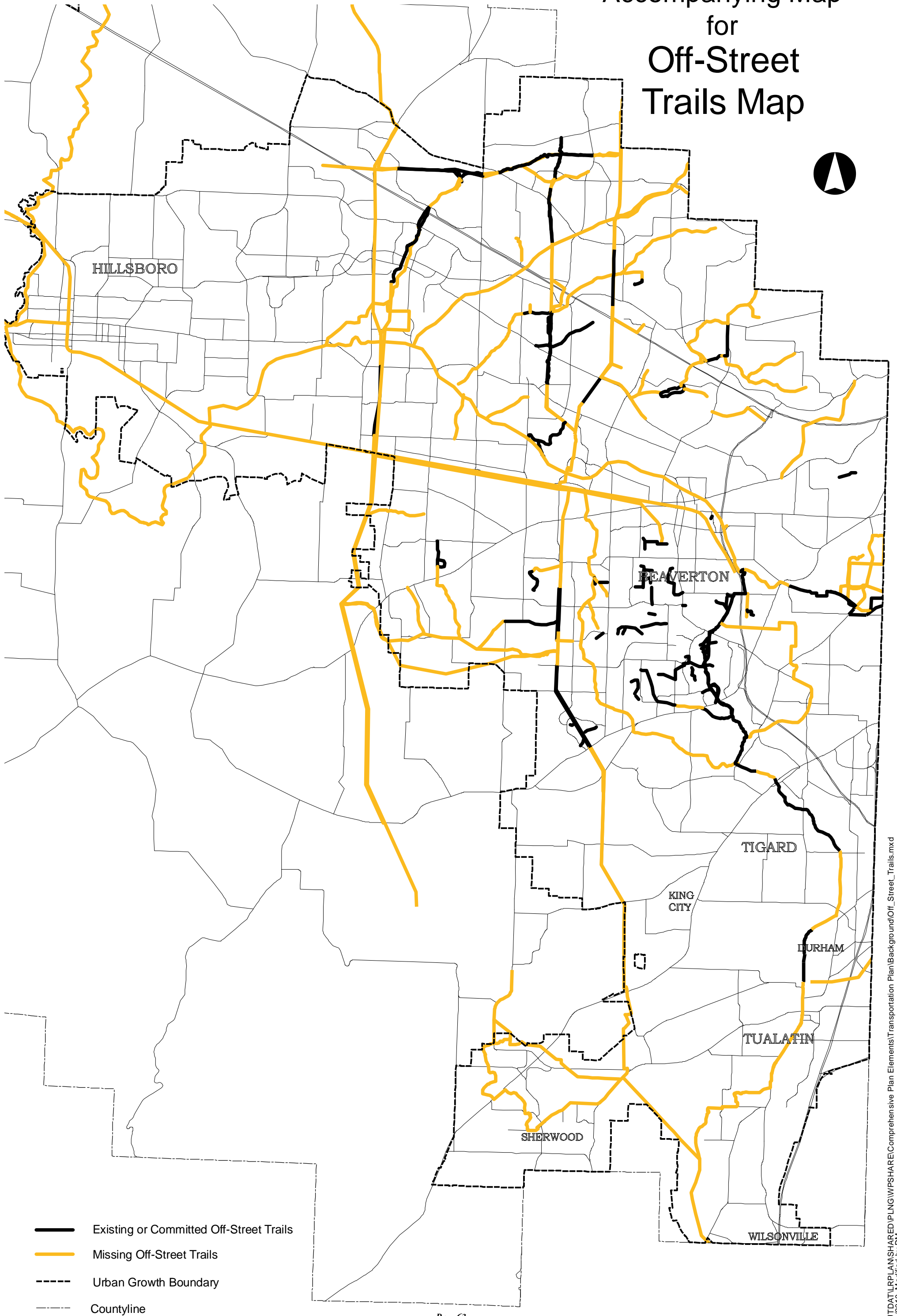


Figure 1.14

Accompanying Map for Off-Street Trails Map



*Bicycle
Element*



Policy 15: Bicycle Policy

Introduction

The Bicycle Element of Washington County's Transportation Plan consists of a policy, strategies and a system map that define and support the development of the Planned Bikeway System. The Bicycle Element is intended to guide continued development of the bikeway system through the year 2020. The Bicycle Policy and strategies in this section must be considered in conjunction with the Bicycle System Map.

Bicycle Background

Planning for bicycles as part of Washington County's transportation system began in the early 1970's and continues to play a significant role in the county's Transportation Plan.



The Bicycle Element is intended to guide continued development of a system of bikeways, consisting of bike lanes and paved shoulders, through the year 2020. The Bicycle System Map (*Figure 2.1*) identifies on-street bikeways within the Urban Growth Boundaries that are proposed to be constructed as part of the countywide bicycle system network. It also shows those rural roadways that are proposed to include paved shoulders of at least five feet in

width. The planned off-street trail network is shown on the *Off-Street Trails Map*.

Oregon State statutes, administrative rules and the Oregon Transportation Plan establish that bicycle facilities are required on all Collector or higher classification roadways when those roads are constructed or reconstructed. Exceptions are provided where a bikeway is not safe, where cost is excessively disproportionate to need or where there is an absence of need due to sparsity of population or other factors. The Plan has been developed to ensure its consistency with state and regional (as provided in the Regional Transportation Plan) guidelines and requirements.

The Regional Transportation Plan (RTP) identifies a Regional Bicycle System, which includes a classification hierarchy for those roads and off-street paths that are part of this system. The RTP's four bikeway classifications are 'regional access bikeway', 'regional corridor bikeway', 'community connector bikeway' and 'multi-use paths with bicycle transportation function'. The Regional Bicycle System classifications are based on a route's connectivity, access, and use characteristics. The design guidelines for each type of bikeway are included in Metro's publication *Creating Livable Streets: Street Design Guidelines for 2040*.

The streets and off-street pathways that are part of the RTP's Regional Bicycle System are also part of the County's planned bicycle system. Off-street pathways are shown on the *Off-Street Trails Map*. Although this Plan does not include a classification hierarchy for the bicycle system, as discussed below, system design is consistent with Metro's guidelines.

As of the date of this Plan, the Washington County Arterial and Collector street system has 64 miles of completed bikeways; in addition, there are 62 bikeway miles on state roadways within the County. The following table describes existing road miles with bicycle lanes and paved shoulders as well as additional miles to complete the system.

**Table 2.1: Bicycle Lanes/Paved Shoulder Inventory Summary
(by Functional Classification (January 2002))**

Roadway Functional Classification*	Total Road Mileage	Road Miles With Bicycle Lanes/Paved Shoulders	Percentage of Road Miles with Completed Bicycle Lanes or Paved Shoulders	Gap: Road Miles Without Bicycle Lanes or Shoulders & Percentage Needing Facilities
State Principal Routes (ODOT)	30.4 Miles	22.6 Miles	74%	7.8 Miles or 26%
State Arterials	31.4 Miles	16.5 Miles	53%	14.9 Miles or 47%
County Arterials	107 Miles	60.7 Miles	57%	46.4 Miles or 43%
County Collectors	75.9 Miles	2.9 Miles	4%	73 Miles or 96%

Note: Although portions of Sunset Highway (US 26) are considered to include paved shoulders on which bicycles are allowed, high traffic volumes and speeds as well as conflicting traffic movements make riding dangerous on this facility. Freeways were therefore not included in this inventory summary.

In urban areas, bicycle facilities exist or are planned on both state and county roadways with functional classifications of Collector or higher. The county’s on-street bicycle system consists of paved shoulders, 4 to 5 feet in width, as well as striped and stenciled dedicated bicycle lanes, 5 to 6 feet in width. In some instances, where constraints limit roadway width for bike lanes or paved shoulders, wide outside travel lanes of 14 feet may be used as bikeway for limited distances. These wide lanes will transition to either paved shoulders or bicycle lanes when roadway width is no longer constrained.

In rural areas, because of low population density and the lack of specific bicycling destinations, the planned rural bicycle network provides for facilities on a more strategic basis, generally limiting their designation to most Arterials and some Collectors.

Other agencies, primarily the Tualatin Hills Parks and Recreation District, have developed and planned an extensive network of paved, off-street pathways intended to be shared by bicycles and pedestrians. While the primary purpose of these facilities is for recreation, they serve a transportation function as well, providing an alternative means of accessing a variety of destinations. Some, but not all of these facilities are shown as part of the Regional Bicycle System in Metro’s Regional Transportation Plan. The alignments shown on the Off-Street Trails Map have been taken from the Tualatin Hills Park and Recreation District’s Trails Master Plan (revised May 2000) and are conceptual; actual alignments and crossing locations at street intersections will be determined via the development review process. For the current official planning status of these trails, consult the most recent version of the Tualatin Hills Parks and Recreation District’s *Trails Master Plan*.

15.0 BICYCLE POLICY

IT IS THE POLICY OF WASHINGTON COUNTY TO ENCOURAGE AND SUPPORT GREATER BICYCLING ACTIVITY IN WASHINGTON COUNTY BY PROVIDING AN ENVIRONMENT IN WHICH BICYCLING IS A SAFE AND CONVENIENT MODE OF TRAVEL.

Strategies:

- 15.1 Focus bicycle improvements on connecting cities, neighborhoods, commercial areas, schools, recreational facilities, employment centers, other major destinations, regional and city bikeways and other transportation modes.
- 15.2 Coordinate the development of the bikeway system with other local and regional agencies and integrate it with the delivery of other transportation services.
- 15.3 Construct all bikeways according to applicable and accepted local, regional, state and federal guidelines and standards.
- 15.4 Provide for safe and convenient bicycle travel through an interconnected street network. When such a street network is impracticable or inappropriate to construct, shared accessways for pedestrians and bicycles shall provide the necessary connections.
- 15.5 Support local, regional and state agencies in their efforts to plan an off-street system of multi-use paths.
- 15.6 Coordinate with cities to identify wide streets with low traffic volume that are appropriate for signing as bicycle routes to enhance safety and connectivity and to supplement the system of bicycle lanes and paved shoulders found on the major street system.
- 15.7 Consider improvements to enhance bicycle safety on a case by case basis on minor roads (Neighborhood Routes and lower classifications) where factors such as traffic volume, terrain, road conditions and/or intensity/frequency of use warrant such improvements. In such instances, the design and type of improvements shall be determined through the project development process.
- 15.8 Construct interim bicycle facilities, as appropriate, on existing streets that are not built to ultimate standards where the construction of full street improvements is not practicable or imminent.
- 15.9 Prioritize and program the construction of bikeway improvements in the Washington County Transportation Capital Improvement Program.
- 15.10 Construct non-capital bikeway improvements through the annual Washington County Road Maintenance Program.

- 15.11 Require design features for bicycle facilities to be incorporated in new urban developments, including bicycle access and parking facilities in accordance with the Community Development Code.
- 15.12 Develop standards for and construct paved shoulders on rural roadways identified on the Bicycle System Map, considering the following:
 - A. Locations of existing and committed bicycle facilities (i.e., paved shoulders and bicycle lanes)
 - B. Locations of rural cities and communities
 - C. Locations of existing or planned recreational facilities (State, Regional or County parks)
 - D. Existing and anticipated (year 2020) roadway traffic volumes
 - E. Presence/absence of parallel routes consisting of other bicycle facilities or low traffic volume roadways
 - F. Designated RTP bicycle facilities and RTP Rural Roadways (which include paved shoulders)
 - G. Known traffic and/or terrain characteristics such as the presence of significant hills and/or grades) or large numbers of trucks, high traffic speeds and/or volumes
 - H. Potential connectivity between existing bicycle facilities and between regional destinations (recreation facilities, population centers and connections to bicycle facilities within the UGB).
- 15.13 Encourage cities and agencies within the county to develop regularly scheduled inspection and maintenance programs to ensure that debris is regularly removed from bikeways.
- 15.14 Consider developing and updating an appropriate County-wide bicycle route suitability map, such as the Getting There by Bike map, previously published by the County.
- 15.15 Consider placing 'Bike Route' signs on roadways identified as 'Secondary Bicycle Routes' on map of the same title in *Technical Appendix C-8* of this Plan

Bicycle Element

Introduction

The Bicycle Element of Washington County's Transportation Plan consists of a policy, strategies and a system map that define and support the development of the Planned Bikeway System. The Bicycle Element is intended to guide continued development of the bikeway system through the year 2020. The Bicycle Policy and strategies in this section must be considered in conjunction with the Bicycle System Map.

Bicycle Background

Planning for bicycles as part of Washington County's transportation system began in the early 1970's and continues to play a significant role in the county's Transportation Plan.

The Bicycle Element is intended to guide continued development of a system of bikeways, consisting of bike lanes and paved shoulders, through the year 2020. The Bicycle System Map (Figure 13) identifies on-street bikeways within the Urban Growth Boundaries that are proposed to be constructed as part of the countywide bicycle system network. It also shows those rural roadways that are proposed to include paved shoulders of at least five feet in width. The planned off-street trail network is shown on the Off-Street Trails Map.

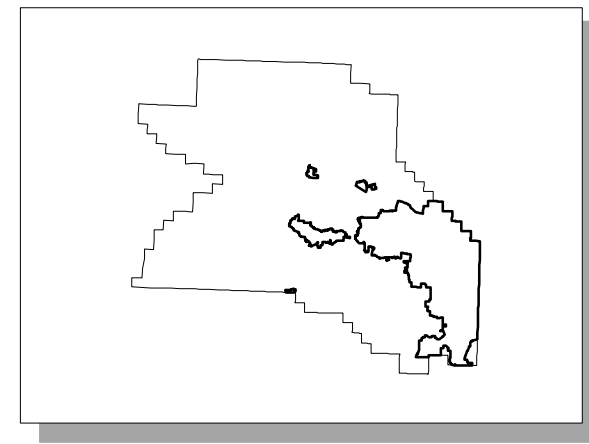
Oregon State statutes, administrative rules and the Oregon Transportation Plan establish that bicycle facilities are required on all Collector or higher classification roadways when those roads are constructed or reconstructed. Exceptions are provided where a bikeway is not safe, where cost is excessively disproportionate to need or where there is an absence of need due to sparsity of population or other factors. The Plan has been developed to ensure its consistency with state and regional (as provided in the Regional Transportation Plan) guidelines and requirements.

The Regional Transportation Plan (RTP) identifies a Regional Bicycle System, which includes a classification hierarchy for those roads and off-street paths that are part of this system. The RTP's four bikeway classifications are 'regional access bikeway', 'regional corridor bikeway', 'community connector bikeway' and 'multi-use paths with bicycle transportation function'. The Regional Bicycle System classifications are based on a route's connectivity, access, and use characteristics. The design guidelines for each type of bikeway are included in Metro's publication *Creating Livable Streets: Street Design Guidelines for 2040*.

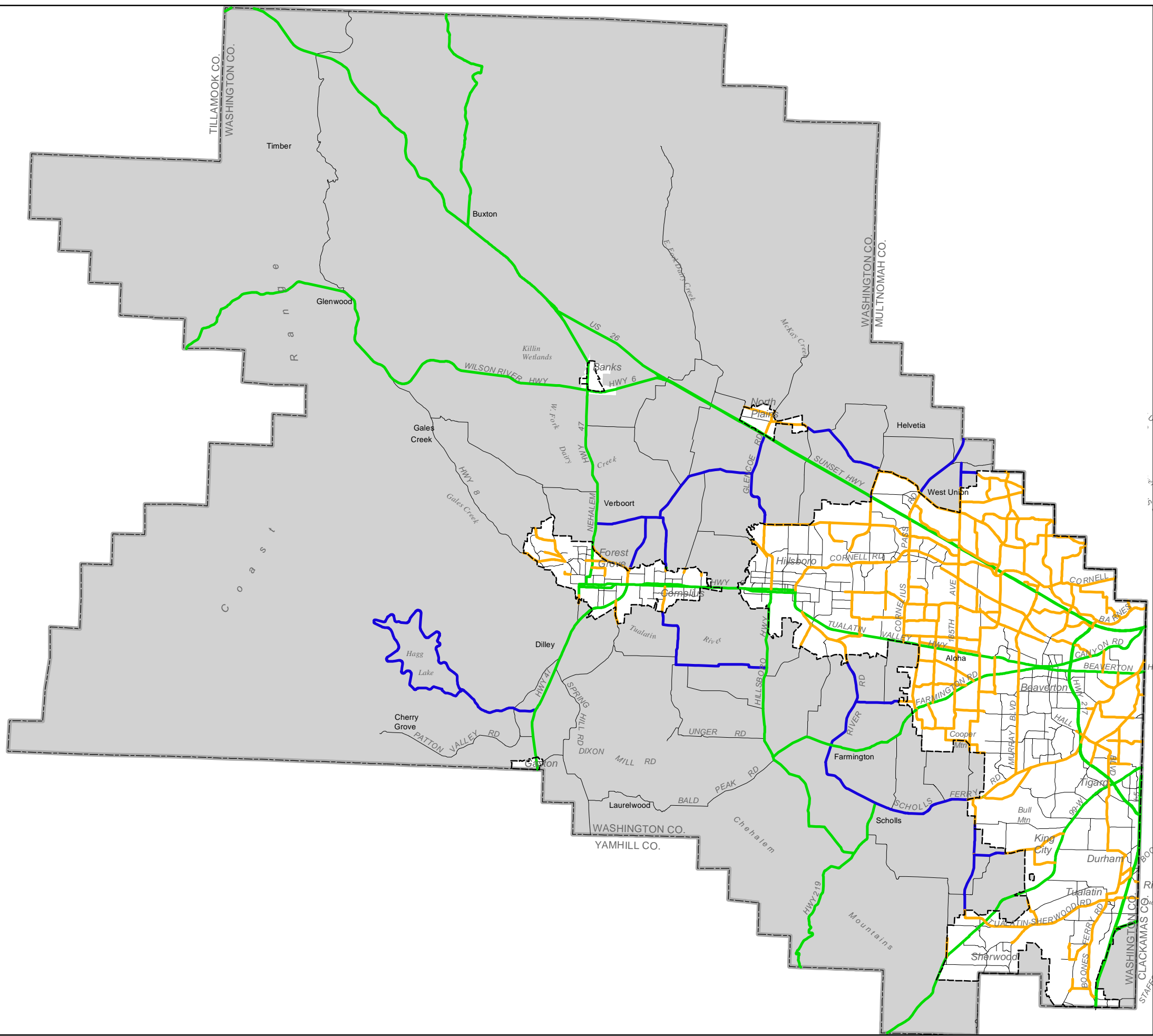
The streets and off-street pathways that are part of the RTP's Regional Bicycle System are also part of the County's planned bicycle system. Off-street pathways are shown on the Off-Street Trails Map. Although this Plan does not include a classification hierarchy for the bicycle system, as discussed below, system design is consistent with Metro's guidelines.

As of the date of this Plan, the Washington County Arterial and Collector street system has 64 miles of completed bikeways; in addition, there are 62 bikeway miles on state roadways within the County. The following table describes existing road miles with bicycle lanes and paved shoulders as well as additional miles to complete the system.

