TUALATIN TRANSPORTATION SYSTEM PLAN

City of Tualatin

Transportation System Plan Update

Appendixes

February 2013

CH2M HILL • DKS
Angelo Planning Group • JLA Public Involvement

Revised Tualatin Transportation System Plan Update
Volume II: Appendixes

Prepared for

City of Tualatin

February 2013

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Contents

Appendixes

Appendix B
Existing Conditions and Deficiencies

This Appendix describes the current (2012) transportation system in Tualatin, including existing conditions, opportunities, and deficiencies. The report evaluates the roadway network, public transportation routes and service, bicycle facilities, pedestrian facilities, rail facilities, airports, and pipelines within the project study area. It also describes general land use patterns and major activity centers that generate traffic. The information used to describe the existing system and identify deficiencies in this report came from the City of Tualatin, Washington and Clackamas Counties, the Oregon Department of Transportation (ODOT), Metro, and the consultant team through a site visit on October 12, 2011.

The information in this report served as the starting point for a discussion with the broader community about the current state of the transportation system in Tualatin. This information was used to help inform the project ideas and alternatives developed into Tualatin's Transportation System Plan (TSP).

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Study Area

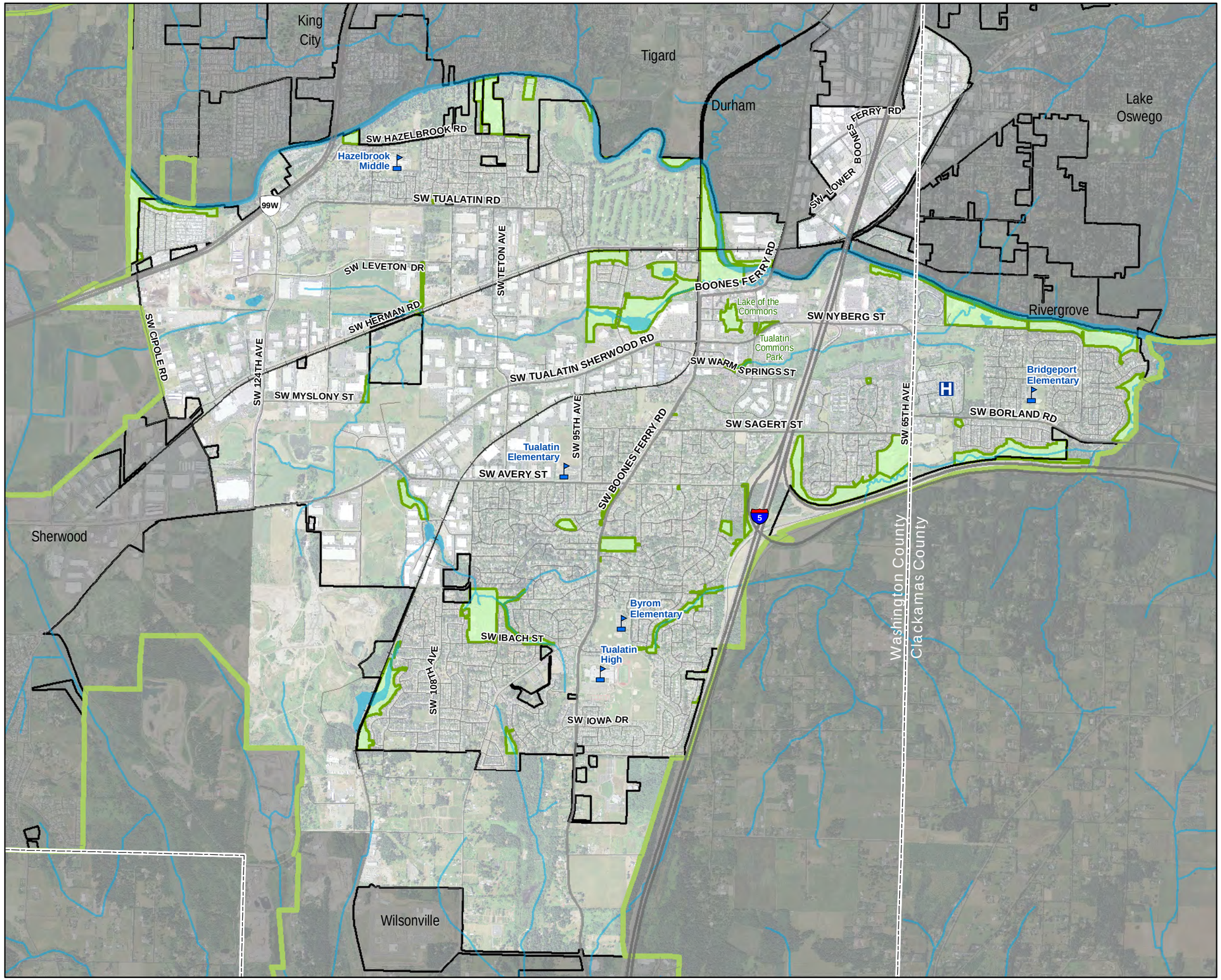
The City of Tualatin is located in the southwestern portion of the Portland Metro region, and according to the 2010 US Census has a population of 26,054 people. It is predominantly located within Washington County, though a small section of the City east of I-5 is located in Clackamas County. Figure 1 shows the study area in more detail.

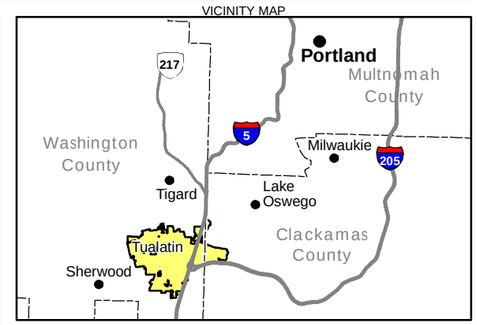
The study area for the Tualatin TSP is comprised of the Tualatin Planning Area Boundary, which includes portions of the Basalt Creek project between Tualatin and Wilsonville and the SW Concept Plan between the City of Sherwood and Tualatin. The Tualatin River is the north boundary of the City west of I-5, with SW Cipole Road and SW 124th Avenue to the west, and SW Helenius and SW Norwood Roads to the south. The eastern boundary follows the west side of I-5 until north of I-205. The City then extends east into Clackamas County east of SW 48th Avenue. The City also includes a section of the Bridgeport Village shopping center on either side of I-5 to approximately SW Rosewood Street in the northeastern quadrant of the City. In addition to the City limits at the edge, there are a handful of areas that are surrounded by the City but not officially incorporated.

Land Use

Introduction

This section provides a general overview of existing and allowed land uses in the City of Tualatin. It is intended to inform the team in identifying how current land uses affect transportation conditions. The City of Tualatin's Zoning and Comprehensive Plan are the same and are codified in the Tualatin Development Code (TDC). The TDC identifies types of development and land uses that are currently allowed within the City. Figure 2 shows land use designations within the City.





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- Study Area
- City Boundaries
- County Boundaries
- Urban Growth Boundary
- Parks
- Schools
- Railroad
- Hospitals

Street System

- Interstate
- Arterial

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FIGURE 1
Base Map
Existing Conditions Analysis
City of Tualatin Transportation System Plan

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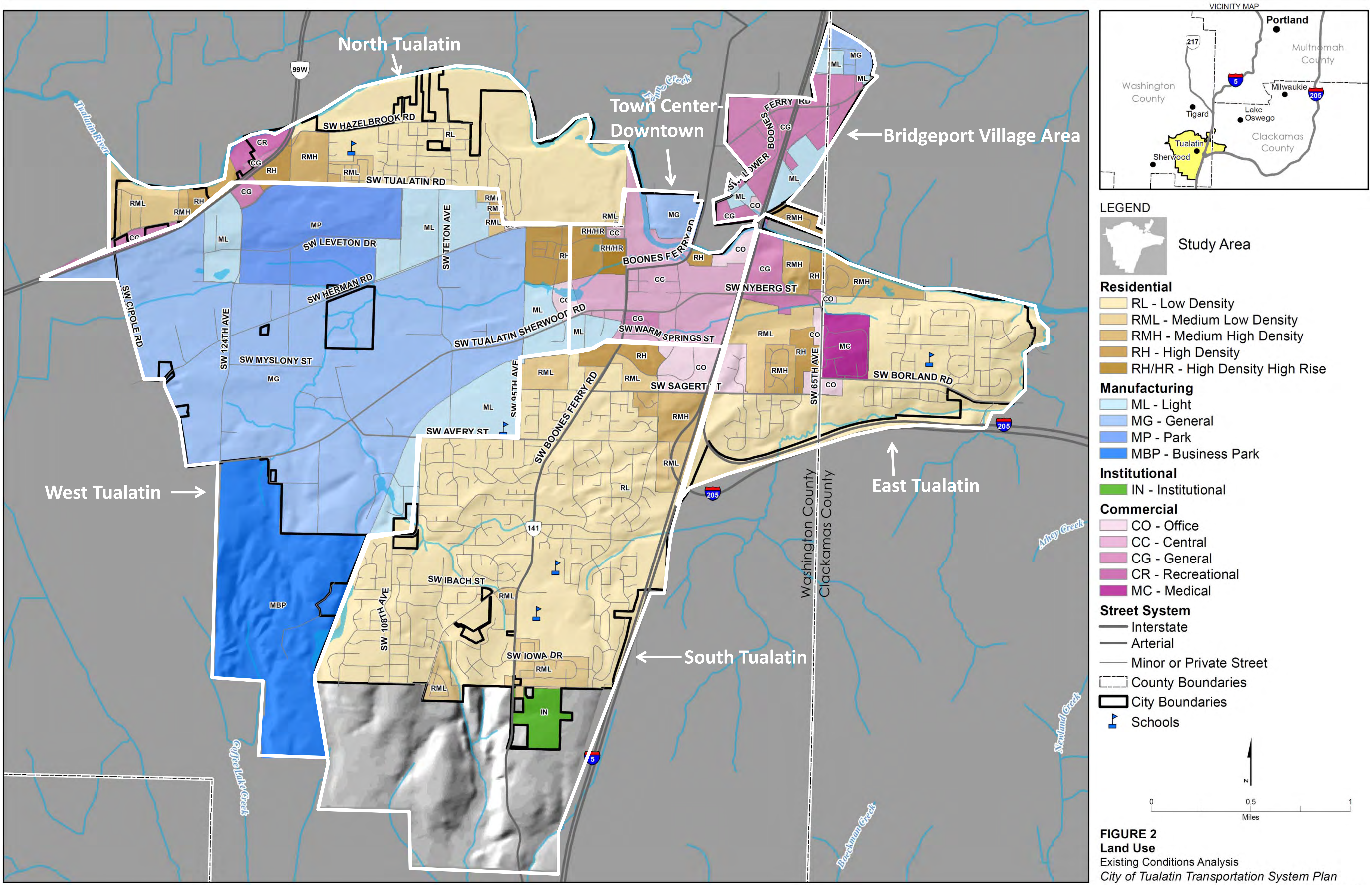
North Tualatin
Town Center-Downtown
Bridgeport Village Area
West Tualatin
East Tualatin
South Tualatin
VICINITY MAP
Portland
Multnomah County
Washington County
Milwaukie
Tigard
Lake Oswego
Tualatin
Sherwood
Clackamas County
LEGEND
Study Area
Residential
RL - Low Density
RML - Medium Low Density
RMH - Medium High Density
RH - High Density
RH/HR - High Density High Rise
Manufacturing
ML - Light
MG - General
MP - Park
MBP - Business Park
Institutional
IN - Institutional
Commercial
CO - Office
CC - Central
CG - General
CR - Recreational
MC - Medical
Street System
Interstate
Arterial
Minor or Private Street
County Boundaries
City Boundaries
Schools
0
0.5
1
Miles
Washington County
Clackamas County
SW HAZELBROOK RD
SW TUALATIN RD
SW LEVETON DR
SW TETON AVE
SW HERMAN RD
SW CIPOLE RD
SW 124TH AVE
SW MYSLONY ST
SW TUALATIN SHERWOOD RD
SW AVERY ST
SW BOONES FERRY RD
SW IBACH ST
SW 108TH AVE
SW IOWA DR
BOONES FERRY RD
SW NYBERG ST
SW WARM SPRINGS ST
SW SAGERT ST
SW 65TH AVE
SW BORLAND RD
Tualatin River
Fanno Creek
Coffee Lake Creek
Saum Creek
Nyberg Creek
Boeckman Creek

FIGURE 2
Land Use
Existing Conditions Analysis
City of Tualatin Transportation System Plan

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Existing Land Uses

This section provides a general overview of existing and allowed land uses within the City of Tualatin's planning area including the SW Concept Plan and the Basalt Creek Planning area. It is not intended to be comprehensive, but to inform the TSP team in identifying how current land uses affect current transportation conditions. The descriptions and areas below are based on distinct land uses and character within the City and are indicated on Figure 2.

Town Center – Downtown Tualatin

The Town Center Area including downtown Tualatin is centered around SW Nyberg Street west of I-5, bounded by I-5, SW Warm Springs Street, SW 90th Avenue, and SW Tualatin Road. The Town Center Area has the highest density residential areas within Tualatin, though the majority of the area is designated Central Commercial and includes Tualatin Commons and the surrounding businesses along SW Tualatin-Sherwood Road, SW Tonka Street, SW Nyberg Street, SW Boones Ferry Road, and SW Tualatin Road. The Tualatin Community Park is partially within the Town Center Area.

There are a number of shopping centers in the Town Center area, especially along SW Tualatin-Sherwood and SW Nyberg Roads. The businesses are predominantly car-oriented and have large parking lots with fast-food or casual dining restaurants adjacent to the main roadways. Other areas have groups of smaller retail and service-oriented businesses, specifically the area between SW Tualatin-Sherwood Road and SW Warm Springs Street and SW Boones Ferry Road and SW Martinazzi Avenue. The Town Center area also has a couple of hotels, one in the Tualatin Commons area and one further south on SW Warm Springs Street.

Example of mixed use development in the Town Center area

In addition to retail businesses, the Town Center area is also home to many City services including the Tualatin Library, Police Department, City Hall, City administrative offices, and Community Park. The central part of the Town Center area is comprised of the Tualatin Commons, which is oriented towards the lake at the center of the commons. The circular area is surrounded by mixed use development with ground floor retail and upper-story residential development (apartments and condos). There are a number of service and restaurant businesses in the Tualatin Commons, and festivals and community events are held in the Commons. It is the center of the community and provides a gathering place for residents.

North Tualatin

North Tualatin is located north of SW Tualatin Road and includes the section of Tualatin that is northwest of OR 99W. The majority of the area in North Tualatin is low-density residential, with a few areas of medium-high density and high density residential, especially near OR 99W. There are a few mobile home parks north of OR 99W adjacent to SW Pacific Drive and some higher-density residential neighborhoods. There are also a few pockets of recreational commercial and general commercial along OR 99W in North Tualatin. The Tualatin Country Club is located in North Tualatin, along with Jurgens Park and Hazelbrook Middle School.

The major through facility, OR 99W, brings regional traffic through this section of the City, though its location on the edge of town reduces the impact of the regional traffic on the local roads or neighborhoods.

Bridgeport Village Area

There is one section of the City north of the Tualatin River extending along I-5 and SW Bridgeport and SW Lower Boones Ferry Roads. On the west side of I-5 is Bridgeport Village, a lifestyle center providing shopping, dining, and entertainment located directly off of exit 290. With approximately 60 businesses located in Tualatin, it is a regional draw including most of the shopping center and additional businesses south of SW Bridgeport Road including a sporting goods store, jewelry store, and grocery store. Parts of the center are located in both Tualatin and Tigard. This area is also bordered by Lake Oswego and Durham. In Tualatin, this area is designated general commercial. On the east side of I-5 is additional general commercial and some light manufacturing and general manufacturing which

includes a shipping distribution center, a few bakery supply businesses, storage, and vehicle repair businesses. There is also a small section of medium-high density residential just east of I-5 and north of the river.

Detail of the Bridgeport Village Area (Tualatin City limits in orange)
Map Source: Bing Maps

The three study area intersections in this part of Tualatin had the two highest traffic volumes during the traffic count period (I-5 northbound ramps and SW Lower Boones Ferry Road, and I-5 southbound ramps and SW Lower Boones Ferry Road), and the third (SW 72nd Avenue and SW Lower Boones Ferry Road) is in the top third of study area intersections for traffic volumes. Much of the traffic is traveling east-west on SW Bridgeport and SW Lower Boones Ferry Roads to or from the highway, in the afternoon rush hour. Many vehicles are exiting northbound I-5 and turning left towards the shopping center on SW Bridgeport Road. At the I-5 southbound ramps, the traffic counts are very similar – most vehicles are heading either east or west bound, with about the same number of vehicles exiting the highway and turning east or westbound onto SW Lower Boones Ferry Road. The intersection directly adjacent to Bridgeport Village, SW 72nd Avenue/SW Bridgeport Road/SW Lower Boones Ferry Road is a better indicator of afternoon rush hour associated with Bridgeport Village. The majority of vehicles turn off of SW 72nd Avenue towards the I-5 interchange, while similar numbers of westbound vehicles pass through the intersection, and turn left and right towards the shopping areas. This part of Tualatin has one of the four I-5 under- or overcrossings at SW Lower Boones Ferry Road near the shopping center.

The second I-5 interchange in the City is located here, and the roads serve shoppers coming to Bridgeport, but also carry freight for the commercial and manufacturing businesses. There are few local roads - most of the transportation network in this part of Tualatin serves the commercial or manufacturing businesses or provides direct access to the I-5 interchange.

East Tualatin

The eastern segment of Tualatin that is east of I-5 also contains the only part of the City that is within Clackamas County. The County line is approximately SW 65th Avenue between Washington and Clackamas Counties. Eastern Tualatin is separated from the rest of the city by the highway, which presents a physical barrier between the eastern and western parts of the City. Two of the four under- or overpasses in Tualatin are located in East Tualatin: SW Nyberg Street near the Town Center area, SW Sagert Street just north of the I-5 and I-205 interchange. This section is also bounded to the south by I-205 and to the north by the Tualatin River.

Example of low density residential in East Tualatin

East Tualatin is a mix of land uses: one of the largest employers in the City - Legacy Meridian Park Medical Center - is located in the area designated Medical Center. There are few areas of commercial office nearby, and a general commercial area east of I-5 on either side of SW Nyberg Road. In addition to these commercial/employment centers, there is some high and medium high density residential. The remainder of East Tualatin is low or medium-low density residential. Bridgeport Elementary School, Browns Ferry Park, Stoneridge Park, and Atfalati Park provide educational and recreational opportunities. The low-density residential areas are similar to the neighborhoods found in

southeastern Tualatin, but the high-density areas are characterized by multi-story condo and apartment style housing.

This area attracts a mix of traffic – the commercial, office, and medical center areas are regional attractors, and local residential traffic is more concentrated in areas with high density residential. Connections to the rest of the city are constrained by I-5, the river, and I -205, but there is a regional connection to the east via SW Borland Road.

South Tualatin

This area around SW Boones Ferry Road, between I-5 and SW 95th Avenue and SW 105th/108th Avenues and the railroad, and downtown Tualatin and the southern planning area limits, including the Basalt Creek Planning Area is mainly low to medium-low density residential with mostly single-family homes organized in cohesive neighborhoods. Many of the neighborhoods seem to have been developed or subdivided at the same time, and have similar house designs and consistent architecture. Two of the public schools are located in south Tualatin: Tualatin High School, and Byrom Elementary School. Parks in this area include Ibach Park, and Little Woodrose Natural Area, Lafky, Saarinen Wayside, and Koller Wetland parks. The street network is neighborhood-oriented with few through streets, and characterized by cul-de-sacs and curving, low volume and speed streets. Many of the neighborhoods were constructed recently and have sidewalks, curbs and gutters. There is also a private school campus located south of Norwood Road, which is zoned institutional. South Tualatin also has one of the four under or over-crossings of I-5 at Norwood Road.

Example of Manufacturing Building in West Tualatin

The transportation system in this part of Tualatin is mainly to serve the neighborhoods; the local streets connect to the arterials to move traffic into and out of the residential areas. The neighborhoods are bicycle and pedestrian friendly in order to accommodate the recreational needs of the families that live in the adjacent houses. Except for the public schools, there are few services or jobs within walking or bicycling range.

West Tualatin

The area between OR 99/OR 99W, SW Tualatin Road and the limits of the SW Corridor planning area between Tualatin and Sherwood, and SW 95th Avenue and SW 105th/108thAvenues and the railroad, is designated manufacturing: Light, General, Park, or Business Park. There are some lumber companies, a national window manufacturer, landscaping, equipment and parts machining and a gravel business, among others in this area. The manufacturing designation is characterized by big parcels with large warehouse style buildings. Additionally, Tualatin Elementary School is located at SW 95th Avenue and SW Avery Street.

These land uses have specific transportation needs; manufacturing businesses are reliant on predictable and consistent deliveries for raw materials and finished goods, making freight accessibility and predictability important. Roads in western Tualatin such as SW Herman Road, SW Tualatin-Sherwood Road, SW 124th Avenue, and OR 99W carry more freight and larger vehicles than other areas within the City. Additionally, the workforce in manufacturing is employed in shifts, and many of the workers leave and arrive in a short time frame, potentially contributing to congestion during shift change times. Due to the large parcels and long distances, the manufacturing land uses are not very pedestrian friendly, though the major roadways do have bicycle lanes.

Demographics

According to the 2005-2009 American Community Survey, the City of Tualatin is fairly similar to the Portland Metro area in terms of household and family size, and in general the population is more likely to have a high school or college degree than the metro area. The median household and family income is also slightly higher than the Portland area and the poverty level of both households and individuals is slightly lower. There are also more children under 18 and fewer adults over 65 in Tualatin when compared to the rest of the region.

