EXISTING CONDITIONS

Existing transportation inventories were collected and evaluated as part of the City of Sherwood Transportation System Plan (TSP) for transportation facilities serving various travel modes (pedestrians, bicycles, transit, motor vehicles, freight, water, air, and pipelines). This 2013 inventory of Sherwood's multimodal transportation infrastructure establishes existing transportation needs in Sherwood.

Study Area

The general TSP study area (Figure 1) includes the Sherwood city limits and the adjacent unannexed area within the existing urban growth boundary (UGB). Figure 1 also shows Sherwood's land use zoning, which includes a concentration of commercial uses along Highway 99W and in Old Town, Sherwood's historic core. For the purposes of this project, its boundaries are generally defined by the Old Town Overlay District on the City's zoning map. The City's industrial uses are generally located in the northeast area along Tualatin-Sherwood Road (including the Tonquin Employment Area) and the Portland & Western (P&W) Railroad track. The remainder of the City primarily includes residential uses of varying densities (i.e., low, medium, and high). The City has completed concept plans for areas that have not yet been annexed into the City, including the Brookman Addition area (southern edge) and Tonquin Employment Area (eastern edge).

Sherwood's transportation system includes infrastructure that supports the ability of residents and visitors to move around town. Figure 2 shows the locations of multiple "activity generators" (locations that attract various activity) around Sherwood. The highest concentration of generators is located in the Old Town area. Along the northern section of Highway 99W, there are multiple shopping centers. Bus stops are located along the roads having fixed transit routes (Langer Drive and Sherwood Boulevard). Schools and parks are the primary activity generators scattered throughout the community and intermixed with the residential areas. The location of these activity generators is important to consider when assessing the gaps and needs of various modes of travel. Having a well-connected transportation network that provides options for travel to and from these locations can be an asset to the community.

Street System

Sherwood's street system is hierarchal in nature and includes five functional classes, where streets with a higher classification (such as arterial streets) emphasize a higher level of mobility for through-movement versus access. They look and function very differently than a street with a lower classification (such as local streets), which emphasize land access. Higher classification streets tend to be higher traffic volume and speed roadways, though they can vary depending on land use context. The functional classification also provides helpful context for determining the desired spacing and general citywide street layout of the various types of facilities.