Figure 2.1

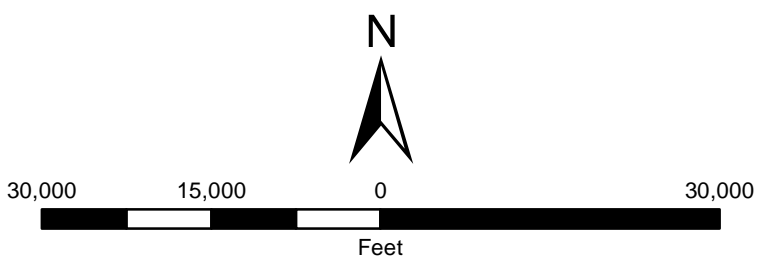


Bicycle System



- Urban Bikeway
- Rural Bikeway
- State Facility
- Urban Area
- Rural Area
- Urban Growth Boundary

NOTE:
 This map shows existing and planned bicycle facilities on County and State roads only. Consult city plans for planned bicycle facilities on city roads. Construction of bicycle facilities and other improvements on State roads are



Updated: 2/7/12

FIGURE 13

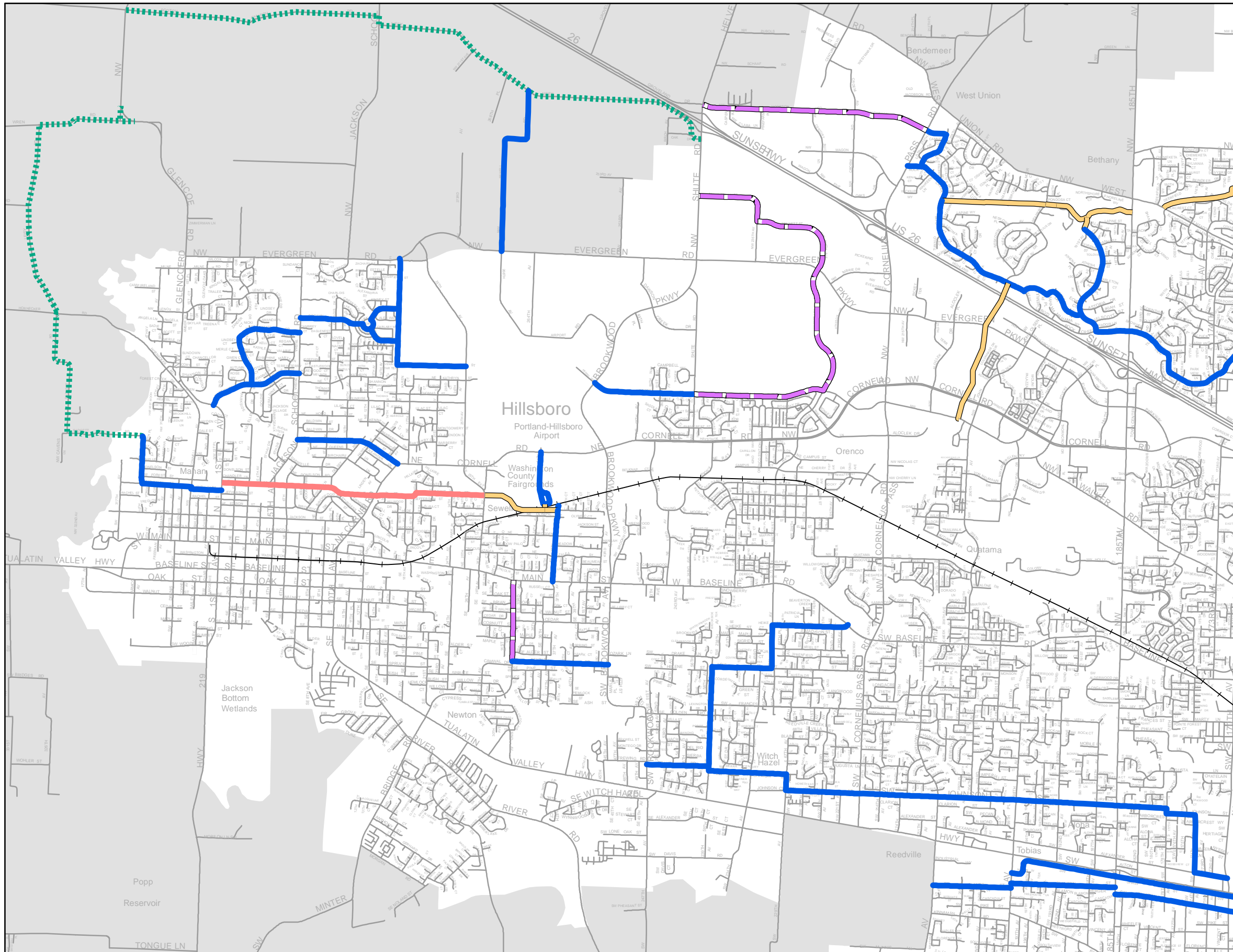
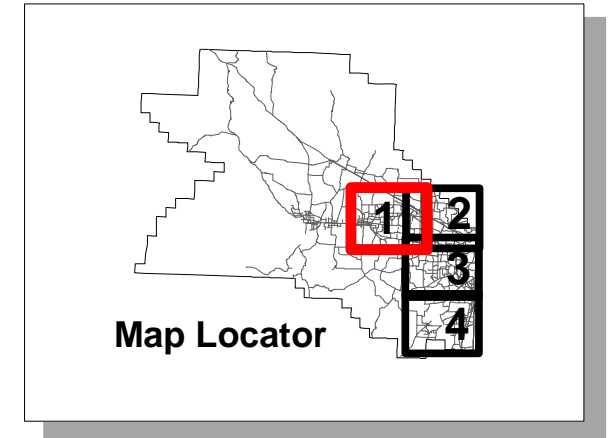


Figure 2.2A



Washington County Secondary Bicycle Routes

Legend








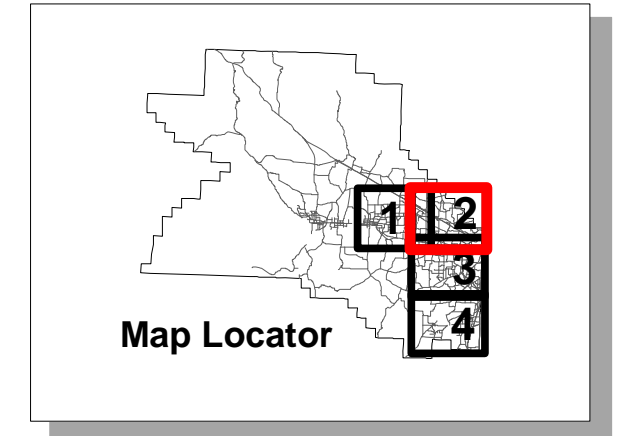
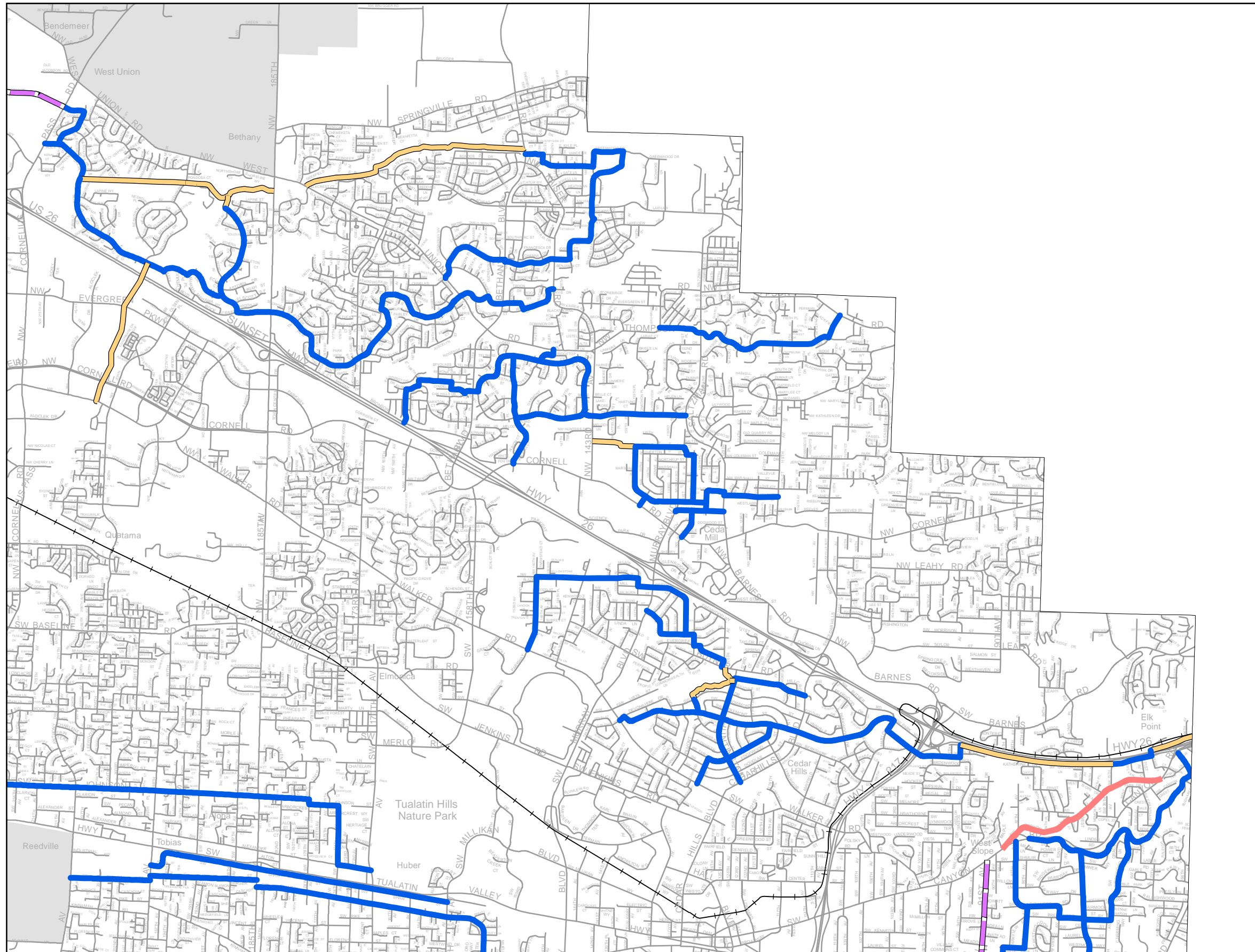
-  Connecting Bike Facility
Higher volume low-moderate speed street
(25-35 mph / Includes wide shoulders)
-  Connecting Low Speed Street
-  Low Speed, Moderate Volume Street
No Bike Lanes
-  Narrow Roads-Low Volume, Higher Speed
No Bike Lanes
-  Connecting Trail Facility - Paved
(May be < 10' wide)
-  MAX
-  Rural Washington County
(Land outside the Urban Growth Boundary
(UGB))










Figure 2.2B



Washington County Secondary Bicycle Routes

Legend

-  Connecting Bike Facility
Higher volume low-moderate speed street
(25-35 mph / Includes wide shoulders)
-  Connecting Low Speed Street
-  Low Speed, Moderate Volume Street
No Bike Lanes
-  Narrow Roads-Low Volume, Higher Speed
No Bike Lanes
-  Connecting Trail Facility - Paved
(May be < 10' wide)
-  MAX
-  Rural Washington County
(Land outside the Urban Growth Boundary
(UGB))



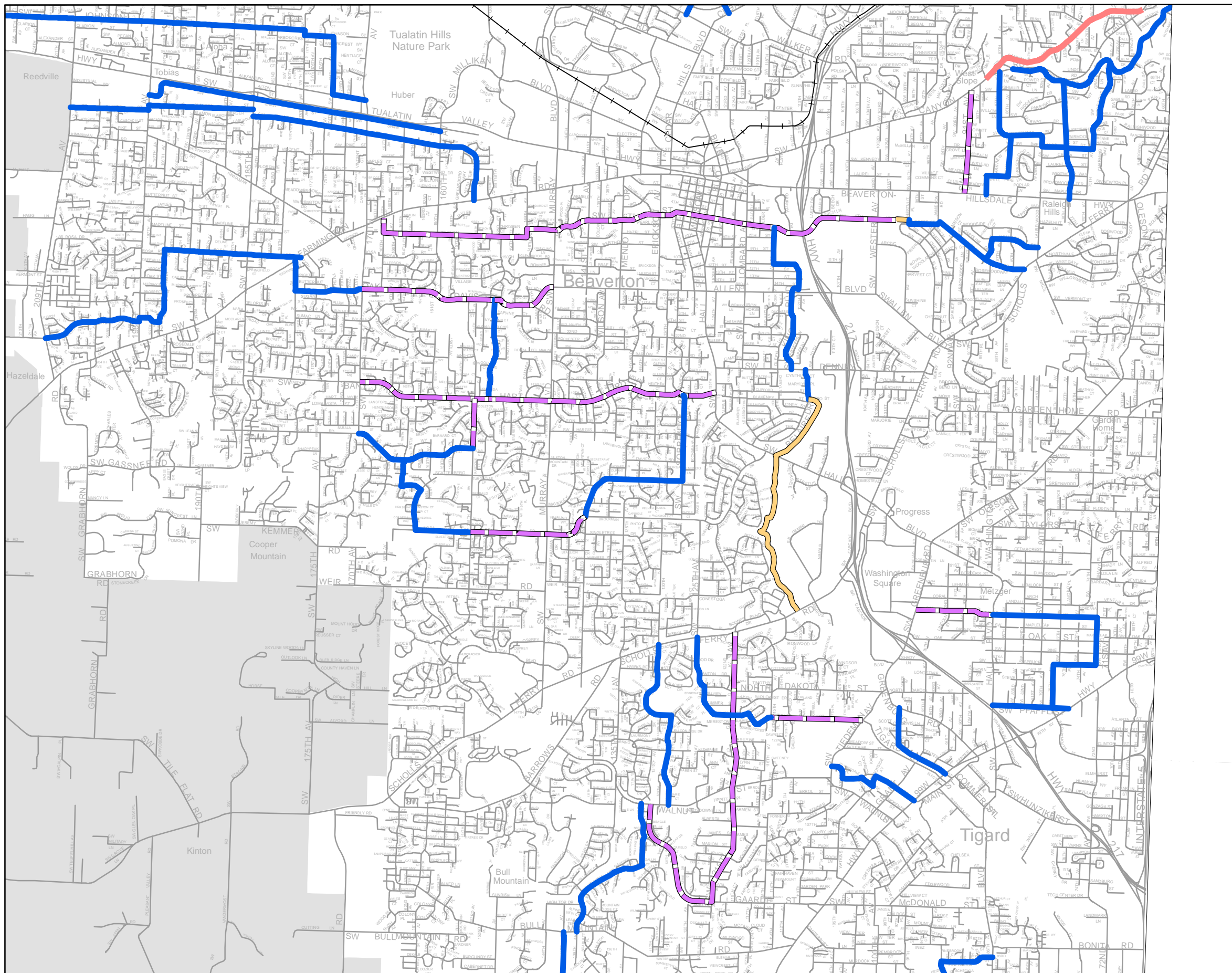
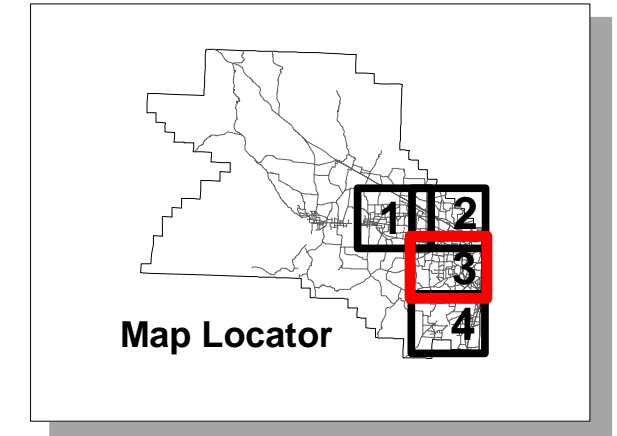









Figure 2.2C



Washington County Secondary Bicycle Routes

Legend

-  Connecting Bike Facility
Higher volume low-moderate speed street
(25-35 mph / Includes wide shoulders)
-  Connecting Low Speed Street
-  Low Speed, Moderate Volume Street
No Bike Lanes
-  Narrow Roads-Low Volume, Higher Speed
No Bike Lanes
-  Connecting Trail Facility - Paved
(May be < 10' wide)
-  MAX
-  Rural Washington County
(Land outside the Urban Growth Boundary
(UGB))



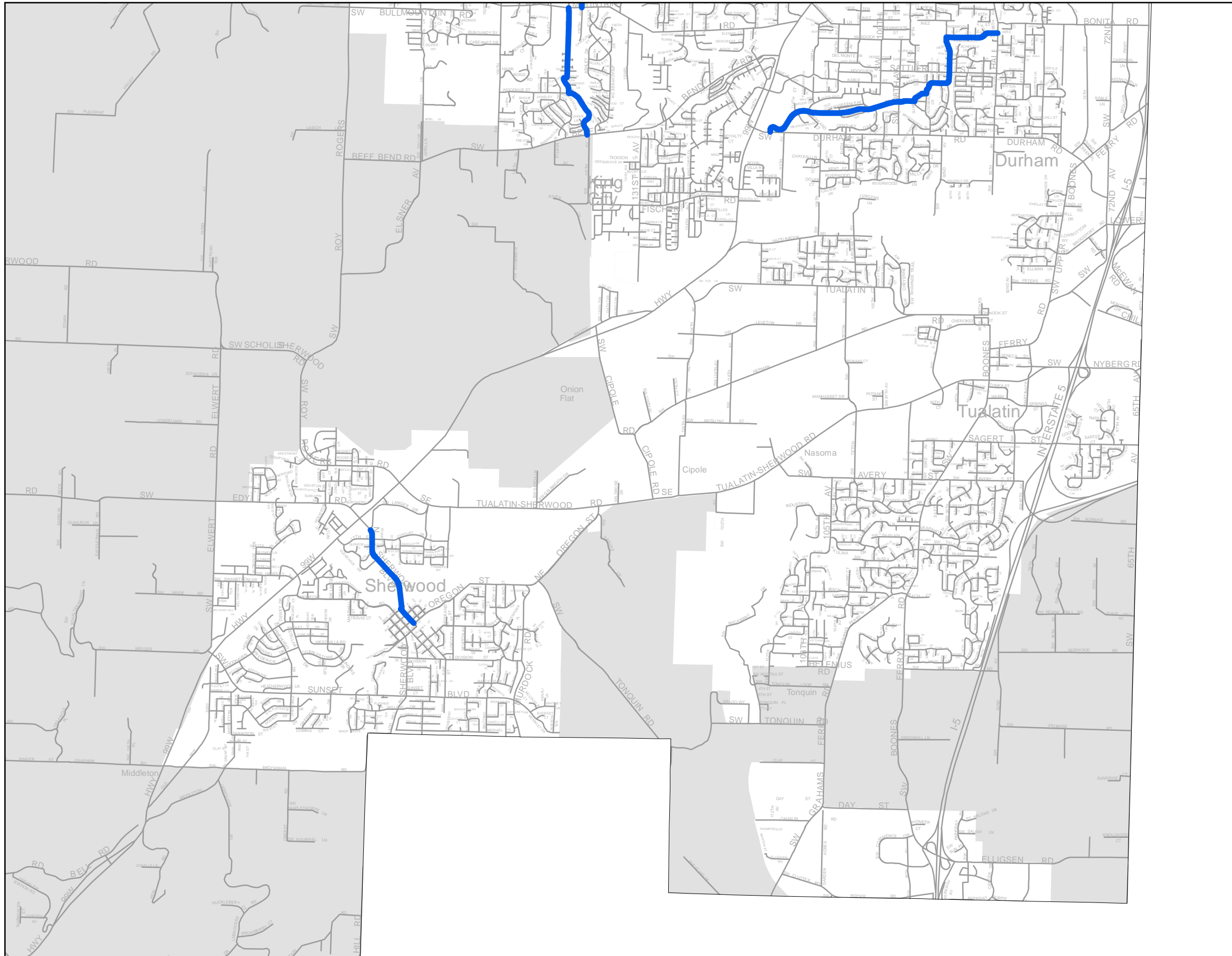
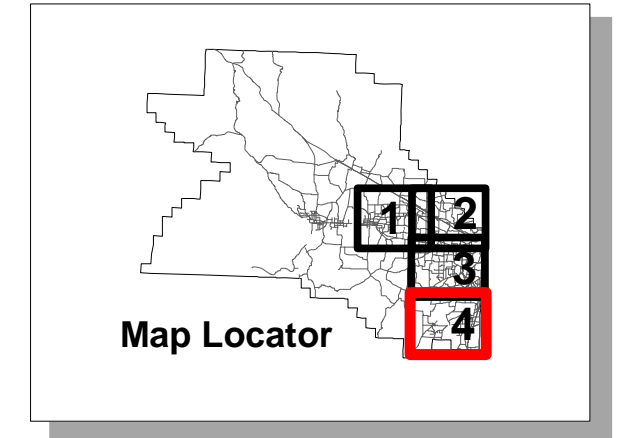









Figure 2.2D



Washington County Secondary Bicycle Routes

Legend

-  Connecting Bike Facility
Higher volume low-moderate speed street
(25-35 mph / Includes wide shoulders)
-  Connecting Low Speed Street
-  Low Speed, Moderate Volume Street
No Bike Lanes
-  Narrow Roads-Low Volume, Higher Speed
No Bike Lanes
-  Connecting Trail Facility - Paved
(May be < 10' wide)
-  MAX
-  Rural Washington County
(Land outside the Urban Growth Boundary
(UGB))



Bicycle System Needs Analysis

This section addresses the system needs of bicyclists in Washington County. The purposes of the needs analysis are to:

- 1) Evaluate where and what types of capital and non-capital system improvements or programs are needed; and
- 2) To be used as a basis for development of a preferred bicycle network.

Evaluation of bicycle needs is based on factors and information that when considered together, will be used to develop conclusions and recommendations regarding needs for the County's bicycle system. All of the following have been given consideration and are discussed in this report:

Context Information

- The regulatory provisions for bicycle facilities.
- The relationship of the County's bicycle system with those of other agencies and jurisdictions.
- Types of system users and the kinds of facilities and programs that best accommodate them.

Empirical Information

- System condition (degree of completion), connections between the bicycle system and the regional transit network, mode-share information, bicyclist counts and accident histories.

Anecdotal Information

- Information gathered from survey data, bicyclist complaints, public open houses and other public and agency input.

Based on an evaluation of all of the above factors, conclusions are made regarding the needs for the bicycle system that should be incorporated into the Washington County 2020 Transportation Plan.

I. Context Information

Relevant Legislation, Plans, and Criteria

State, regional, and local plans set forth the regulatory and planning context for determining the needs anticipated for Washington County's bikeway system.

Transportation Planning Rule

The Oregon Transportation Planning Rule (TPR) requires a Transportation System Plan to contain: "A bicycle and pedestrian plan for a network of bicycle and pedestrian routes throughout the planning area. The network and list of facility improvements shall be consistent with the requirements of ORS 366.514...". The TPR also requires local governments to adopt regulations that ensure construction of bikeways along arterials and major collector streets and to provide bicycle parking facilities as part of new multi-

family residential developments of four units or more, new retail, office and institutional developments, and all transit transfer stations and park-and-ride lots¹².

Existing Community Development Code provisions (CDC Section 429) incorporate bicycle parking standards that are consistent with the TPR. The bicycle system for the 2020 Transportation Plan is being developed so that it will be consistent with statutory and Oregon Administrative Rule requirements.



Metro's Regional Transportation Plan (RTP)

The RTP calls for a continuous regional network of safe and convenient bikeways connected to other transportation modes and local bikeway systems, consistent with regional street design guidelines. The RTP bicycle system includes both on-street bicycle lanes and off-street, multi-use paths. While Washington County does not currently plan, develop, operate or maintain off-street paths, it does assist in obtaining necessary easements or right-of-way to facilitate development of

these facilities through the land development process when possible. The County also recognizes the value of these facilities as part of the overall bicycle system network. They will be shown in the 2020 Transportation Plan on the 'Off-Street Trails Map'.

Figure 1.18 of the RTP identifies many Washington County arterial streets as well as several off-street bikeway corridors as part of a regional bicycle system. In addition, the RTP's Regional Street Design Guidelines include recommended designs for bikeways. Development of the County's 2020 planned bicycle system will consider the Regional Bicycle System identified in the RTP as well as the bikeway design guidelines from the RTP.

Washington County Transportation Plan & Community Development Code

The County's existing (1988) Transportation Plan and the Community Development Code were amended to implement many bicycle provisions called for by the Transportation Planning Rule. Most of the significant Code provisions relating to bicycles are found in CDC Sections 408 (Neighborhood Circulation), 429 (Bicycle Parking) and in CDC Article 7 (Public Transportation Facilities). The 1988 Transportation Plan called for a bicycle network on most arterial streets inside the Urban Growth Boundary and on selected arterials in the rural portion of the County.