Tualatin has a higher percentage of Spanish speakers and Hispanic or Latino residents compared to the Portland Metro area, with approximately 18 percent of the population self-identifying as Hispanic or Latino. A similar percentage of the population speaks Spanish, while approximately 10 percent of the population speaks Spanish with English spoken less than "very well". A higher number of residents within Tualatin rent their homes than own them when compared to the Metro area. Tualatin has grown quickly and attracted residents; approximately 72 percent of current residents moved to the City since 2000.

Commute Characteristics

Tualatin has more jobs in the City than there are workers to fill those jobs, and many of Tualatin residents work outside of the City. According to the 2010 three year ACS estimates, 25 percent of Tualatin residents identified themselves as working in Tualatin, while 75 percent identified as working outside of the City. Thirty-seven percent of workers in the Portland Metro area work in the City where they live, with 50 percent identifying themselves as working outside of where they live. These commute patterns mean that there are a large number of commuters that are both entering and leaving the city at both the morning and evening peak times. As discussed above in the West Tualatin section, many of the manufacturing jobs tend to be scheduled around shifts, creating demand for roadways near these areas.

The City is home major to companies including Kershaw Knives, Columbia River Knife and Tool, and Novellus Systems, which designs and manufactures equipment for use in semiconductors. The City's largest employer is Legacy Meridian Park Hospital, followed by the United Parcel Service (UPS) and Precision Wire Components. These employers are scattered throughout the City, and are not located in one consolidated employment center. Table 1 lists the top five employers according to number of employees.

TABLE 1
Top Five Employers in Tualatin

Business Name	Number of Employees	Type of Business
Legacy Meridian Park Hospital	823	Hospital
Novellus Systems, Inc.	650	Manufacturer
United Parcel Service (UPS)	512	Delivery Service
Precision Wire Components	457	Manufacturer
Huntair	360	Manufacturer

Source: City of Tualatin business license information. March 2011 Active Business List

According to the 2010 US Census American Community Survey (ACS) three year estimates, Tualatin is home to approximately 14,800 non-military employees in the labor force, with a 10.3 percent unemployment rate. Workers 16 and older predominantly drive to work alone (77.6 percent), with smaller percentages carpooling (7.4 percent), using public transit (4.2 percent), walking (2.9 percent), bicycling (0.4 percent), or working at home (6.1 percent). Travel time to work for Tualatin residents varies across the working population. Table 2 below shows the estimated percentage of workers based on their travel time to work. It should be noted that these travel times are self-reported, and may be based on perception rather than actual travel time.

TABLE 2
Travel Time to Work

Travel Time to Work for Tualatin Residents	City of Tualatin Percent	Portland Metro Area Percent
Less than 10 minutes	23%	12%
10 to 14 minutes	16%	14
15 to 19 minutes	14%	15
20 to 24 minutes	13%	17
25 to 29 minutes	7%	7
30 to 34 minutes	12	15
35 to 44 minutes	7%	7
45 to 59 minutes	4%	7
60 or more minutes	5%	6

Source: US Census American Community Survey 3 year estimates. Accessed 11/17/2011.

Roadway System, Geometry and Conditions

Introduction

This section describes the current roadway network within the study area, including functional classification, ownership, geometric conditions (including alignment, cross section, and vertical curves), and freight designation. Sections were developed based on information provided from the City's GIS database as well as ODOT's statewide database.

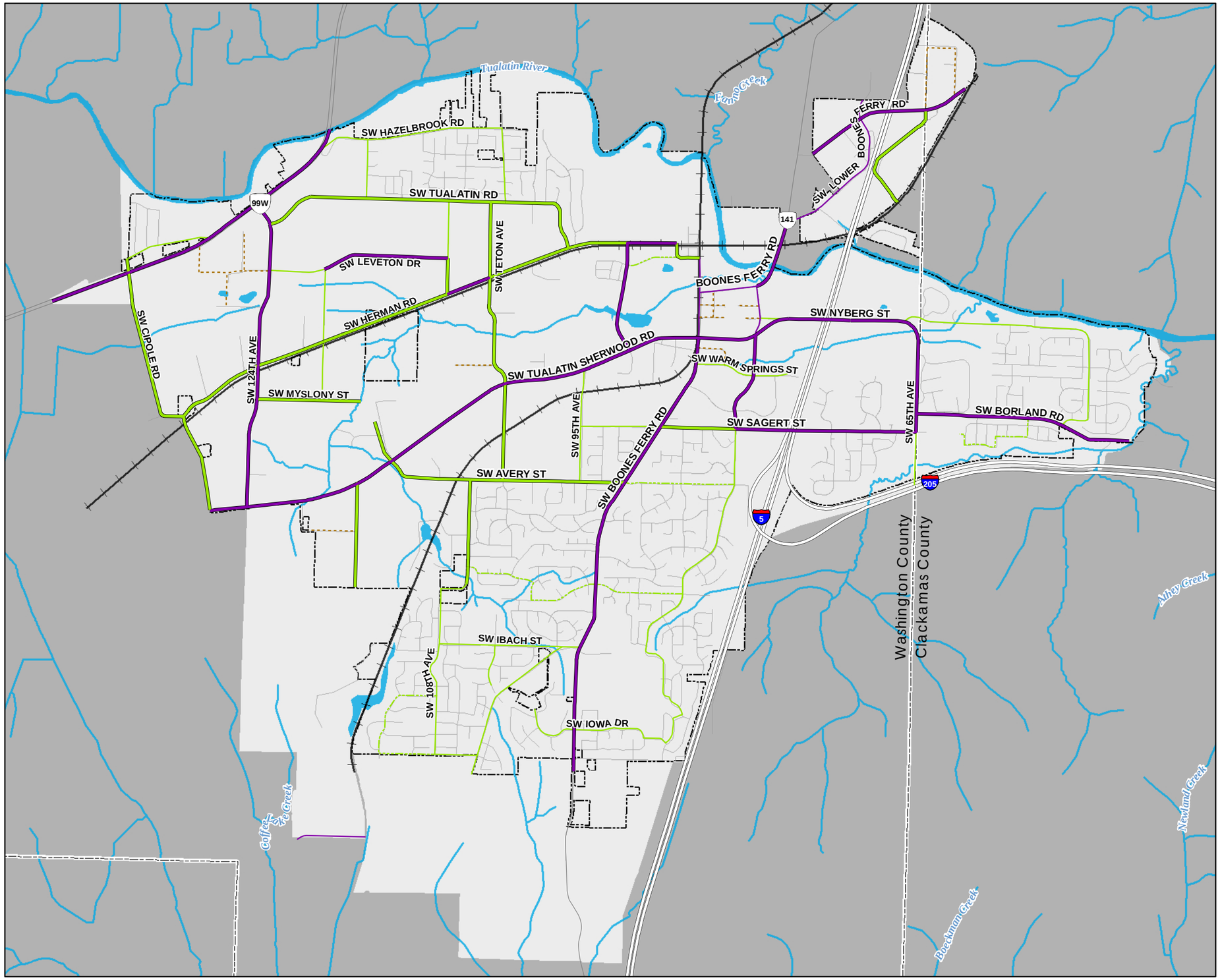
Roadway Classification

Functional classification identifies how a roadway is intended to operate within the overall transportation system and defines the character of service it provides. In addition, functional classification defines standards for roadway and right-of-way width, access spacing and pedestrian and bicycle facilities. The City of Tualatin has established a functional classification system for the roadways owned by the City. Table 3 identifies the existing classifications as described in the current City of Tualatin TSP. Functional classifications assessed as part of this TSP include major and minor arterials, and major, minor, and residential collectors, local roadways, and freeways. Figure 3 shows the roadway classifications in the City of Tualatin.

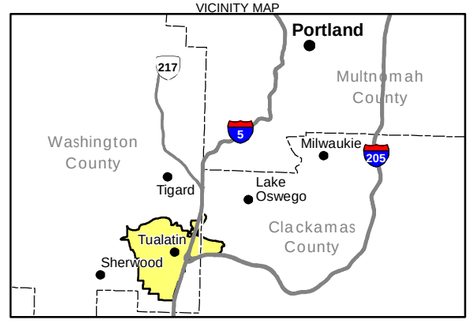
TABLE 3
City of Tualatin Functional Classification Description

Functional Classification	Description
Freeway	Primary function is to carry high levels of regional vehicular traffic and public transit at high speeds; full access control with access limited to interchanges and street crossings with grade separations; widely spaced access points; serves motorized vehicle traffic only; contains a median.
Major Arterial - (Ei) - (Eb&t)	Primary function is to serve both local and through traffic as it enters and leaves the urban area; connects the minor arterial and collector street system to freeways and expressways; provides access to other cities and communities; serves major traffic movements; access control through medians and/or channelization; restricted on-street parking; sidewalks and bicycle facilities required; may allow a right-turn pocket if warranted; will be used by public transit.
Minor Arterial - (Db&t) - (Db&t – Downtown)	Primary function is to serve local and through traffic between neighborhoods and to community and regional facilities; distributes traffic from major arterials to collectors and local streets, higher degree of access than major arterials; trip lengths, traffic volumes, and speeds are lower than on major arterials; sidewalks and bicycle lanes required; likely to be used by public transit.
Major Collector - (Cb&t)	Primary function is to serve local traffic between neighborhoods and community facilities, principal carrier between arterials and local streets; provides some degree of access to adjacent properties, while maintaining circulation and mobility for all users; carries lower traffic volumes at slower speeds than arterials; typically has two to three lanes; may contain some on-street parking; pedestrian and bicycle facilities are required; may be used by public transit.
Minor Collector - (Cb&p) - (Cs&2p) - (Cs&p) - (Cb)	Primary function is to connect neighborhoods with major collector streets to facilitate movement of local traffic; has slower speeds to ensure community livability and safety for pedestrians and bicyclists; on-street pedestrian and bicycle facilities are required; bicycle facilities may be exclusive or street parking is prevalent; shared roadways depending on traffic volumes, speeds, and extent of bicycle travel; may be used by public transit.
Residential Collector - (Cr)	Provides primary routes into residential neighborhoods; carries higher volumes than local streets, but is not intended to serve through traffic; provides direct access to adjacent land uses; characterized by moderate roadway distances and slow speeds, serves passenger cars, public transit, pedestrians, and bicyclists; pedestrian facilities are required. Pickup and delivery by truck is allowed, but not through-truck movements.
Local Commercial Industrial - (B-CI)	Primary function is to provide direct truck, public transit, and vehicular access to commercial and industrial land uses; characterized by short to moderate roadway distances and slow speeds; offers a high level of accessibility; pedestrian facilities are required.
Local Street - (B-D) - (B)	Primary function is to provide direct access to adjacent land uses; characterized by short roadway distances, slow speeds, and low volumes; offers a high level of accessibility; serves passenger cars, pedestrians, and bicycles, but not trucks; may be used by public transit, pedestrian facilities are required.

Source: City of Tualatin Transportation System Plan 2001.



VICINITY MAP



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Study Area

City Functional Classification

- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Residential Collector
- Local Commercial Industrial
- Interstate
- Other Streets
- City Boundaries
- County Boundaries
- Railroad

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FIGURE 3
Functional Classification
Existing Conditions Analysis
City of Tualatin Transportation System Plan

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Arterials

The primary function of arterial streets is to provide a high degree of vehicular mobility including accommodations for trucks; however, they may also serve a secondary role providing access to individual properties. Typically arterials serve longer and higher speed trips. The nature of arterial streets dictates that their designs typically limit property access and on-street parking to improve traffic capacity for through traffic. Arterial streets are used as primary bicycle, pedestrian, emergency response routes and transit routes.

Example of a major arterial: SW Boones Ferry Road at SW Ibach Street

There are two classifications of urban arterial streets within the City of Tualatin: major arterials and minor arterials. Major arterials serve trips entering and leaving the urban area, providing access to other cities and communities. Minor arterials, however, serve local and through traffic between neighborhoods and within the community, and provide more local access than major arterials. Because major and minor arterials have similar functions, the designs of major and minor arterials are also usually similar, except freeways and expressways. While freeways and expressways are typically classified as major arterials, they have unique geometric criteria that control their design, and highly regulated access controls that limit access to adjacent land uses.

Typical major arterials within the city include: SW Tualatin-Sherwood Road, SW 124th Avenue, and SW Boones Ferry Road from SW Tualatin-Sherwood Road south.

Typical minor arterials within the city include: SW Boones Ferry Road from SW Tualatin-Sherwood Road north, SW Martinazzi Avenue between SW Boones Ferry and SW Tualatin-Sherwood Roads, and SW Borland Road.

Collectors

The primary function of collector streets is to assemble traffic from the interior of an area and deliver it to the closest arterial street. Collectors provide for both mobility and access to property and are designed to balance both functions. They usually serve shorter trip lengths and have lower traffic volumes and speeds than arterial streets. Collector streets are also used as important emergency response routes and are frequently used as transit routes.

There are three classifications of collector streets: major collectors, minor collectors and residential collectors. The function of each collector type is progressively less mobility and more land use/access driven from major to residential.

Typical major collectors within the city include: SW Herman Road, SW 105th Avenue, and SW Avery Street.

Typical minor collectors within the city include: SW Ibach Street, SW Martinazzi Avenue south of SW Sagert Street, SW Hazelbrook Road

Typical residential collectors within the city include: SW Blake Street between SW Boones Ferry Road and SW Martinazzi Avenue, SW Alsea Drive, and SW Sagert Street.


Example of a major collector: Avery Street

Ownership

Within the City of Tualatin there are roadways owned by four different agencies; the Oregon Department of Transportation (ODOT), Washington County, Clackamas County, and the City of Tualatin. Typically the higher classified roadways focused on vehicle mobility and throughput are owned by the other agencies such as ODOT, Clackamas County or Washington County. The lower classification arterials, collector streets, and local roadways are typically owned by the City of Tualatin. The breakdown of ownership is shown below.

ODOT

- I-5
- OR 99W (Pacific Highway)
- SW Nyberg Street (in the vicinity of the I-5 and Nyberg Street Interchange)
- SW Boones Ferry Road (between the Tualatin River Bridge and SW Lower Boones Ferry Road)
- SW Lower Boones Ferry Road (OR 141, in the vicinity of the I-5/Lower Boones Ferry Road Interchange)

Washington County

Major Arterials

- SW 65th Avenue[1]
- SW Bridgeport Road
- SW Nyberg Street (between SW Nyberg and SW Sagert Streets)
- SW Tualatin-Sherwood Road

Minor Arterials

- SW 72nd Avenue
- SW Lower Boones Ferry Road

Major Collectors

- SW Cipole Road

Minor Collectors

- SW 65th Avenue (south of SW Sagert Street)
- SW Grahams Ferry Road
- SW Pacific Drive

Clackamas County

- SW Borland Road
- SW Lower Boones Ferry Road (within Clackamas County)

Maintenance Responsibility

Maintenance responsibility of the roadway infrastructure typically falls to the agency which has jurisdiction or ownership of that roadway. For example, SW Tualatin-Sherwood Road, although located within the City of Tualatin is owned and operated by Washington County and thus maintenance responsibility lies with the County. Some exceptions may occur where two agencies have entered in to a separate agreement for maintenance responsibility. This may be a case by case type agreement or wholesale through the City. The City maintains an agreement with Clackamas County where the City is responsible for all existing traffic control devices and for installing additional traffic control devices, except energized traffic signals, as necessary upon the County roads within City boundaries. There is also an agreement with Washington County that the City will maintain the storm drains on County roads located in the City. All other maintenance responsibilities lie with the owning agency for each roadway.

Freight or Truck Routes

Designated freight and truck routes exist within the project study area. State freight routes and federally designated truck routes that are part of the National Highway System (NHS) are described in the following sections. The City of

[1] SW 65th Avenue is located on the border between Washington and Clackamas Counties, though Washington County maintains the roadway.

Tualatin has also designated certain roadway corridors as trucks routes. Typically these routes connect the commercial/industrial districts within the City to major arterials and ultimately OR 99W and I-5.

City of Tualatin Truck Routes

- I-5 (north to south City limits)
- OR 99W (west to north City limits)
- SW 124th Avenue (OR 99W to SW Tualatin-Sherwood Road)
- SW Tualatin Road (SW 124th Avenue to SW Jurgens Avenue)
- SW Herman Road (SW Tualatin Road to SW Cipole Road)
- SW 108th Avenue (SW Tualatin Road to SW Herman Road)
- SW Teton Avenue (SW Tualatin Road to SW Avery Street)
- SW Cipole Road (OR 99W to SW Tualatin-Sherwood Road)
- SW Boones Ferry Road (south City Limits to SW Lower Boones Ferry Road)
- SW Lower Boones Ferry Road (SW Boones Ferry Road to the northeast City limits)
- SW Tualatin-Sherwood Road (west City limits to the Nyberg Street Interchange)
- SW Avery Street (SW Tualatin-Sherwood Road to SW 95th Avenue)
- SW 105th Avenue (SW Avery Street to SW Moratoc Drive)

State Designated Freight Route

- I 5 (north to south City limits)
- OR 99W (west to north City limits)

Federally Designated Truck Routes

- I 5 (north to south City limits)
- OR 99W (west to north City limits)

The difference between freight and truck routes is the agency that is authorized to make changes (mobility standards, construction, etc) to the routes. Federally designated freight routes need Federal Highway Administration (FHWA) approval while state routes need ODOT and/or local government approval. State freight routes have higher mobility standards than other state highways, but these mobility standards apply to freight routes only. The NHS truck routes also have certain standards, such as truck size, that must be met. In Tualatin, the state/federal freight routes generally correspond with the interstate highway system and the truck routes generally correspond with other major arterials within Tualatin. The City-designated truck routes are meant to connect local roadways within the City to State and federally designated freight and truck routes.

Existing Geometry vs. City Design Standards

A high level assessment compared the existing City of Tualatin roadway network against current design standards to identify deficiencies in the system. Roadways were checked for intersection skew angles, spacing and general conformance with the cross section standards including presence of parking, medians and sidewalks.

Existing intersections within the City of Tualatin system conform to this requirement. The standards identify a minimum interior angle of 75° with a preferred angle of 90°. In some cases, intersections with major arterials or collectors occur as slightly smaller angles, which could result in sight distance limitations and increased safety concerns. However, in most cases this occurs at wide intersections that are signalized where sight distance and trailer sweep are better accommodated.

In general, major arterials within the City match the current established design standards. One exception is SW Boones Ferry Road south of SW Warm Springs Street. Although identified as a major arterial in the City's current TSP, the roadway width and section more closely matches a major collector. Another example is portions of SW Herman Road that are identified as major arterial but are not yet improved to City standard and lack curb, sidewalk, etc.

In general the minor arterials within the City have been built out and meet the standards with the exception of overall width, which tends to be slightly narrower than the standard curb-to-curb width. Additionally SW Martinazzi Avenue lacks designated bicycle lanes between SW Sagert Road and SW Boones Ferry Road.

Major collectors within the City generally meet the design standards reviewed. There are some instances where there are no bike lanes on portions of SW Herman Road and SW Teton Avenue. Further, bike lanes are reduced or eliminated at most intersections due to left turn lanes. Curb-to-curb widths are generally less than the standard (14 feet) due to the reduction in median/center turn lane width.

Minor collectors within the City appear to vary the most from standard. In most cases the roadways lack either bike lanes, on street parking, or both. Some minor collectors are not striped at all, but still do not meet the standard because the overall curb-to-curb is narrower than the accepted width.

Residential collectors in the City generally meet the design standard curb-to-curb width. Residential collectors, like local streets, are typically not striped and therefore individually dedicated cross section elements are difficult to determine, however the overall width appears to generally meet standard.

Roadway Needs

Based on the review of existing roadway infrastructure against the standards listed above, Table 4 lists high level deficiencies identified in no particular order of priority:

TABLE 4
Previously Identified Deficiencies in Tualatin

Item No.	Roadway Segment or Intersection	Deficiency
1	SW Boones Ferry Road south of SW Tualatin-Sherwood Road	Roadway is listed as Eb&t major arterial to south city limits but is generally a 3-lane section.
2	SW Herman Road at SW Cipole Road	Intersection within a sharp curve on SW Cipole and is at close proximity to an unimproved railroad crossing. Bicycle and pedestrian are not accommodated.
3	SW Herman Road between SW 125th Avenue and SW Cipole Road	Section is 2-lane unimproved with no curbs, sidewalks or bike lanes. Shoulders are extremely narrow.
4	SW Herman Road between SW Teton Avenue to SW Tualatin Road	Section is 2-lane unimproved with no curbs, sidewalks or bike lanes but is listed at Eb&t in current plan. Shoulders are extremely narrow.
5	SW 105th Avenue to SW Blake Street to SW 108th Avenue, south of SW Tualatin-Sherwood Road	This segment of roadway is unimproved 2-lane roadway with sharp curvature and no accommodations for bicycles or pedestrians.
6	SW Borland Road	Roadway is listed as Eb&t major arterial to south city limits but is generally a 3-lane section from SW 65th Avenue east of SW Wilke Road, and then a 2-lane section east to the City limits.
7	SW 65th Avenue	Roadway is listed as Eb&t major arterial to south city limits between SW Nyberg and SW Sagert Streets but is a 3-lane section.
8	OR 99W	Designated as an arterial, but the cross-section is not consistent with arterial design standards.
9	SW Grahams Ferry Road between Sitka and Ibach	This segment of roadway is unimproved 2-lane roadway has no accommodations for bicycles or pedestrians.
10	SW Sagert Street	Roadway is listed as a Eb&t major arterial between SW Martinazzi and SW 65th Avenues but is a 2-lane section.

Source: Site visit observations and city-provided Geographic Information System (GIS) data

In addition to the above deficiencies, there is also limited connectivity on some of the local neighborhood streets, especially in neighborhoods that are adjacent to land that has not yet been developed.

A listing of streets and the standards assessed including commentary is included in Attachment A for reference.