Figure 1

Study Area and Zoning

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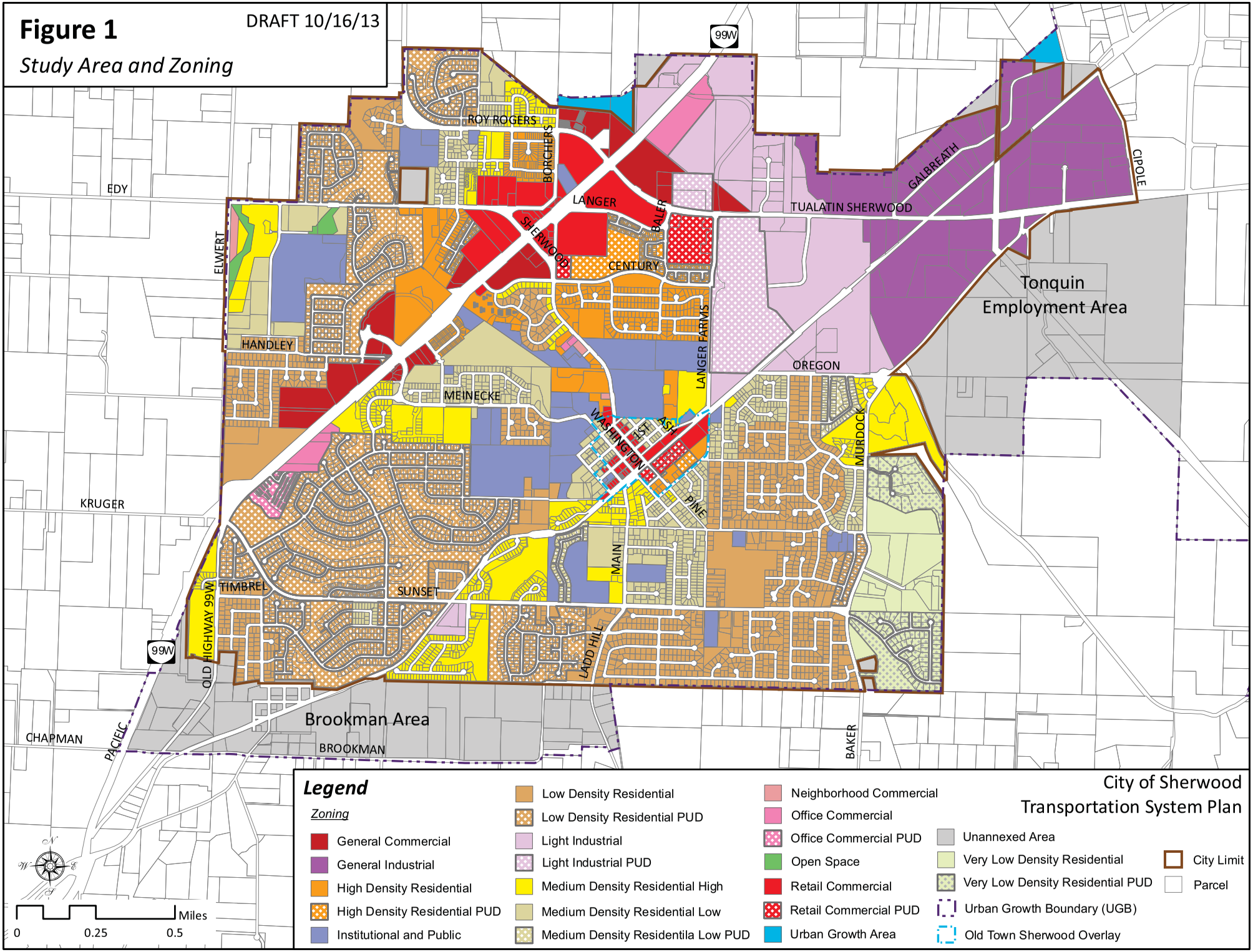

Legend

Zoning

- General Commercial
- General Industrial
- High Density Residential
- High Density Residential PUD
- Institutional and Public
- Low Density Residential
- Low Density Residential PUD
- Light Industrial
- Light Industrial PUD
- Medium Density Residential High
- Medium Density Residential Low
- Medium Density Residentila Low PUD
- Neighborhood Commercial
- Office Commercial
- Office Commercial PUD
- Open Space
- Retail Commercial
- Retail Commercial PUD
- Urban Growth Area
- Unannexed Area
- Very Low Density Residential
- Very Low Density Residential PUD
- Urban Growth Boundary (UGB)
- Old Town Sherwood Overlay
- City Limit
- Parcel