¹²Oregon Transportation Planning Rule – OAR 660-12-045

The 2020 Transportation Plan will need to significantly expand the bicycle system from the 1988 Transportation Plan by designating the entire collector and arterial road system inside of the UGB as part of the planned bicycle system, in accordance with state standards. Outside of the UGB, the 2020 plan will designate a number of roadways as part of the planned bicycle system that were not included in the 1988 Plan. In selecting what roadways outside of the UGB should be part of the bicycle system, consideration will be given to factors such as terrain, the presence of nearby parallel roads with low traffic volumes, recreational and activity center destinations, functional classification, and connectivity between cities. At the same time, the rural bicycle system must be planned with recognition that population densities are much lower than in the urban area with fewer potential system users; in addition, costs for development of the rural system are quite high, since roadway distances are long.

Existing County Implementation Provisions

While the 1988 Transportation Plan and the 2020 Transportation Plan both focus on providing bicycle facilities on the major street system, there is also substantial emphasis on the local street network. The County's Comprehensive Plan and Community Development Code include street connectivity policies that help promote construction of a connected local street system which may augment the bicycle system on the major streets.

Policy 14.10 of the 1988 Transportation Plan (as amended via Ordinance 471) states that safe and convenient bike and pedestrian access is best provided by the street network, with sidewalks along streets. However, the policy also provides for separate bike and pedestrian 'accessways' when a street network is impracticable or inappropriate ('Accessways', are defined in the Code as off-street ways intended for the primary use of pedestrians and/or bicycles). Shared local streets, with lower traffic speeds and volumes, may provide alternative or connecting routes that may be less intimidating for children, less experienced adult cyclists or riders that do not want to cope with the higher traffic speeds, volumes and complexities of the bicycle system that has been and will continue to be developed on the major street system. The 2020 Plan will continue to support development of a connected local street system and accessway network.

Relationship of Other Agency/Jurisdiction Plans to the County's Planned Bicycle System

This section discusses the interface and connection between the County's planned bicycle system and those of other jurisdictions and agencies.

City & Other Agency Plans

The major cities within Washington County including Hillsboro, Forest Grove, Beaverton, Tigard and Tualatin all have Transportation System Plans (TSP's) that include bicycle elements. Some of these jurisdictions are in the process of updating their year-2015 TSP's to year-2020. Although it was sought, electronic map coverage of planned city bicycle systems this coverage has not been available. However, a review of city plans was performed and the County coordinated development of the 2020 Transportation Plan with other jurisdictions for over a year through an Intergovernmental Coordinating Committee (ICC) which met on a monthly basis. The Tualatin Hills Parks and Recreation District (THPRD) which plans, develops, operates and maintains an off-

street, multi-use trail network throughout the urban portion of the County was a member of the ICC.

Off-street trails, including those trails that are part of the Metro Greenspaces program and the Oregon State Parks Department (the Banks-Vernonia Linear Park Trail) are shown in the 2020 Transportation Plan. While not planned, developed, operated and maintained by the County, the off-street trail network is considered a part of the overall Countywide bicycle system as it provides connections to the existing and planned on-street County bicycle system.

While city bicycle systems are not shown in the County's 2020 Plan, they too are important components of a Countywide bicycle system. City bicycle facilities connect to the County's existing and planned bicycle system resulting in accessibility and connectivity to schools, parks, shopping areas, transit facilities and employment centers within both incorporated and unincorporated areas of the County. Some of the important bicycle system connections, which were considered in assessing needs for the County's bike system, are listed below:

Tigard

Tigard's Transportation System Plan, adopted in fall 2000, calls for bicycle lanes on all arterials and collectors within Tigard. All schools, parks, public facilities and retail areas are to have direct access to a bikeway. The plan also calls for connecting to neighboring jurisdictions' bikeway networks. Planned bicycle system roadways include:

- Beef Bend Road
- 121st Avenue
- Greenburg Road
- Taylor's Ferry Road
- Barrows Road
- Nimbus/Oak Street
- North Dakota/Greenburg/Hunziker
- Pfaffle/Dartmouth Street
- Walnut Street
- Bull Mountain Road

Beaverton

The Beaverton Transportation System Plan plans for bicycle facilities on all arterial and collector streets. The following strategies are identified in the Beaverton plan:

- Connecting key bicycle corridors to schools, parks, recreational uses and activity centers.
- Filling gaps in the network where some bikeways exist.
- Constructing bike lanes with roadway improvement projects.

Developing bicycle facilities in corridors that commuters might use and providing mobility to and within commercial areas. Examples of planned bicycle corridors include:

- Millikan Way/160th bike lanes
- 125th Avenue
- Canyon Road
- Greenway/Brockman bike lanes
- Hall Boulevard bike lanes
- Cedar Hills Boulevard bike lanes
- Denney Road bike lanes
- Allen Boulevard bike lanes

Hillsboro

Hillsboro's Transportation System Plan, adopted in 1999, plans for construction of bikeway facilities on major, new or reconstructed arterial and collector streets within Hillsboro. The plan also calls for linking regional trails network to Hillsboro's bicycle system. Planned bicycle corridors include:

- Rock Creek Trail/Greenway
- Glencoe Road – 1st Avenue
- Jackson School Road
- 231st Avenue
- Cornelius Pass Road
- 205th – 206th Avenue
- 185th Avenue
- West Union Road
- Evergreen Road/Evergreen Parkway
- Cornell Road

Tualatin Hills Parks and Recreation District

The Tualatin Hills Parks and Recreation District (THPRD) Trails Master Plan, adopted July 22, 1998, plans for development of a network of multi-use trails within the THPRD and its future service area. The Plan identifies existing trails, corridors for future trails, prioritizes trail segments and establishes a funding package. Planned multi-use pathways include:

- Beaverton Creek Trail
- Beaverton Powerline Trail
- BN Powerline Trail
- Bronson Creek Trail
- Fanno Creek Trail
- Cedar Mill Creek Trail
- Rock Creek Trail
- North Johnson Creek Trail
- South Johnson Creek Trail

Bicycle Trip Characteristics/Types of System Users

Bicycle trips in Washington County include trips to work, school, shopping and for recreational purposes. Bicycling is generally considered particularly suited for shorter trips, typically less than three miles. Acceptable trip length can vary greatly depending on the skill and fitness level of the cyclist.

In preparing the 2020 Transportation Plan, land uses representing likely bicyclist starting points and destinations were compared to the existing and planned street network to help determine how to optimize the planned bicycle system. In most cases, the beginning point or ultimate end-point of a bicycle commute trip will be a residential area. Likely destinations include schools, shopping areas, employment centers or recreation facilities. While there are some areas of the County that are primarily residential, industrial or commercial, land use analysis showed that the County has a diverse mixture of land uses throughout the urban area.

Considering the proximity of different land use types, the spacing of the major street system (i.e., the collector and arterial street network) and the optimum bicycle trip length of around three miles, the analysis suggests that the land use characteristics of the County are suited for greater use of the bicycle as a mode of travel. However, the traffic characteristics of the major street system, with high peak period traffic volumes, make it essential that appropriate bicycle facilities be in place if the bicycle mode-share is to increase.

Another important context factor is the connection between the bicycle and transit systems. The *Bikes on Tri-Met* program allows cyclists to obtain a permit to use bicycle racks that are provided on Tri-Met buses or to take bicycles on MAX. Also available at MAX stations are a limited number of bicycle lockers that allow for secure bike storage. The *Bikes on Tri-Met* program allows for multi-modal trips using bikes and transit together. This can enable a cyclist to avoid certain barriers such as steep terrain or facilitate longer distance or even regional trips using a combination of bicycling and transit. Because this type of trip can have a great deal of utility in increasing the attractiveness of cycling, it is important, in assessing bicycle needs, to identify how the bicycle system connects to the transit system. Such an analysis was undertaken in preparing the 2020 Transportation Plan.

Secure bicycle parking or storage facilities are a recognized need at cyclist destination points. Riders may be discouraged from using a bicycle to make an otherwise appropriate trip if secure parking is not available at the destination. Additional amenities, such as showers and lockers that some employers provide may not constitute a need but are particularly attractive to commuting cyclists. The County's existing Community Development Code includes bicycle parking requirements for new development; larger employers may choose to provide additional amenities as part of DEQ's Employee Commute Options (ECO) program.

Another important consideration in preparing the bicycle plan is to recognize the primary types of cyclists and the differing needs each group has. Generally, the types of bicyclists fall into three categories:

- **Type A** – Experienced adult cyclists with high skill levels. These users are comfortable and skilled in operating bicycles in traffic or on high-traffic volume streets with bicycle lanes or paved shoulders. Typically, this classification includes people that already use bicycles to commute to work or other destinations regularly or occasionally as well as riders that use their bicycles for regular fitness training. For this type of cyclist, on-street bicycle lanes that provide direct routes to destinations are preferred.
- **Type B** – Less experienced adult cyclists or adolescent riders with lower skill levels or less developed judgment for operating bicycles safely in high traffic volume conditions. These riders are less likely to use their bikes for regular commuting, shopping or other errands and may ride occasionally for recreation. This type of cyclist is likely to prefer riding on separated, off-street pathways or on low volume, low speed local or neighborhood streets. Direct connections to destinations are less important to this type of rider.
- **Type C** – Pre-adolescent riders without sufficient judgment or skills to operate safely on major streets, even if they have good bicycle facilities. Even on low speed, low traffic volume local or neighborhood streets, these types of riders may not be able to operate bicycles safely (wrong-way riding is a common practice for example). Off-street paths, which are completely separated from traffic, may be appropriate for these types of riders with supervision. For Type C riders, education/skill development programs are most appropriate.

II. Empirical Information

Empirical information that is being used to assess bicycle system conditions and needs include the following:

System Condition – Existing Facilities

A complete inventory of the County's existing bicycle facilities (*figure 2.4*) was performed as part of the 2020 Transportation Plan development process and is included in the *Existing Conditions Report*, which will be a background document supporting the 2020 Transportation Plan. The County's bicycle system consists of on-street bicycle lanes, five to six feet wide and paved shoulders of at least four feet in width.

While wide outside travel lanes (of 14 feet) are also considered appropriate 'shared roadway' bicycle facilities, these were not inventoried nor are they a preferred design type. The RTP indicates that wide, shared roadway facilities are appropriate as part of system design only where constraints restrict provision of paved shoulders or full bicycle lanes.

The inventory of bicycle facilities is of particular importance in evaluating bicycle system needs as it provides an objective way of determining where gaps in the system exist. Filling these gaps through construction of bikeways will increase connectivity and accessibility of the system.

Attachment A is the Bicycle Facility Gap Analysis Atlas which shows where bicycle lanes and wide paved shoulders exist on the County road system. The Atlas also shows where gaps exist in the system.

Comparison of the gap analysis maps with the multi-modal projects that will be identified through the 2020 Transportation Plan will show where gaps will be filled by planned projects. However, since planned multimodal projects are limited, such projects will not result in completion of the entire bicycle system. The segments of roadway on which bicycle facilities are identified as needed but that are not part of planned projects are included as *Attachment B* to this analysis. Rough cost estimates, based on filling drainage ditches and paving wide shoulders on these roadway segments, in order to provide at least interim bicycle facilities to complete the system are also provided in *Attachment B*; right-of-way costs are not included in these estimates.

Bicycle Connections to Transit

As discussed above, trips that incorporate both transit and bicycling can substantially increase the range, utility and convenience of using a bicycle to make trips. Connections to transit are an important component of the overall bicycle system.



Tri-Met allows bicycles to be carried on buses and on MAX (with an easily obtained permit). This report (see summary) identifies bicycle needs to include completion of the network of on-street lanes and wide shoulders on all collectors and arterials within the urban area and on selected arterials outside of the UGB. With the exception of one short segment that is located on a neighborhood

route (< 1 mile on Oak Hills Drive), all of the regional bus routes are on arterial or collector streets that are being identified as part of the planned bicycle system. The planned bicycle system will therefore be effectively linked to the major bus transit system.

Connections to MAX Light Rail, which are as important as connections to regional bus routes have also been evaluated. The table below provides an assessment of bicycle accessibility to MAX stations within Washington County, including stops within the incorporated cities.

Table 2.2 – MAX Station Bicycle Accessibility

MAX Station Location	Road Jurisdiction	Access Characteristics*
Beaverton Central	Beaverton	Poor bicycle access – Area under redevelopment; bike lanes not present on any feeder street
Beaverton Creek	Beaverton	Fair bicycle access – Bike lanes located on Jenkins Road, approximately ½ mile north of MAX station. Bike lanes also located on Murray, approximately ½ mile southeast of the station. Direct access from 153 rd Avenue, which is a wide street that is suitable for shared use.
Beaverton Transit Center	Beaverton	Good bicycle access – Bike lanes on Lombard, which fronts the station and connects to bicycle lanes on Center Street to the north and TV Highway to the south.
Elmonica/SW 170 th Avenue	Washington County	Good bicycle access from the north (Baseline Rd.), poor bicycle access from the south – Bike lanes located on Baseline, approximately 500' north of station; south of the station, it is approximately 1.2 miles to TV Highway, the nearest street with bicycle lanes.
Fair Complex/Hillsboro Airport	Hillsboro	Good bicycle access – Bike lanes on Cornell; approximately ¼ mile north of the station via NE 34 th Avenue, a wide street with relatively low traffic speeds and volumes. Access is also available from the south via NE 37 th Avenue, a city street with low traffic speeds and volumes. NE 37 th Avenue connects to a shared use path at its north terminus that provides direct access to the station.
Hatfield Government Center	Hillsboro	Good bicycle access – This station is served by relatively low speed and traffic volume streets from all directions.
Hawthorn Farm	Hillsboro	Fair bicycle access – Station is located approximately 0.8 miles north of bicycle lanes on Baseline Road and 0.25 mile south of bicycle lanes on Cornell Road. Direct access from Elam Young Parkway and NE 53 rd Avenue, both of which are wide streets that are adequate shared road type facilities.
Hillsboro Central & SE 8 th Avenue Stations	Hillsboro	Good bicycle access – Stations are served by a low volume and speed downtown street grid from all directions.
Merlo Road/SW 158 th Ave	Washington County	Good bicycle access – Good access from the north, bicycle lanes are located on Jenkins Road, 0.1 mile north of station; fair access from Merlo Road, which runs generally east – west and would be considered a shared facility with wide travel lanes.
Millikan Way	Washington County	Fair bicycle access – Millikan Way, ¼ mile south of the station, has bike lanes; Jenkins Road, ½ mile to the north also has bike lanes. Direct access is from 141 st Avenue, which connects to Millikan and also to Jenkins via Terman Road and Hocken Avenue. The connection to the north is considered 'fair' due to the distance to bicycle lanes.
Orenco/NW 231 st Ave	Hillsboro	Fair bicycle access – Bike lanes present on Cornell Road <1/4 mile north of station. There is no access available from the south to this station.
Quatama/NW 205 th Ave	Washington County & Hillsboro (206 th Ave. north of station)	Good to poor bicycle access – Bike lanes present on Cornell Road, 0.8 miles north of station and on Baseline Road, approximately 0.4 miles south of the station; bicycle lanes also exist on NW Quatama, which the station fronts. From Baseline or Cornell, access is via NW 205 th /206 th Avenue, which has mixed characteristics. From the north, NW 206 th is a wide street with a continuous two-way center turn lane that is fair for cycling. Access from the south is generally poor for cycling, although a separated path exists for northbound pedestrians and cyclists; this path only exists along one side of the road so southbound bicycle facilities are virtually non-existent. Southbound cyclists will also encounter a narrow bridge that is extremely hazardous.

MAX Station Location	Road Jurisdiction	Access Characteristics*
Sunset Transit Center	Washington County	Good bicycle access – From the south, access is via a pedestrian bridge over Highway 26. The pedestrian bridge can be reached via existing bicycle lanes or wide low speed and volume streets such as Parkway, Roxbury or Wilshire. From the east and west, cyclist can reach Sunset Transit Center via Barnes Road, which has paved shoulders or bicycle lanes and which fronts the access to the transit center.
Washington Street/SE 12 th	Hillsboro	Good bicycle access – Bicycle lanes present on Baseline, which is less than 300’ north of the station and provides east-west access. From the south, access is available via a grid street system that has low to moderate traffic volumes and low speeds.
Willow Creek/SW 185 th Transit Center*	Washington County	Good bicycle access – Bicycle lanes present on 185 th Avenue, which provides access from north and south directions. Baseline Road currently has bicycle lanes east of 185 th Avenue and under construction to the west of 185 th Avenue. It provides (or will provide in the immediate future) an east-west bicycle connection to the existing facilities on 185 th Avenue.

Access Characteristics are ranked as poor, fair or good followed by a description of the characteristics that result in the ranking. Since the MAX line serves an east-west alignment, the most critical station access is provided by north-south oriented streets.

The data in *Table 2.2* show where bicycle facility improvements are needed to improve bicycle connections to MAX stations, increasing the accessibility for trips using a combination of cycling and light rail modes.

Mode Share Information

Metro provides a mode share analysis approximately every five years to gauge trip patterns in the Metro region. Washington County’s bicycle mode share is less than one percent of home-work based trips. In addition, the census provides work trip data as well. However, this data is limited in its utility for assessing non-work trips like riding to schools, shopping, and or recreational rides. While mode share information is useful in determining changes in use of the bicycle system over time, it does not correlate to assessment of specific needs.

Bicycle Accident Data

This data is useful for analyzing trends and identifying locations with safety problems. It is important to recognize that most bicycle crashes are not reported and that many crashes result from traffic law violations rather than system design deficiencies. It is generally accepted that 65 to 85 percent of bicycle crashes do not involve a motor vehicle, according to national studies of bicycle safety. These crashes typically involve falls or collisions with stationary objects, other cyclists or pedestrians.

Crashes involving motor vehicles tend to have much more serious injuries and may point to engineering solutions at certain locations where an identified design deficiency might be correctable.

The available accident data for unincorporated Washington County showed some roadways where more than one crash had occurred over a three-year reporting period. However, there was no data indicating that facility design played a role in the reported accidents. While accident trends will need to continue to be monitored over time to

determine if system design deficiencies exist, the available accident data for unincorporated Washington County did not show such a correlation.

III. Anecdotal Information

Many jurisdictions lack empirical data for their bicycle systems. While Washington County is fortunate to have some of this type of information, it does not present a complete picture of bicycle system needs. As discussed below, as part of the 2020

Transportation Plan development process, several methods were employed to gather anecdotal input concerning bicycle system needs in the County.



Survey Instrument

A mode-specific survey was prepared and distributed to solicit user input regarding the bicycle system. While not a true scientific survey, the information that was gathered is nevertheless useful and identified a number of areas of concern. In reviewing the survey information it is recognized that the survey sampled a relatively narrow segment of the County's population, primarily targeting Type A cyclists that already use the system and cycle regularly. Identified concerns include system completion, maintenance (more frequent sweeping/cleaning of bike lanes), increased efforts at motorist and bicyclist education. The survey also identified bicycle trip characteristics (length, frequency, time of year and purpose) but this data is more reflective of the targeted survey respondents than the population as a whole.

Public Open Houses

In addition to the survey, 11 public open houses were held to solicit public opinion on development and needs for bicycle travel within the County. This effort included a presentation of maps identifying the location of major streets likely to have bicycle facilities and predominant land use types. Opinion was solicited regarding whether improvements should be focused to serve specific types of land uses (commercial, recreation facilities, schools, or employment areas). Because of trip length and the diverse mixture of land uses around the County, the consensus was that the system should be designed to serve all types of land uses conveniently. The best means for achieving this goal is completion of the bicycle network on the major street system.



Other Citizen/Jurisdiction Input

Additional citizen and input from other jurisdictions was gathered throughout the 2020 Transportation Plan development process. This included submission of comments by the public and input from other jurisdictions through an Intergovernmental Coordinating Committee (that met monthly for over a year) and from a 23 member Citizen Advisory Committee (which included one bicycle advocate member and nine additional members that expressed specific interest in bicycling as a transportation mode). Comments from these sources were given careful consideration in developing a list of bicycle system needs.

IV. Summary and Conclusions

Based upon consideration of all of the factors discussed above, the following recommendations have been developed to address identified bicycle system needs:

- Capital improvements should focus on provision of bikeways (five to six foot wide, striped and stenciled bicycle lanes, striped, paved shoulders of at least four feet in width and 14 foot wide outside travel lanes in areas of constrained right-of-way) on the entire urban major street network (collectors and arterials). Identified gaps in the system should be targeted for completion to maximize system connectivity.
- Outside of the UGB, sparsity of population and length of roadway segments make coverage of the entire arterial and collector road network with bikeways impracticable. However, capital bikeway improvements based on a strategic system of bikeways should be identified to provide connections between cities and activity centers. Other factors to be considered in identifying the rural bicycle system should include terrain, spacing between facilities and the presence of low traffic volume, paved roadways that would be appropriate as alternate cycling routes and where widening would not be required due to low traffic volumes (<3000 ADT).
- The Plan should support education efforts for motorists and bicyclists to increase bicyclist skills, increase driver awareness and courtesy and promote compliance with traffic laws, and decrease unsafe driver and cyclist behavior. This could include support for non-capital improvements such as signage to alert motorists to the presence of bicyclists, support for bicycle safety rodeos that are conducted by the County Sheriff's Department, and education efforts in schools and by other agencies.

- The Plan should support efforts to improve the portion of the bicycle system that is not a part of the major street network (this will be especially beneficial to Type B and C cyclists). This includes supporting development of the off-street trail system as well as developing a program to identify safe routes to schools on low traffic volume, low speed local and neighborhood streets. Where appropriate, design input for off-street trails should be provided to the responsible agencies. Crossings and intersections are of particular importance. Additionally, non-capital improvements should include identification and signing of a network of low traffic volume, low speed local and neighborhood streets that would make alternative through-routes to those provided on the major street system.
- A regular maintenance program for inspection and cleaning of bikeways should be supported by the 2020 Transportation Plan. Well-maintained striping and bikeway surface conditions are critical for users of the system. Monitoring and responding to operational issues such as signal sensitivity are also important.
- Connections to transit should be given consideration when undertaking prioritization through a capital improvement programming effort.
- Mode-share, bicycle count and accident data should be developed and monitored over time to assess future improvement locations, system performance and level of use.
- The bicycle parking standards in the Community Development Code are adequate for supporting the bicycle system and shall continue to apply.
- The local street connectivity provisions in the Plan and Community Development Code are important for the bicycle system and shall continue to apply.