Traffic Operations

This section describes the motor vehicle environment and operations at key intersections within Tualatin. Areas covered in this section include data collection techniques, intersection operations, travel times on key corridors, and safety analysis.

Data Collection

The project team collected traffic volume counts for 30 study intersections in October 2011 on weekdays during the morning (7am-9am) and afternoon (4pm-6pm) peak periods. In addition, the team took 24-hour counts at 11 locations on key roadways in Tualatin. In addition to intersection and daily volume profiles, the project team collected corridor data related to travel times and speeds during the pm peak period.

Daily Traffic Volumes

Daily traffic volume counts help demonstrate overall travel behavior trends in Tualatin. Table 5 provides bi-directional motor vehicle volumes for each of the 11 locations where 24-hour counts were taken. The team identified the time period with the highest overall bi-directional demand as well. All counts were taken in October 2011 unless noted otherwise.

TABLE 5
Daily Motor Vehicle Traffic Volumes

No.	Roadway	Count Location	Daily Volume	Peak Hour
1	SW Tualatin-Sherwood Road	West of SW 124th Avenue	26,600	4pm-5pm
2	SW Nyberg Road*	West of SW 65th Avenue	21,700	5pm-6pm
3	SW Boones Ferry Road	North of SW Ibach Street	16,100	4pm-5pm
4	SW Tualatin Road	East of SW 90th Avenue	14,600	4pm-5pm
5	SW Boones Ferry Road	North of SW Sagert Street	14,300	5pm-6pm
6	SW Lower Boones Ferry Road*	East of SW Childs Road	13,700	5pm-6pm
7	SW Tualatin Road	West of SW 109th Avenue	10,700	5pm-6pm
8	SW Borland Street	East of SW 60th Avenue	10,500	5pm-6pm
9	SW Boones Ferry Road	South of SW Ibach Street	10,400	4pm-5pm
10	SW Bridgeport Road*	West of SW Hazel Fern Road	10,000	12pm-1pm
11	SW Herman Road	West of SW 108th Avenue	7,200	4pm-5pm

SOURCE: Count data collected in October 2011 by All Traffic Data unless noted otherwise.

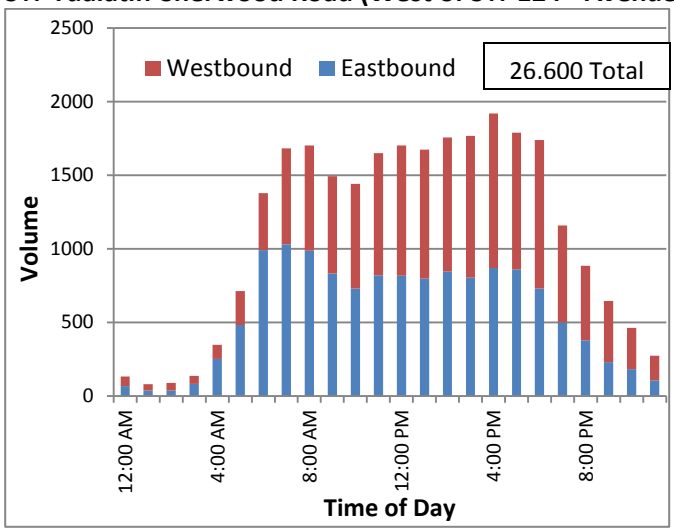
***Count taken in May 2010 (SW Bridgeport Road & SW Nyberg Road) or March 2010 (SW Lower Boones Ferry Road) by Quality Counts.

The daily traffic volumes illustrate the relative use of Tualatin's roadways by autos and trucks at various locations within the city. The peak hour demonstrates when during the day there is the highest use of the roads. SW Tualatin-Sherwood and SW Nyberg Roads have the highest traffic volumes, with over 20,000 vehicles per day. The SW Tualatin Road and SW Boones Ferry Road corridors have10,000 motor vehicles daily at multiple locations.

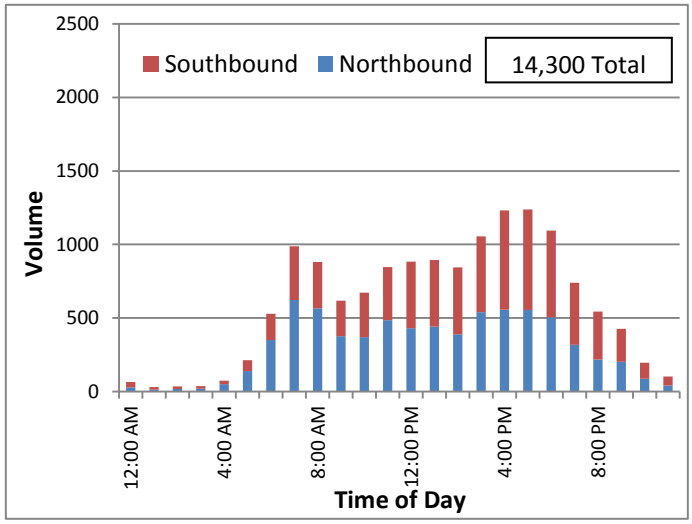
- On most roadways, traffic volumes peak during the morning and afternoon commute periods, with the highest overall volumes occurring between 4pm to 6pm. This profile is known as a "commuter profile" and is representative of most roadways in Tualatin. However, some roadways have a more consistent hourly demand, with a less dramatic increase in demand during the AM and PM peak commute periods. These

roadways tend to have more truck traffic, retail trips, or school trips. Figure 4 shows a sample of 24-hour volume profiles for various geographic locations around the city.

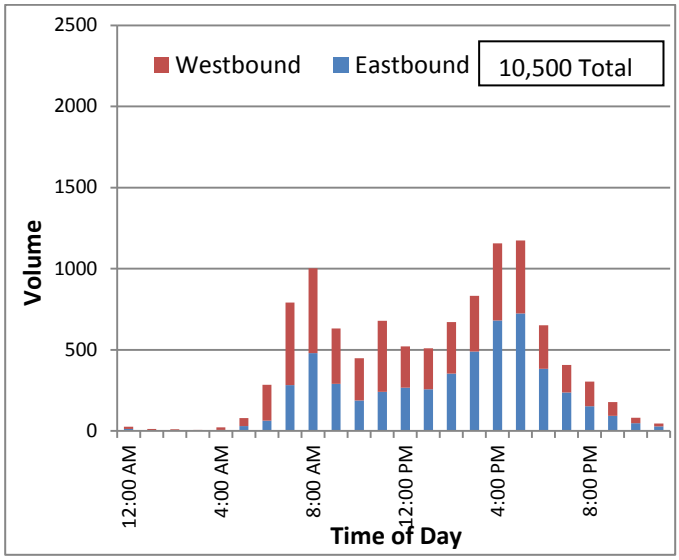
SW **Tualatin-Sherwood Road (West of** SW **124th Avenue)**



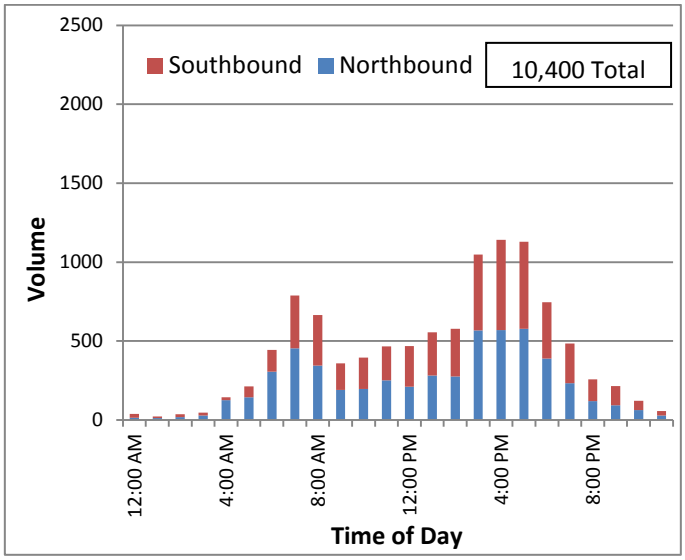
SW **Boones Ferry Road (North of** SW **Sagert Street)**



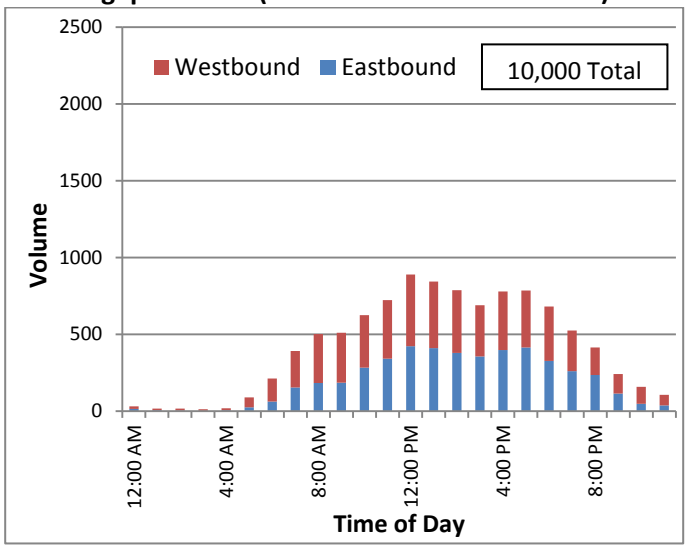
SW **Borland Street (East of** SW **60th Avenue)**



SW **Boones Ferry Road (South of** SW **Ibach Street)**



SW **Bridgeport Road (West of** SW **Hazelfern Road)**



SW **Tualatin Road (West of** SW **109th Avenue)**

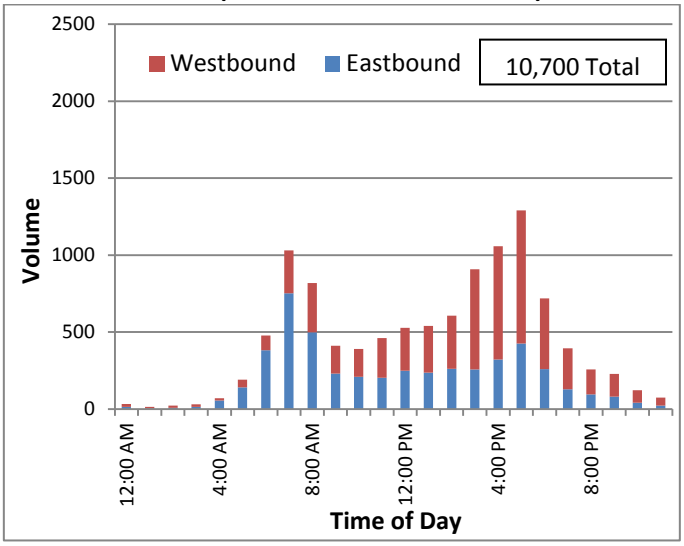


Figure 4: 24-Hour Volume Profiles

Areas with predominantly retail or commercial land uses may experience more traffic during the mid-day. An example of this is SW Bridgeport Road near the Bridgeport Village shopping center, which has a relatively consistent volume profile with peak demand occurring between 12 pm and 1pm.

While SW Tualatin-Sherwood Road has peak periods in line with the commuter profile, the difference between peak and off-peak travel is relatively small, due in part to the high percentage of heavy vehicles (trucks with three or more axles) and trucks. From 8am to 3pm, heavy vehicles make up 15 percent of SW Tualatin-Sherwood Road traffic volume, compared to 8 percent during the pm peak period (4pm to 6pm). Table 6 identifies the percentage of heavy vehicles from four 24-hour classification counts performed for the TSP Update. These percentages are higher than an average road in the Portland Metro area which typically has 2-4 percent heavy vehicles.

TABLE 6
Heavy Vehicle Percentage of Daily Motor Vehicle Traffic

Roadway	Count Location	Heavy Vehicle Percentage
SW Tualatin-Sherwood Road	West of SW 124th Avenue	11.5%
SW Boones Ferry Road	South of SW Ibach Street	8.4%
SW Lower Boones Ferry Road*	East of SW Childs Road	5.4%
SW Nyberg Road*	West of SW 65th Avenue	5.2%

SOURCE: Count data collected in October 2011 by All Traffic Data unless noted otherwise.

*****Count taken in May 2010 (SW Nyberg Road) or March 2010 (SW Lower Boones Ferry Road) by Quality Counts.

Intersection Operations

While daily traffic volumes analyses are useful in understanding the general nature of traffic and travel behavior, traffic volume alone does not indicate the street network's ability to carry additional traffic, nor the congestion and delay travelers experience. To create a more complete picture of traffic operations, the project team uses performance measures for intersections based on traffic volumes, control (such as traffic signal, four-way stop, etc.), and roadway geometry.

Performance Measures

Level of service (LOS) and volume-to-capacity (V/C) ratios are two commonly used measures of performance for intersection operations. The measures reflect related yet distinct elements of intersection operations:

- Level of service (LOS): A "report card" rating (A through F) based on the average delay experienced by vehicles at the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity. This condition is typically evident in long queues and delays.
- Volume-to-capacity (V/C) ratio**:** This measure is a range from 0.0 to 1.0 and represents how full an intersection is with vehicles. The ratio is similar to a percentage, for example, if a glass of water were 75 percent full, it would have a V/C ratio of 0.75. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced.

Design Hour Traffic Volumes

Intersection turn movement traffic counts collected during the am and pm peak periods represent raw data. The Oregon Department of Transportation (ODOT) Transportation Planning and Analysis Unit (TPAU) outlines procedures to take raw data and convert it to represent the 30th highest vehicle hour data. This allows the project team to convert raw data collected at any time during the year to represent data that would be similar to the 30th busiest motor vehicle traffic day of the year for analysis. This does not represent the worst possible traffic day of the year, but represents conditions where the traffic congestion would be better on approximately 80 percent of days.

To convert the raw data to the 30th highest hour, the project team adjusts the raw counts by using a seasonal factor determined by the TPAU Analysis Procedures Manual (APM). The conversion factors are based on the time of year and the type of typical travel. For intersections within the City of Tualatin the project team used a "commuter"

seasonal adjustment factor of 1.03 for October traffic counts[2]. This adjustment factor is supported by automatic traffic recorder data available for similar roadways in the Portland Metro area[3].

In addition to the seasonal factor adjustment, the project team makes balancing adjustments to match volumes between closely spaced intersections and to reflect a consistent overall peak hour for the study area. As a result of these combined adjustments the project team identifies a design hour volume for both the am and pm peak hour.

Jurisdictional Operating Standards

Intersections within the City of Tualatin fall along the jurisdictions previously identified in the Roadway Geometry section of this memo. Each jurisdiction has a distinct set of operating standards depending on the area or type of facility. The City of Tualatin uses a level-of-service standard that is based on the average delay calculated at intersections. The City has decided to use Metro's Regional Transportation Plan Level of Service standards for the Transportation System Planning process.

ODOT and Washington County's standards are based on a volume-to-capacity (V/C) ratio. The V/C ratio uses the most constrained movements at the intersection to calculate the overall intersection V/C ratio. Table 7 outlines the operating standards that will be used for existing and future intersection operations by jurisdiction.

TABLE 7
Intersection Operating Standards by Jurisdiction and Facility

Jurisdiction	Facility	Standard
City of Tualatin	Town Center*	LOS F for peak hour
		LOS E for ½ hour before and after peak hour
	All Other Areas*	LOS D (signalized)
		LOS E (unsignalized)
Washington County	General Urban Area	0.99 (first hour)
		0.90 (second hour)
	Town Center	0.99 (first hour and second hours)
	Rural Area	0.90 (first and second hours)
ODOT	General Metro Area	0.99 (peak hour)
	Town Center Area	1.10 (peak hour)
	Freeway Ramp Terminals	0.99 (peak hour)
	OR 99W**	0.99 (peak hour)

SOURCE: City of Tualatin 2001 Transportation System Plan and Development Code
Washington County Transportation System Plan, November 2003, Table 5.
1999 Oregon Highway Plan, Table 7, Policy 1F Revisions: Adopted December 21, 2011

* A volume-to-capacity ratio greater than 1.00 should also be considered to be below the minimum standard, regardless of level of service.

** Oregon 99W is specified as an "area of special concern" between I-5 and SW 124th Avenue, and has a 0.95 minimum acceptable V/C standard. Elsewhere the standard for OR 99W is 0.99 V/C ratio.

Operational Results

The project team analyzed study area intersections using the most current version of the *Highway Capacity Manual (2010)* which uses both the average intersection delay (converted to LOS) and critical V/C ratio calculations. Intersection traffic operations are evaluated using identified design hour (30th highest hour) traffic volumes. Table 8 identifies the am and pm LOS and V/C for each study intersection, as well as the applicable jurisdictional standard for minimum performance.

[2] Based on the ODOT 2011 Seasonal Trend Table, printed 10/27/2011.

[3] Similar roadways, with urbanized commuter characteristics, with available automatic traffic recorder data available in Portland Metro included: OR 224 near Johnson Road, TV Highway in Hillsboro, and US 26 through the Vista Ridge Tunnel.

Two of the thirty study intersections fail to meet performance standards. The intersections that do not meet performance standards are SW Teton Avenue at SW Tualatin Road and SW Martinazzi Avenue at SW Sagert Street. SW Teton Avenue is stop-controlled; while through traffic on SW Tualatin Road is not stopped. This is an intersection under city jurisdiction with the performance standard of LOS E. During the pm peak hour, the northbound left turn operates at LOS F. The intersection of SW Martinazzi Avenue at SW Sagert Street is an all-way stop controlled intersection. During the AM peak hour, northbound traffic operates at LOS F, while during the PM peak hour, southbound traffic operates at LOS F.

TABLE 8
AM and PM Peak Hour Intersection Traffic Operations

Intersection	Jurisdiction	Minimum Standard	AM LOS	AM V/C	PM LOS	PM V/C
Signalized						
SW 124th Ave & Hwy 99W	ODOT	0.99	C	0.80	C	0.69
SW 124th Ave & SW Tualatin Rd	Tualatin	D	A	0.64	B	0.66
SW 124th Ave & SW Herman Rd	Tualatin	D	C	0.48	C	0.53
SW 124th Ave & SW Tualatin-Sherwood Rd	Wash. Co.	0.99	B	0.81	C	0.90
SW Avery St & SW Tualatin-Sherwood Rd	Wash. Co.	0.99	C	0.73	B	0.71
SW Teton Ave & SW Tualatin-Sherwood Rd	Wash. Co.	0.99	D	0.79	D	0.79
SW 90th Ave & SW Tualatin-Sherwood Rd	Wash. Co.	0.99	C	0.78	C	0.60
SW Boones Ferry Rd & SW Tualatin-Sherwood Rd	Wash. Co.	0.99	D	0.93	D	0.93
SW Martinazzi Ave & SW Tualatin-Sherwood Rd	Wash. Co.	0.99	C	0.90	D	0.94
I-5 SB Ramps & SW Nyberg Rd	ODOT	0.99	D	0.79	D	0.79
I-5 NB Ramps & SW Nyberg Rd	ODOT	0.99	C	0.71	B	0.68
SW 65th Ave & SW Borland Rd	Wash. Co.	0.99	C	0.78	D	0.93
SW Teton Ave & SW Herman Rd	Tualatin	D	C	0.76	C	0.65
SW Tualatin Rd & SW Herman Rd	Tualatin	D	C	0.89	B	0.59
SW 90th Ave & SW Tualatin Rd	Tualatin	D	B	0.84	B	0.75
SW Tualatin Rd & SW Boones Ferry Rd	Wash. Co	0.99	A	0.48	B	0.62
SW Martinazzi Ave & SW Boones Ferry Rd	Wash. Co	0.99	D	0.92	D	0.89
SW Boones Ferry Rd & SW Lower Boones Ferry Rd	ODOT	0.99	B	0.72	C	0.76
SW 72nd Ave & Lower Boones Ferry Rd & Bridgeport Rd	Wash. Co	0.99	C	0.51	C	0.66
I-5 SB Ramps & SW Lower Boones Ferry Rd	ODOT	0.99	B	0.53	C	0.75
I-5 NB Ramps & SW Lower Boones Ferry Rd	ODOT	0.99	B	0.54	B	0.74
SW Boones Ferry Rd & SW Avery St	Wash. Co.	0.99	C	0.70	C	0.87
SW Boones Ferry Rd & SW Sagert St	Wash. Co.	0.99	C	0.71	C	0.75
SW Boones Ferry Rd & SW Ibach St	Wash. Co.	0.99	B	0.75	B	0.70
All-way Stop-control						
SW Martinazzi Ave & SW Avery St*	Tualatin	E	B	0.42	B	0.55
SW Martinazzi Ave & SW Sagert St* [4]	**Tualatin**	**E**	**F**	**0.93**	**F**	**0.95**
SW Teton Ave & SW Avery St*	Tualatin	E	D	0.41	C	0.40

[4] HCM Methodology does not account for a three-lane approach for an all way stop (as exists for the southbound approach.) To estimate LOS and V/C for the intersection the three lanes (one dedicated to each movement) are combined into two: through-right and through-left lanes. Because of this approximation, actual performance may be slightly better than reported above.

TABLE 8
AM and PM Peak Hour Intersection Traffic Operations

Intersection	Jurisdiction	Minimum Standard	AM LOS	AM V/C	PM LOS	PM V/C
SW 65th Ave & SW Sagert St* [5]	Wash. Co.	0.99	F	0.98	F	0.98
*Minor Street Stop-control**						
SW 105th Ave & SW Avery St	Tualatin	E	D	0.45	C	0.28
SW Teton Ave & SW Tualatin Rd	Tualatin	E	D	0.43	F	0.98

SOURCE: Count data collected by All Traffic Data on October 18th (Tuesday) or October 19th (Wednesday) 2011

*LOS and V/C reported for highest delay movement.