City of Sherwood
Transportation System Plan

Figure 2

Key Activity Generators

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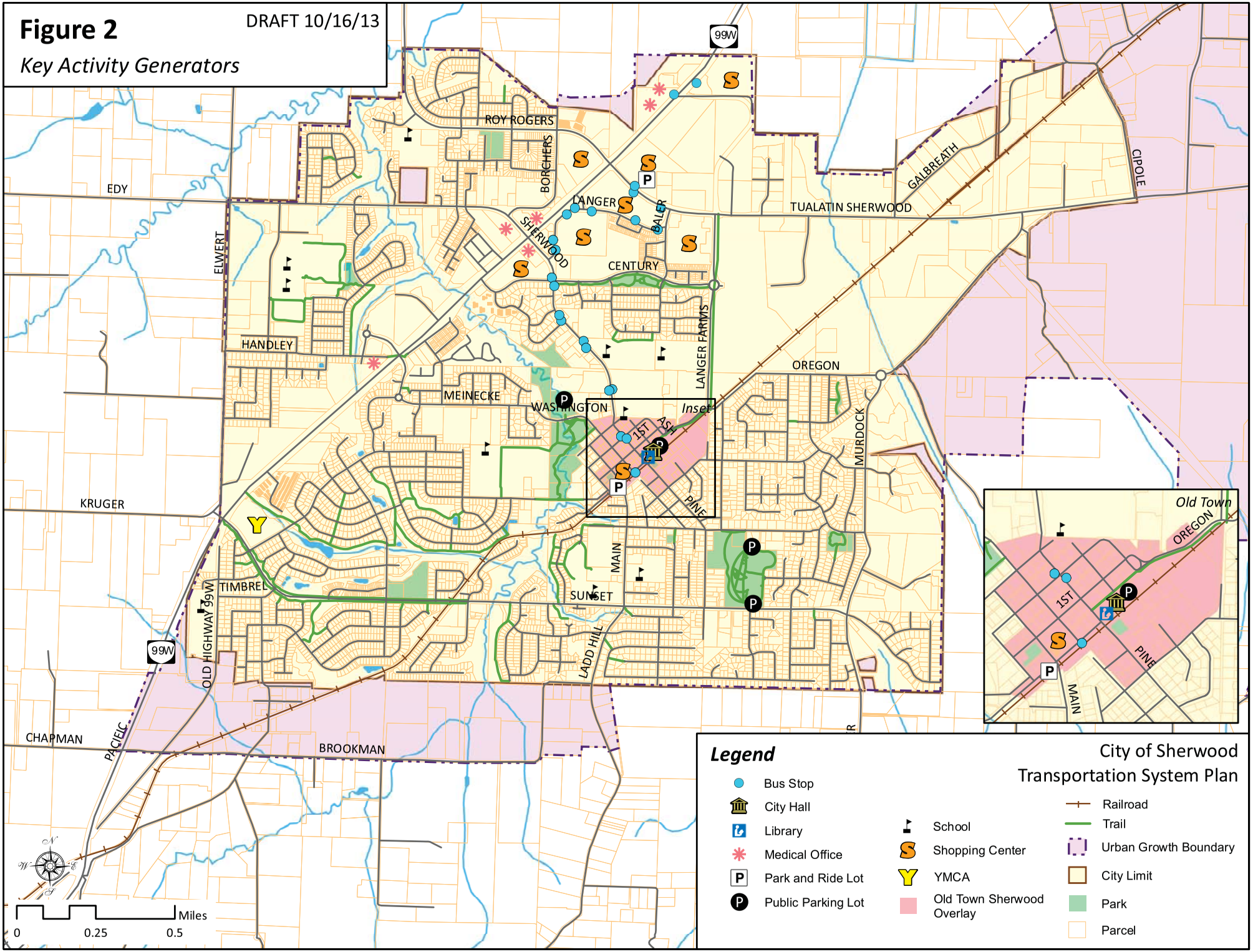

Functional Classification

Sherwood has five functional classes for streets:

- **Principal Arterials** are access controlled highways that span several jurisdictions and provide a high level of mobility. They generally have four or more travel lanes, bicycle lanes (or shoulders), and limited access (preferably connecting primarily with arterials).
- **Arterials** serve as the major roadways within Sherwood and link major commercial, residential, industrial and institutional areas. Many of these roadways also extend beyond Sherwood and connect to other nearby cities. Limited access is a key feature of arterials to ensure increased mobility through town.
- **Collectors** have the primary role of facilitating circulation within Sherwood by funneling traffic from residential, commercial, and industrial areas to the arterial street network. They do not require as extensive control of access (compared to arterials).
- **Neighborhood Routes** are the primary roadways used to access residential neighborhoods. They serve a similar function as collector roadways but are designed to feel more like a neighborhood street.
- **Local Streets** have the sole function of providing access to immediate adjacent land. Service to "through traffic movement" on local streets is deliberately discouraged by design.

Figure 3 shows the functional classifications of Sherwood's roadways. The primary regional roadway providing mobility to residents and connecting the City of Sherwood with the surrounding area is Highway 99W, which is classified as a Principal Arterial. Highway 99W runs northeast-southwest through the northern half of the City and connects to the Portland Metropolitan Area to the northeast and Newberg, McMinnville, and other areas of Yamhill County to the southwest. Through Sherwood, Highway 99W has limited access, including five signalized intersections, which serve as the primary crossing locations between land uses on either side of the highway. There are only a few other accesses with local roads and private driveways, and these are all limited to right-in/right-out movements except Bookman Road.