Figure 2.3A

Bicycle Facility Gap Analysis

- Major Roads
- - - County Line
- Urban Growth Boundary

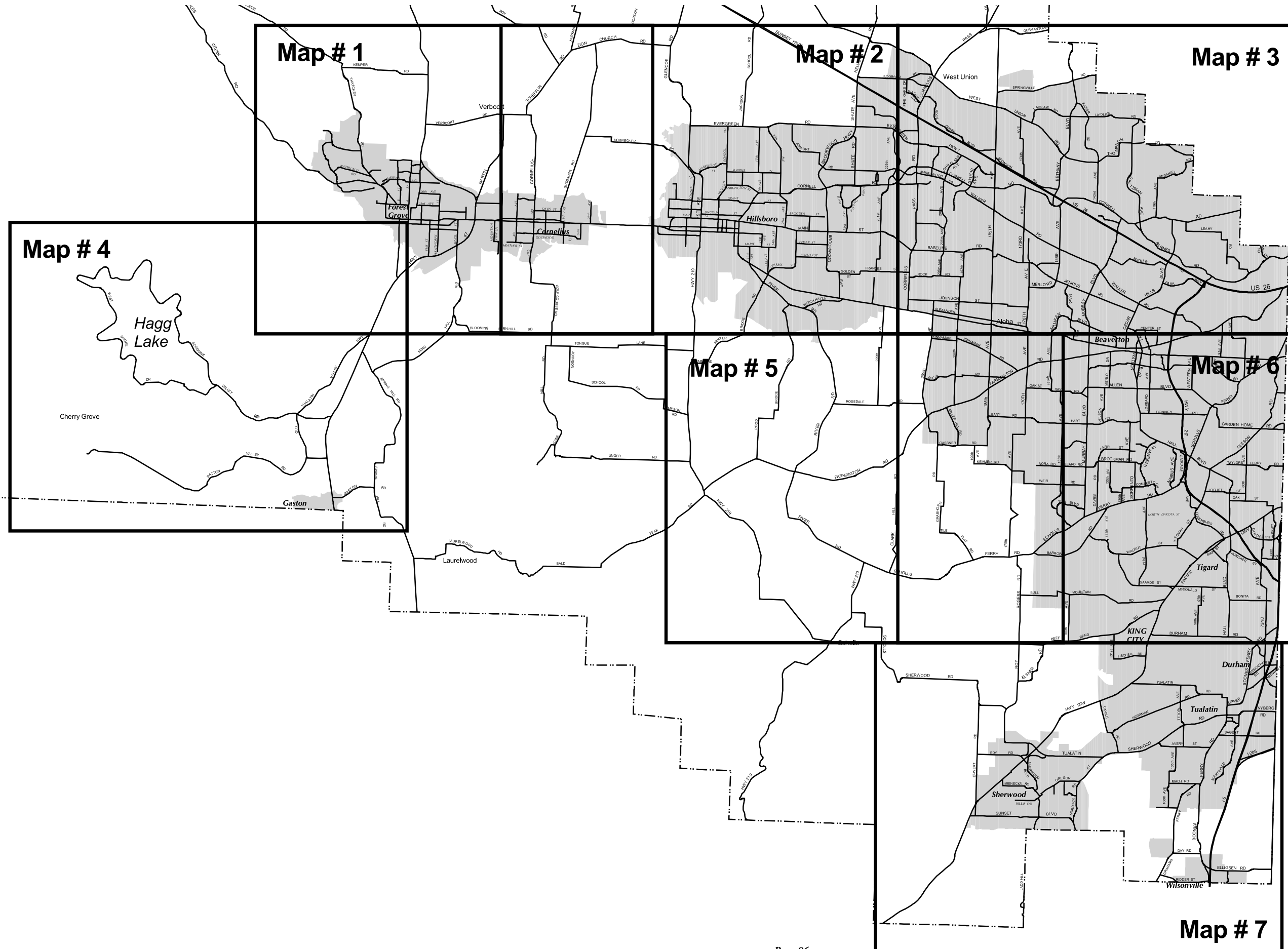







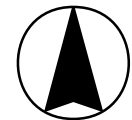


Figure 2.3B

Bicycle Facility Gap Analysis



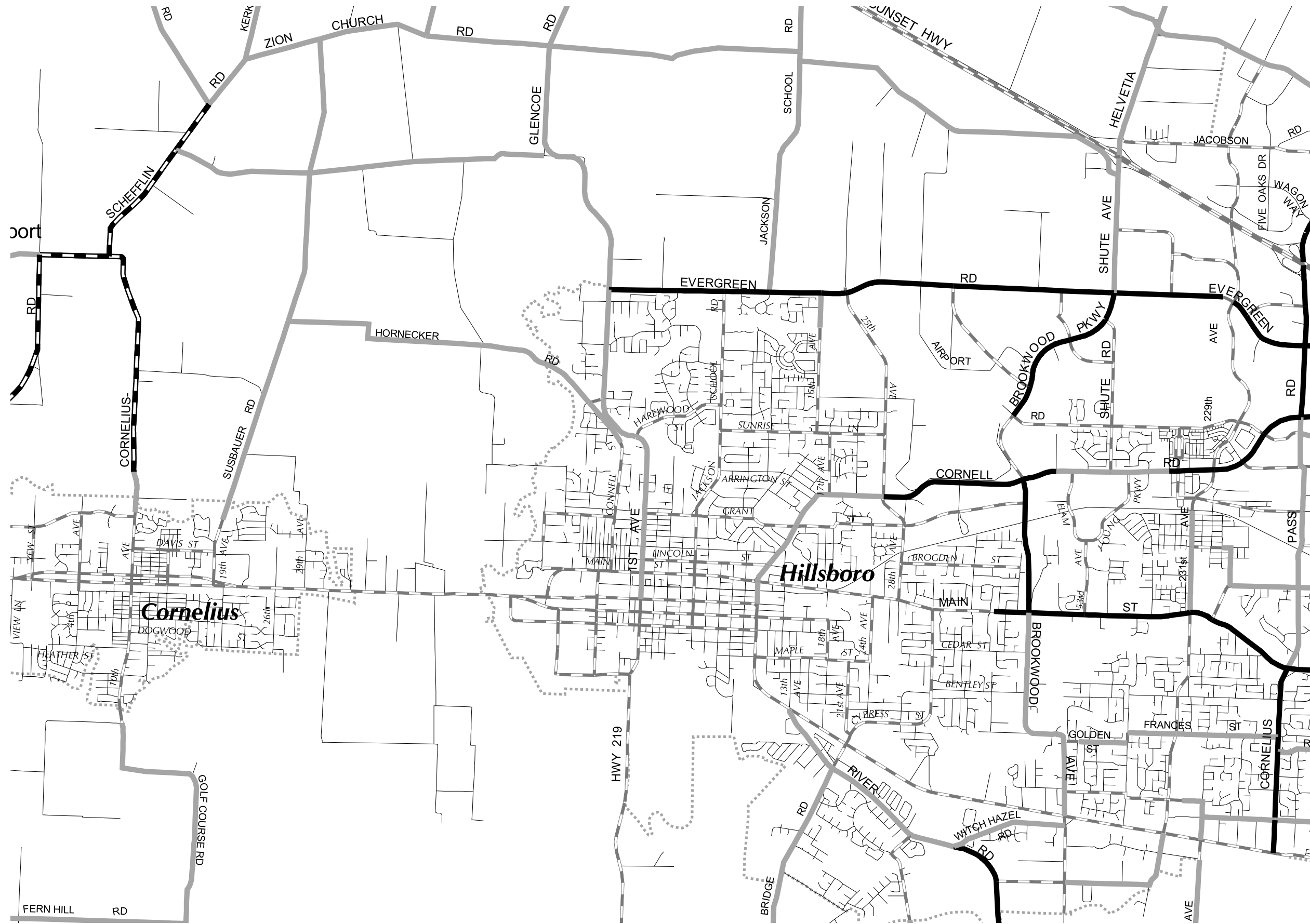
-  No Bike Facility
Collector or Arterials under Washington County Jurisdiction
-  Shoulder suitable for bikes
- Minimum 4 feet
-  Bike Lane - 5 to 6 feet
-  Other Jurisdiction
- Bike facility status unknown or not shown
-  Urban Growth Boundary
-  Local Streets
-  County Line



NOTE:
Bicycle facilities are shown for roads under county jurisdiction only. These include roads with paved shoulders at least 4 feet in width or 5 to 6 feet paved, striped & stenciled bicycle lanes when such facilities are present on both sides of the road. The bike facilities shown are existing or committed facilities (funded and to be constructed by 2006).

Figure 2.3C

Bicycle Facility Gap Analysis



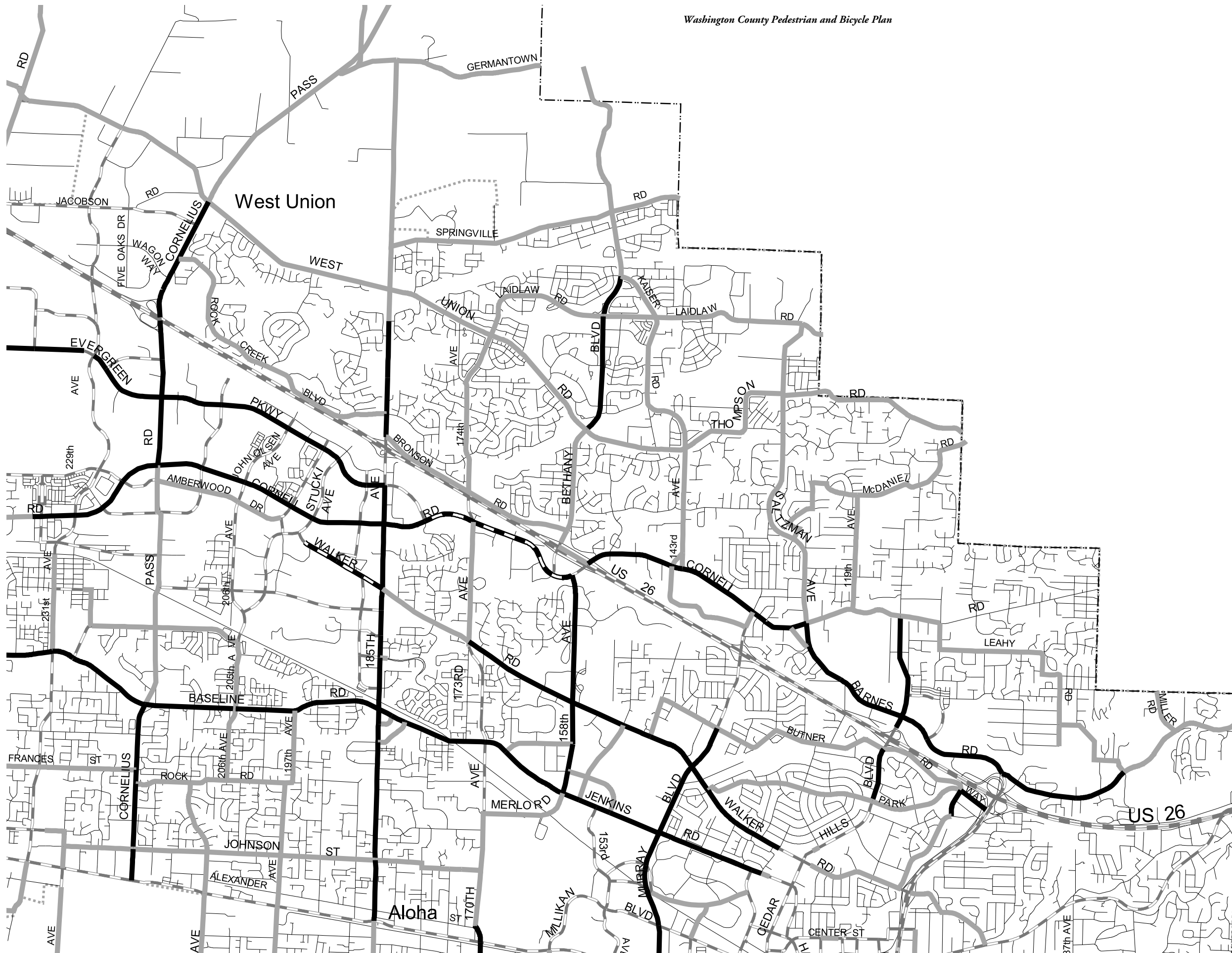
- No Bike Facility
Collector or Arterials under Washington County Jurisdiction
- Shoulder suitable for bikes
- Minimum 4 feet
- Bike Lane - 5 to 6 feet
- Other Jurisdiction
- Bike facility status unknown or not shown
- Urban Growth Boundary
- Local Streets
- County Line










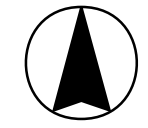
NOTE:
Bicycle facilities are shown for roads under county jurisdiction only. These include roads with paved shoulders at least 4 feet in width or 5 to 6 feet paved, striped & stenciled bicycle lanes when such facilities are present on both sides of the road. The bike facilities shown are existing or committed facilities (funded and to be constructed by 2006).

Figure 2.3D

Bicycle Facility Gap Analysis



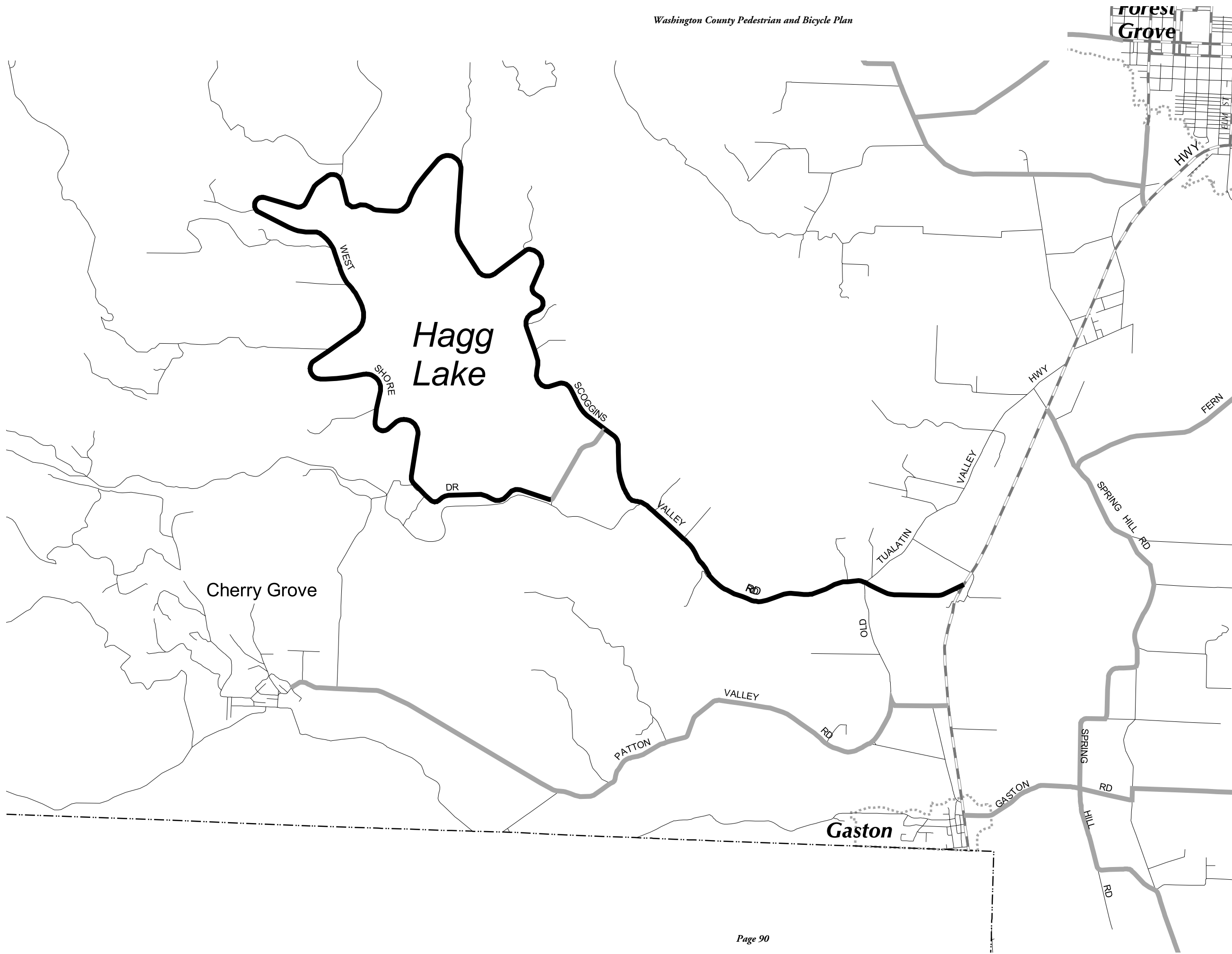
-  No Bike Facility
Collector or Arterials under
Washington County Jurisdiction
-  Shoulder suitable for bikes
- Minimum 4 feet
-  Bike Lane - 5 to 6 feet
-  Other Jurisdiction
- Bike facility status unknown
or not shown
-  Urban Growth Boundary
-  Local Streets
-  County Line










NOTE:
Bicycle facilities are shown for roads under county jurisdiction only. These include roads with paved shoulders at least 4 feet in width or 5 to 6 feet paved, striped & stenciled bicycle lanes when such facilities are present on both sides of the road. The bike facilities shown are existing or committed facilities (funded and to be constructed by 2006).

Figure 2.3E

Bicycle Facility Gap Analysis



-  No Bike Facility
Collector or Arterials under Washington County Jurisdiction
-  Shoulder suitable for bikes
- Minimum 4 feet
-  Bike Lane - 5 to 6 feet
-  Other Jurisdiction
- Bike facility status unknown or not shown
-  Urban Growth Boundary
-  Local Streets
-  County Line



NOTE:
Bicycle facilities are shown for roads under county jurisdiction only. These include roads with paved shoulders at least 4 feet in width or 5 to 6 feet paved, striped & stenciled bicycle lanes when such facilities are present on both sides of the road. The bike facilities shown are existing or committed facilities (funded and to be constructed by 2006).

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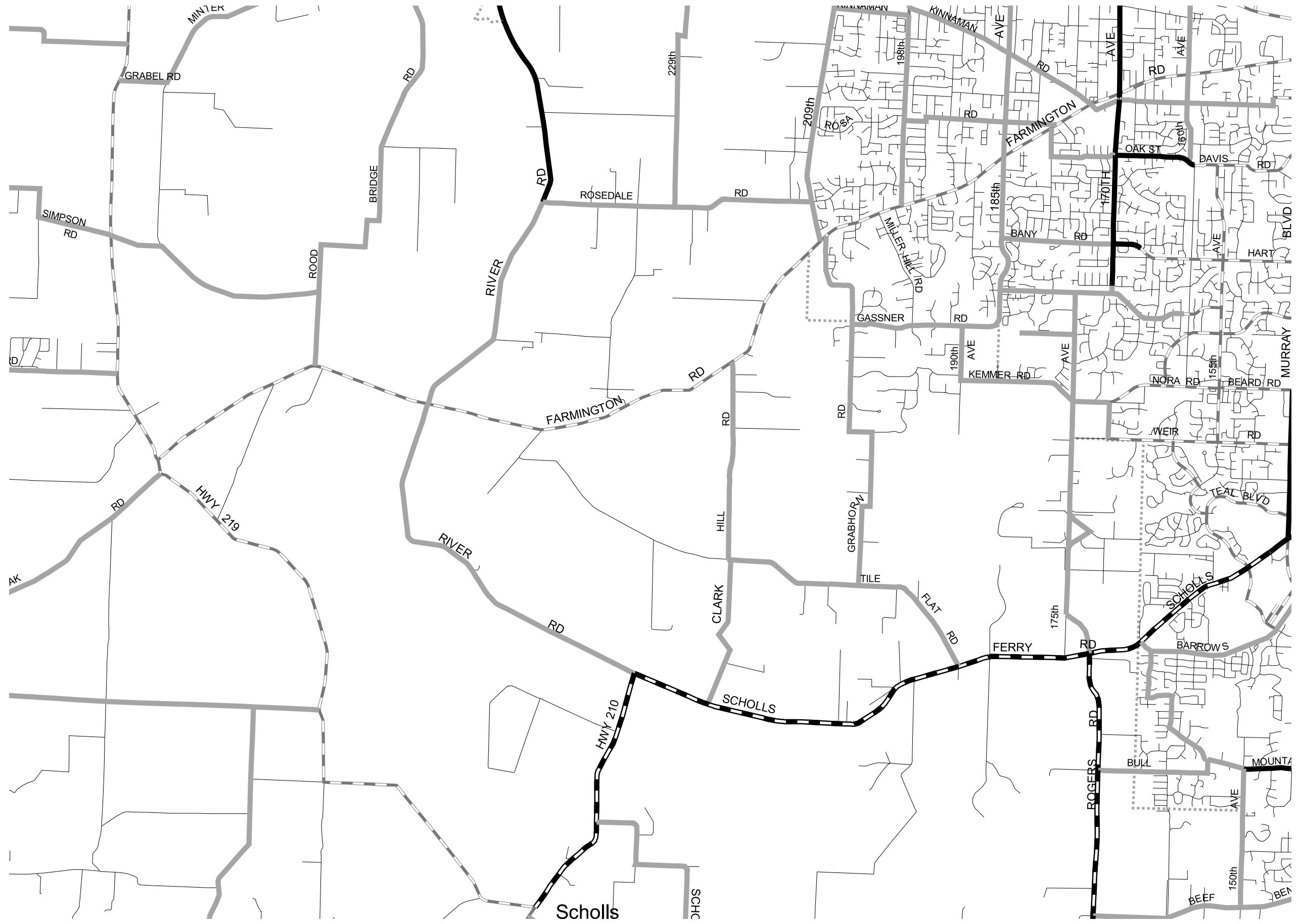









Figure 2.3F

Bicycle Facility Gap Analysis

-  No Bike Facility
Collector or Arterials under Washington County Jurisdiction
-  Shoulder suitable for bikes
- Minimum 4 feet
-  Bike Lane - 5 to 6 feet
-  Other Jurisdiction
- Bike facility status unknown or not shown
-  Urban Growth Boundary
-  Local Streets
-  County Line



NOTE:
Bicycle facilities are shown for roads under county jurisdiction only. These include roads with paved shoulders at least 4 feet in width or 5 to 6 feet paved, striped & stenciled bicycle lanes when such facilities are present on both sides of the road. The bike facilities shown are existing or committed facilities (funded and to be constructed by 2006).