BOLD and highlighted dark grey text indicates meet minimum performance standard is not met

Travel Times and Speeds

The project team selected four corridors within Tualatin to gather travel time data during the PM peak period. These travel time corridors were selected on roadways that help connect through and to downtown Tualatin. The corridors selected were SW Tualatin-Sherwood Road/Nyberg Road/65th Avenue/Borland Road (from SW Cipole Road to SW Prosperity Park Road), SW Boones Ferry Road (from SW Durham Road to SW Norwood Road), SW Tualatin Road (from 99W to SW Boones Ferry Road), and the connection of SW Avery Street and SW Martinazzi Road (from SW Tualatin-Sherwood Road to SW Boones Ferry Road). The project team collected travel times and the average speed along the corridors. Table 9 summarizes the overall travel time results for each corridor, while Figure 5 illustrates individual pieces of each corridor at a smaller scale.

TABLE 9
Existing (2011) PM Peak Period (4pm-6pm) Travel Time Data

Corridor	From	To	Distance	Posted Speed	Average Speed	Average Travel Time
SW Tualatin-Sherwood Rd/Nyberg Rd/SW 65th Ave/Borland Rd	SW Cipole Road	SW Prosperity Park Road	4.6 miles	35/45mph	22 mph	12min 32 sec
	SW Prosperity Park Road	SW Cipole Road	4.6 miles	35/45mph	10 mph	28 min 32 sec
SW Boones Ferry Road	SW Durham Road	SW Norwood Road	3.7 miles	30/35mph	20 mph	10 min 25 sec
	SW Norwood Road	SW Durham Road	3.7 miles	30/35mph	18 mph	11 min 31 sec
SW Avery/ SW Martinazzi	SW Tualatin-Sherwood Rd	SW Boones Ferry Road	2.5 miles	25/35mph	16 mph	8 min 58sec
	SW Boones Ferry Road	SW Tualatin-Sherwood Rd	2.5 miles	25/35mph	15 mph	9 min 14 sec
SW Tualatin Road	Hwy 99W	SW Boones Ferry Road	2.4 miles	35mph	24 mph	5 min 52 sec
	SW Boones Ferry Road	Hwy 99W	2.4 miles	35mph	24 mph	5 min 59 sec

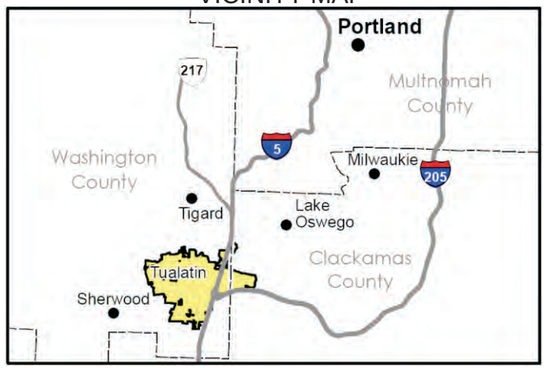
SOURCE: All Traffic Data, November 2011

The travel time runs along the corridors help identify congested areas on major roadways beyond signalized intersections. Based on the travel time runs, a level-of-service for the roadways can be calculated from the travel speed. To best serve travel with reliable travel times on a corridor, it is best to have corridors at a level-of-service D or better during peak travel times. This indicates a minor level of congestion on a corridor. When LOS for a corridor

[5] HCM Methodology does not account for a three-lane approach for an all way stop (as exists for the southbound approach.) To estimate LOS and V/C for the intersection the dedicated southbound left turn lane and through lane are combined, due to the relatively small volume on the left turn movement. Because of this approximation, actual performance may be slightly better than reported above.

starts to reach levels of E and F it is an indication that the corridor (as well as the intersections typically) is reaching saturated conditions and users will frequently be going slow, or waiting through multiple signal cycles to get through the intersection.

VICINITY MAP



LEGEND

- Travel Time Checkpoint
- (XX) - Average Directional Speed (mph)
- **Xm XXs** - Average Directional Travel Time (min/sec)

Arterial Level-of-Service (LOS)

- LOS A through C
- LOS D
- LOS E
- LOS F

SOURCE: Quality Counts, November 1-3, 2011

FIGURE 5
PM Peak Period Travel Time Survey Results
City of Tualatin Transportation System Plan

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Results from the travel time runs indicate that SW Tualatin Road, major portions of SW Boones Ferry Road, and the combination of SW Avery Street/ SW Martinazzi Road tend to operate at a LOS D or better during the PM peak period. SW Tualatin-Sherwood Road typically has delays near the I-5 interchange area, and westbound from the downtown core. In addition, the downtown area where all four corridors surveyed interact with one another typically has some level of congestion.

Roadway Needs

Needs and deficiencies identified for the roadway system in the City of Tualatin are summarized below:

- **Improved Roadway connectivity** – new roadway connections should be constructed to improve east-west connectivity south of SW Tualatin-Sherwood Road and north-south connectivity between SW Boones Ferry Road and OR 99W, as well as across the Tualatin River. Metro RTP policies related to a complete street system identify one-mile spacing between major arterial streets, with collector streets or minor arterials spaced a half-mile apart.
- **Improved travel time along congested corridors** - SW Tualatin-Sherwood Road, SW Nyberg Street, SW 65th Avenue, Boones Ferry Road, Martinazzi Avenue, and I-5 are some key corridors that experience significant congestion.
- **Intersection improvements**- at the SW Teton Avenue and SW Tualatin Road to address the peak period demand for vehicles turning from SW Teton Avenue.
- **Upgrading roadway geometries** - City design standards for roadway width, sidewalks, and bicycle facilities should be followed where specific deficiencies have been identified (see Table 4).

Safety

Safety Analysis

The project team evaluated the crash history for the City of Tualatin for the three year period of January 1, 2008 through December 31, 2010[6]. In addition, the team reviewed Safety Priority Indexing System (SPIS) data, which is the ranking system for collision locations based on crash rates and severity, from Washington County and ODOT to determine if any SPIS intersections were within the City of Tualatin. Key findings from the crash data analysis are summarized below and Figure 6 shows all collision data.

- Over the three year time frame, one fatality occurred when a driver lost control, crashing into a tree and fence, while traveling on Grahams Ferry Road near SW Sitka Court. Two other fatalities occurred on I-5.
- Half of all collisions resulted in injury while the other half resulted in property damage only (PDO).
- The majority of the crashes were intersection or congestion related. These included rear-end (58 percent) and turn movement (24 percent) type crashes. In the case of rear-end crashes, the cause was often cited as “following too close”. The cause for turn movement type crashes were most often cited as being “failure to yield” or “disregarding a traffic signal”.
- The number of reported crashes coincides with the daily changes in traffic volume, with peaks during the morning and evening commute hours, particularly between 7:00-8:00 a.m. and from 3:00-4:00 p.m.
- The majority (64 percent) of crashes occurred under clear, dry and daylight conditions.
- The majority (61 percent) of crashes occurred on (or at intersections on) Tualatin-Sherwood Road, Nyberg Road, and Boones Ferry Road.

In addition to the intersection collisions, Figure 7 shows the average annual crashes per mile for the major through streets and average number of crashes per year for each of the major intersections. This figure also identifies the

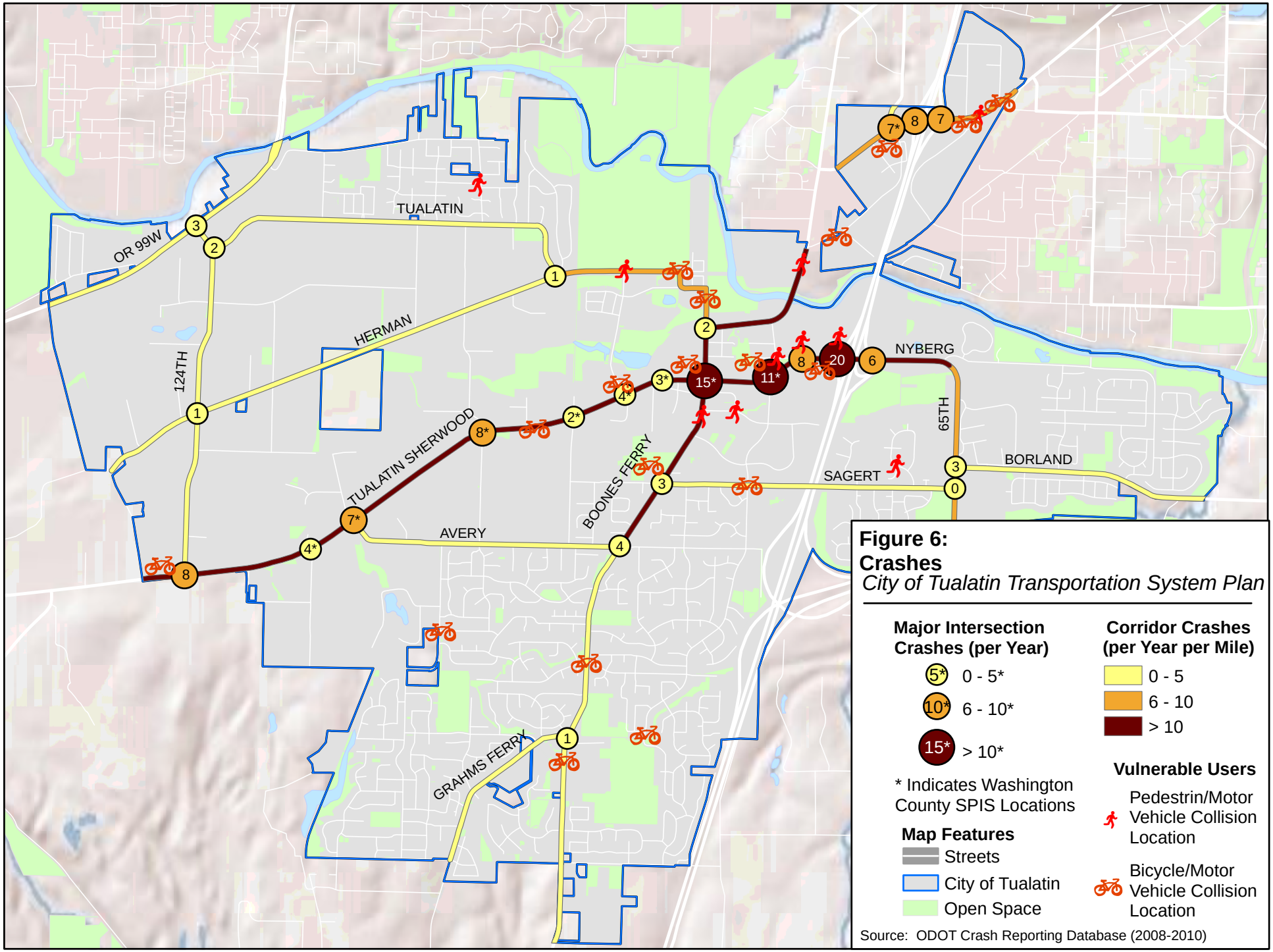
[6] Source: Oregon Department of Transportation Crash Reporting Database, received October 2011.

locations of all of bicycle or pedestrian crashes during the study time frame. Many of these crashes occurred along the busy major streets.

Both Washington County and ODOT rank their high accident SPIS locations based on an indexing formula that identifies potentially hazardous locations. The index is based on frequency (total number of crashes), rate (frequency compared to traffic volumes), and severity. Within the City of Tualatin there are three locations that rank within the top 50 SPIS sites in Washington County: SW Tualatin-Sherwood Road/ SW Boones Ferry Road, SW Tualatin-Sherwood Road/ SW Martinazzi Avenue, and SW Bridgeport Road/ SW 72nd Avenue. Eight other intersections are included in Washington County's list of top 262 SPIS sites. ODOT has identified five SPIS locations within the City: SPIS locations for both ODOT and Washington County are illustrated in Figure 7.

Intersection Analysis

The project team calculated intersection crash rates for the arterial to arterial intersections and for Washington County SPIS intersections. Table 10 below shows the results of the crash rate analysis. An intersection crash rate is a measure of the frequency of crashes compared to the total motor vehicle traffic volume (this measures exposure to the crash risk). The rate is measured in crashes per one million entering vehicles. Typically rates of 1.0 crashes per million entering vehicles are considered higher than normal and the intersection becomes a candidate for additional investigation.


TUALATIN
OR 99W
HERMAN
124TH
TUALATIN SHERWOOD
AVERY
BOONES FERRY
GRAHMS FERRY
NYBERG
65TH
SAGERT
BORLAND
Figure 6:
Crashes
City of Tualatin Transportation System Plan
Major Intersection Crashes (per Year)
5* 0 - 5*
10* 6 - 10*
15* > 10*
* Indicates Washington County SPIS Locations
Map Features
Streets
City of Tualatin
Open Space
Corridor Crashes (per Year per Mile)
0 - 5
6 - 10
> 10
Vulnerable Users
Pedestrin/Motor Vehicle Collision Location
Bicycle/Motor Vehicle Collision Location
Source: ODOT Crash Reporting Database (2008-2010)

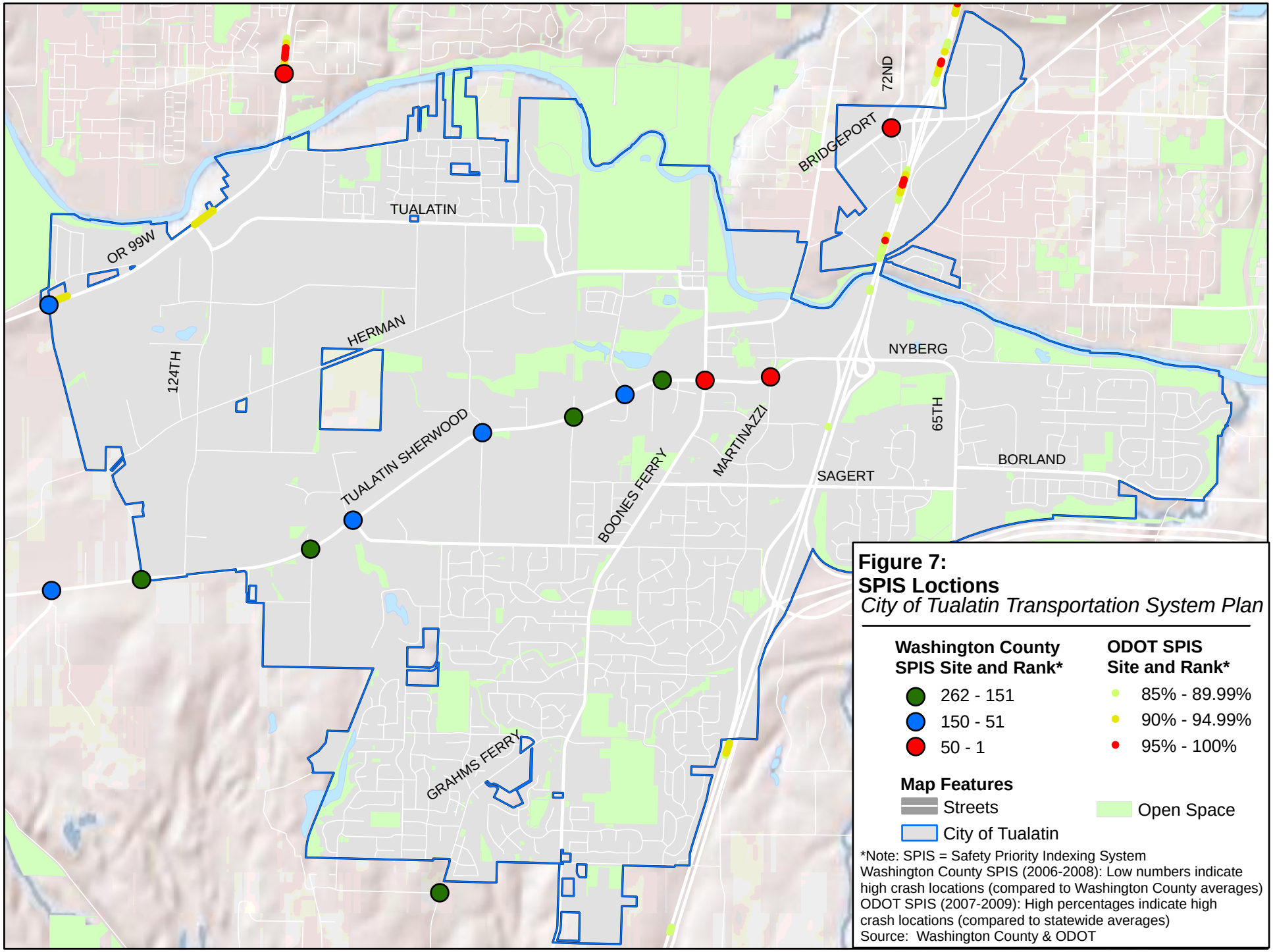


Figure 7:
SPIS Loctions
City of Tualatin Transportation System Plan

Washington County SPIS Site and Rank*

- 262 - 151
- 150 - 51
- 50 - 1

ODOT SPIS Site and Rank*

- 85% - 89.99%
- 90% - 94.99%
- 95% - 100%

Map Features

- Streets
- City of Tualatin
- Open Space

*Note: SPIS = Safety Priority Indexing System
Washington County SPIS (2006-2008): Low numbers indicate high crash locations (compared to Washington County averages)
ODOT SPIS (2007-2009): High percentages indicate high crash locations (compared to statewide averages)
Source: Washington County & ODOT

TABLE 10
Intersection Crash Rates between January 1, 2008 and December 31, 2010

Intersection	Crashes	Annual Average Daily Traffic	Crash Rate (Crashes per million entering vehicles)	Washington County SPIS Site? [7]
Hwy 99W/SW SW 124th Ave	9	30500	0.27	
SW Herman Rd/SW 124th Ave	3	11250	0.24	
SW Tualatin Rd/SW 124th Ave	6	16750	0.33	
SW Bridgeport Rd/SW 72nd Ave/SW Lower Boones Ferry Rd	21	39400	0.49	Yes
SW Lower Boones Ferry Rd/I-5SB	24	47500	0.46	
SW Lower Boones Ferry Rd/I-5NB	21	47750	0.40	
SW Tualatin Rd/SW Boones Ferry Rd	6	25700	0.21	
SW Avery St/SW Boones Ferry Rd	12	21000	0.52	
SW Sagert St/SW Boones Ferry Rd	9	19350	0.42	
SW Nyberg St/I-5SB	**58**	**45550**	**1.16**	
SW Nyberg St/I-5NB	18	31900	0.52	
SW Tualatin-Sherwood Rd/SW Boones Ferry Rd	**50**	**39650**	**1.15**	**Yes**
SW Tualatin-Sherwood Rd/ SW Avery St/SW 112th Ave	21	21350	0.90	Yes
SW Tualatin Rd/SW Herman Rd	3	19300	0.14	
SW Tualatin-Sherwood Rd/SW 89th Ave	9	26900	0.31	Yes
SW Tualatin-Sherwood Rd/SW 90th Ave	12	27050	0.41	Yes
SW Tualatin-Sherwood Rd/SW 95th Ave	6	21430	0.26	Yes
SW Tualatin-Sherwood Rd/SW Teton Ave	24	26500	0.83	Yes
SW Tualatin-Sherwood Rd/SW 115th Ave	12	24600	0.45	Yes
SW Tualatin-Sherwood Rd/SW 124th Ave	20	22200	0.82	
SW Tualatin-Sherwood Rd/SW Martinazzi Ave	33	41650	0.72	Yes
SW Tualatin-Sherwood Rd/SW Nyberg St	24	44700	0.49	
SW 65th Ave/SW Sagert St	0	16250	0.00	
SW Boones Ferry Rd/SW Ibach St	3	19400	0.14	
SW 65th Ave/SW Borland Rd	9	21300	0.39	

Source: ODOT, October 2011
Bold text indicates intersections with a crash rate over 1.0

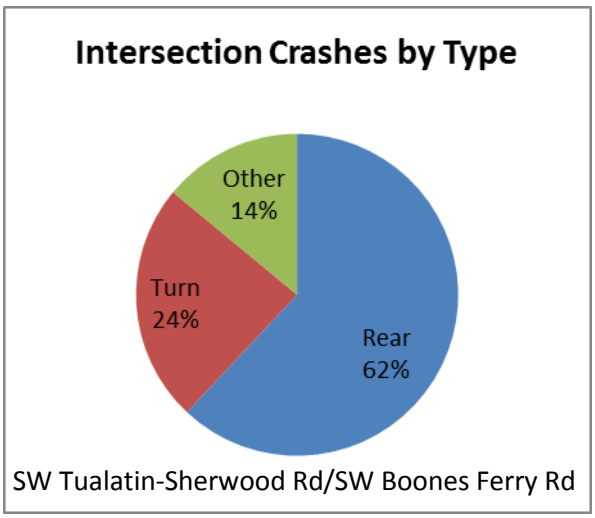
High Crash Locations

Within the City of Tualatin, there were two locations (SW Tualatin-Sherwood Rd/ SW Boones Ferry Rd and SW Nyberg St/ I-5 SB) where the crash rate exceeded 1.0 crashes per million entering vehicles. The project team investigated both of these intersections further to identify potential patterns.

[7] SPIS sites represent the top 50% SPIS-rated Washington County intersections that experienced at least three total crashes, one severe crash, or a fatality over the three-year period. Latest available SPIS rankings are based on 2006-2008 data.

SW Tualatin-Sherwood Rd/SW Boones Ferry Rd

Between 2008 and 2010, 50 crashes were recorded at the intersection of SW Tualatin-Sherwood Road/SW Boones Ferry Road, which has an average annual crash rate of 1.15 crashes per million entering vehicles. No fatalities were recorded at this location, less than one-half of the crashes (46 percent) resulted in injury, and the remainder of the crashes were recorded as property damage only.