The other major roadways within Sherwood (classified as Arterials) are the primary mobility routes that provide regional connections through Sherwood. These arterials include Tualatin-Sherwood Road (connecting to Tualatin), Roy Rogers Road (connecting to Beaverton), Oregon Street, Murdock Road, Sherwood Boulevard, Main Street, Sunset Boulevard, and Elwert Road.

Figure 3

Street Functional Classification

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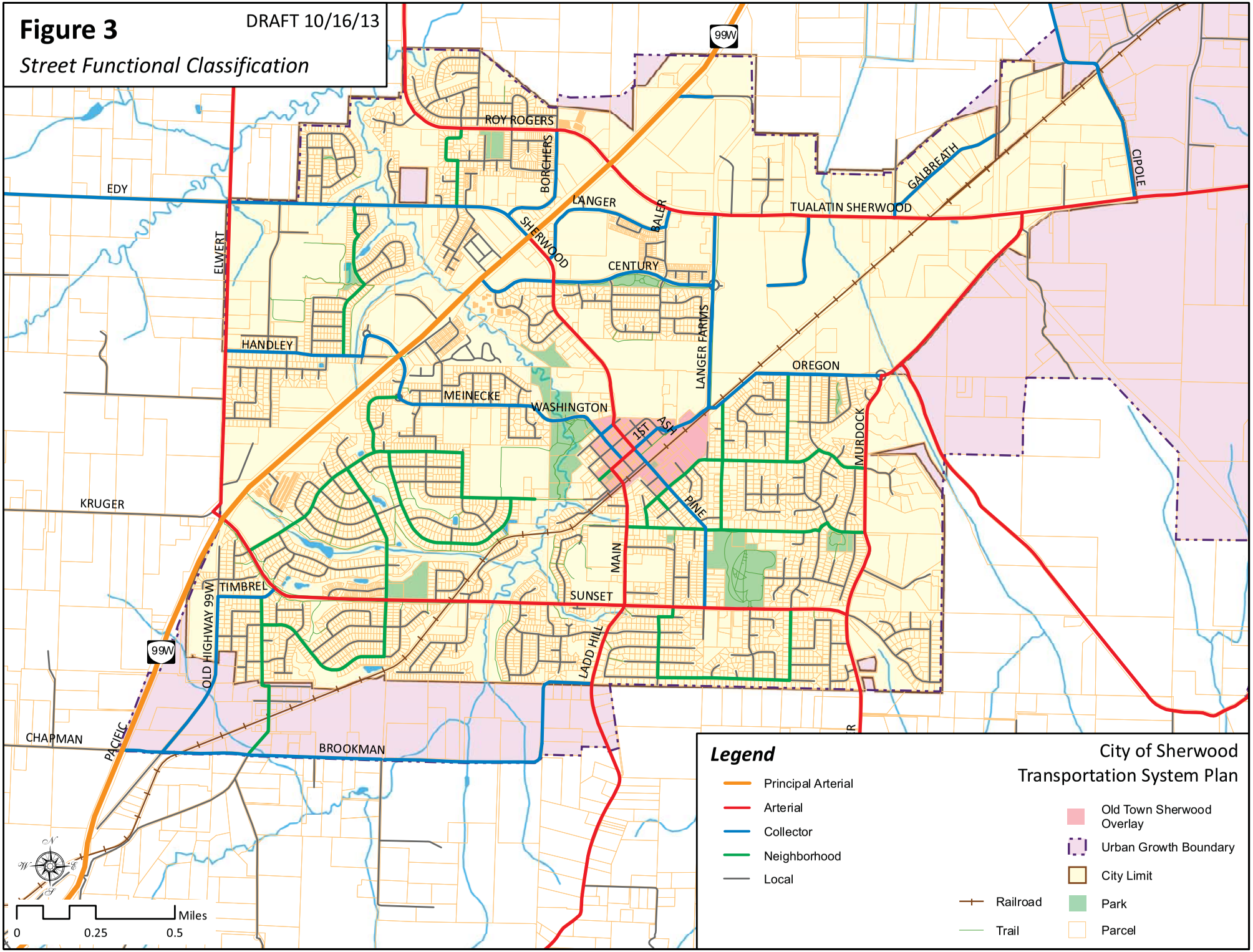
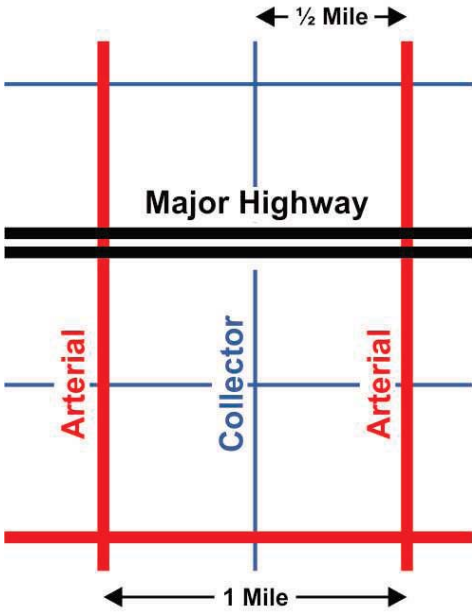