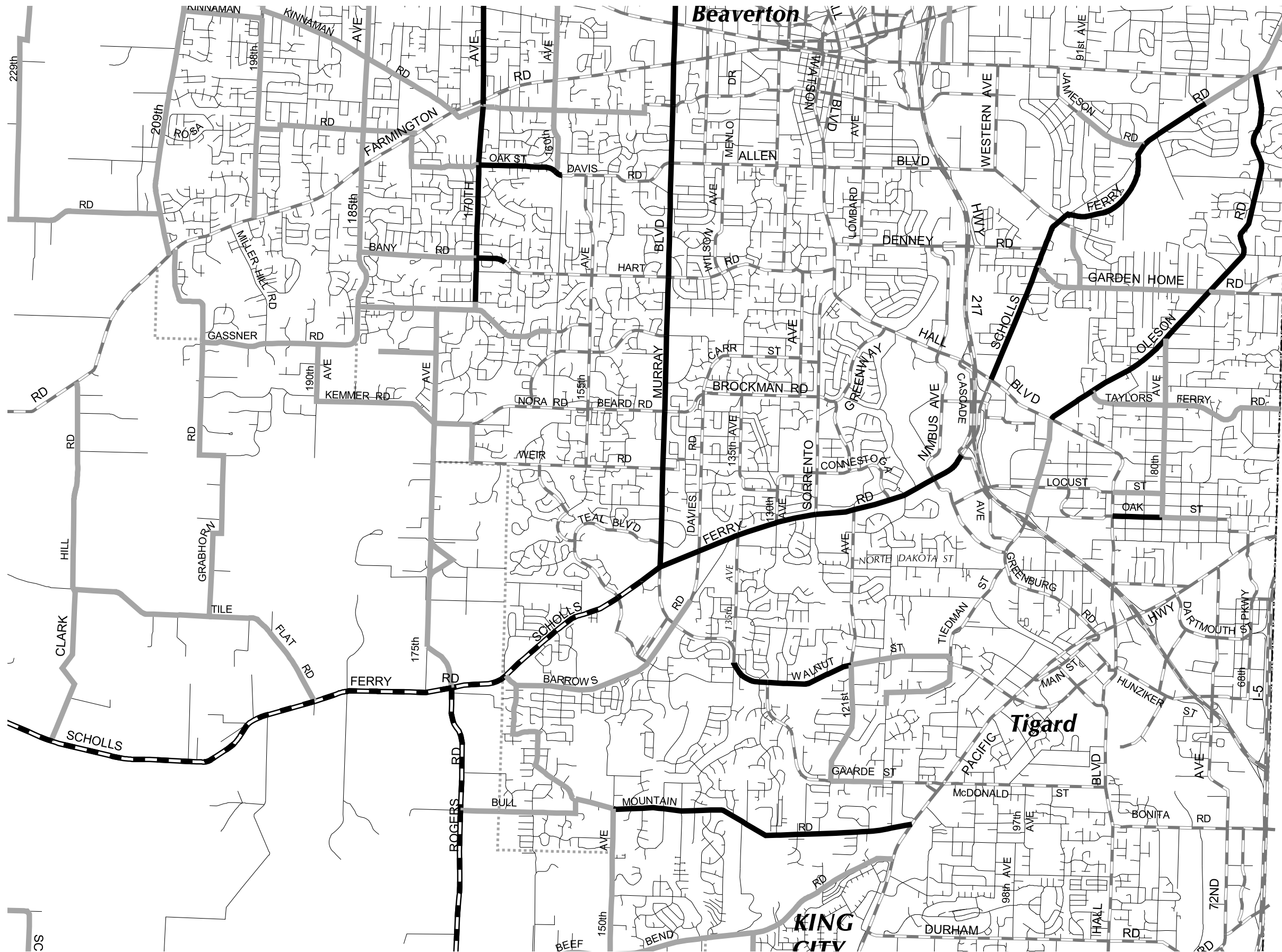









Figure 2.3G

Bicycle Facility Gap Analysis

-  No Bike Facility
Collector or Arterials under Washington County Jurisdiction
-  Shoulder suitable for bikes
- Minimum 4 feet
-  Bike Lane - 5 to 6 feet
-  Other Jurisdiction
- Bike facility status unknown or not shown
-  Urban Growth Boundary
-  Local Streets
-  County Line



NOTE:
Bicycle facilities are shown for roads under county jurisdiction only. These include roads with paved shoulders at least 4 feet in width or 5 to 6 feet paved, striped & stenciled bicycle lanes when such facilities are present on both sides of the road. The bike facilities shown are existing or committed facilities (funded and to be constructed by 2006).

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TSG 04/29/2002

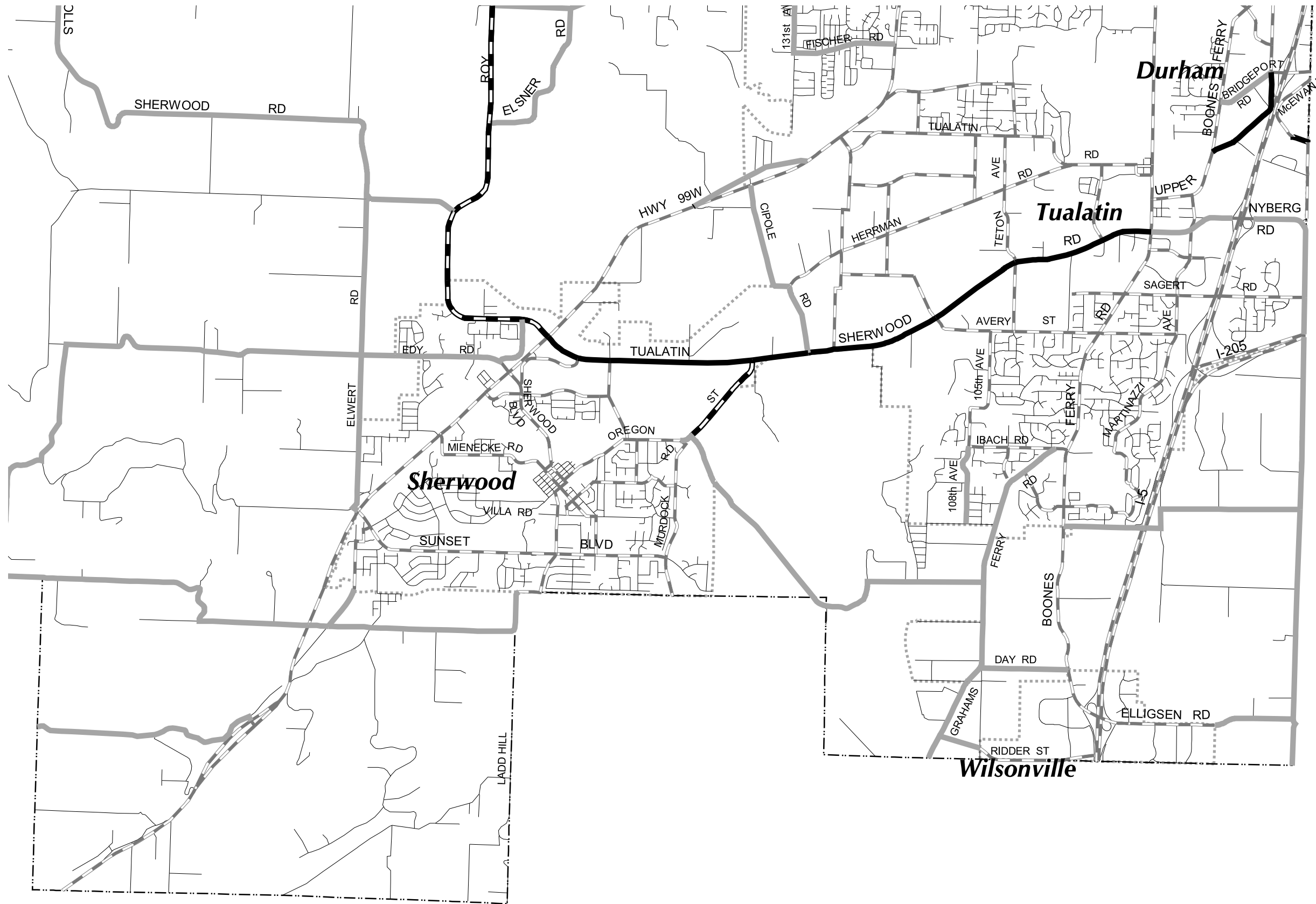
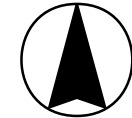


Figure 2.3H

Bicycle Facility Gap Analysis

- No Bike Facility
Collector or Arterials under Washington County Jurisdiction
- Shoulder suitable for bikes
- Minimum 4 feet
- Bike Lane - 5 to 6 feet
- Other Jurisdiction
- Bike facility status unknown or not shown
- Urban Growth Boundary
- Local Streets
- County Line



NOTE:
Bicycle facilities are shown for roads under county jurisdiction only. These include roads with paved shoulders at least 4 feet in width or 5 to 6 feet paved, striped & stenciled bicycle lanes when such facilities are present on both sides of the road. The bike facilities shown are existing or committed facilities (funded and to be constructed by 2006).

The following two tables were developed to identify proposed rural and urban interim bikeway improvements that could be constructed over the course of the 2020 Transportation Plan's planning horizon. The tables include the geographic limits of each potential improvement and the total cost associated with each project.

**Table 2.3 Interim Bikeway Improvement Rough Cost Estimates- Rural
(From Technical Appendix C-8 Attachment B)**

STREET	FROM	TO	Fun. Class.	Feet	Paving	Storm Piping	Total Project
WEST UNION RD	UGB	JACKSON SCHOOL RD	Arterial	1,120.42	\$112,042	\$98,597	\$210,639
WEST UNION RD	JACKSON SCHOOL RD	JACKSON QUARRY RD	Arterial	3,987.84	\$398,784	\$350,930	\$749,714
CORNELIUS PASS RD	OLD CORNELIUS PASS RD	COUNTY LINE	Arterial	4,083.54	\$408,354	\$359,352	\$767,706
CORNELIUS PASS RD	GERMANTOWN RD	OLD CORNELIUS PASS RD	Arterial	1,025.14	\$102,514	\$90,212	\$192,726
WEST UNION RD	JACKSON QUARRY RD	HELVETIA RD	Arterial	11,143.05	\$1,114,305	\$980,588	\$2,094,893
ZION CHURCH RD	SUSBAUER RD	GORDON RD	Arterial	3,860.06	\$386,006	\$339,685	\$725,691
WEST UNION RD	HELVETIA RD	UGB	Arterial	2,546.55	\$254,655	\$224,096	\$478,752
GLENCOE RD	ZION CHURCH RD	SUNSET HWY	Arterial	6,797.69	\$679,769	\$598,197	\$1,277,966
ZION CHURCH RD	GORDON RD	GLENCOE RD	Arterial	4,337.06	\$433,706	\$381,661	\$815,366
CORNELIUS-SCHEFFLIN RD	ROY RD	KERKMAN RD	Arterial	2,033.11	\$203,311	\$178,914	\$382,225
HELVETIA RD	UGB	WEST UNION RD	Arterial	4,118.31	\$411,831	\$362,411	\$774,242
CORNELIUS PASS RD	WEST UNION RD	GERMANTOWN RD	Arterial	6,909.34	\$690,934	\$608,022	\$1,298,956
VERBOORT RD	HWY 47	MARTIN RD	Arterial	8,533.25	\$853,325	\$750,926	\$1,604,250
GLENCOE RD	EVERGREEN RD	ZION CHURCH RD	Arterial	9,779.69	\$977,969	\$860,613	\$1,838,582
GOLF COURSE RD	BLOOMING-FERN HILL RD	LaFOLLETT RD	Arterial	9,323.53	\$932,353	\$820,471	\$1,752,824
GOLF COURSE RD	TONGUE LANE	BLOOMING-FERN HILL RD	Arterial	1,318.84	\$131,884	\$116,058	\$247,942
TONGUE LN	GOLF COURSE RD	JOHNSON SCHOOL RD	Arterial	2,040.52	\$204,052	\$179,566	\$383,619
TONGUE LN	JOHNSON SCHOOL RD	HWY 219	Arterial	13,829.99	\$1,382,999	\$1,217,039	\$2,600,038
RIVER RD	FARMINGTON RD	ROSEDALE RD	Arterial	8,774.37	\$877,437	\$772,145	\$1,649,582
RIVER RD	FARMINGTON RD	HWY 210	Arterial	14,746.39	\$1,474,639	\$1,297,682	\$2,772,321
ROSEDALE RD	RIVER RD	229TH AVE	Collector	4,768.75	\$476,875	\$419,650	\$896,525
ROSEDALE RD	229TH AVE	209TH AVE	Collector	5,036.81	\$503,681	\$443,239	\$946,919
Total Cost							\$24,461,478

**Table 2.4 Interim Bikeway Improvement Rough Cost Estimates- Urban
(From Technical Appendix C-8 Attachment B)**

STREET	FROM	TO	Fun. Class.	Feet	Paving	Storm Piping	Total Project
WEST UNION RD	GLENCOE RD	UGB	Arterial	5,375.31	\$537,531	\$473,028	\$1,010,559
WEST UNION RD	W. UGB	CORNELIUS PASS RD	Arterial	5,927.10	\$592,710	\$521,585	\$1,114,296
SPRINGVILLE RD	KAISER RD	COUNTY LINE	Arterial	2,591.24	\$259,124	\$228,029	\$487,153
HELVETIA RD	SUNSET HWY	JACOBSON RD	Arterial	561.928	\$56,193	\$49,450	\$105,642
CORNELIUS PASS RD	ROCK CREEK BLVD	WEST UNION RD	Arterial	2,380.61	\$238,061	\$209,494	\$447,555
CORNELIUS PASS RD	STATE JUR	ROCK CREEK BLVD	Arterial	1,271.80	\$127,180	\$111,918	\$239,098
SHUTE RD	EVERGREEN RD	SUNSET HWY	Arterial	4,721.64	\$472,164	\$415,505	\$887,669
LAIDLAW RD	173RD AVE	WEST UNION RD	Arterial	2,192.93	\$219,293	\$192,978	\$412,271
SALTZMAN RD	THOMPSON RD E. LEG	THOMPSON RD W. LEG	Arterial	64.25	\$6,425	\$5,654	\$12,079
THOMPSON RD	SALTZMAN RD	COUNTY LINE	Arterial	7,061.51	\$706,151	\$621,413	\$1,327,563
THOMPSON RD	143RD AVE COLLECTOR CONNELL AVE	SALTZMAN RD	Arterial	5,060.17	\$506,017	\$445,295	\$951,312
CONNELL AVE	BURTON ST	GLENCOE RD	Arterial	52.857	\$5,286	\$4,651	\$9,937
SALTZMAN RD	W. UGB	THOMPSON RD	Arterial	4,320.78	\$432,078	\$380,229	\$812,306
GALES CREEK RD	61ST VE	FOREST GALE DR	Arterial	3,143.12	\$314,312	\$276,594	\$590,906
CORNELL RD	ARRINGTON RD	48TH AVE	Arterial	3,964.70	\$396,470	\$348,893	\$745,363
CORNELL RD	CORNELIUS JUR.	25TH AVE	Arterial	2,300.82	\$230,082	\$202,473	\$432,555
CORNELIUS-SCHEFFLIN RD	E ST	N. UGB	Arterial	513.901	\$51,390	\$45,223	\$96,613
PACIFIC AVE	END OF CURVE	END OF CURVE	Arterial	443.431	\$44,343	\$39,022	\$83,365
CORNELL RD	SALTZMAN RD	119TH AVE	Arterial	1,785.75	\$178,575	\$157,146	\$335,722
1ST AVE	BASELINE ST	JACKSON ST	Arterial	1,853.92	\$185,392	\$163,145	\$348,538
173RD AVE	WALKER RD	CORNELL RD	Arterial	4,407.58	\$440,758	\$387,867	\$828,625
10TH AVE	BASELINE ST	MAIN ST	Arterial	782.178	\$78,218	\$68,832	\$147,049
173RD AVE	END OF MSTIP PROJECT	WALKER RD	Arterial	195.927	\$19,593	\$17,242	\$36,834
185TH-BASELINE JUG HANDLE	185TH AVE	BASELINE RD	Arterial	692.489	\$69,249	\$60,939	\$130,188
MILLER RD	COUNTY LINE	BARNES RD	Arterial	1,692.78	\$169,278	\$148,964	\$318,242
RIVER RD	TUALATIN VALLEY HWY	MINTER BRIDGE RD	Arterial	2,603.98	\$260,398	\$229,150	\$489,548
CEDAR HILLS BLVD	BEAVERTON JUR.	HUNTINGTON AVE	Arterial	274.932	\$27,493	\$24,194	\$51,687
RIVER RD	MINTER BRIDGE RD	WITCH HAZEL RD	Arterial	5,193.34	\$519,334	\$457,014	\$976,349
JENKINS RD	EDGEMOOR AVE	BEAVERTON JUR.	Arterial	317.248	\$31,725	\$27,918	\$59,643
MINTER BRIDGE RD	S. UGB	RIVER RD	Arterial	4,469.80	\$446,980	\$393,342	\$840,322
WALKER RD	HWY 217 BEAVERTON-HILLSDALE HWY	CANYON RD	Arterial	3,708.76	\$370,876	\$326,371	\$697,247
SCHOLLS FERRY RD	COUNTY LINE	COUNTY LINE	Arterial	2,772.13	\$277,213	\$243,947	\$521,160

**Table 2.4 Interim Bikeway Improvement Rough Cost Estimates- Urban
(From Technical Appendix C-8 Attachment B)**

STREET	FROM	TO	Fun. Class.	Feet	Paving	Storm Piping	Total Project
BANY RD	185TH AVE	170TH AVE	Arterial	4,030.48	\$403,048	\$354,683	\$757,731
92ND AVE	GARDEN HOME RD	ALLEN BLVD	Arterial	2,114.51	\$211,451	\$186,077	\$397,528
GARDEN HOME RD	92ND AVE	71ST AVE	Arterial	5,335.94	\$533,594	\$469,563	\$1,003,157
170TH AVE	RIGERT RD	SARALA ST	Arterial	288.334	\$28,833	\$25,373	\$54,207
RIGERT RD	175TH AVE	170TH AVE	Arterial	1,329.00	\$132,900	\$116,952	\$249,852
175TH AVE	RAVINE DR	RIGERT RD	Arterial	1,508.25	\$150,825	\$132,726	\$283,551
175TH AVE	KEMMER RD	RAVINE DR	Arterial	2,422.09	\$242,209	\$213,144	\$455,353
KEMMER RD	175TH AVE	170TH AVE	Arterial	1,316.87	\$131,687	\$115,884	\$247,571
175TH AVE	WEIR RD	KEMMER RD	Arterial	1,328.72	\$132,872	\$116,927	\$249,799
GAARDE ST	121ST AVE	115TH AVE	Arterial	1,817.90	\$181,790	\$159,975	\$341,766
BEEF BEND RD	131ST AVE	HWY 99W	Arterial	5,582.35	\$558,235	\$491,247	\$1,049,482
BEEF BEND RD	150TH AVE UPPER BOONES FERRY RD	131ST AVE	Arterial	4,998.35	\$499,835	\$439,855	\$939,690
BRIDGEPORT RD		72ND AVE	Arterial	2,049.70	\$204,970	\$180,373	\$385,343
NYBERG ST	I-5 ON-RAMPS	65TH AVE	Arterial	1,619.27	\$161,927	\$142,496	\$304,423
TUALATIN SHERWOOD RD	BOONES FERRY RD	I-5 ON-RAMPS	Arterial	2,886.01	\$288,601	\$253,969	\$542,570
65TH AVE	SAGERT RD	NYBERG RD	Arterial	2,596.75	\$259,675	\$228,514	\$488,188
OREGON ST	MURDOCK RD	TONQUIN RD	Arterial	406.159	\$40,616	\$35,742	\$76,358
ELWERT RD	HWY 99W	UGB	Arterial	3,239.28	\$323,928	\$285,057	\$608,985
NORTH AVE	MOUNTAINDALE RD	SHADYBROOK RD	Collector	5,000.70	\$500,070	\$440,062	\$940,132
GLENCOE RD	WEST UNION RD	NORTH AVE	Collector	1,124.97	\$112,497	\$98,997	\$211,494
LAIDLAW RD	KAISER RD	SALTZMAN RD	Collector	5,514.98	\$551,498	\$485,318	\$1,036,815
LAIDLAW RD	SALTZMAN RD	COUNTY LINE	Collector	896.054	\$89,605	\$78,853	\$168,458
15TH AVE	HILLSBORO JUR. ?	EVERGREEN RD	Collector	1,205.65	\$120,565	\$106,097	\$226,662
SALTZMAN RD	THOMPSON RD W. LEG	LAIDLAW RD	Collector	2,861.43 11,094.8	\$286,143 \$1,109,4	\$251,806	\$537,950
ROCK CREEK BLVD	CORNELIUS PASS RD	185TH AVE	Collector	6	86	\$976,348	\$2,085,834
THATCHER RD	NO. UGB	DAVID HILLD	Collector	4,809.24	\$480,924	\$423,213	\$904,138
DAVID HILL RD	PROPOSED NEW ROAD	THATCHER RD ARTERIAL CONNELL AVE	Collector	3,107.48	\$310,748	\$273,458	\$584,206
CONNELL AVE	HORNECKER RD	AVE	Collector	131.7	\$13,170	\$11,590	\$24,760
HORNECKER RD	W. UGB	CONNELL AVE	Collector	2,843.71	\$284,371	\$250,246	\$534,617
THATCHER RD	DAVID HILL RD	GALES CREEK RD	Collector	3,082.62	\$308,262	\$271,271	\$579,533
WATERCREST RD	VISTA DR	THATCHER RD	Collector	1,792.31	\$179,231	\$157,723	\$336,954