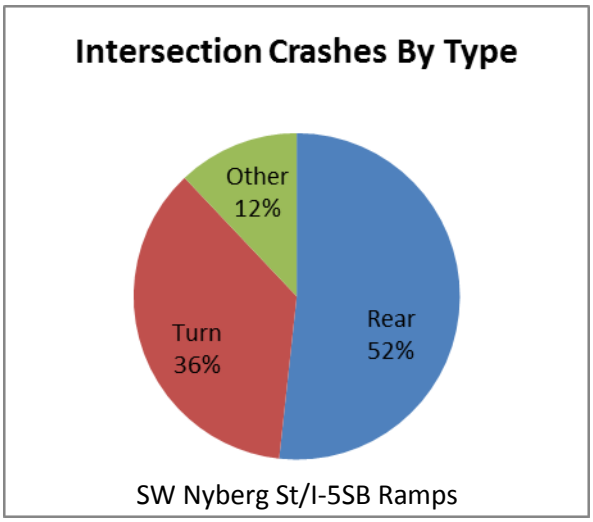
SW Tualatin-Sherwood Rd/SW Boones Ferry Rd

Further analysis revealed that the majority of the crashes were either rear-end or turn movement related. This type of crash pattern is typically seen at congested signalized intersections where vehicles are likely to be stopped or moving slowly due to the traffic signal. The primary cause for the rear-end type crashes was recorded as following too close. The cause for the turn movement crashes was indicated as being a result of not yielding the right of way. Both of these causes are symptoms of congested conditions as well as impatient, aggressive, or inattentive drivers.

There was one bike crash reported at this intersection over the three year analysis time period. The crash occurred during clear daylight hours and was caused by a norhtbound right turning motorist. Driver innattetion may have been a contribution factor in this crash, which resulted in injury to the bicyclist.

SW Nyberg St/I-5 SB Ramps

At the intersection of SW Nyberg Street/I-5 Southbound Ramps, 58 crashes were recorded between 2008 and 2010. The average annual crash rate at this intersection was 1.16 crashes per million entering vehicles. No fatalities were recorded at this location and one-half of the crashes (50 percent) resulted in either an injury or a property damage only crash.



SW Nyberg St/I-5SB Ramps

Further analysis revealed that the majority of the crashes were either rear-end or turn movement type crashes. Similar to the intersection of SW Tualatin-Sherwood Road/SW Boones Ferry Road, congestion at this signalized intersection may contribute to crashes. The proportion of turn movement crashes to rear end high crashes at this location is higher than the intersection of SW Tualatin-Sherwood Road/SW Boones Ferry Road, which was to be expected, given the higher proportion of turning vehicles to vehicles traveling straight through the intersection.

Over the three year time period, there were two bike crashes and one pedestrian crash recorded at this intersection, each resulting in injury to the bicyclist or pedestrian. All three of these crashes occurred during dark conditions by southbound right turning vehicles. Illumination levels and/or driver innattetion at the intersection may have contributed to these crashes. Conflicts may result when southbound right-turning vehicles attempt to turn on red while westbound through travelers (incuding bicyclists) attempt to stay in the far right travel lane where the additional (third) westbound through lane is added west of the intersections.

Safety Needs

Needs and deficiencies identified for the safe travel through the City of Tualatin are identified based on analysis of available crash data. SW Boones Ferry Road, SW Tualatin-Sherwood Road and SW Nyberg Street have the highest crash rates per mile and include the intersections with the highest reported intersection crash rates and SPIS rankings (based on crash severity, rate, and frequency) in the city. Safety improvements along the SW Tualatin-Sherwood Road and SW Nyberg Street corridor are needed, particularly along the segment between Boones Ferry Road and the

I-5/Nyberg Road interchange. Specific improvements should be considered to improve conflicts between motor vehicles and pedestrians or bicycles, particularly for southbound right turning vehicles at the intersection of SW Nyberg Street/I-5 Southbound Ramps. A second segment with safety concerns is the SW Lower Boones Ferry Road interchange including Bridgeport Village. Crashes along these corridors appear to be the symptoms of congested conditions and impatient, aggressive, or inattentive drivers.

Bicycle

Introduction

This section describes the current bicycle network and usage at key intersections within Tualatin, and covers existing shared roadways, shoulder bikeways, bike lanes, multi-use paths, and facility conditions. Bicycling is an inexpensive and important mode of transportation that provides health benefits and reduces stress. When considering bicycle connections it is important to focus on shorter trips, typically trips less than three miles in length, and to consider key destinations, such as schools, services, and commercial areas.

Bicycle Facilities and Amenities

Bicyclists use a variety of facilities within the City of Tualatin. These are briefly described below.

Example of a bike lane on SW Martinazzi Avenue

- **Bike Lanes:** Bike lanes are portions of the roadway that are striped and stenciled specifically for bicycle travel. The typical width of bike lanes is 5 feet, but when the road is narrow, lanes can be as narrow as 4 feet. Buffered bike lanes, with an additional two-foot width, are striped to create a painted buffer area between motor vehicle traffic and bike lanes. Bike lanes are most appropriate on higher volume and speed streets to separate travel modes. Bike lanes comprise a substantial portion of the bicycle facilities in Tualatin. The city defers bike lane width standards to the most recent AASHTO Guide for the Development of Bicycle Facilities and the Oregon Bicycle and Pedestrian Plan. Standards include a 4 foot minimum on a roadway with no curb and gutter, and 5 foot minimum when adjacent to parking or a curb.

Example of a signed shared roadway

- **Shared Roadway:** Shared roadways are roads where bicyclists and motorists share the same travel lane. The most suitable roadways for shared bicycle use are low speed (25mph or less) and low traffic volumes (3,000 vehicles per day or fewer) roads. Shared roadways are often signed, and are designated bicycle routes, providing links to other bicycle facilities (e.g. bicycle lanes) or designating a preferred route through a community. Shared roadways can also include signs that highlight specific information such as travel time or distance to popular destinations. There are a number of shared roadways in Tualatin, but they are primarily in the southern residential area of the city.

Example of a multi-use path in Tualatin Community Park

- **Multi-use Paths:** A multi-use path is an off-street route that is shared with bicycles, pedestrians, and other non-motorized users. Paths are typically recreationally focused, but can also serve as a commuting corridor. These paths are meant to provide a lower stress environment than a roadway for users by separating motor vehicles and bicyclists. The multi-use paths in Tualatin are located primarily to the north next to the Tualatin River and public parks.

- **Cycle Track:** While not currently found in the City of Tualatin, a cycle track provides a separate facility for

bicycles, and is physically separated (usually raised or lowered) from both pedestrians and motor vehicles.

Other bicycle amenities besides those described above can provide an inviting environment to help encourage riders to use the existing bicycle facilities, including areas to store/secure bicycles at destinations. Bike parking and storage is typically provided in either a bicycle rack or a storage locker.

Existing Facilities

In general, the bicycle network in the City of Tualatin consists of on-street bike lanes ranging in width from 4 to 6 feet. Buffered bike lanes have been striped along Tualatin-Sherwood Road between Sherwood and the SW Teton Avenue intersection. There are a number of shared roadway facilities, usually on lower volume streets within and around residential neighborhoods. Multi-use paths are found near parks and schools, and are mostly in the north portion of the city along the Tualatin River. Figure 8 shows the existing bike network by facility type, including planned facilities. Additionally, data from Metro includes areas that are labeled “Caution areas” which include streets with narrow lanes, high traffic, and/or sharp curves.

Much of the City has bicycle facilities. However, there are a few gaps in the system. Many of these gaps have been identified as a planned improvement; the following list includes planned facilities where applicable:

Gaps with Planned Facilities

- SW Herman Road – from SW Teton Avenue approximately 1,000 to the east (planned)
- SW Norwood Road – from SW Boones Ferry Road to SW 84th Avenue (planned)
- SW Ibach Court – from SW Boones Ferry Road to SW Martinazzi Ave (planned)
- Tualatin River Greenway Trail:
    - From SW 84th Avenue to just east of SW 65th Avenue (planned)
    - From SW 55th Avenue to approximately SW Canal Road (planned)
    - From SW Boones Ferry Road to SW Cheyenne Way (planned)
    - West of SW Cheyenne Way to eastern City boundary – some segments built (planned)
- Interstate 5 multi-use path:
    - From SW Boones Ferry Road to SW Avery Street (planned)
    - From SW 80th Avenue to SW Norwood Road (planned)

Gaps without planned facilities

- SW 95th Avenue – from SW Sagert Street north to SW Tualatin-Sherwood Road
- SW 112th Avenue – from cul-de-sac end north to SW Myslony Street
- SW Blake Street – from SW 105th Avenue to SW 108th Avenue
- SW Martinazzi Avenue – from SW Warm Springs Street to SW Boones Ferry Road
- SW Wilke Road – from SW Borland Road to SW 50th Avenue
- SW 80th Avenue – from SW Avery Lane to I-5 multi-use path
- SW Grahams Ferry Road – south of SW Ibach Road to southern City boundary

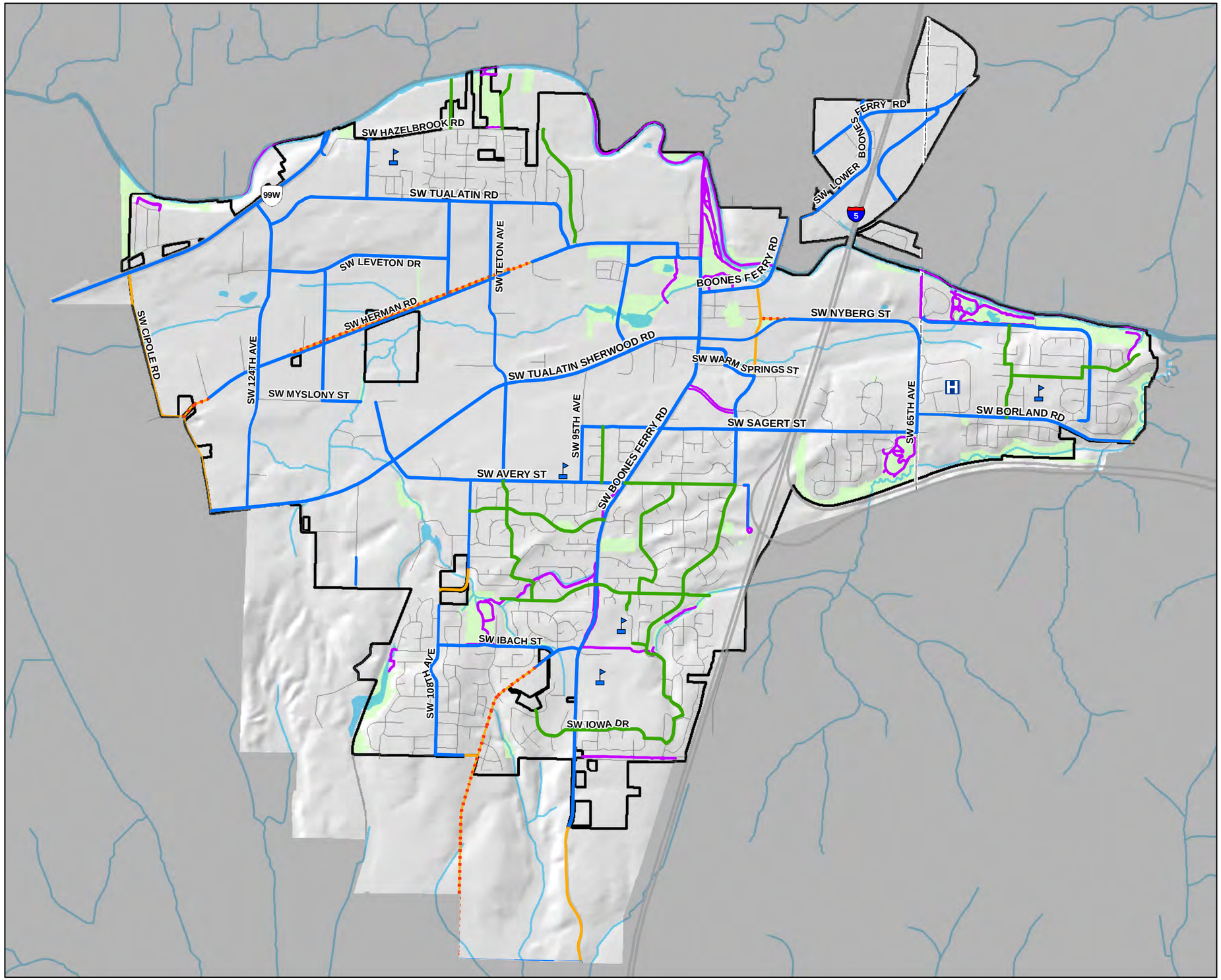
Many of the gaps with no planned facilities are less than ¼ mile in total distance.

High Bicycle Activity Locations

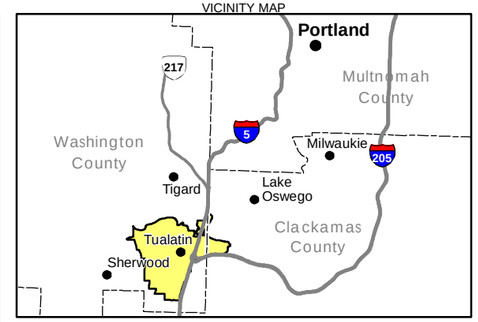
The study team collected activity data at 30 intersections during both the morning (7am-9am) and afternoon (4pm-6pm) rush hour on a typical weekday. These activity data included bicycle counts, indicating intersections with high bicycle volumes. The counts were taken on Wednesday October 19, 2011 when temperatures were between 50 and 60 degrees, with no precipitation. These conditions would reflect typical weather for the area and should not have depressed bicycle demand relative to a typical day over the course of the year, though volumes could be significantly higher during the summer.

The data indicated that both the morning and afternoon rush hours have fewer than ten bicycles traveling through any one intersection during the corresponding peak hours. Of the top ten intersections with bicycle activity, five of

those were along the Tualatin-Sherwood corridor connection to the I-5 interchange at SW Nyberg Street. Table 11 provides a list of the top ten intersections and the bicycle count.



VICINITY MAP



LEGEND

Study Area

Bike System

- Multi-use path
- Bike lane
- Shared Roadways
- High traffic through street
- Caution area
- County Boundaries
- Parks
- City Boundary
- Hospitals
- Schools

Street System

- Interstate
- Arterial
- Minor or Private Street

N

0 0.5 1
Miles

FIGURE 8
Bike System
Existing Conditions Analysis
City of Tualatin Transportation System Plan

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TABLE 11
Top Bicycle Activity Intersections by Morning and Afternoon Peak Hours

Intersection	AM Peak Hour	PM Peak Hour	Total Activity
SW Martinazzi Ave/SW Tualatin-Sherwood Rd	5	5	10
SW Boones Ferry Rd/SW Tualatin-Sherwood Rd	4	5	9
SW 65th Ave/SW Borland Rd	6	2	8
SW Boones Ferry Rd/SW Lower Boones Ferry Rd	3	5	8
SW Teton Ave/SW Avery St	3	5	8
I-5 SB Ramps/SW Nyberg St	2	5	7
I-5 NB Ramps/SW Nyberg St	2	5	7
SW Boones Ferry Rd/SW Avery St	2	5	7
SW 124th Ave/SW Tualatin-Sherwood Rd	3	3	6
SW Teton Ave/SW Tualatin-Sherwood Rd	3	3	6

SOURCE: Count data collected by All Traffic Data on October 18th (Tuesday) 2011

In addition to the count data collected at study area intersections, bicycle usage along sections of the multi-use path on the Tualatin River Greenway Trail was previously collected as part of the *Intertwine Trail Use Snapshot*. This report reviewed multi-use trail users at three locations; two were in the City of Tualatin. The following are some of the relevant bicycle user findings.

The multi-use trail has approximately 150 daily users, with slightly higher use on the weekends. Annually, approximately 55,350 bicyclists use the multi-use trail. Almost two-thirds of bicyclists are male (65 percent). Bicycle use makes up 16 percent of the overall use of the trail system. The trail is used primarily for pleasure/ exercise (80 percent of respondents), while the other 20 percent use the trail for going to/from school or work. Users typically access the trail by biking or walking (83 percent), but 17 percent of users access it by car.

Bike Needs

The City of Tualatin enjoys a robust bicycle network with minor gaps (less than ¼ mile in general). Needs and gaps within this system are summarized below:

- **Difficult left turn maneuvers –** Along wider roadways that have bike lanes (four lanes or wider) it is difficult to traverse from the bike lane on the right to make a left turn at intersections. Many riders choose to dismount their bicycle and use the sidewalk system to cross the street via a crosswalk. A few current examples of this occurrence are the intersections of SW Martinazzi Avenue/SW Nyberg Street and SW Lower Boones Ferry Road/SW 72nd Avenue/SW Bridgeport Road.

- **Constrained environment –** At some locations the bike lanes narrow to four feet on roadways with high vehicle volumes making it a less desirable environment for cyclists. This occurs in areas like SW Lower Boones Ferry Road where it passes beneath I-5 and SW Boones Ferry Road south of SW Sagert Street.

Narrow bike lanes in constrained areas at SW Lower Boones Ferry Road interchange

- **Difficult areas with low bike visibility –** Some of the roadways have vehicle right turns that cross over existing bike lanes into a separate right turn pocket. Bike lanes at

these locations are only indicated by dashed white lines. Additional visibility for bicycles could be made through a colored pavement on the bicycle lane highlighting where bicycles are likely to be present. This occurs on SW Boones Ferry Road northbound, and on SW 90th Avenue at SW Tualatin-Sherwood Road.

- **Bike lanes outside of turn lanes –** when bicycle lanes are located to the right of right-turn lanes, through movements at an intersection are more difficult and hazardous. Examples of this include southbound SW Martinazzi Avenue at SW Sagert Road and eastbound SW Ibach Road at SW Grahams Ferry Road.

- **Obstacles within the bike lane –** There are currently some obstacles within bike lanes that affect bicycles. One example is drainage grates located in the bike lane with the grating parallel to the bicycle travel direction. Bicycle wheels could get caught in these grates. Another obstacle is rail lines over bike lanes. The preferable bike lane crossing over a rail line would be at a 90 degree angle. Less than 90 degree angles can catch bike wheels when bicyclists travel across the rail tracks.

Bicycle crossing on SW Teton Avenue

- **Gaps in the network** – Gaps in the network (identified on the previous page) do not provide continuity to or connectivity to the network, which can be discouraging for riders. In some areas bike lanes do not extend all the way to intersections making it potentially hazardous for cyclists.

High Crash Locations

Between January 1, 2008 and December 31, 2010 there were 17 reported crashes involving bicycles within the City. All of these crashes resulted in an injury to the bicyclist, and most occurred on dry roadway surface (16 out of 17 crashes) in daylight conditions. Many of the crashes were also result of a vehicle turning maneuver, and most occurred at intersection areas. The highest crash locations for bicyclists are along various points of SW Boones Ferry Road (6 crashes), and SW Tualatin-Sherwood Road (4 crashes, 2 at SW 90th Avenue, and the others at other points along the roadway). There were also two bicycle crashes on Nyberg, both at the southbound ramp exiting from I-5.

Pedestrian System

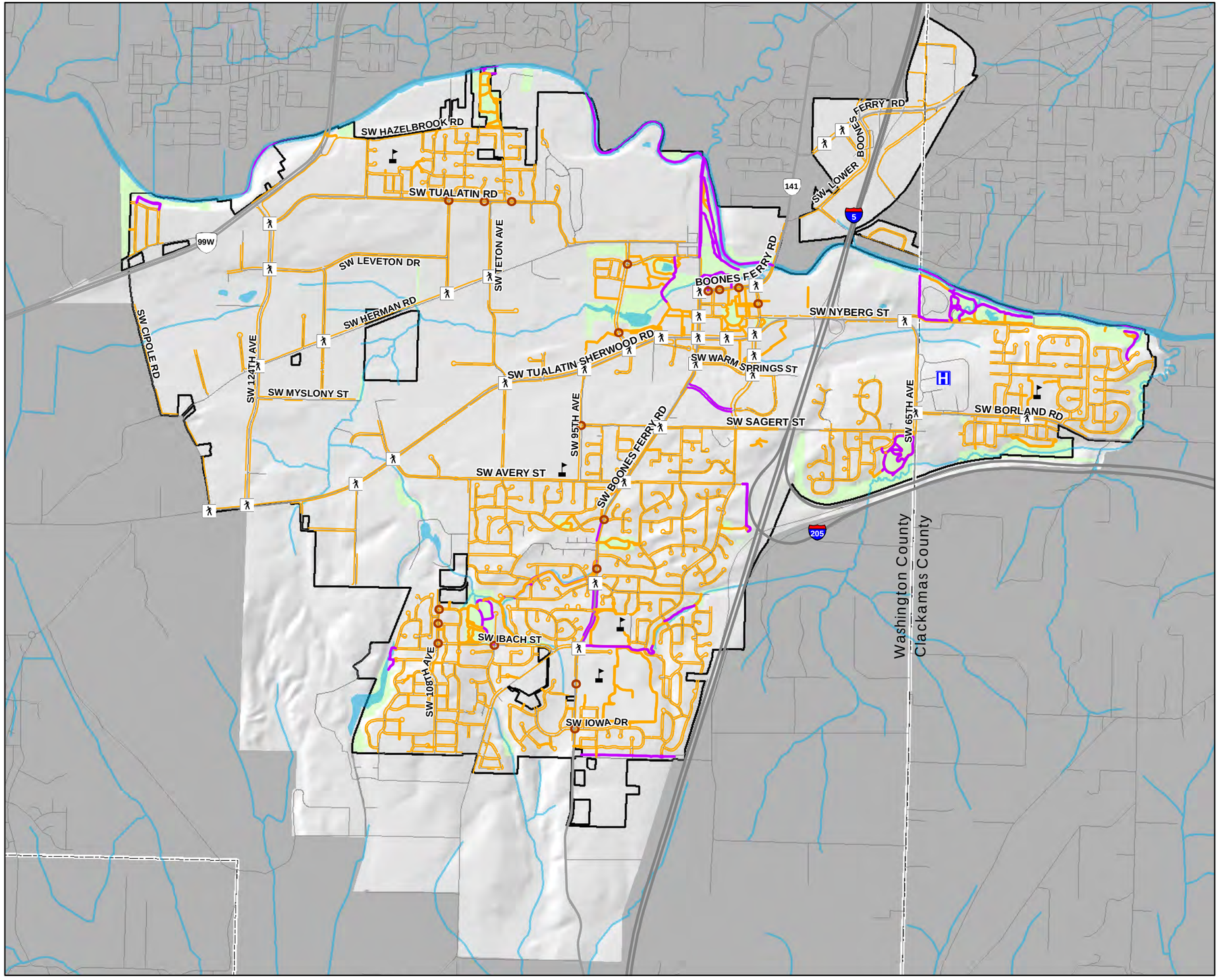
Introduction

This section describes the current pedestrian facility network within the study area, including sidewalks, roadway shoulders, accessways, multi-use paths, and facility conditions. The pedestrian system serves all types of pedestrians and different types of pedestrian trips. This section will document the different types of facilities and identify needs. Figure 9 shows the pedestrian system within the City.