System Connectivity

The Metro Regional Transportation Functional Plan (RTFP) requires that each city incorporate street connectivity guidelines into local TSPs. The image at right shows the recommended spacing for arterial streets (approximately one-mile) and collector streets (approximately half-mile). There is allowance for deviations to this spacing based on the presence of significant barriers, such as topography, rail lines, freeways, existing development, and the presence of natural areas.[1] The roadway network spacing guidelines were recommended to support walking, biking, and access to transit, as well as improved connectivity to reduce demand on the arterial roadway system.



Based on these street connectivity guidelines, Sherwood currently has the following system connectivity characteristics in its arterial and collector network. Specific gaps (as numbered) are shown in Figure 3A.

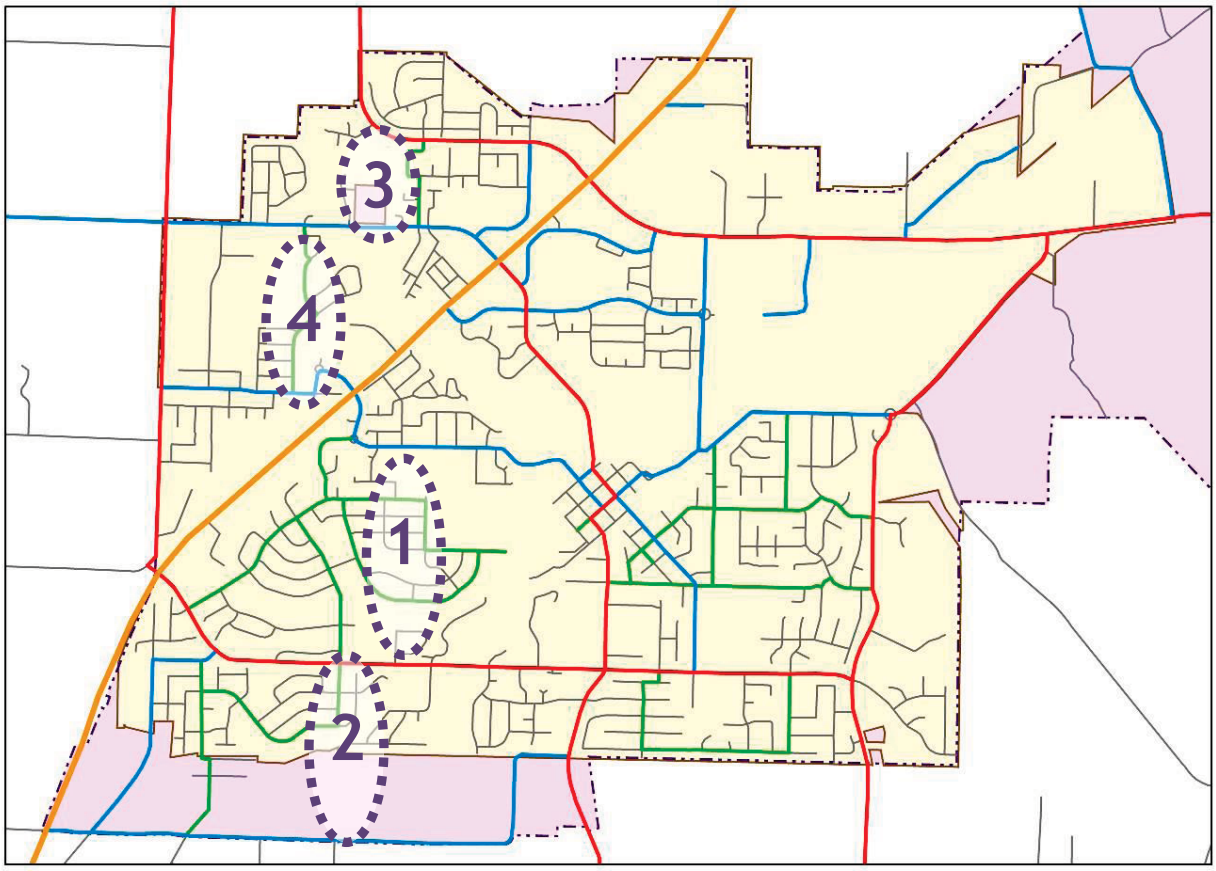
- **East-West Roadways (South of Highway 99W):** Tualatin-Sherwood Road and Sunset Boulevard are the two east-west arterials in Sherwood south of Highway 99W. They are spaced approximately 1¼ miles apart, which only slightly exceeds the desired one-mile arterial spacing guideline. Oregon Street and Meinecke Road are collectors that provide east-west connectivity located approximately midway between Tualatin-Sherwood Road and Sunset Boulevard (approximately ½ mile from each arterial). Brookman Road, a collector, also is located approximately ½ mile south of Sunset Boulevard.
- **North-South Roadways (South of Highway 99W):** Sherwood Boulevard – Main Street and Oregon Street-Murdock Road are the primary north-south arterials on the southern side of Highway 99W. Highway 99W also accommodates north-south travel. In general, these roadways are spaced between ¾ and 1 ¼ miles apart, which is generally consistent with the one-mile arterial spacing guideline. Langer Farms Parkway, a collector, provides north-south travel between Tualatin-Sherwood Road and Oregon Street and is located approximately ½ to ¾ mile from the adjacent arterial facilities. South of Oregon Street, Pine Street is the collector between Main Street and Murdock Road. However, west of Main Street the collector gaps are larger, including:
    - There is no collector (gap 1) that links Meinecke Road and Sunset Boulevard. This area is constrained by established residential neighborhoods, the rail line, and the creek. Dewey Drive and Pinehurst Drive serve as neighborhood routes to the west.