**Table 2.4 Interim Bikeway Improvement Rough Cost Estimates- Urban
(From Technical Appendix C-8 Attachment B)**

STREET	FROM	TO	Fun. Class.	Feet	Paving	Storm Piping	Total Project
MCDANIEL RD	119TH AVE	COUNTY LINE PROPOSED	Collector	5,082.87	\$508,287	\$447,292	\$955,579
WILLAMINA AVE	MAIN ST	COLLECTOR	Collector	2,824.90	\$282,490	\$248,591	\$531,081
THATCHER RD	DAVID HILL RD	GALES CREEK RD	Collector	994.065	\$99,407	\$87,478	\$186,884
AMBERWOOD DR	JOHN OLSEN AVE	COMPTON RD	Collector	1,747.76	\$174,776	\$153,802	\$328,578
BRONSON RD	185TH AVE	BETHANY BLVD	Collector	7,643.07	\$764,307	\$672,590	\$1,436,896
McDANIEL-126TH-WALKER- WOODROSE-128	SALTZMAN RD	119TH AVE	Collector	4,747.09	\$474,709	\$417,744	\$892,453
SUSBAUER RD	CONELIUS JUR.	N. UGB	Collector	670.602	\$67,060	\$59,013	\$126,073
143RD AVE	CORNELL RD	PROJECT	Collector	576.702	\$57,670	\$50,750	\$108,420
GOFF RD	GOFF PL	E ST	Collector	909.359	\$90,936	\$80,024	\$170,959
HAWTHORNE ST	23RD AVE	26TH AVE	Collector	1,228.45	\$122,845	\$108,104	\$230,948
DOGWOOD ST	228TH AVE	227TH AVE	Collector	310.128	\$31,013	\$27,291	\$58,304
119TH AVE	CORNELL RD	McDANIEL RD	Collector	4,219.52	\$421,952	\$371,318	\$793,270
RITCHEY RD	W. UGB	E ST	Collector	2,403.99	\$240,399	\$211,551	\$451,949
227TH AVE	QUATAMA RD	DOGWOOD ST	Collector	1,357.20	\$135,720	\$119,433	\$255,153
SCIENCE PARK DR	CORNELL RD	MURRAY BLVD	Collector	4,326.63	\$432,663	\$380,744	\$813,407
QUATAMA RD	CORNELIUS PASS RD	206TH AVE	Collector	3,181.18	\$318,118	\$279,944	\$598,062
BARNES RD	CORNELL RD	SALTZMAN RD	Collector	991.888	\$99,189	\$87,286	\$186,475
107TH AVE	LEAHY RD	CORNELL RD	Collector	978.05	\$97,805	\$86,068	\$183,873
LEAHY RD	107TH AVE	90TH AVE	Collector	5,244.38	\$524,438	\$461,506	\$985,944
90TH AVE	LEAHY RD E. LEG	LEAHY RD W. LEG	Collector	1,797.77	\$179,777	\$158,203	\$337,980
DOWNING-BUTNER	MEADOW DR	MURRAY BLVD	Collector	2,296.63	\$229,663	\$202,103	\$431,766
MEADOW DR	WALKER RD	DOWNING RD	Collector	1,443.49	\$144,349	\$127,027	\$271,377
BASELINE RD	JENKINS RD	158TH AVE	Collector	2,568.04	\$256,804	\$225,987	\$482,791
FRANCES ST	239TH AVE	CORNELIUS PASS RD	Collector	5,283.38	\$528,338	\$464,937	\$993,275
LEAHY RD	90TH AVE	BARNES RD	Collector	3,589.85	\$358,985	\$315,907	\$674,892
FRANCES ST	52ND AVE	239TH AVE	Collector	1,710.57	\$171,057	\$150,530	\$321,587
KOLL PKY	JAY ST	WALKER RD KOLL PWKY	Collector	2,349.54	\$234,954	\$206,760	\$441,714
JAY ST	158TH AVE	EXTENSION	Collector	734.126	\$73,413	\$64,603	\$138,016
206TH AVE	ROCK RD	BASELINE RD	Collector	2,698.73	\$269,873	\$237,488	\$507,360
ROCK RD	206TH AVE	198TH AVE	Collector	2,156.11	\$215,611	\$189,738	\$405,348
ROCK RD	ANTHONY DRIVE	206TH AVE	Collector	1,360.87	\$136,087	\$119,756	\$255,843

**Table 2.4 Interim Bikeway Improvement Rough Cost Estimates- Urban
(From Technical Appendix C-8 Attachment B)**

STREET	FROM	TO	Fun. Class.	Feet	Paving	Storm Piping	Total Project
ROCK RD	CORNELIUS PASS RD	ANTHONY DR	Collector	2,054.17	\$205,417	\$180,767	\$386,185
BUTNER RD	CEDAR HILLS BLVD	PARK WAY	Collector	3,453.80	\$345,380	\$303,934	\$649,313
KOLL PKWY EXTENSION	JENKINS RD	JAY ST	Collector	895.597	\$89,560	\$78,813	\$168,372
PARK WAY	WALKER RD	BUTNER RD	Collector	9,888.31	\$988,831	\$870,171	\$1,859,002
JAY ST	KOLL PKWY EXTENSION	JENKINS RD	Collector	1,917.04	\$191,704	\$168,699	\$360,403
JOHNSON ST	FRED MEYER ACCESS	229TH AVE	Collector	717.803	\$71,780	\$63,167	\$134,947
229TH AVE	JOHNSON ST E. LEG	JOHNSON ST W. LEG	Collector	551.444	\$55,144	\$48,527	\$103,671
JOHNSON ST	229TH AVE	CORNELIUS PASS RD	Collector	2,555.54	\$255,554	\$224,888	\$480,442
ANTHONY DR	JOHNSON ST	ROCK RD	Collector	2,739.12	\$273,912	\$241,042	\$514,954
229TH AVE	TUALATIN VALLEY HWY	JOHNSON ST E. LEG	Collector	805.273	\$80,527	\$70,864	\$151,391
JOHNSON ST	185TH AVE	174TH AVE	Collector	2,916.98	\$291,698	\$256,694	\$548,391
WITCH HAZEL RD	RIVER RD	247TH AVE	Collector	4,091.18	\$409,118	\$360,024	\$769,142
ROXBURY AVE	WALKER RD	MARLOW AVE	Collector	3,446.45	\$344,645	\$303,288	\$647,933
209TH AVE	TUALATIN VALLEY HWY	JOHNSON ST	Collector	1,526.32	\$152,632	\$134,317	\$286,949
TERMAN RD	SHANNON PL	HOCKEN AVE	Collector	1,610.43	\$161,043	\$141,718	\$302,760
TERMAN RD	MURRAY BLVD	SHANNON PL TUALATIN VALLEY	Collector	2,098.70	\$209,870	\$184,686	\$394,556
234TH AVE	DAVIS RD	HWY	Collector	1,918.08	\$191,808	\$168,791	\$360,599
DAVIS RD	247TH AVE	234TH AVE	Collector	2,971.64	\$297,164	\$261,504	\$558,669
SHANNON PL	MILLIKAN BLVD	TERMAN RD TUALATIN VALLEY	Collector	1,380.25	\$138,025	\$121,462	\$259,486
198TH AVE	KINNAMAN RD E. LEG	HWY	Collector	2,043.09	\$204,309	\$179,792	\$384,101
110TH AVE	CANYON RD BEAVERTON-HILLSDALE	CABOT ST	Collector	1,278.11	\$127,811	\$112,473	\$240,284
110TH AVE	HWY	CANYON RD	Collector	1,868.94	\$186,894	\$164,467	\$351,361
DIVISION ST	170TH AVE	END OF CUL-DE-SAC	Collector	384.86	\$38,486	\$33,868	\$72,354
160TH AVE	DIVISION ST	TUALATIN VALLE HWY	Collector	3,870.01	\$387,001	\$340,561	\$727,561
DIVISION ST	167TH AVE	160TH AVE	Collector	1,860.67	\$186,067	\$163,739	\$349,806
147TH AVE	DIVISION ST	6TH ST	Collector	302.159	\$30,216	\$26,590	\$56,806
DIVISION ST	160TH AVE	149TH AVE END OF EXISTING	Collector	3,095.52	\$309,552	\$272,406	\$581,957
DIVISION ST	FARMINGTON RD	STREET	Collector	724.94	\$72,494	\$63,795	\$136,289
198TH AVE	ROSA RD	KINNAMAN RD W. LEG	Collector	3,793.80	\$379,380	\$333,855	\$713,235
ROSA RD	198TH AVE	FARMINGTON RD	Collector	5,664.37	\$566,437	\$498,464	\$1,064,901
JAMIESON RD	BEAVERTON JUR.	SCHOLLS FERRY RD	Collector	2,658.81	\$265,881	\$233,975	\$499,857

**Table 2.4 Interim Bikeway Improvement Rough Cost Estimates- Urban
(From Technical Appendix C-8 Attachment B)**

STREET	FROM	TO	Fun. Class.	Feet	Paving	Storm Piping	Total Project
179TH AVE	OAK ST	FARMINGTON RD	Collector	1,035.54	\$103,554	\$91,128	\$194,682
OAK ST	179TH AVE	170TH AVE	Collector	2,339.04	\$233,904	\$205,835	\$439,739
160TH AVE	OAK ST	DIVISION ST	Collector	2,165.46	\$216,546	\$190,560	\$407,106
198TH AVE	FARMINGTON RD	ROSA RD	Collector	3,092.07	\$309,207	\$272,102	\$581,309
185TH AVE	RIGERT RD	BANY RD	Collector	2,012.12	\$201,212	\$177,066	\$378,278
RIGERT RD	185TH AVE	175TH AVE	Collector	2,704.26	\$270,426	\$237,975	\$508,400
RIGERT RD	170TH AVE	BEAVERTON JUR.	Collector	2,984.96	\$298,496	\$262,677	\$561,173
GRABHORN RD	GASSNER RD	FARMINGTON RD	Collector	3,900.95	\$390,095	\$343,283	\$733,378
185TH AVE	GASSNER RD	RIGERT RD	Collector	1,379.99	\$137,999	\$121,439	\$259,439
GASSNER RD	MILLER HILL RD	185TH AVE	Collector	5,125.88	\$512,588	\$451,077	\$963,665
80TH AVE	TAYLORS FERRY RD	OLESON RD	Collector	2,291.58	\$229,158	\$201,659	\$430,816
TAYLORS FERRY RD	WASHINGTON DR	80TH AVE	Collector	1,790.64	\$179,064	\$157,576	\$336,640
TAYLORS FERRY RD	80TH AVE	COUNTY LINE	Collector	4,241.16	\$424,116	\$373,222	\$797,339
KEMMER RD	UGB	175TH AVE	Collector	2,992.05	\$299,205	\$263,300	\$562,505
170TH AVE	WEIR RD	KEMMER RD	Collector	1,310.16	\$131,016	\$115,294	\$246,310
80TH AVE	LOCUST ST	TAYLORS FERRY RD	Collector	3,034.55	\$303,455	\$267,040	\$570,495
LOCUST ST	HALL BLVD	80TH AVE	Collector	1,705.58	\$170,558	\$150,091	\$320,648
80TH AVE	OAK ST	LOCUST ST	Collector	826.392	\$82,639	\$72,722	\$155,362
OAK ST	80TH AVE	74TH AVE	Collector	1,884.16	\$188,416	\$165,806	\$354,222
BARROWS RD	SCHOLLS FERRY RD	ROSHAK RD	Collector	490.617	\$49,062	\$43,174	\$92,236
BARROWS RD	ROSHAK RD	SPRINGBROOK LN	Collector	7,378.64	\$737,864	\$649,321	\$1,387,185
FONNER ST	115TH AVE	WALNUT ST	Collector	3,359.12	\$335,912	\$295,603	\$631,515
121ST AVE	GAARDE ST	WALNUT ST	Collector	4,187.39	\$418,739	\$368,490	\$787,229
ROSHAK-SNAPDRAGON-UPLANDS	BULL MOUNTAIN RD	BARROWS RD	Collector	5,601.34	\$560,134	\$492,918	\$1,053,052
BULL MOUNTAIN RD	ROSHAK RD	150TH AVE	Collector	1,338.55	\$133,855	\$117,793	\$251,648
BULL MOUNTAIN RD	UGB	ROSHAK RD	Collector	3,134.71	\$313,471	\$275,854	\$589,325
150TH AVE	BEEF BEND RD	BULL MOUNTAIN RD	Collector	5,007.54	\$500,754	\$440,663	\$941,417
131ST AVE	FISCHER RD	BEEF BEND RD	Collector	2,642.17	\$264,217	\$232,511	\$496,728
FISCHER RD	131ST AVE	HWY 99W	Collector	3,486.68	\$348,668	\$306,828	\$655,496
PACIFIC DR	UGB	HWY 99W	Collector	2,250.25	\$225,025	\$198,022	\$423,047
CIOLE RD	HERRMAN RD	HWY 99W	Collector	3,997.14	\$399,714	\$351,749	\$751,463
CIOLE RD	TUALATI-SHERWOOD RD	HERRMAN RD	Collector	2,353.66	\$235,366	\$207,122	\$442,487
BORCHERS RD	EDY RD	ROY ROGERS RD	Collector	1,956.44	\$195,644	\$172,167	\$367,811

**Table 2.4 Interim Bikeway Improvement Rough Cost Estimates- Urban
(From Technical Appendix C-8 Attachment B)**

STREET	FROM	TO	Fun. Class.	Feet	Paving	Storm Piping	Total Project
EDY RD	UGB	BORCHERS RD	Collector	3,574.08	\$357,408	\$314,519	\$671,928
108TH AVE	UGB	IBACH RD	Collector	2,736.00	\$273,600	\$240,768	\$514,367
NORWOOD RD	BOONES FERRY RD	I-5	Collector	2,792.52	\$279,252	\$245,742	\$524,993
GRAHAMS FERRY RD	UGB	IBACH RD	Collector	3,908.35	\$390,835	\$343,934	\$734,769
WILLAMINA EXT	WILLAMINA AVE	DEAD END	Proposed Collector	469.398	\$46,940	\$41,307	\$88,247
HERITAGE PRKWY	185TH AVE	HERITAGE LOOP	Proposed Collector	277.827	\$27,783	\$24,449	\$52,231
JOHNSON ST	DEAD-END	170TH AVE	Proposed Collector	708.963	\$70,896	\$62,389	\$133,285
DIVISION ST	END OF CUL-DE-SAC	167TH AVE	Proposed Collector	206.572	\$20,657	\$18,178	\$38,836
DIVISION ST	END OF EXISTING STREET	170TH AVE	Proposed Collector	464.701	\$46,470	\$40,894	\$87,364
RAVINE DR EXTENSION	DEAD-END	175TH AVE	Proposed Collector	1,981.31	\$198,131	\$174,355	\$372,486
TAYLORS FERRY RD	OLESON RD	WASHINGTON DR	Proposed Collector	936.752	\$93,675	\$82,434	\$176,109
Total Cost							\$81,893,199

Bicycle System Existing Conditions

As in many growing areas, bicycle facilities in Washington County are still developing. In some cases there are completed continuous bike lanes, while in others, significant gaps in connections between facilities exist. *Figure 2.4* shows the County's existing and committed bicycle system, which is a combination of on-street and off-street facilities. New bicycle facilities are systematically constructed on the County's urban arterial and major collector street network in conjunction with roadway improvement projects. Outside of the Urban Growth Boundary, improvement projects for major roadways typically include wide shoulders (8 to 10 feet) to accommodate wide and slow moving farm equipment. While these wide shoulders are not specifically built as bicycle lanes, they are considered bikeways and accommodate bicycles and pedestrians. Inside the UGB, where interim improvement projects occur on major streets, five (5) foot paved shoulders are provided. Off-street multi-use pathways are not built by the County and are not under the County's jurisdiction but are considered part of the overall bicycle network.

Bicycle lanes exist on a number of major routes including Highway 99W, Scholls Ferry Road, Tualatin Valley Highway, Evergreen Road, 185th Avenue, Walker Road, Cornell Road, Murray Boulevard and other major streets; however, not all of these roads have continuous bike lanes. Some of the gaps in the system will be alleviated as part of committed road improvement projects.

Bicycles are allowed on all paved roadways in Washington County except I-5, and part of Highway 26. There are bicycle lanes on portions of Highway 99W, Scholls Ferry Road, Murray and Hall Boulevards, Cornell Road, Highway 8, and Tualatin Valley Highway, among others. Although allowed on Highway 26, bicycle movement along this highway in the urban area is hazardous due to high traffic volumes, vehicle speeds and conflicted traffic movements at on- and off-ramp facilities. Lack of appropriate facilities and local street connectivity as well as missing key sections on some major roads such as Canyon Road and Beaverton-Hillsdale Highway make safe and convenient bicycle travel difficult in some parts of the county.

Other Facility Planning Considerations

The Transportation Planning Rule identifies schools, shopping, and transit stations as key destinations for bicyclists, in addition to employment centers. Parks, public facilities, and retail centers are other destinations likely to attract cyclists. Because most trips start or end at home, the network must be complete and offer a bikeway within a reasonable distance for bicyclist comfort and ease of use. This "reasonable" distance varies from jurisdiction to jurisdiction. While there is no widely-accepted ideal spacing between bikeways, many suburban jurisdictions with similar land-use patterns space their bikeways approximately one half to one mile apart, roughly following the arterial system spacing.

The Transportation Planning Rule as well as Oregon Revised Statutes, however, require bicycle facilities to be provided on major streets (major collectors and above) when such roads are constructed or reconstructed. The spacing of these facilities in the urban portion of Washington County is typically less than one-half mile.

Existing Bicycle Facility Network

Washington County has jurisdiction of 107 miles of urban arterial streets and 75.9 miles of urban collector streets. There are approximately 63.6 miles of existing bikeways (minimum 4’ width paved shoulders or 6’ bicycle lanes) and 14.8 miles of committed bikeways on these streets. The County’s existing and committed (i.e. funded and scheduled roadway improvement projects that include bicycle facilities) on-street bicycle system is therefore approximately 35% complete on the major urban street network. These figures do not include miles of shared roadways with wide (14 foot) outside travel lanes nor does it include off-street, shared, multi-use pathways. The County does not currently have a system of signed bicycle routes on local streets or other designated informal routes.

In addition to County facilities, there are approximately 62 miles of urban principal routes and arterial roadways under state (ODOT) jurisdiction (this does not include freeway miles or roads outside of the UGB). Thirty-four miles of these non-freeway ODOT facilities include bikeways providing coverage of approximately 62% of these roadways in urban Washington County.

Washington County also has an extensive system of local roadways. While these streets are not signed for bicycle routes and bikeway facilities are not developed, they may be and are used as shared roadways by bicycles. It may be possible to identify areas where good local street connectivity has been established and appropriately sign these areas as bicycle routes, to supplement the main system of bikeways on the arterial and collector street network.

Table 2.5: Existing & Committed Bikeway System Mileages

Jurisdiction	Bicycle Lanes		Paved Shoulders		Shared Use Path
	Existing	Committed	Existing	Committed	
Washington County	72.8	14.8	2.3	8.7	29.4
Incorporated Cities	28.3	4.3	Unknown	0.3	(multiple agencies)
ODOT (State)	58.0	0.2	3.6	None	
TOTAL MILEAGE	159.1	19.3	5.89 (Inventoried)	9.0	29.4

Notes:

Bicycle Lanes include on-street striped & stenciled lanes.

Paved shoulders includes areas beyond fog line at least four feet in width.

Shared Use paths include off-street paved or asphalt pathways suitable for pedestrian & bicycle use that are least five feet in width. (Existing facilities only are shown).

Obstacles

Obstacles to bicycle travel in urban Washington County include physical gaps in facilities, lack of regular maintenance, funding adequacy, historic development patterns where there is a lack of local street connectivity and the presence of flood plains and topographic constraints. Intersections that are not designed for current and future traffic volumes, such as Beaverton-Hillsdale Highway at Scholls Ferry Road, and missing links

in facilities such as those found along Boones Ferry Road, Canyon Road and Highway 8 are obvious obstacles to bicyclists.

The County's major streets evolved from "farm-to-market" roads at a time when principal markets and employment centers were located in Portland. The result was a system that primarily served east-west travel needs. This historic trend, as well as topographic conditions, has resulted in a street pattern that, for the most part, is not developed in an interconnected, grid pattern. For bicycle travel, grid-pattern streets have the advantage of providing multiple routes on parallel roadways, some of which typically carry lower traffic volumes with lower speeds, making them particularly suitable for bicycle travel.

Outside of the Urban Growth Boundary, obstacles to bicycle travel are different than in the urban portions of the County. While traffic volumes are generally much lower in most of the rural area, many rural roads have narrow travel lanes with steep ditches for drainage, little or no shoulders, high vehicle speeds and poor sight distance due to vertical and horizontal curves. Even with the lower traffic volumes, these conditions create significant hazards for cyclists. Nevertheless, many rural roads in Washington County are attractive riding areas for recreational cyclists. As previously mentioned, outside of the UGB, road improvements on major facilities are being designed with wide shoulders; while not specifically designated as bike lanes, these wide shoulders serve as shared-roadway bikeways and will represent an addition to the rural bikeway system.



Although the County has undertaken an ambitious program to improve the road system in recent years, it continues to lack adequate peak hour capacity and includes many substandard roadways that are consequently more costly to maintain than roads built to County and city design standards. The road system is also lacking in serving new demand for north-south travel.

Major streets in Washington County provide the most continuous and direct routes connecting business and residential areas in Washington County. As a result, they are

required to serve as true multi-modal facilities, balancing the needs for peak-period motor-vehicle capacity, public transit, pedestrian and bicycle travel. Bikeways on the major street system provide direct connections for bicyclists, making them the logical choice for longer trips. At the same time, the high traffic volumes, greater speeds and the potential for conflicting turning movements at intersections, which are common on the major street network, may also be considered obstacles by some bicyclists.