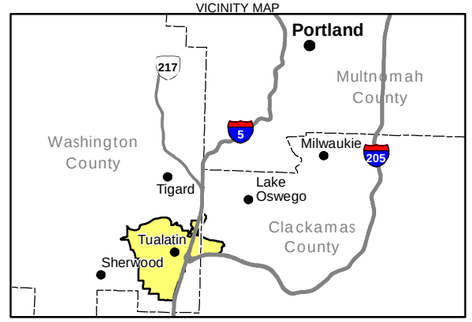
Sidewalks, Multi-Use Pathways, Crosswalks, and Pedestrian Signals

Sidewalks

Sidewalks are located along roadways, sometimes directly adjacent to the curb or separated from the road by landscaping or a planter strip. They are hard surfaced, usually concrete or asphalt. Sidewalks should also be free of utility poles, sign posts, fire hydrants, vegetation and removable objects such as trash cans. According to the Tualatin Development Code, sidewalks are required on both sides of all fully developed major and minor arterial streets within the City. Major collector, minor collector, residential collector, local commercial industrial, and local streets are required to have sidewalks on both sides. Sidewalk standards are included in Table 12 below:



VICINITY MAP



LEGEND

Study Area

City Boundaries

County Boundaries

School

Hospital

Traffic Signal with Pedestrian Indicator

Crosswalk

Parks

Pedestrian Categories

Existing multi-use path

Existing pedestrian path

Sidewalk

Street System

Interstate

Arterial

Minor or Private Street

N

0 0.5 1
Miles

FIGURE 9
Pedestrian System
Existing Conditions Analysis
City of Tualatin Transportation System Plan

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TABLE 12
Sidewalk Standards

Street Classification	Required Sidewalk Width (for both sides of the street)
Major Arterial	6-8 feet
Minor Arterial	8-10 feet
Minor Arterial (downtown) – includes tree well	12 feet
Major, Minor, and Residential Collector	6-8 feet
Local Commercial Industrial	6 feet
Interim Local Commercial Industrial	5 feet
Local street (downtown) – includes a tree well	10 feet
Local Street	5 feet

Source: Tualatin Development Code

Many of the arterial and collector streets within Tualatin have sidewalks, with the notable exception of SW Herman Road between SW Tualatin Road and SW Teton Avenue, and between SW 125th Court and SW Cipole Road. There is a paved/gravel shoulder on the south side of the road, and on the north side there is a drainage ditch directly adjacent to the roadway, making it impossible for pedestrians or those in mobility devices to walk along the north side of the road. There is a new sidewalk on the north side of the street starting just east of Teton Avenue and extending to SW 125th Court, but not along the full length of the road through the City. Other arterials such as SW Tualatin Road, SW Tualatin-Sherwood Road, and SW Boones Ferry Road have sidewalks on both sides, though in places the sidewalks may be narrower than City standards, discussed above in the roadway system section.

No sidewalks exist on SW 108th/105th Avenues


SW Blake Street and SW 105th Avenue lack of shoulder

Sidewalks in Tualatin are wide and well maintained in areas where there are likely to be pedestrians: the Tualatin Commons and downtown Tualatin, immediately adjacent to all five public schools, and the four park and ride facilities.

There are a number of local roads with sidewalks on only one side, including SW 105th Avenue south of SW Siletz Drive, where there is a narrow sidewalk on the east side of the street, but no pedestrian facility on the west side. South of SW Paulina Drive, where SW 105th Avenue curves to connect to SW 108thAvenue via SW Blake Street there are no sidewalks and no shoulder for pedestrians. The speed limit is signed at 30 miles per hour, and there are few other connections for pedestrians in the area. The roadway is signed to warn drivers that pedestrians are present, but there is little room for both vehicles and pedestrians on the roadway.

Much of the residential development within Tualatin consists of subdivisions that were generally built at the same time, ranging from the 1960s to the 2000s. Most have sidewalks, with the exception of:

- The neighborhood built in the 1970s just west of the Tualatin Country Club including:
  - Sections of SW Cheyenne Way

  - SW Shawnee Trail
  - SW Pawnee Path
  - SW Chippewa Trail
- The neighborhood built in the 1960s and 1970s west of Little Woodrose Natural Area along SW Killarney and SW Cherry Lanes, and
- The mobile home park north of OR 99W near SW 122nd Terrace.

These neighborhoods generally have wide and/or curving streets that provide a visual cue for drivers to slow down. Additionally, they are not connected to the surrounding roadway network and do not have through traffic which keeps vehicle speeds and volumes low.

Pedestrian in bike lane on Sagert Street overpass

In areas that have sidewalks, especially neighborhoods built in the 1970s and 1980s; the sidewalks can be narrow with barriers for pedestrians including light poles, trees, mailboxes, and movable objects such as trash cans. Fixed barriers can make a sidewalk inaccessible for those in mobility devices, and those with disabilities such as blindness to safely use the sidewalk.

Sidewalk Needs

There are a number of sidewalk gaps on arterials and collector streets. These include:

- SW Herman Road between SW Tualatin Road and SW Teton Avenue, and between SW 125th Court and SW Cipole Road
- SW Grahams Ferry Road on the east side between SW Ibach Street and the Church of Jesus Christ of LDS, and on the west side between the church and just north of SW Sitka Court.
- Sections of SW Boones Ferry Road:
  - On the west side just south of SW Iowa Drive to the southern City limits
  - On the east side, approximately two blocks north of the City limits to the southern City limits
  - On the west side from approximately Tualatin High School south to the southernmost crosswalk associated with the school, approximately two blocks north of SW Iowa Drive
- SW Blake Street between SW 105th and 108th Avenues
- SW 105th Avenue between SW Paulina Drive and SW Blake Street
- SW Sagert Street overpass over I-5 from just west of the overpass to SW 72nd Avenue

Sidewalks that do not meet current City standards on the arterials and collectors should be studied to determine if there is a need to improve sidewalks to standard.

Narrow sidewalk blocked by trash can – Boones Ferry Road

Crosswalk closed sign at Lower Boones Ferry Road and I-5 off-ramp

SW Nyberg Street has a sidewalk on the north side only, but the pedestrian crossings over the highway ramps can be intimidating, and the sidewalks under I-5 at SW Lower Boones Ferry Road require out of direction travel for pedestrians due to closed crosswalks.

Multi-Use Pathways

Multi-use pathways are used by a variety of users including pedestrians, bicyclists, runners, and those using mobility devices. Pathways may be paved or graveled, and are often wider than a sidewalk and are separated from roadways. Multi-use pathways are generally located in a park or greenway.

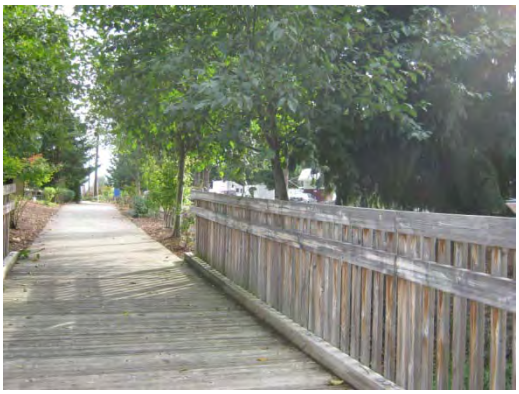
There are a number of planned and existing multi-use, off street paths within the City. Many of the parks and greenways have multi-use paths, and some extend into adjacent commercial or residential areas. Multi-use paths in Tualatin are paved, concrete, or gravel, or in the case of sections of the Tualatin River Greenway, are built as a boardwalk.

Multi-use paths can provide a pleasant off-street alternative for pedestrians. Most of the paths within Tualatin are meant for recreational use – they do not connect residential areas to commercial or job centers. While there are plans for a regional and city-wide interconnected network of off-street paths, the current system is fragmented and limited to areas near parks or schools.

According to the *Intertwine Trail Use Snapshot* from Oregon Metro, approximately 4,675 people use the Tualatin River Greenway path during an average week, most are pedestrians walking for pleasure or exercise. Approximately 70 percent of pedestrians access the trail by car. An interconnected system of trails would allow more people to access the paths by foot from their homes or places of business.

Asphalt path in Tualatin Community Park

Gravel path in Jurgens Park



Boardwalk in Browns Ferry Park – Tualatin River Greenway

Concete path in Tualatin Community Park

Multi-use Pathway Needs

There is currently only one exclusive bicycle or pedestrian crossing over the Tualatin River through the Tualatin Community Park, though two future pedestrian and bicycle bridges are planned but are not yet built: one near Jurgens Park on the west side of the City, the other near Browns Ferry Park on the east side. A bicycle and pedestrian bridge just outside the City's western boundary is planned to be part of the Tonquin Trail. There is a need for an interconnected network of pathways throughout the system. This would allow bicyclists and pedestrians to travel to destinations and potentially use the paths for work or other trips in addition to recreation. Additionally, signs and other wayfinding guides are needed to inform bicyclists or pedestrians how to move between the various multi-use pathways.

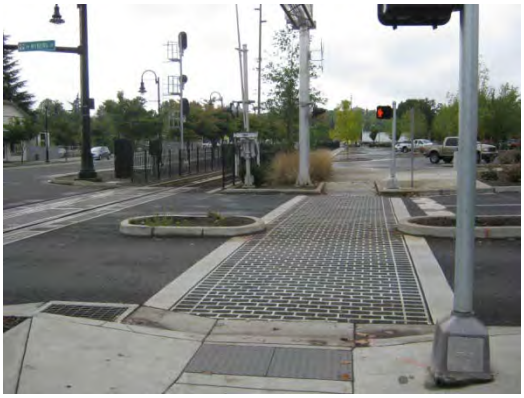
Crosswalks

Crosswalks are striped areas on a road that indicate to both pedestrians and motorists that pedestrians are likely to cross a roadway. However, every intersection is a legal crosswalk in the City of Tualatin; this section refers to the striped crosswalks. There are a number of forms of crosswalks, the most common of which are two parallel lines from one side of the street to the other. Other types of crosswalks include the "ladder" or "zebra" crossings that are a series of hash marks across the roadway. Crosswalks can also be a street design element and painted or stamped designs can be added to mimic brick or pavers to further differentiate the crosswalk from the roadway.

There are a number of crosswalks in the City, notably in the commercial areas and near public schools. Major intersections have crosswalks and walk indicators at the signals. Residential crosswalks are located near public schools, parks, or transit stops.

The crosswalks near the WES station at SW Boones Ferry Road and the access into the park and ride lot and at SW Boones Ferry and SW Tualatin-Sherwood Roads have clearly delineated, stamped and painted pavement to indicate where pedestrians are to cross. There are also audible signals at both intersections for vision impaired pedestrians that indicate the street names and when to cross.

SW Boones Ferry Road and WES crosswalk near Park and Ride entrance



Park and ride entrance crosswalk

Additionally, there are crossings at unsignalized intersections including:

- SW Iowa Drive and SW Boones Ferry Road
- SW Ibach Street and SW 103rd Avenue
- SW Ibach Street and SW 108th Avenue
- SW Willow Street and SW 108th Avenue
- SW 95th Avenue and SW Sagert Street
- SW Seneca Street and SW Martinazzi Avenue

Unsignalized crosswalk on SW 108th Avenue

There are several mid-block crossings on lower volume streets,

usually to connect neighborhoods and schools. A few mid-block crossings in the City include:

- SW Boones Ferry Road just south of the entrance to the Tualatin High School parking lot and includes a pedestrian island
- SW 108th Avenue between SW Willow and Ibach Streets
- Two on SW Boones Ferry Road between SW Tualatin Road and SW Martinazzi Avenue

SW Avery Street and SW Boones Ferry Road intersection wide turning radius

Crosswalk Needs

There are a number of concerns with pedestrian safety at crosswalks, and community members have indicated that better lighting or flashing lights at crosswalks, especially those that see heavy pedestrian usage or are mid-block would help improve safety and drivers would be more aware of pedestrians at these locations.

A number of crosswalks at intersections are not pedestrian-friendly because of a wide turning radius built to accommodate trucks, especially on routes that are frequented by trucks including SW Tualatin-Sherwood Road and SW Lower Boones Ferry Road near Bridgeport Village. This occurs at off and on-ramps to I-5 and at a few intersections in the City including:

- SW Avery Street and SW Boones Ferry Road
- SW Lower Boones Ferry Road, SW Bridgeport Road, and SW 72nd Avenue
- SW65th Avenue and SW Lower Boones Ferry Road
- SW Boones Ferry Road and SW Martinazzi Avenue
- SW Tualatin-Sherwood Road and SW Martinazzi Avenue
- SW Sagert Street and SW Martinazzi Avenue
- SW Tualatin Road and SW Boones Ferry Road
- SW Tualatin-Sherwood Road and SW Boones Ferry Road
- SW Warm Springs Street and SW Boones Ferry Road
- SW Sagert Street and SW Boones Ferry Road
- SW Tualatin-Sherwood Road and SW Avery Street
- SW Tualatin-Sherwood Road and SW 115th Avenue
- SW Tualatin-Sherwood Road and SW 124th Avenue
- SW Herman Road and SW 108th Avenue
- SW Sagert Street and SW 65th Avenue

The wider turning radius allows larger vehicles to turn right easily, but increases vehicle turning speeds, increases the distance that pedestrians need to cross in the intersection, and decreases pedestrian visibility at these intersections when compared to a more right-angle intersection.

Pedestrian Signals

Pedestrian signals are similar to traffic signals, but are only activated when a pedestrian is present to activate the signal. The majority of the time the signal is unlit until a pedestrian is present, and then a red light or a blinking yellow light activates. There are also traffic signals that indicate when pedestrians should cross in addition to controlling vehicle traffic. Depending on the signal programming, the pedestrian signal may automatically indicate

when pedestrians should cross, or the signal may need to be activated by a pedestrian. Many of the study area intersections in Tualatin have pedestrian signals, some indicate when it is safe for a pedestrian to cross automatically, and some require a pedestrian to push a button to activate the pedestrian cross signal. There are no dedicated pedestrian signals within the City of Tualatin.

Pedestrian Signal Need

Some community members have expressed concern for crossings where the light is too short for a pedestrian to cross the entire length of the intersection, specifically in the downtown area and at SW Sweek and SW Tualatin Roads. Other community concerns include issues that the pedestrian light does not work unless it is specifically activated by a pedestrian. The intersection of SW Avery Street and SW Tualatin-Sherwood Road was specifically cited as a location where the pedestrian signal does not work unless it is activated.

High Pedestrian Activity Locations

The study team collected activity data at 30 intersections during both the morning and afternoon rush hour. These activity data included pedestrian counts, indicating intersections with high pedestrian volumes. The intersection with the most pedestrian traffic is SW Boones Ferry Road and SW Ibach Street, which is close to both Byrom Elementary School and Tualatin High School. In the afternoon, most of the pedestrians are crossing from the school to the residential areas west and north of the schools. The next highest intersections for pedestrians are in the downtown area near the Tualatin Commons: SW Martinazzi Avenue and SW Boones Ferry Road and SW Martinazzi Avenue and SW Tualatin-Sherwood Road are near transit stops and city services. Additionally, many people who work in the Tualatin Commons area park in the City parking lots, and likely cross at these intersections to get to and from their cars.

High Crash Locations

Between January 1, 2008 and December 31 2010, there were eight reported crashes involving a pedestrian, four of which were on SW Boones Ferry Road. All of the pedestrian crashes resulted in an injury to the pedestrian, and five of the crashes occurred in dark or low-light conditions such as dusk or dawn. For three of the crashes, the pedestrian was illegally in the roadway, while five crashes were attributed to the vehicle failing to yield for pedestrians. Most of the pedestrian crashes occurred when a passenger car was turning (six out of the eight crashes), and most of the crashes occurred during dry conditions. The reported crashes are included in Table 13 below:

TABLE 13
Pedestrian Crashes by Location

Primary Street	Secondary Street/Intersection	Weather	Light	Cause	Vehicle movement
SW Apache Dr	SW Boones Ferry Rd	Clear	Daylight	Failure to Yield	Right turn
SW Boones Ferry Rd	SW Warm Springs St	Clear	Daylight	Failure to Yield	Left turn
SW Boones Ferry Rd	SW Lower Boones Ferry Rd	Cloudy	Dusk	Pedestrian in roadway	Left turn
SW Boones Ferry Rd	SW Warm Springs St	Rain	Dark – no street lights	Pedestrian in roadway	Straight
SW Boones Ferry Rd	SW Nyberg Rd	Rain	Dark – no street lights	Failure to Yield	Left turn
SW Nyberg Rd	Southbound exit at Nyberg St	Clear	Dark with street lights	Failure to Yield	Right turn
SW Nyberg Road	SW Tualatin-Sherwood Rd	Clear	Daylight	Motorized wheelchair - Pedestrian in roadway	Straight
SW Tualatin Rd	SW 90th Ave	Rain	Dawn	Failure to Yield	Left turn

Source – ODOT 2011

Public Transit

Introduction

Public transportation serves a vital function for residents and businesses/employers of Tualatin. It provides a choice for residents who have a car and wish to not use it at all times, serves as a primary means of transportation for those who have mobility limitations and cannot travel any other way, and it provides options for residents who do not have a car and who wish to travel further than is feasible on a bicycle or on foot. Approximately 60 percent of transit trips within Tualatin are likely to be commuting trips, with the remaining trips likely to be used for shopping, recreation, or other purposes[8]. Transit riders who access the TriMet or South Metro Area Regional Transit (SMART) systems in Tualatin can connect to other services and travel throughout the Portland metropolitan region and Salem.

Public transportation in the City of Tualatin is provided primarily by TriMet, with some service provided by the SMART district. TriMet serves Tualatin with five bus lines, Westside Express Service (WES) commuter rail, and paratransit. SMART serves Tualatin with one bus line (to Wilsonville).

Existing Service[9]

The following paragraphs describe existing bus, commuter rail, paratransit[10], and shuttle service in Tualatin. Figure 10 depicts the locations of bus lines and WES.

Bus Lines

- **TriMet Bus line 12 (Barbur/Sandy Blvd)** connects Gresham to Sherwood via downtown Portland on both weekdays and weekends. Bus line 12 does not serve the center of Tualatin, but it serves OR-99W as it passes through the City of Tualatin in the city's western edge. Bus line 12 operates every 30 minutes in Tualatin between approximately 5:00 am and 10:00 am; then operates every hour between 11:00 am and 3:00 pm; then returns to 30 minute service between 3:00 pm and 6:00 pm.
- **TriMet Bus line 36 (South Shore)** provides weekday service between Lake Oswego and Tualatin and provides continued service during rush hour to Portland city center. It originates at the Tualatin Park and Ride and provides service to Lake Oswego Transit Center approximately every 30 minutes between 6:00 am and 10:00 am, and approximately every 60-120 minutes between 11:40 am and 6:00 pm. Bus line 36 provides two services per weekday that continue to SW 6th and Burnside in Portland City Center; these are currently scheduled to depart Tualatin Park and Ride at 6:58 am and 7:29 am.
- **TriMet Bus line 37 (Lake Grove)** connects Lake Oswego and Tualatin via SW Lower Boones Ferry and Boones Ferry Roads. It operates approximately every 90 minutes on weekdays between 7:00 am and 6:00 pm and connects the Lake Oswego Transit Center and the Tualatin Park and Ride.
- **TriMet Bus line 38 (Boones Ferry Road)** connects Tualatin and Portland city center via Lake Oswego and SW Portland. It originates at the Tualatin Park and Ride provides service every 30-40 minutes between 6:00 am and 8:30 am, and between 3:30 pm and 5:30 pm. Line 38 does not operate on Saturdays or Sundays.
- **TriMet Bus line 76 (Beaverton/Tualatin)** connects Beaverton to Tualatin and passes through Durham, Tigard, and Washington Square. It originates at the Meridian Park Hospital main stop, connects to the Tualatin Park and Ride, the Tigard Transit Center, the Washington Square Transit Center, and the Beaverton Transit Center. Service is provided approximately every 30 minutes from 5:40 am to 6:40 pm, then every hour from 7:30 pm to 9:30 pm on both weekends and weekdays.
- **TriMet Bus Line 94 (Sherwood/Pacific Highway)** connects Sherwood, King City, Tigard, Burlingame and Portland City Center. It travels along Pacific Highway, but does not have a stop within the City of Tualatin.