Identification of low traffic volume streets for use as “bike routes” (shared roadways, bicycle boulevards, or shoulder bikeways) may be possible in some areas at relatively low cost. Many areas of Washington County lack well - connected low traffic volume streets for such a system. However, newer developments do tend to have well connected local street networks and an effort to identify these areas could help facilitate the establishment of an alternative to the bicycle network that is on the major street system.

Funding

The County has focused its transportation funding on improvements along urban arterial and major collector streets, which are designed to provide increased travel capacity for all modes. Improvements have been made to major east-west and north-south arterials largely through the locally initiated Major Streets Transportation Improvement Program (MSTIP) since 1985 as well as through the use of Traffic Impact Fee (TIF) funds. The County also makes road improvements using other funding sources.

Funding for 'stand-alone' bicycle improvement projects is very limited, but may be available periodically through ODOT's Pedestrian/Bicycle Grant Program or Metro's MTIP, which allocates federal funds for transportation every two years.

Maintenance

While constructing bikeway facilities is important, keeping them well maintained and in good condition is equally important. Cyclists are often forced to ride outside of bicycle lanes and in motor vehicle travel lanes, to avoid glass and other debris when lanes are not swept regularly. Additionally, various utility cuts that occur in the area of a street where bike lanes are located can cause temporary or long-term hazards for cyclists if they are not adequately resurfaced.



Maintenance of bikeways is complicated by the existence of multiple jurisdictions within Washington County. The County maintains its roads in unincorporated Washington County as well as County roads within various city limits. ODOT maintains their roads throughout Washington County. Added to this mix are city streets maintained by the various individual jurisdictions within Washington County. Bicyclists and residents may not know who to call for maintenance requests or problems.

Sweeping

Bicycle lanes on County roads with curbs and gutters are swept regularly by Unified Sewerage Agency; roads without curbs and gutters do not receive regular sweeping. USA performs sweeping to help ensure water quality, not for road maintenance purposes. However, the sweeping obviously provides a benefit to the bicycle system. For the purposes of sweeping, the County is broken into nine zones, which are each swept a minimum of six times/year. In addition to sweeping performed by USA, cities and ODOT sweep their roadways at least 4 times/year. The cities also sweep County roads that are within their jurisdictions.

Washington County's Department of Land Use and Transportation Operations Division responds to reported problems through the use of hand sweeping, either by their own crews or community service crews, or by putting a request in to USA.

Winter ice storms can present lingering challenges for cyclists. Gravel placed on roadways to reduce motorists' skidding on ice may collect in bicycle lanes and on shoulders and cause a hazard and severe nuisance for cyclists. The County has worked to reduce the impact of sanding by using anti-icing chemicals in advance of winter storms.

Striping, signing, and stencils

Washington County attempts to maintain a regular annual striping and stenciling schedule for bicycle lanes on its roads. Although complete re-striping has not occurred in some recent years, the Operations Division believes that the annual maintenance schedule will be met in the future.

Vegetation management

Washington County devotes a full-time vegetation crew as well as community service crews to trim blackberry vines and ivy, prune tree limbs, and keep roads and sidewalks free from vegetative overgrowth. Washington County prioritizes the roads based on their classification and volume, maintaining roads on a regular cycle as well as handling individual requests.

Drainage grates

Drainage grate inlets for storm water are potential hazards for bicyclists. Those with bars that are parallel to the direction of travel can trap the front wheel of a bicycle, resulting in loss of control of the bike and serious injury to a cyclist. Even if they are oriented correctly, the metal surfaces can become slippery.

It is not known how many bicycle-unsafe drainage grates may exist within the bikeway network. To address the issue, the County includes curb inlet drainage grates whenever possible for new construction and reconstruction. These grates are flush with the curb face and are not a hazard to bicyclists. When standard drainage grates are installed in new construction or reconstruction they are required to fitted with cross bars running perpendicular to the direction of bicycle travel thereby eliminating the chance of a bicycle tire catching in the gaps. Finally, existing storm drain grates are retrofitted or "strapped" with cross bars on request or as identified by crews.

Pavement Maintenance

The County employs their own crews year-round to patch potholes and other surface deterioration. Information on bike-related requests was not available although the County responds as quickly as possible to identified problems.

Railroad crossings

Accepted design standards for bicycle crossings of railroad tracks at-grade recommend that such crossings ideally be at a right angle to the rails. The greater the deviation from this crossing angle, the greater the potential for a bicycle's front wheel to be trapped in the flangeway, resulting in a loss of control. Other design standards recommend that crossings be designed so that the road approach is at the same grade as the rails and that for angles of less than approximately 45 degrees, consideration be given to providing a wider outside lane, shoulder or bike lane to allow enough room for a bicyclist to cross at a right angle. Consideration should also be given to materials of the crossing surface and flangeway width and depth.

Identified problems at railroad crossings are referred to the owner of the rail line and the County may notify the PUC if a problem is not addressed. The County and railroads share in the responsibility of resolving crossing issues.

Signal detection

Some intersections in Washington County have actuated signals, which are triggered when the presence of a vehicle is detected by a sensitive wire buried in the pavement—usually in the shape of a diamond. This sensitive wire detects the presence of metal in a vehicle, and relays the information to a signal control box.

Intersections with actuated signals often have pedestrian push buttons. However, some bicyclists are not aware that they can actuate the signal by properly positioning their bicycle over the signal detector loop.

Accessing the pedestrian push buttons requires a cyclist to leave the bicycle lane, since the push buttons are located on the sidewalk. The Oregon Bicyclist's Manual contains information on positioning bicycles for detection by actuated signals. Washington County provides detectors for bicycles per ODOT standards on new traffic signals and can adjust the loop detectors' sensitivity when problem locations are identified.

Signing

Currently Washington County uses pavement stencils to identify bicycle lanes. Directional signs are generally not provided on County bicycle facilities although the County provides green and white reflective signs meeting MUTCD standards along bicycle lanes. However, in accordance with State standards, it is now acceptable to use stencils within the bicycle lanes instead of the signs, which were formerly required every 500'. The County is converting to the stenciling to avoid a proliferation of signs. Additionally, signing is provided at intersections to inform roadway users of conflict points in the transition areas between through bicycle lanes and right-turn lanes. Signs are inventoried annually on roads that are classified as minor collectors to arterials.

Bikeway Support Facilities

Parking

Cyclists' needs for bicycle parking range from simply a convenient piece of street furniture, to storage in a bicycle locker that affords weather, theft and vandalism protection, gear storage space, and 24-hour personal access. The type of facility needed is determined by several factors:

- **Type of trip being made:** whether or not the bicycle will be left unattended all day or just for a few minutes.
- **Security of area:** determined by factors such as visibility, presence of people, type of area and perception of the bicycle owner.
- **Value of the bicycle:** the more a cyclist has invested in a bicycle, the more concern she or he will show for theft protection or how prone a given area is to bicycle theft.

Additional needs for some commuting cyclists include shower, locker, and changing facilities at trip destinations. For those cyclists needing to dress more formally, travel longer distances, or cycle during wet or hot weather, the ability to shower, change, and store clothing can be as critical as bicycle storage.

Bicycle Parking Facilities in Washington County

While bicycle parking has been required in new developments since 1994 by the Section 429 of the Community Development Code, little or no baseline information is available on the amount or quality of existing bicycle parking. However, Washington County's Development Standards for Bicycle Parking are comprehensive, with provisions in the Code for development of bicycle parking facilities in conjunction with multi-family developments of four units or more, retail, office, institutional, and industrial development, transit centers and park and ride lots.

Bicycle Safety Education Programs

Education is an important element in increasing bicycling while also improving safety.

Information available from other communities indicates that the number of bicycle accidents does not necessarily rise with increases in cycling. While improving the quality of Washington County's bikeway facilities is key, there is also a need for proper education of both youth and adult cyclists as well as motorists.



The Washington County Sheriff's Department offers rodeos and bike safety fairs for Washington County's youth upon request. The Sheriff's Department sponsored a bike safety fair in May 2000, reaching 200 children in Washington County. Employees of the

County's Land Use and Transportation Department participate in their own Bridge Program, offering lessons and videos on bike safety, helmet fittings and assistance in finding sponsors for the purchase of helmets. These on-request programs are often done in partnership with the Trauma Nurses Talk Tough programs.

Other groups such as the Elk's Clubs, and the Modern Woodmen of America have been active in helping organize and fund bicycle rodeos. No data exists on the number of children reached through these various programs.

The Bicycle Transportation Alliance's Bicycle Safety Education Program has been active in the Washington County area for two consecutive years. Two schools participated; Minterbridge Elementary School in Hillsboro and West Sylvan Middle School (which is in Washington County although in Portland Public School District). The program combines ten hours of classroom and on-bicycle training targeting 5th and 6th grade students. 850 students have gone through the program.

Multi-Modal Connections

Improving the bicycle-transit link can create more options for bicycle travel in Washington County. Linking bicycles with bus transit mitigates some obstacles to bicycling such as lengthy trips, personal security concerns, riding at night, poor weather, or steep topography.

There are four main components of bicycle-transit integration:

- Allow bicycles on transit
- Offer bicycle parking at transit locations
- Improve bikeways to transit, and
- Encourage use of bicycle and transit programs.



Encouragement and Support Programs

Encouragement, education and other types of support programs are typically run by a variety of entities like non-profit organizations, bicycle shops and ride groups, local governments, police/sheriff's offices, and others. They help support the County's efforts to improve facilities by encouraging cyclists, offering incentives, and providing safety education. The organizations listed below help encourage and support bicycling in Washington County.

- Westside Transportation Alliance (WTA), is a transportation management association set up to assist businesses in meeting the state's ECO Rule requirements for decreasing single occupancy motorized vehicle commuting. The intent of this law is to improve air quality in the urbanized areas.

- Beaverton Bicycle Club (BBC), a racing club that works to elevate the sport of bicycle racing. The BBC is host of the Oregon State Games Track race at Alpenrose Velodrome in July, featuring track events for all ages and categories.
- The Bike Gallery Bicycle Club, offers free group rides for beginning and intermediate cyclists in a safe and non-competitive atmosphere. Typically 2 rides per month depart from the Bike Gallery's Beaverton location. Bicycle handling instruction for road riding and mountain biking is offered once a month, as well as bicycle maintenance and repair classes.
- The Bicycle Transportation Alliance, based in Portland, OR, promotes bicycling for safer streets, cleaner air, and energy independence. They can be reached at 503-2260676, or <http://www.bta4bikes.org/>.
- Portland Wheelmen Touring Club is based in Portland but with members throughout the region.

Events

Bicycle events that educate the public on the benefits of bicycle transportation can encourage ridership and acceptance of bicycling as a mainstream form of transportation. Two such bicycle events take place in Washington County annually. They are Bike Commute Day and the Bicycle Commute Challenge, both sponsored by the Bicycle Transportation Alliance (BTA).

Bike Commute Day takes place during National Bike Month in May. Bicyclists in Washington County gather at Beaverton, Tigard or Barbur Boulevard Transit Centers to participate in group rides.

The rides lead to various destinations in the region featuring a continental breakfast, prize drawings, and a program featuring civic leaders speaking on the benefits of a more integrated bicycle transportation system. This is a popular bicycle event with an estimated 500 participants region-wide.

The Bike Commute Challenge takes place in September. Overall, 146 Portland-area businesses, including seven Washington County businesses took part in this event in 2000. About two percent (125 employees) of these businesses' 6330 employees participated.



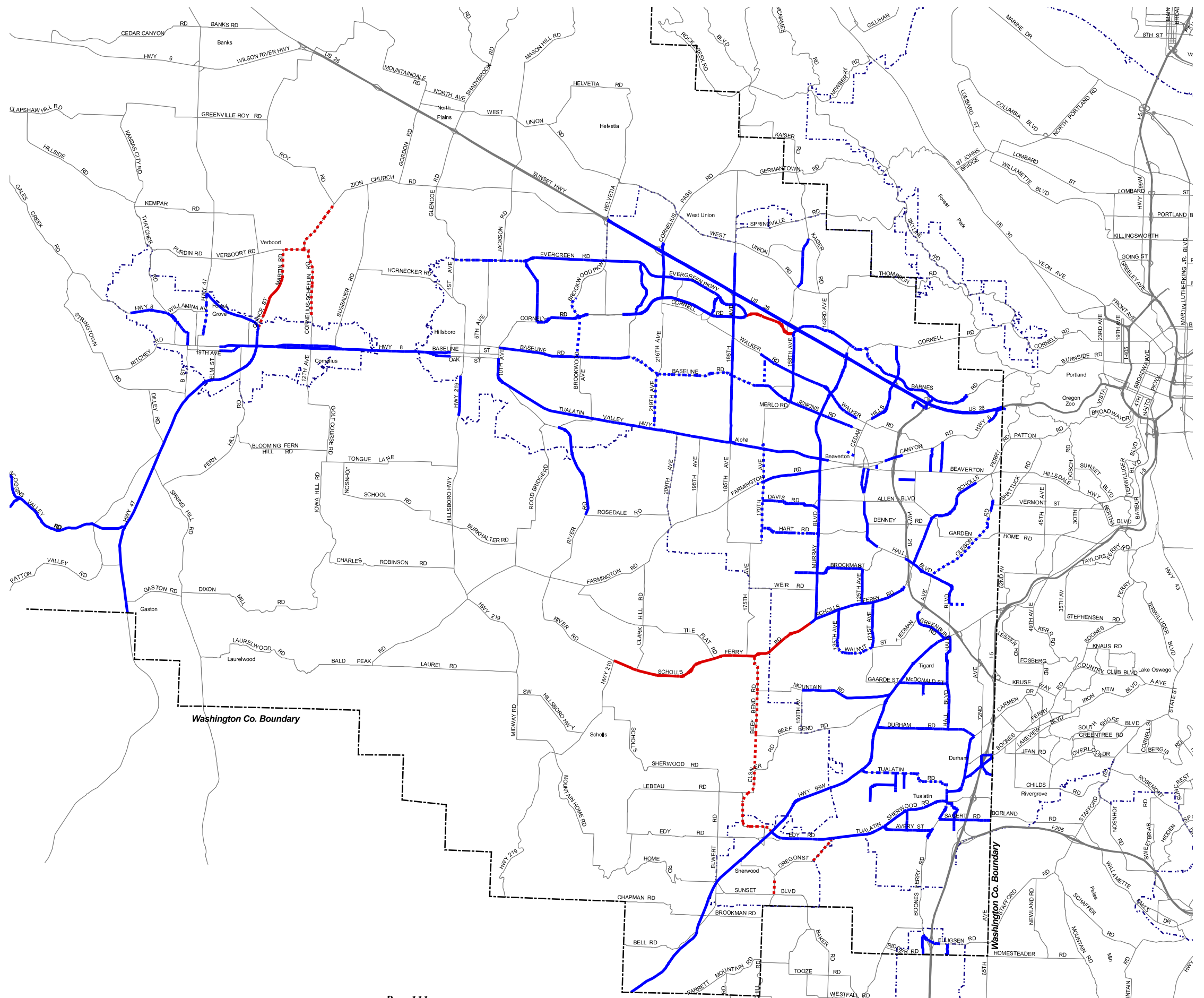
Figure 2.4

Existing and Committed Bike Lanes and Paved Shoulders

Legend

- Bike lanes**
 - Built (Solid blue line)
 - Committed (Dashed blue line)
- Paved shoulders**
 - Built (Solid red line)
 - Committed (Dashed red line)
- Arterials**
 - Freeways (Thick grey line)
 - Major Streets (Thin grey line)
 - UGB Line (Dotted blue line)

Sources:
Metro RLIS Lite
Washington County GIS Department



Note: Existing bike lanes (striped and stenciled) and paved shoulders were compiled using available information supplied by Washington County. Built lanes and shoulders are on the ground today, and committed lanes and shoulders are planned facilities.

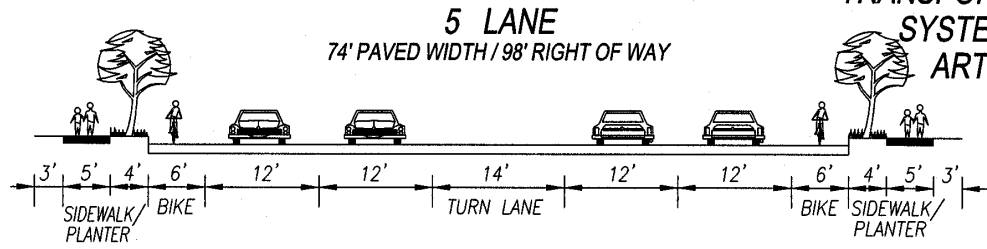
Appendix



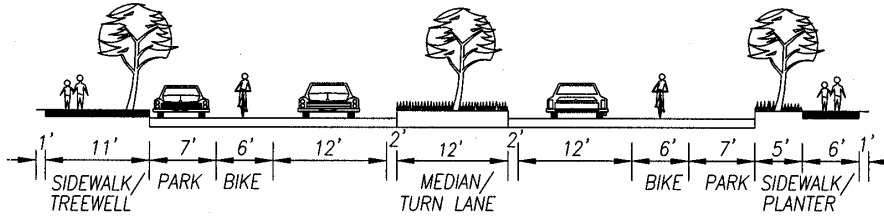
Typical Street Cross Sections

The following typical cross sections are examples of designs for different functional classifications that are consistent with the general parameters contained in the plan, the regional street design guidelines and Washington County street design standards.

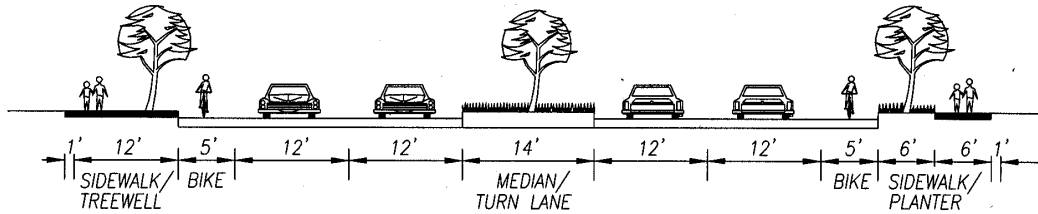
TRANSPORTATION SYSTEM PLAN: ARTERIAL



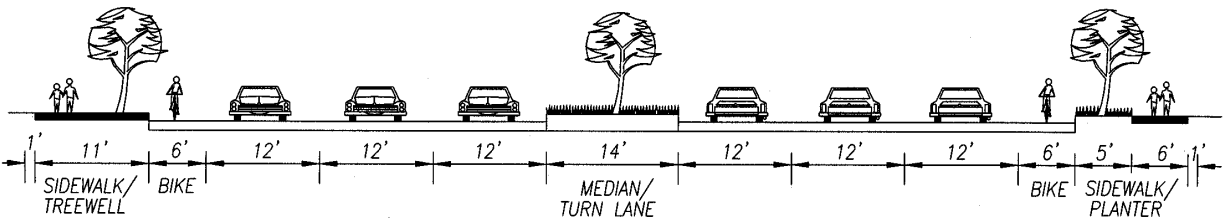
3 LANE - COMMUNITY STREET / BOULEVARD WITH PARKING
66' PAVED WIDTH / 90' RIGHT OF WAY



5 LANE - COMMUNITY STREET & BOULEVARD
72' PAVED WIDTH / 98' RIGHT OF WAY



7 LANE - COMMUNITY STREET / BOULEVARD
98' PAVED WIDTH / 122' RIGHT OF WAY



CRITERIA	7 LANES	5 LANES	3 LANES
VEHICLE LANE WIDTHS:	11-12 FT.	11-12 FT.	12 FT.
ON STREET PARKING:	NONE	NONE	7-8 FT. (OPTIONAL)
BICYCLE LANES:	5-6 FT.	5-6 FT.	5-6 FT.
SIDEWALKS:	5-12 FT.	5-14 FT.	5-12 FT.
LANDSCAPE STRIPS:	0-8 FT.	0-8 FT.	0-8 FT.
MEDIANS/TURN LANE WIDTHS:	12-16 FT.	12-16 FT.	12-16 FT.
NEIGHBORHOOD TRAFFIC MANAGEMENT:	NOT APPROPRIATE	NOT APPROPRIATE	NOT APPROPRIATE

NOTE: 20 FT. CLEAR BETWEEN PARKING AND RAISED MEDIAN CURB FOR EMERGENCY RESPONSE REQUIRED.

WASHINGTON COUNTY
STREET CROSS SECTIONS
WASHINGTON COUNTY, OREGON

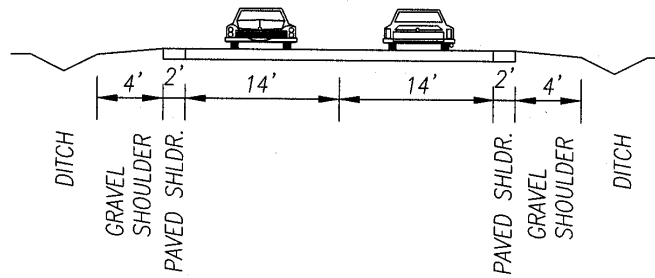
EXAMPLES OF TYPICAL ROADWAY SECTIONS - ARTERIAL

DATE 07/18/02... \2312\TPU.DWG (LYT. TPU7 (URBAN ARTERIALS))

**TRANSPORTATION
SYSTEM PLAN:
RURAL ARTERIAL / COLLECTOR**

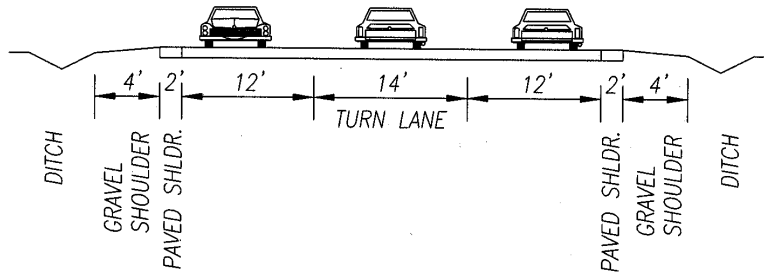
2 LANE

32' PAVED WIDTH / 60' RIGHT OF WAY *



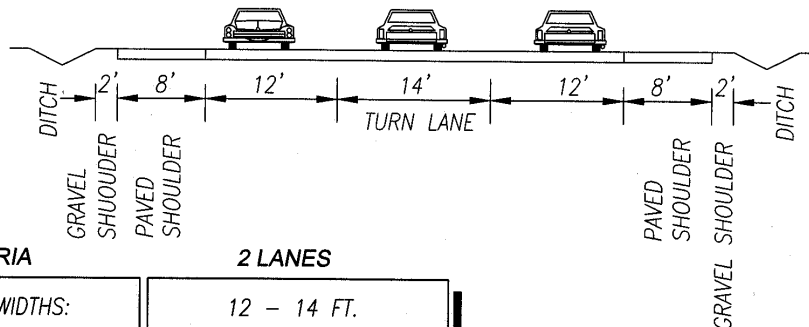
2 LANE - WITH TURN LANE

42' PAVED WIDTH / 60' RIGHT OF WAY



2 LANE WITH TURNLANE AND WIDE SHOULDERS

54' PAVED WIDTH / 70' RIGHT OF WAY



CRITERIA

2 LANES

VEHICLE LANE WIDTHS:	12 - 14 FT.
TURN LANE WIDTH	12 - 14 FT.
PAVED SHOULDER	2 - 10 FT.
GRAVEL SHOULDER	2 - 4 FT.

* 90 FT. RIGHT OF WAY FOR RURAL ARTERIAL

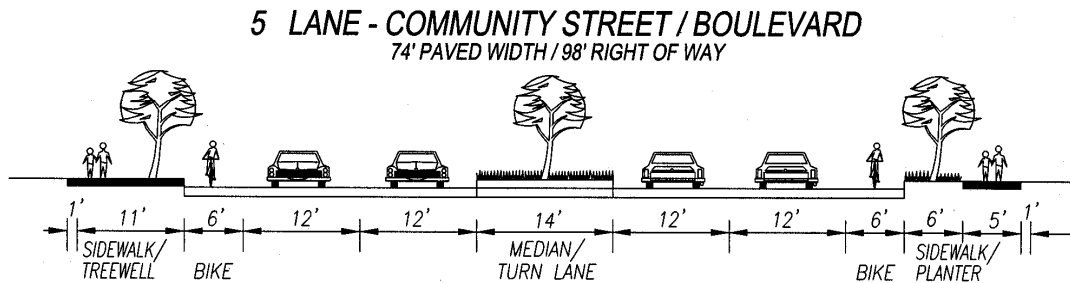
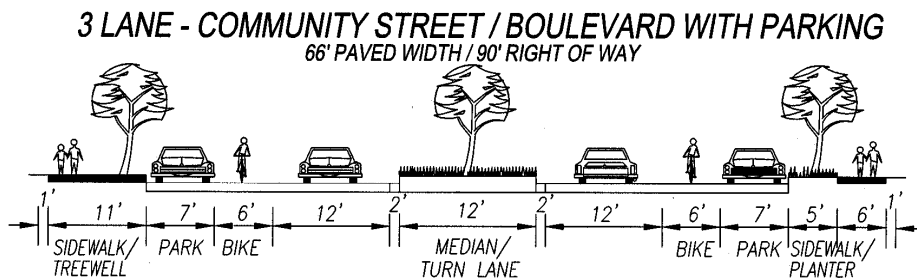
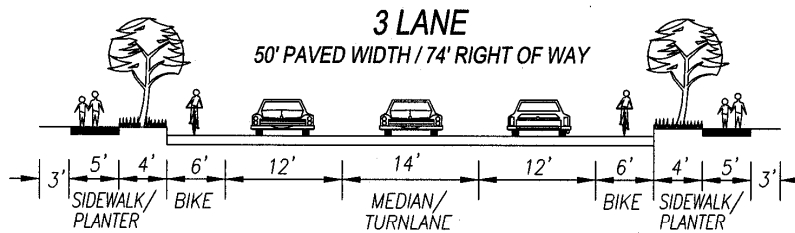
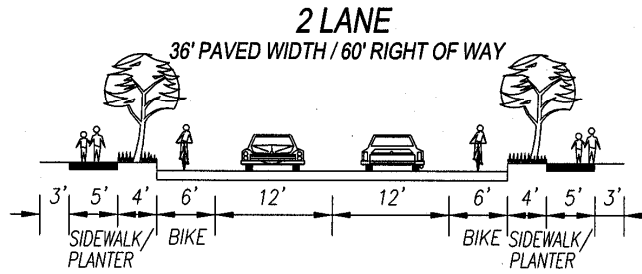


**WASHINGTON COUNTY
STREET CROSS SECTIONS**
WASHINGTON COUNTY, OREGON

**EXAMPLES OF TYPICAL RURAL
ARTERIAL / COLLECTOR ROADWAY SECTIONS**

DATE 07/18/02 ... \2312\TPU.DWG (LYT. TPU9 (RURAL ROADWAY SECTS.))

**TRANSPORTATION
SYSTEM PLAN:
COLLECTOR**



CRITERIA	5 LANES	3 LANES	2 LANES
VEHICLE LANE WIDTHS:	11-12 FT.	11-12 FT.	11-12 FT.
ON STREET PARKING:	NONE	7 FT. (OPTIONAL)	NONE
BICYCLE LANES:	5-6 FT.	5-6 FT.	5-6 FT.
SIDEWALKS:	5-14 FT.	5-14 FT.	5-12 FT.
LANDSCAPE STRIPS:	0-8 FT.	0-8 FT.	0-8 FT.
MEDIANS/TURN LANE WIDTHS:	12-16 FT.	12-16 FT.	NONE
NEIGHBORHOOD TRAFFIC MANAGEMENT:	NOT APPROPRIATE	NOT APPROPRIATE	NOT APPROPRIATE

NOTE: 20 FT. CLEAR BETWEEN PARKING AND RAISED MEDIAN CURB FOR EMERGENCY RESPONSE REQUIRED.



**WASHINGTON COUNTY
STREET CROSS SECTIONS**
WASHINGTON COUNTY, OREGON

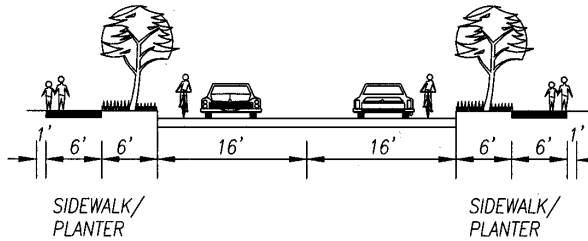
**EXAMPLES OF TYPICAL COLLECTOR
ROADWAY SECTIONS**

DATE 07/18/02 ... \2312\TPU.DWG (LYT. TPU8 (COLLECTORS))

**TRANSPORTATION
SYSTEM PLAN:
NEIGHBORHOOD ROUTE**

NEIGHBORHOOD ROUTE

32' PAVED WIDTH / 60' R/W



CRITERIA

2 LANES

VEHICLE LANE WIDTHS:	16-18 FT.
ON STREET PARKING:	SHARED
BICYCLE LANES:	SHARED
SIDEWALKS:	5-12 FT.
LANDSCAPE STRIPS:	0-7 FT.
MEDIANS/TURN LANE WIDTHS:	NONE
NEIGHBORHOOD TRAFFIC MANAGEMENT:	CONDITIONALLY ALLOWED

DATE 07/18/02 ... \2312\TPU.DWG (LYT. TPU6 (NEIGHBORHOOD STREET))



**WASHINGTON COUNTY
STREET CROSS SECTIONS**
WASHINGTON COUNTY, OREGON

**EXAMPLE OF TYPICAL
NEIGHBORHOOD ROUTE ROADWAY SECTIONS**

Glossary

2040 Growth Concept - A concept for the long-term growth management of our region, stating the preferred form of the regional growth and development, including if, where, and how much the urban growth boundary should be expanded, what densities should characterize different areas, and which areas should be protected as open space.

Access - The ability to gain direct ingress or egress to or from a specific location along a roadway. Local roads providing direct access to individual properties generally have better access than Arterial roads or freeways, whose primary purpose is to serve through travel.

Accessibility - The relative ease with which a given destination or type of land use can be reached by one or more modes of travel. Locations that can be accessed by many people using a variety of modes of transportation generally have high accessibility.

Access Management - Measures regulating access to streets, roads and highways from public roads and private driveways. Measures may include but are not limited to restrictions on the siting of interchanges, restrictions on the type and amount of access to roadways, and use of physical controls, such as signals and channelization including raised medians, to reduce impacts of approach road traffic on the main facility.

Accessway - A paved transportation facility that is not part of a roadway and is built to provide a direct access for pedestrians and bicyclists when a direct street connection is not practicable.

Advanced Traffic Management System (ATMS) - This term refers to traffic management techniques that use computer processing and communications technologies to optimize performance of motor vehicle, freight and public transportation systems. ATMS is a subset of intelligent transportation system (ITS) technologies and must be addressed as one of the 16 ISTEA planning factors.

Americans With Disabilities Act (ADA) of 1990 - Civil rights legislation enacted by Congress that mandates the development of a plan to address discrimination and equal opportunity for disabled persons in employment, transportation, public accommodation, public services and telecommunications. TriMet's ADA transportation plan outlined the requirements of the ADA as applied to TriMet services, the deficiencies of the existing services when compared to the requirements of the new act and the remedial measures necessary to bring TriMet and the region into compliance with the act. Metro, as the region's metropolitan planning organization (MPO) is required to review TriMet's ADA Paratransit Plan annually and certify that the plan conforms to the Regional Transportation Plan. Without this certification, TriMet cannot be found to be in compliance with the ADA. ADA also affects the design of pedestrian facilities being constructed by local governments.

Arterial - Arterial streets interconnect and support the Principal Arterial highway system. Arterials intended to provide general mobility for travel within the region. Correctly sized Arterials at appropriate intervals allow through trips to remain on the Arterial system thereby

discouraging use of Local streets for cut-through traffic. Arterial streets link major commercial, residential, industrial and institutional areas.

Bicycle - A vehicle having two tandem wheels, a minimum of 14 inches in diameter, propelled solely by human power, upon which a person or persons may ride. A three-wheeled adult tricycle is considered a bicycle. In Oregon, a bicycle is legally defined as a vehicle. Bicyclists have the same right to the roadways and must obey the same traffic laws as the operators of other vehicles.

Bicycle facilities - A general term denoting improvements and provisions made to accommodate or encourage bicycling, including parking facilities, all bikeways and shared roadways not specifically designated for bicycle use.

Bike lane - A portion of a roadway that has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists

Bikeway - A bikeway is created when a road has the appropriate design treatment for bicyclists, based on motor vehicle traffic volumes and speeds. Bikeways include striped and stenciled bike lanes of 5 to 6 feet in width, paved shoulders of at least 4 feet in width and off-street, paved, multi-use paths at least 10 feet in width. In areas where constraints limit roadway width, 14 foot wide outside travel lanes that transition to either paved shoulders or bike lanes when the constraint ends are also considered bikeways.

Boulevard – A “Boulevard” is a design overlay intended to improve the pedestrian environment in specified locations throughout the metropolitan area. Boulevard locations within Washington County are specifically identified in the Regional Street Design Overlay Map in the Plan. A “Boulevard Study Area” is an area where a Boulevard is planned but its location has not yet been determined. Boulevard design features will be considered for facilities identified for “Boulevard Design Consideration” on the map, and may be incorporated into these projects. A Boulevard may have three or more lanes and may include landscaped medians, on-street parking, landscape buffered sidewalks and enhanced pedestrian crossings. These roadways also include bicycle lanes and wide sidewalks that can accommodate transit enhancements such as benches or bus shelters.

Boulevard intersections - Boulevard design classifications are usually focused on centers and some main streets where a pedestrian and transit-oriented street design can best complement dense development patterns. However, there are many locations where corridors and some main streets intersect along major streets. At these intersections, the confluence of motor vehicle traffic must be managed to limit negative impacts on multi-modal travel and the development of planned land-uses. While boulevard intersections accommodate a significant amount of motor vehicle travel, they are designed with special amenities that promote pedestrian, bicycle and public transportation travel. Pedestrian improvements are substantial, including wide sidewalks, special lighting, crossings on all streets and special crossing features where unusually heavy motor vehicle traffic is present.

Capacity - The maximum number of vehicles (vehicle capacity) or passengers (person capacity) that can pass over a given section of roadway or transit line in one or both directions during a given period of time under prevailing roadway and traffic conditions.

Capital Improvements Program (CIP) – a document that lists projects to be undertaken in the next five- to ten-year timeframe, the estimated costs and funding sources for those projects, and if funding has been committed to a project, a schedule for the funded work, which may be design, right of way acquisition, construction or all three.

Citizen Advisory Committee (CAC) - Selected for a specific issue, project or process, a group of citizens volunteer and are appointed by the Washington County Board of Commissioners to represent citizen interests.

Collector - Collector streets provide both access and circulation between residential, commercial, industrial and agricultural community areas and the Arterial system. As such, Collectors tend to carry fewer motor vehicles than Arterials, with reduced travel speeds. Collectors may serve as freight access routes, providing local connections to the Arterial network.

Corridor study – A study that is directed toward specifically defining projects and strategies for meeting an identified need in a transportation corridor.

Deficiency area - Deficiency areas result from an evaluation of 2020 conditions based upon the projects identified in this Plan being in place. Even with the planned projects certain facilities, system elements and sub-areas are expected to exceed the acceptable performance measures defined and no appropriate feasible solution has been identified. Additional strategies to raise the motor vehicle performance in these areas, if any, will be approached on a case by case basis.

Development review - The process of reviewing a proposed development action for conformance with the County’s Community Development Code (“Code”) and the applicable standards and requirements of the Comprehensive Plan as specified by the Code.

Director - The Director of Washington County’s Department of Land Use and Transportation.

Functional classification – A mechanism for classifying roadways according to the function they perform in the transportation system. Classifications typically range from Arterials, which are intended to facilitate relatively high speed traffic over long distances, to Local Roads, which facilitate access to properties. When properly combined, roadways with different functional classifications provide a system that meets both the access and mobility needs of the communities it serves.

High-occupancy vehicle (HOV) - This term refers to vehicles that are carrying two or more persons, including the driver. An HOV could be a transit bus, vanpool, carpool or any other vehicle that meets the minimum occupancy requirements of the specific facility. In practice, only vehicles with two or three or more persons would be able to use a designated “HOV” travel lane.

Intermodal facility - A transportation element that accommodates and interconnects different modes of transportation and serves the statewide, interstate and international

movement of people and goods. For example, an intermodal yard is a railyard that facilitates the transfer of containers or trailers. See also passenger intermodal facility and freight intermodal facility definitions.

Local Street - Local Streets primarily provide direct access to adjacent land. While Local streets are not intended to serve through traffic, the aggregate effect of local street design impacts the effectiveness of the Arterial and Collector system when local travel is restricted by a lack of connecting routes, and local trips are forced onto the Arterial street network. In the urban area, local roadway system designs often discourage “through traffic movement”, however, in the rural area local roads are sometimes the only facilities available for access to dispersed rural land uses.

Major transit stop - Major bus stops, transit centers and light-rail stations on the regional transit network.

Metro - The regional government and designated metropolitan planning organization (MPO - see below) of the Portland metropolitan area. It is governed by a 7-member Metro Council elected by and representing districts within Metro’s jurisdictional boundaries: Multnomah County and generally the urban portions of Clackamas and Washington counties. Metro is responsible for the Oregon Zoo, solid waste landfills, the Oregon Convention Center, the Portland Center for the Performing Arts, establishing and maintaining the urban growth boundary, and for regional transportation planning activities such as the preparation of the RTP, and the planning of regional transportation projects including light-rail.

Minor modification - Minor modification to a roadway including channelization or realignment that does not have significant land use or traffic impacts beyond the immediate neighborhood.

Mobility - The ability of people and goods to move quickly, easily and cheaply to where they are destined at a speed that represents free flow or comparably high-quality conditions.

Motor vehicle - This includes automobiles, motorcycles, recreational vehicles and all types of trucks, including those used for freight. It does not include buses as those are considered an element of another mode (transit).

Motor Vehicle Level of Service – A qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort, convenience and safety. A LOS rating of “A” through “F” describes the traffic flow on streets and highways and at intersections. The following information describes general traffic flow characteristics for each level of service on a street or highway.

- A. Virtually free flow; completely unimpeded
- B. Stable flow with slight delays; reasonably unimpeded
- C. Stable flow with delays; less freedom to maneuver
- D. High Density but stable flow
- E. Operating conditions at or near capacity; unstable flow
- F. Forced flow, breakdown conditions

Neighborhood Route - Neighborhood Routes (generally former Minor Collectors) are in residential neighborhoods and provide connectivity to the Collector and Arterial system. They do not serve citywide or community circulation. Because traffic needs are greater than a Local street, certain measures should be considered to retain the neighborhood character and livability of these routes. Neighborhood traffic management measures are allowed (including devices such as speed humps, traffic circles and other devices). New neighborhood routes may be established via the land development process.

Off-Street Trails - A transportation facility that is physically separated from motor vehicle traffic by an open space or barrier for use by bicyclists; pedestrians, including persons using a wheelchair; skaters; and other non-motorized travel. Off-street trails may be located in a road right of way or within an independent right of way.

Peak two-hour period - The highest hour of motor vehicle demand on a given facility or segment and the hour immediately following the highest hour of demand.

Pedestrian - A person on foot, in a wheelchair or walking a bicycle.

Pedestrian facility - An improvement provided for the benefit of pedestrian travel, including sidewalks, crosswalks, illumination, signals and benches.

Planning period - The twenty-year period to which the Plan applies.

Placeholder projects – A “placeholder” project is used as a surrogate for a project that has not yet been defined. Placeholder projects are generally used in study areas, and serve primarily as mechanisms for estimating the impacts on the rest of the transportation system of a project that will be identified later as part of study area analysis.

Principal Arterial - Principal Arterials (Freeways and Highways) form the backbone of the motor vehicle network. These routes connect over the longest distance (sometimes miles long) and are spaced less frequently than other Arterials or Collectors. These highways generally span several jurisdictions and often have statewide importance. At a minimum, highways that are classified by ODOT as Interstate or Statewide Highways are considered Principal Arterials.

Regional Transportation Plan (RTP) - The official intermodal transportation plan that is developed through a regional transportation planning process and adopted by Metro.

Right-of-way (ROW) - This term refers to publicly-owned land, property or interest therein, usually in a strip, within which the entire road facility (including travel lanes, medians, sidewalks, shoulders, planting areas, bikeways and utility easements) must reside. The right-of-way is usually defined in feet and is acquired for or devoted to multi-modal transportation purposes including bicycle, pedestrian, public transportation and vehicular travel.

Roadway segment - A portion of a street right-of-way developed for vehicular traffic.

Sidewalk - A concrete walkway that is separated from the roadway by a curb, planter area or roadside ditch that is built to adopted standards.

Single-occupancy vehicle - This term refers to vehicles that are carrying one person.

Study area – In general, study areas relate to facilities or areas for which further study is required to determine specifically how an identified need should be met. In these cases the function, proposed alignment, or other specific solution has yet to be identified. Additional analysis will need to occur before solutions to the identified traffic problems can be addressed. The purpose of each study area is defined in the study area descriptions in Plan strategy 10.10.

Telecommute - This term refers to a transportation demand management strategy whereby an individual substitutes working at home for commuting to a work site on either a part-time or full-time basis.

Traffic calming - A transportation system management technique that aims to prevent inappropriate through-traffic and/or reduce motor vehicle speeds on a particular roadway. Traditionally, this technique may include speed humps/tables, curb extensions, planted median strips or rounds and narrowed travel lanes.

Transit - This term refers to publicly funded and managed transportation services and programs within the urban area, including light-rail, regional rapid bus, frequent bus, primary bus, secondary bus, minibus, paratransit and park-and-ride.

Transportation Demand Management (TDM) - Actions which are designed to change travel behavior in order to improve performance of transportation facilities and to reduce need for additional road capacity. Methods may include but are not limited to the use of alternative modes, ride-sharing and vanpool programs, and trip-reduction ordinances.

Transportation disadvantaged - Individuals who have difficulty in obtaining transportation because of their age, income, physical or mental disability.

Transportation Management Association (TMA) - This term refers to non-profit coalitions of local businesses and/or public agencies dedicated to reducing traffic congestion and pollution and improving commuting options for employees.

Transportation Plan (“the Plan”) - The Washington County 2020 Transportation Plan.

Transportation Planning Rule (TPR) - The implementing rule of statewide planning goal (#12) dealing with transportation, as adopted by the state Land Conservation and Development Commission (LCDC). Among its many provisions, the rule includes requirements to preserve rural lands, reduce vehicle miles traveled (VMT) per capita by 20 percent in the next 30 years, reduce parking spaces and to improve alternative transportation systems.

Transportation System Management (TSM) - Strategies and techniques for increasing the efficiency, safety, capacity or level of service of a transportation facility without major

new capital improvements. This may include signal improvements, intersection channelization, access management, HOV lanes, ramp metering, incident response, targeted traffic enforcement and programs that smooth transit operations.

TriMet - Tri-County Metropolitan Transportation District, which is the transit agency for most of Clackamas, Multnomah and Washington counties.

Urban Growth Boundary (UGB) - The legally defined boundaries adopted by Washington County, Metro or appropriate incorporated cities, and acknowledged by LCDC, which identify and separate urbanized land from rural and natural resource land.

Vanpool/Carpool – A group of two or more people who share the use and/or cost of a van or car for transportation to and from a destination.

Vehicle miles traveled (VMT) - Automobile vehicle miles of travel. Automobiles, for purposes of this definition, include automobiles, light trucks, and other similar vehicles used for movement of people. The definition does not include buses, heavy trucks and trips that involve commercial movement of goods. VMT includes trips with an origin and a destination within the MPO boundary and excludes pass through trips (i.e., trips with a beginning and end point outside of the MPO) and external trips (i.e., trips with a beginning or end point outside of the MPO boundary). VMT is estimated prospectively through the use of metropolitan area transportation models.

Walkway - A hard-surfaced transportation facility built for use by pedestrians, including persons using wheelchairs, such as a sidewalk, off-street trail, accessway or path.