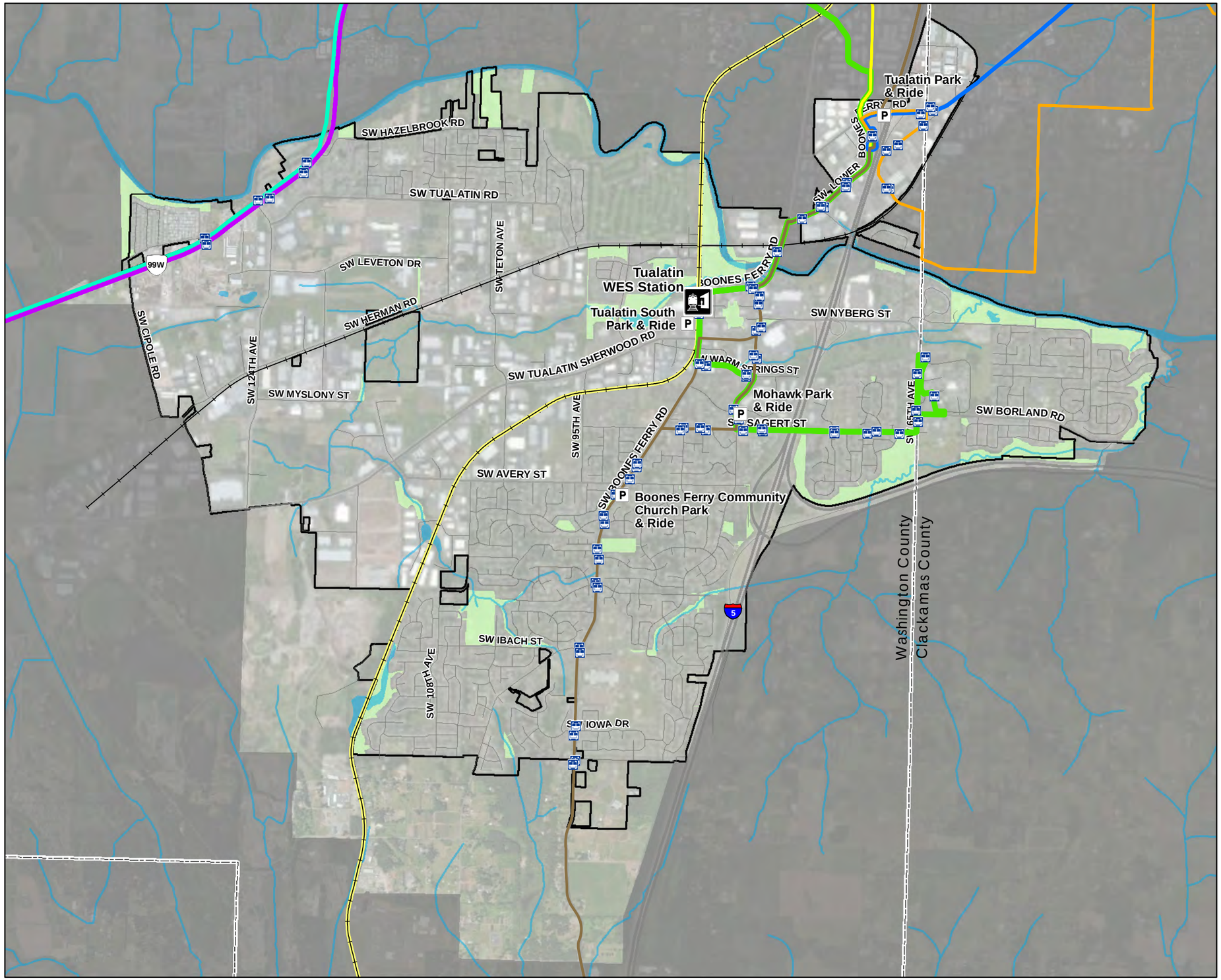
8 American Public Transportation Association *2010 Fact Book*.

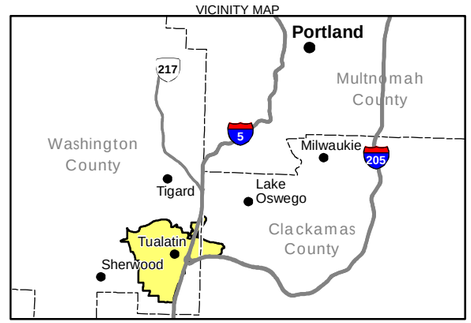
9 Current bus lines as of March, 2012, data provided by TriMet.

10 Paratransit is a shared-ride public transportation for those unable to use regular buses or trains due to a disability or disabling health condition.

This line is a commuter-oriented express bus with service only on weekdays heading towards Portland between 5:50 am to 7:40 am and heading towards Sherwood between 3:05 pm to 6:35 pm.

- **TriMet Bus line 96 (Tualatin/I-5)** connects the Commerce Circle in Wilsonville with downtown Portland via I-5. It originates at the 10100 Block on SW Commerce Circle and connects to the Tualatin Park and Ride before continuing on directly to downtown Portland. Bus line 96 provides weekday service approximately every 30 minutes between approximately 5:30 am and 10:00 am, and between 2:30 pm and 9:00 pm.
- **SMART Line 2X – Barbur** on SMART travels from the Wilsonville WES station to the Barbur Transit Center with a stop at the Tualatin Park and Ride. Service is provided approximately every 30 minutes between 5:00 am to 10:00 am, every hour from 10:00 am to 2:00 pm, and every 30 minutes from 2:30 pm to 7:30 pm on weekdays and Saturdays; there is no Sunday service. Figure 11 shows SMART line 2X.





LEGEND

Study Area

Bus Lines

- Line 12
- Line 36
- Line 37
- Line 38
- Line 76
- Line 94
- Line 96
- WES (Westside Express Service)
- Bus Stop
- WES Stop
- Park and Rides
- Railroad
- Parks
- Streams
- Rivers and Water Bodies
- City Boundaries
- County Boundaries

Street System

- Interstate
- Arterial
- Minor or Private Street

N

0 0.5 1
Miles

FIGURE 10
Public Transit System
Existing Conditions Analysis
City of Tualatin Transportation System Plan

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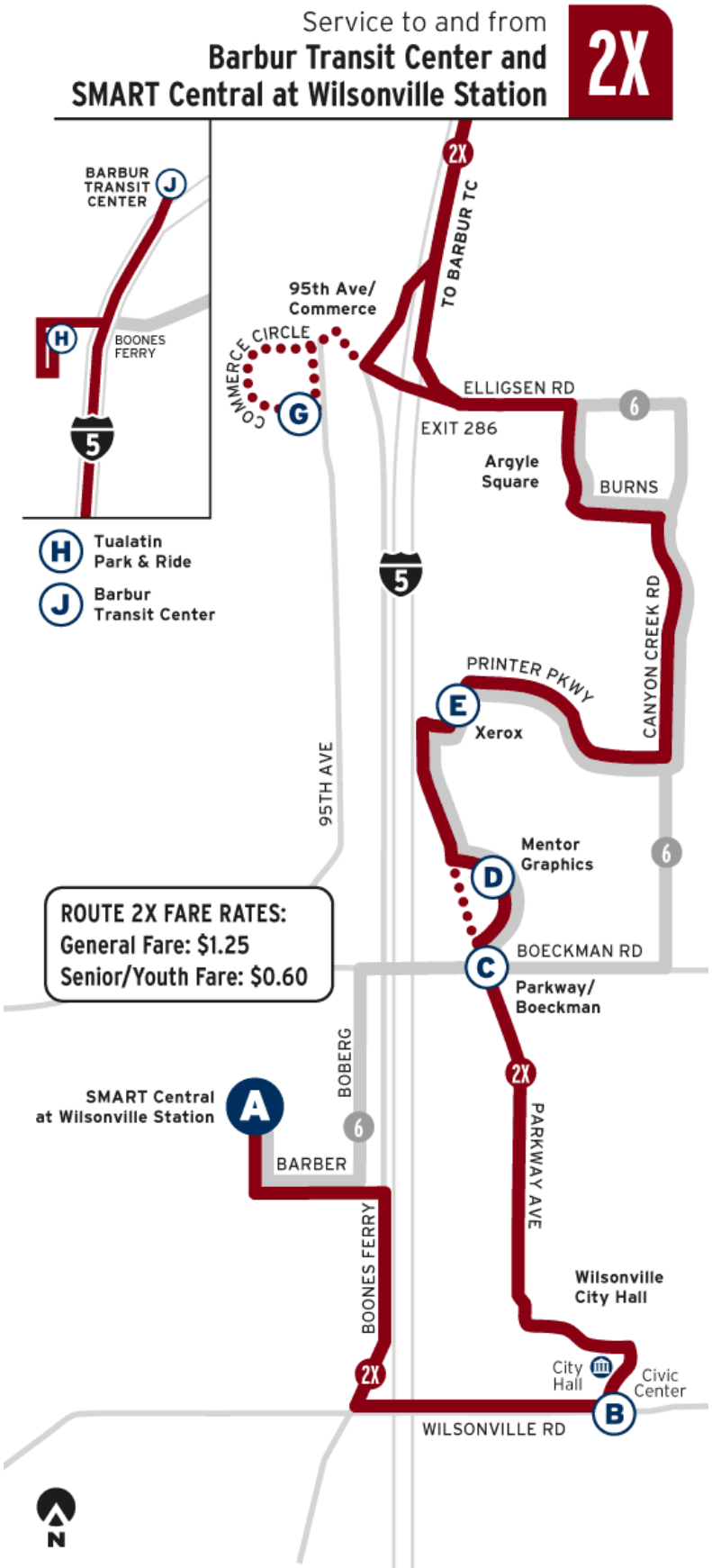
Figure 11 SMART Route 2X in Tualatin



TriMet's service area includes three zones which determine the price per ride. Tualatin lies within zone 3. As of November 2011, the cost of an all-zone (zone 3) ticket on TriMet is $2.40, youth tickets are $1.50, and honored citizen tickets (seniors, people with disabilities, and people on Medicare) are $1. Tickets are valid for two hours. If the return trip is made within the two hour period, there is no additional charge.

A regular, one-way fare on SMART costs $1.25 as of November 2011. The fare is $0.60 for seniors, persons with disabilities, youth, and persons on Medicare.

Commuter Rail

TriMet's Westside Express Service (WES) commuter rail connects the Westside suburbs of the Portland metropolitan area. It includes stops in Beaverton, Tigard, Tualatin, and Wilsonville. WES trains stop at the Tualatin station in the northbound direction (towards Beaverton) every half hour on weekdays between 5:30 am and 9:00 am, and between 3:30 pm and 7:00 pm. WES trains stop at the Tualatin station in the southbound direction (towards Wilsonville) every half hour on weekdays between 6:09 am and 9:39 am, and between 4:16 pm and 7:46 pm. WES does not operate on Saturdays or Sundays. As of November 2011, the cost of a ticket on WES is $2.40. Youth tickets are $1.50 and tickets for honored citizens are $1. WES, bus, and MAX tickets can be used interchangeably between those three modes.

Paratransit

TriMet's LIFT paratransit service is available within the City of Tualatin. LIFT is a shared-ride program for eligible people who cannot use regular, fixed-route service due to a disability or health condition. LIFT operates from 4:30 am – 2:30 am all days of the week and services all areas of the TriMet service boundary, which encompasses the majority of the Portland metropolitan region. The cost per ride of using LIFT is $1.85 in November 2011.

Tualatin Shuttle

The Tualatin Chamber of Commerce operates a free service on weekdays to connect passengers from TriMet bus stops and WES to businesses in Tualatin. The shuttle operates from 5:00 am to 9:30 am and from 2:00 pm to 6:00 pm. It is oriented towards commuters coming from outside of Tualatin. The shuttle offers one pickup in downtown Portland at 5:30 am.

Limitations of Existing Transit Service

It is likely that most residents of Tualatin do not rely solely on transit service to meet their transportation needs, because most people in Tualatin do not live within walking distance (one-quarter mile) of a transit stop, and because transit is not provided at frequent intervals during all hours of the day. TriMet does not provide transit service within all areas of the city and on all major corridors. There is no transit service provided on SW Tualatin-Sherwood Road or SW Tualatin Road, and many residents in the western portion of the city live over a mile from the nearest transit line. Residents who do live near a bus line are not served by transit at regular intervals during the day. Because of the limitations of service during off-peak hours, non-commuting trips may be more difficult to complete using transit in Tualatin. Outside of 99W there is no east-west bus service, and outside of the Chamber shuttle, there is no transit loop through the City.

Existing Transit Facilities

TriMet provides amenities at bus stops and park and ride facilities. Bus stops and park and ride facilities are described in detail in the sections below.

Bus Stops

Bus stops in the City of Tualatin vary by the number of amenities provided. Sixty-seven bus stops out of a total of 85 within the city include a sign only. The remaining 18 include a shelter with a posted schedule. The facilities available at bus stops can have an impact on how many people use them; people generally prefer using stops where a shelter and lighting are provided, particularly during the winter months. Other facilities provided at the larger stops include seating and bike parking. Approximately half of the bus stops in Tualatin include lighting from street lights, but fewer than a third have shelters.

Bus lines 76 and 96 have the most stops with shelters and lighting within the City of Tualatin. With the exception of the Tualatin Park and Ride, bus lines 36 and 37 do not have any stops within the City of Tualatin that contain a shelter. Bus line 12 only has one stop within the City of Tualatin that has a shelter. This is consistent with ridership information for each bus line (provided below) – the largest numbers of riders use bus lines 76 and 96.

Attachment B provides detail on bus stops within the City of Tualatin on TriMet routes. SMART does not maintain separate bus stops in Tualatin; the line 2X-Barbur stops at the Tualatin Park and Ride, which is maintained by TriMet.

Bus stop with sign only

Bus stop with shelter and sign

Park and Rides

There are four park and ride lots within the City of Tualatin. They are depicted graphically on Figure 10. All four park and rides have seen less use, on average, in 2011 than they did in 2010[11]. The park and rides are located on the east side of Tualatin, close to either the I-5 or SW Boones Ferry Road corridors.

- The **Tualatin Park and Ride** is the largest park and ride lot within the City of Tualatin, and is located at SW 72nd Avenue and SW Bridgeport Road in the northern part of the City north of the Tualatin River and downtown. It has 466 total vehicle spaces and is open all days. It is served by bus lines 36 (South Shore), 37 (Lake Grove), 38 (Boones Ferry Road), 76 (Beaverton/Tualatin), 96 (Tualatin/I-5), and SMART 201Barbur. Covered bike racks and bike lockers are available at this location, and there are two bus shelters along SW Lower Boones Ferry Road. This park and ride is easily accessed from I-5. On average, this park and ride has been 83 percent full in 2011.


Tualatin Park and Ride


Mohawk Park and Ride

- The **Mohawk Park and Ride** is located at SW Mohawk Street and SW Martinazzi Avenue about a half mile south of the Tualatin Commons and downtown Tualatin. It has 232 total vehicle spaces and is open all days. It is served by bus lines 76 (Beaverton/Tualatin) and 96 (Tualatin/I-5).It also has covered bike

[11] Source: TriMet Operated P&R Facilities (Fall 2010-2011 Comparison)

racks and one covered bus stop. On average, this park and ride has been 22 percent full in 2011.

- The **Tualatin South Park and Ride** is the newest park and ride in the City, and is located at 18955 SW Boones Ferry Road just west of the Tualatin Commons and downtown. It is open all days and provides bike parking with lockers and covered racks. It has 147 total vehicle spaces. It is served by WES and bus line 76 (Beaverton/Tualatin). The main focus of the park and ride is the WES service; the parking lot and pedestrian and bicycle amenities are oriented towards the train station, but there are covered bus stops for both north and southbound passengers on SW Boones Ferry Road. The park and ride is broken up into different lots, one is directly west of the WES stop, and one is further south along SW Boones Ferry Road. On average, this park and ride has been 24 percent full in 2011.


Tualatin South Park and Ride


Boones Ferry Community Church Park and Ride

- The **Boones Ferry Community Church Park and Ride** is the smallest park and ride in the City of Tualatin. It is open Monday through Friday only, and provides 20 vehicle spaces. There are no bike parking facilities at this location It is located at 20500 SW Boones Ferry Road and is served by bus line 96 (Beaverton/Tualatin). The bus stops are located along SW Boones Ferry Road, but riders need to cross either SW Avery Street to access the northbound bus stop, or SW Boones Ferry Road to access the southbound stop. For the southbound stop, riders must walk out of direction to the traffic signal to legally cross SW Boones Ferry Road from the driveway of the Park and Ride. Neither of the bus stops have a shelter, but there is a sign and a bus pull-out to indicate the bus stop. There are also no sidewalks along the driveway from the parking lot to the sidewalk along SW Boones Ferry Road. On average, this park and ride has been 10 percent full in 2011.

Transit Ridership

Ridership on TriMet varies greatly by bus line and by time of day. Bus lines 76 and 96 have the most ridership within the City of Tualatin, followed by WES. Table 14 provides average ridership on each TriMet service in Tualatin. The passenger boardings and alightings (when a passenger gets off the bus or train) statistics provided are for passengers that board or alight at a stop within the Tualatin city limits.

Bus lines in Table 14 with similar counts of boardings and alightings, including bus lines 12, 36, and 38 in the AM and PM peak, 76 in the AM peak and weekend, and 96 in the AM peak indicate that passengers are likely to be using transit round-trip. Disparate counts of boardings and alightings, such as bus line 37 in the AM peak, 38 on average weekdays, 76 in the PM peak, 96 in the AM and PM peak, and WES indicate that passengers may use another form of transportation for part of the trip.

TABLE 14
Average Transit Ridership on TriMet in the City of Tualatin in Spring 2011

Service	Average Total Weekday		Average Weekday AM peak (6-9 am)		Average Weekday PM Peak (4-7 pm)		Average Saturday		Average Sunday	
	Boardings	Alightings	Boardings	Alightings	Boardings	Alightings	Boardings	Alightings	Boardings	Alightings
Bus line 12 (Barbur/Sandy Blvd)	66	66	17	13	15	18	38	38	27	25
Bus line 36 (South Shore)	18	21	9	8	4	8	-	-	-	-
Bus line 37 (Lake Grove)	26	25	10	5	5	8	-	-	-	-
Bus line 38 (Boones Ferry Road)	27	19	15	10	7	7	-	-	-	-
Bus line 76 (Beaverton/ Tualatin)	504	576	114	119	112	139	416	423	259	263
Bus line 96 (Tualatin/ I-5)	603	591	423	114	88	379	-	-	-	-
WES	229	212	111	81	113	130	-	-	-	-

Note: cells in black with no information indicate lines that do not operate on Saturday or Sunday

Source: TriMet Spring 2011 Passenger Survey

Transit Travel Times

The average in-vehicle transit travel times between the Tualatin South Park and Ride and key regional destinations on the west side of the Portland metropolitan region are as follows[12]:

- **From Tualatin South Park and Ride to Downtown Portland at SW Jefferson and 10th**: 21-26 minutes via bus line 96 (Tualatin/I-5)
- **From Tualatin South Park and Ride to Wilsonville Central**: 10 minutes via WES
- **From Tualatin South Park and Ride to Washington Square Transit Center**: 12-24 minutes via bus line 76 (Beaverton/Tualatin)
- **From Tualatin South Park and Ride to Lake Oswego Transit Center:** 15 minutes via bus line 37 (Lake Grove)
- **From Tualatin South Park and Ride to Beaverton Transit Center**: 17 minutes via WES (from Tualatin South Park and Ride to Beaverton TC WES Station)or 35-48 minutes via bus line 76 (Beaverton/Tualatin)

Total transit travel times are comprised of the in-vehicle times listed above, plus time for walking or driving to the station and time for waiting for the bus or WES to arrive. The total travel time for the trips listed above is likely 10-15 minutes longer than listed, depending on the specific origin of the user's trip. Because TriMet and SMART buses travel in general purpose traffic lanes, transit travel times can vary based on traffic conditions.

Given the typical amount of time it may take to find parking in downtown Portland, the total time for taking a private vehicle is likely similar to that of using transit. Although the in-vehicle travel times for trips to Wilsonville, Washington Square, Lake Oswego, and Beaverton are likely to be similar for transit and private vehicles, the total travel time of using transit to any of those destinations is in general longer than driving in a private vehicle. Therefore, the primary trips that are likely to attract non-transit dependent users are commuting trips to Beaverton or downtown Portland.

12 Source: www.trimet.org, schedules by transit line.

Freight Rail, Pipeline, Waterways, Airport

Introduction

This section describes current freight rail, pipeline, waterways, and airport facilities within the study area, including depots, at-grade crossings (for freight rail), and facility needs. Figure 12 shows freight rail and pipelines in the City.

Freight Rail

Portland and Western Railroad (PNWR) currently owns and operates two freight rail lines in Tualatin: one that runs mostly north-south, which is shared by the WES described in the Transit section, and one that runs east-west along Herman Road. The east-west line carries one train daily in each direction, and the north south has two trains daily in each direction. There are a number of public road railroad crossings in the City, all of which are gated:

- SW Tualatin Road (at two locations)
- West terminus of SW Nyberg Street/entrance to shopping center
- SW Tualatin-Sherwood Road
- SW 95th Avenue
- SW Teton Avenue (at two locations)
- SW Avery Street
- SW Cipole Road
- SW 124th Avenue
- SW 118th Avenue
- SW 90th Avenue
- SW Boones Ferry Road

In addition to these public roadway crossings, there are a number of driveways or private roads that cross the railroad tracks. These crossings are not signalized, but are stop-controlled. Freight trains have the right of way at all intersections.

The railroad tracks pass through the manufacturing areas in west Tualatin, creating the potential for companies to use rail for freight shipping, but there are not currently any depots or stops in the City. PNWR does not currently have plans to increase their freight service through Tualatin.

A freight train on the north-south railroad alignment near Tualatin Community Park

Pipeline

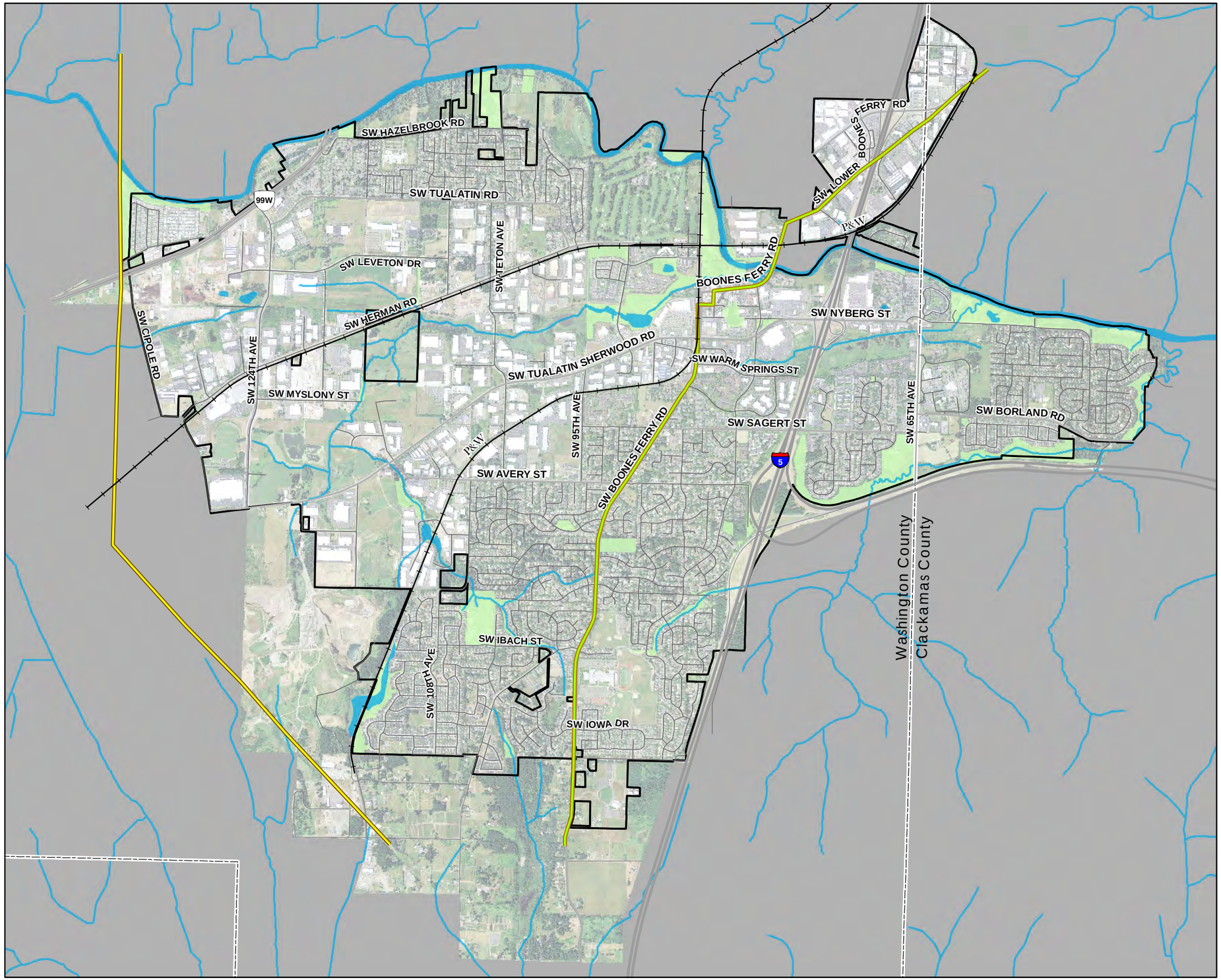
There is one gas transmission pipeline within the City which roughly follows SW Boones Ferry Road in the far north, crossing underneath I-5 south of SW Bridgeport Road, and continuing to the southern city limits along SW Boones Ferry Road. Additionally, there is a gasoline pipeline that is included in the SW Concept Plan area, which is also included in our study area.

Waterways

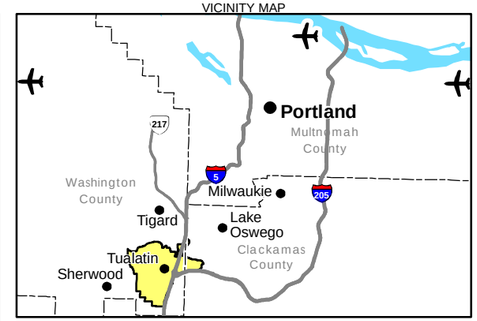
The Tualatin River is the largest waterway within the study area. The river starts in the Coast Range, and ends at the Willamette River in West Linn. The Tualatin River is not navigable from the Willamette due to impassible areas and a diversion dam near SW Borland Road in West Linn. Recreational canoeing and kayaking is allowed on the Tualatin River and can be accessed from Browns Ferry Park, Tualatin Community Park, Jurgens Park, and at the 99W Bridge at SW Hazelbrook Road. A motorboat launch is located at Tualatin Community Park.

Airport

There are no airports within the Tualatin City limits. There are, however, a number of airports within 30 miles: Aurora State Airport, the Portland Hillsboro Airport, and the Portland International Airport. Only Portland International provides scheduled passenger service.



VICINITY MAP



LEGEND

Study Area

Railroad

County Boundaries

Parks

City Boundaries

Rivers and Water Bodies

Gas Pipelines

Natural Gas

Gasoline

Street System

Interstate

Arterial

Minor or Private Street

Railroad

N

0 0.5 1

Miles

FIGURE 12
Freight Rail and Gas Pipeline System
Existing Conditions Analysis
City of Tualatin Transportation System Plan

CH2MHILL

Attachment A: Roadway Standards Assessment

Street Name	Classification	Abbreviation	Truck Route?	Skew Angle	Intersection Spacing	Median?	Travel Lanes	Bike Lanes	Sidewalks	On-Street Parking	Curb to Curb Width	Comments
SW 120TH AVE	LOCAL COMMERCIAL INDUSTRIAL	B-CI	NO	M	M	N/A	M	N/A	M	N/A	M	
SW 63RD AVE	LOCAL COMMERCIAL INDUSTRIAL	B-CI	NO	D	M	N/A	D	N/A	G	N/A	D	Tight skew, less than standard number of lanes, gaps in sidewalk
SW 65TH AVE	LOCAL COMMERCIAL INDUSTRIAL	B-CI	NO	M	M	N/A	D	N/A	G	N/A	D	Less than standard number of lanes, gaps in sidewalk
SW 84TH AVE	LOCAL COMMERCIAL INDUSTRIAL	B-D	NO	M	M	N/A	M	N/A	M	N/A	M	
SW ITEL ST	LOCAL COMMERCIAL INDUSTRIAL	BC-I	NO	M	M	N/A	M	N/A	M	N/A	M	
SW MANHASSET DR	LOCAL COMMERCIAL INDUSTRIAL	B-CI	NO	M	M	N/A	M	N/A	P	N/A	M	Narrow or curb tight sidewalk, no planter
SW NYBERG ST	LOCAL COMMERCIAL INDUSTRIAL	B-D	YES	M	M	N/A	M	N/A	P	N/A	M	Narrow or curb tight sidewalk, no planter
SW ROSEWOOD AVE	LOCAL COMMERCIAL INDUSTRIAL	B-CI	NO	M	M	N/A	M	N/A	M	N/A	D	Curb to curb width less than standard
SW SENECA ST	LOCAL COMMERCIAL INDUSTRIAL	B-D	YES	M	M	N/A	M	N/A	M	N/A	M	
SW TONKA RD	LOCAL COMMERCIAL INDUSTRIAL	B-CI	NO	M	M	N/A	M	M	P	N/A	M	Narrow or curb tight sidewalk, no planter
SW 124TH AVE	MAJOR ARTERIAL	Eb&t	YES	M	M	M	M	M	M	N/A	M	
SW 90TH AVE	MAJOR ARTERIAL	Eb&t	NO	M	M	M	P	M	M	N/A	D	
SW BOONES FERRY RD	MAJOR ARTERIAL	Eb&t	YES	M	M	P	P	P	P	N/A	D	Narrow or curb tight sidewalk, no planter
SW HERMAN RD	MAJOR ARTERIAL	Eb&t	YES	D	M	P	P	G	G	N/A	D	Gaps in sidewalk and bike lane. Narrow median
SW LEVETON DR	MAJOR ARTERIAL	Eb&t	NO	M	M	P	M	M	M	N/A	P	Median width less than standard
SW MARTINAZZI AVE	MAJOR ARTERIAL	Eb&t	NO	P	M	M	M	G	P	N/A	D	Gaps in bike lane throughout and lack of planter strip
SW SAGERT ST	MAJOR ARTERIAL	Eb&t	NO	M	M	D	P	P	P	N/A	D	Gaps in sidewalk and bike lane across I-5 bridge
SW TUALATIN RD	MAJOR ARTERIAL	Eb&t	NO	M	M	M	D	M	P	N/A	P	Does not meet number of travel lanes for this class
SW 108TH AVE	MAJOR ARTERIAL	Eb&t	YES	M	M	P	D	M	P	N/A	P	Median is narrow. Sidewalks are curb tight with no planter.
SW BOONES FERRY RD	MINOR ARTERIAL	Db&t-D	YES	M	M	P	M	P	M	N/A	P	Section and bike lane narrow/removed at Tualatin River Bridge
SW MARTINAZZI AVE	MINOR ARTERIAL	Db&t-D	NO	M	M	D	M	D	P	N/A	P	No bike lane or planter near downtown core
SW TUALATIN RD	MINOR ARTERIAL	Db&t-D	YES	D	M	M	M	P	P	N/A	P	Narrow bike lane, 1/2 street sidewalk, some tight skews
SW 105TH AVE	MAJOR COLLECTOR	Cb&t	NO	M	M	D	M	P	P	N/A	P	Narrow bike lanes and sidewalk. No median.
SW 115TH AVE	MAJOR COLLECTOR	Cb&t	NO	P	M	P	P	P	P	N/A	P	Street only 1/2 built. Likely all M after property develops
SW 65TH AVE	MAJOR COLLECTOR	Cb&t	NO	M	M	N/A	M	P	P	N/A	P	Section altered at intersection. Sidewalk and Bike Lanes do not exist
SW AVERY ST	MAJOR COLLECTOR	Cb&t	NO	M	M	D	M	P	P	N/A	P	No median. Bike and sidewalk curb tight and narrow.
SW BLAKE ST	MAJOR COLLECTOR	Cb&t	NO	M	M	D	P	D	D	N/A	D	No sidewalk, bike lane or median. Narrow travel lanes
SW HERMAN RD	MAJOR COLLECTOR	Cb&t	YES	D	M	P	P	P	P	N/A	P	Gaps in bike lane and 1/2 street sidewalk due to rail.
SW MCEWAN RD	MAJOR COLLECTOR	Cb&t	NO	M	M	P	M	P	P	N/A	P	Gaps in bike lane and sidewalk. No median.
SW MYSLONY ST	MAJOR COLLECTOR	Cb&t	NO	M	M	P	P	P	P	N/A	P	Street only 1/2 built. Likely all M after property develops
SW SAGERT ST	MAJOR COLLECTOR	Cb&t	NO	M	M	D	M	P	P	N/A	P	Narrow bike lanes and curb tight sidewalk narrow sidewalk
SW TETON AVE	MAJOR COLLECTOR	Cb&t	YES	M	M	P	M	P	M	N/A	P	Narrow or missing median. Gaps in bike lane.
SW TUALATIN RD	MAJOR COLLECTOR	Cb&t	YES	M	M	P	M	M	M	N/A	P	Gaps in median width provided.

Street Name	Classification	Abbreviation	Truck Route?	Skew Angle	Intersection Spacing	Median?	Travel Lanes	Bike Lanes	Sidewalks	On-Street Parking	Curb to Curb Width	Comments
SW 103RD AVE	MINOR COLLECTOR	Cb&p	NO	M	M	N/A	M	M	M	M	P	
SW 108TH AVE	MINOR COLLECTOR	Cb	YES	M	M	N/A	M	M	M	P	P	Intermittent parking provided
SW 115TH AVE	MINOR COLLECTOR	Cb	NO	M	M	P	M	M	M	D	P	narrow median and lack of parking
SW 118TH AVE	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	M	M	D	P	no street parking
SW 50TH AVE	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	M	M	D	P	no street parking
SW 95TH PL	MINOR COLLECTOR	Cb&p	NO	M	M	N/A	M	P	P	P	P	narrow bike lane, no planter, parking south of Avery only
SW BLAKE ST	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	D	D	D	P	no parking, sidewalk or bike lanes
SW GRAHAMS FERRY RD	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	P	P	P	P	1/2 developed. Likely all M after developments
SW HAZELBROOK RD	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	P	P	P	P	Partially developed. Likely all M after developments
SW HELENIUS RD	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	P	P	P	P	Partially developed. Likely all M after developments
SW IBACH ST	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	M	M	D	P	no street parking
SW IOWA DR	MINOR COLLECTOR	Cs&2p	NO	M	M	N/A	M	M	M	M	M	
SW JURGENS AVE	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	P	M	M	P	narrow or gaps in bike lane
SW LEVETON DR	MINOR COLLECTOR	Cb	NO	M	M	P	M	M	M	D	P	Narrow median. No street parking
SW MARTINAZZI AVE	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	M	M	M	M	
SW NYBERG LANE	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	P	M	M	P	narrow bike lane or gaps
SW NYBERG ST	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	P	M	M	P	narrow bike lane or gaps
SW SAGERT ST	MINOR COLLECTOR	Cb&p	NO	M	M	N/A	M	M	M	M	M	
SW STONO DR	MINOR COLLECTOR	Cs&p	NO	M	M	N/A	M	M	M	M	P	full c-c width north provided
SW WARM SPRINGS ST	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	D	P	D	P	1/2 street sidewalk, no street parking, narrow bike or gap
SW WILKE RD	MINOR COLLECTOR	Cb	NO	M	M	N/A	M	P	P	D	P	no street parking, sidewalk and bike lane gaps
SW 112TH AVE	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	M	M	roadway not completed to Helenius
SW 56TH AVE	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	P	P	full width not provided
SW 99TH AVE	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	P	P	full width not provided
SW ALSEA DR	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	P	P	full width not provided
SW AVERY ST	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	M	M	
SW BLAKE ST	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	M	M	
SW COQUILLE DR	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	M	M	Narrow at intersection
SW HELENIUS RD	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	M	M	roadway not completed to 112th
SW MARILYN RD	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	M	M	
SW PAULINA DR	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	M	M	
SW PORT ORFORD ST	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	M	P	Narrow c-c width
SW SAGERT ST	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	M	P	Narrow c-c width
SW SWEEK DR	RESIDENTIAL COLLECTOR	Cr	NO	M	M	N/A	M	N/A	M	M	M	

M – Meets standard
P – Partially meets standard
D – Does not meet standard
G – Gap in feature

Attachment B: Bus Stops within the City of Tualatin

STOP ID	LOCATION	ROUTE	Direction	Shelter?	Lighting?
Bus line 12: Barbur/Sandy Blvd					
4292	SW Pacific Hwy & SW Hazelbrook Rd	12	W	no	no
4260	SW Pacific Hwy & SW 124th Ave	12	W	no	no
4300	SW Pacific Hwy & SW Pacific Dr	12	W	no	no
4301	SW Pacific Hwy & SW Pacific Dr	12	E	no	no
4316	SW Pacific Hwy & SW 124th Ave	12	E	no	yes
4293	SW Pacific Hwy & SW Hazelbrook Rd	12	N	yes	yes
Bus line 36: South Shore					
3821	7100 Block SW McEwan Rd	36	N	no	no
3820	SW McEwan Rd & NW Book Deposit	36	N	no	yes
3824	SW McEwan Rd & SW 65th Ave	36	N	no	yes
7879	Tualatin Park & Ride	36	N	yes	yes
9045	SW Lower Boones Ferry Rd & SW McEwan Rd	36	E	no	yes
3819	17900 Block SW McEwan Rd	36	W	no	yes
3822	7100 Block SW McEwan Rd	36	S	no	no
Bus line 37: Lake Grove					
12852	SW Lower Boones Ferry Rd & SW 65th Ave	37	W	no	no
7879	Tualatin Park & Ride	37	N	yes	yes
13195	SW Lower Boones Ferry & SW McEwan Rd	37	E	no	no
Bus line 38: Boones Ferry Road					
7880	Tualatin Park & Ride	38	All	yes	yes
Bus line 76: Beaverton/Tualatin					
7880	Tualatin Park & Ride	76	All	yes	yes
558	18000 Block SW Lower Boones Ferry Rd	76	W	no	yes
514	SW Lower Boones Ferry Rd & SW Childs Rd	76	W	no	yes
495	18200 Block SW Boones Ferry Rd	76	S	no	yes
13078	SW Boones Ferry Rd & SW Martinazzi Ave	76	W	no	yes
13079	SW Boones Ferry Rd & SW Nyberg St	76	S	yes	no
13080	SW Warm Springs St & SW Boones Ferry Rd	76	E	no	yes
13081	SW Warm Springs St & SW Martinazzi Ave	76	E	no	no
8274	SW Martinazzi Ave & SW Mohawk St	76	S	no	yes
8506	SW Sagert St & SW Martinazzi Ave	76	E	no	no

STOP ID	LOCATION	ROUTE	Direction	Shelter?	Lighting?
4999	7800 Block SW Sagert St	76	E	no	yes
5003	SW Sagert St & SW 72nd Ave	76	E	no	yes
5002	SW Sagert St & SW 70th Ave	76	E	no	yes
5001	SW Sagert St & SW Wampanoag Dr	76	E	no	yes
7839	SW 65th Ave & SW Borland Rd	76	N	no	yes
3868	Meridian Park Hospital Main Stop	76	N	yes	yes
3867	Meridian Park Hospital Rd & SW 65th Ave	76	N	no	no
8944	19500 Block SW 65th Ave	76	S	yes	yes
8279	SW 65th Ave& SW Borland Rd	76	S	no	yes
8281	SW Sagert St & SW 68th Ave	76	W	no	yes
8282	SW Sagert St & SW 72nd Ave	76	W	no	yes
8283	7800 Block SW Sagert St	76	W	no	yes
8285	SW Martinazzi Ave & SW Mohawk St	76	N	yes	yes
13082	SW Warm Springs St & SW Martinazzi Ave	76	W	no	yes
13083	SW Warm Springs St & SW Boones Ferry Rd	76	W	no	no
13084	SW Boones Ferry Rd & SW Seneca St	76	N	yes	yes
13085	SW Boones Ferry Rd & SW Martinazzi Ave	76	E	no	yes
7880	Tualatin Park & Ride	96	All	yes	yes
	Bus line 96: Tualatin/I-5				
558	18000 Block SW Lower Boones Ferry Rd	96	W	no	yes
514	SW Lower Boones Ferry Rd & SW Childs Rd	96	W	no	yes
495	18200 Block SW Boones Ferry Rd	96	S	no	yes
3779	SW Martinazzi Ave & SW Seneca St	96	S	no	yes
5004	SW Sagert St & SW 86th Ave	96	E	no	yes
8278	SW Sagert St & SW Tillamook Ct	96	E	no	yes
9026	SW Martinazzi Ave & SW Tualatin-Sherwood Rd	96	S	no	yes
8252	SW Martinazzi Ave & Martinazzi Square	96	S	no	yes
8285	SW Martinazzi Ave & SW Mohawk St	96	N	yes	yes
8274	SW Martinazzi Ave & SW Mohawk St	96	S	no	yes
8276	SW Sagert St & SW Tillamook Ct	96	W	no	yes
8788	SW Sagert St & SW 86th Ave	96	W	no	yes
501	SW Boones Ferry Rd & SW Apache Dr	96	S	no	yes
9352	SW Boones Ferry Rd & SW Avery St	96	S	no	yes
563	SW Boones Ferry Rd & SW Siletz Dr	96	S	no	yes
535	SW Boones Ferry Rd & SW Killarney Ln	96	S	no	yes
500	SW Boones Ferry Rd & SW Alsea Dr	96	S	no	yes

STOP ID	LOCATION	ROUTE	Direction	Shelter?	Lighting?
530	SW Boones Ferry Rd & SW Ibach St	96	S	no	no
9512	SW Boones Ferry Rd & SW Iowa Dr	96	S	no	yes
542	SW Boones Ferry Rd & SW Norwood Rd	96	S	no	yes
543	SW Boones Ferry Rd & SW Norwood Rd	96	N	no	yes
9511	SW Boones Ferry Rd & SW Iowa Dr	96	N	no	yes
531	SW Boones Ferry Rd & SW Ibach St	96	N	no	yes
510	SW Boones Ferry Rd & SW Blake St	96	N	no	yes
503	SW Boones Ferry Rd & SW Arapaho Rd	96	N	no	yes
562	SW Boones Ferry Rd & SW Siletz Dr	96	N	no	yes
9353	SW Boones Ferry Rd & SW Avery St	96	N	no	yes
502	SW Boones Ferry Rd & SW Apache Dr	96	N	no	yes
5004	SW Sagert St & SW 86th Ave	96	E	no	yes
8278	SW Sagert St & SW Tillamook Ct	96	E	no	yes
8285	SW Martinazzi Ave & SW Mohawk St	96	N	yes	yes
8249	SW Martinazzi Ave & Martinazzi Square	96	N	yes	yes
8250	SW Martinazzi Ave & SW Tualatin-Sherwood Rd	96	N	no	yes
3778	SW Martinazzi Ave & SW Boones Ferry Rd	96	N	yes	yes
570	SW Lower Boones Ferry Rd & SW Boones Ferry Rd	96	E	no	yes
513	SW Lower Boones Ferry Rd & SW Childs Rd	96	E	no	yes
537	18000 Block SW Lower Boones Ferry Rd	96	E	no	yes
13069	Tualatin WES Station	WES	N/S	yes	yes
7879	Tualatin Park & Ride	96	All	yes	yes
	WES Commuter Rail				
13069	Tualatin WES Station	WES	N/S	yes	yes

Source: www.trimet.org