[1] Metro's Regional Transportation Functional Plan (RTFP), Title 1 section 3.08.110(C)

- South of Sunset Boulevard, there is a gap of approximately 1 ¼ miles (gap 2) east to Ladd Hill Road to Old Highway 99W and Timbrel Lane. While Pinehurst Drive (a neighborhood route) extends south of Sunset Boulevard, it ends in a residential neighborhood that backs against the rail line.

- **North of Highway 99W:** The two arterials north of Highway 99W, Roy Rogers Road and Elwert Road, are spaced approximately ½ miles apart to the north and 1 ½ miles apart near Highway 99W due to the curvature in Roy Rogers Road. Between the two arterials, Edy Road and Handley Street provide east-west connectivity. However, north-south collector connectivity is limited.
  - There is a north-south collector gap of nearly a mile (gap 3) between Borchers Drive and Elwert Road north of Edy Road. While a neighborhood route is located along Houston Drive and Lynnly Way, area to the west is somewhat constrained by the creek.
  - There is a north-south gap of approximately a mile south of Edy Road (gap 4). The neighborhood route of Bedstraw Terrace-Ladyfern Drive-Roellich Avenue is located in the general area that would meet the collector spacing guidelines. However, these roads are fronted by residential development that has direct access to the facility and would restrict the mobility function of a collector.

Figure 3A: Arterial and Collector Gaps in System Connectivity



Roadway Characteristics

Figure 4 shows the speed limits on Sherwood's roadways and the traffic control used for the City's intersections. Most of the roadways have 25 mile per hour (mph) speed limits, with some of the arterial roadways having higher speeds of 35, 45, or 55 mph. The majority of the City's traffic signals are also on the arterial roadways, while roundabouts are located at various intersections around town. Old Town Sherwood has a large concentration of the City's all-way stops, and there are also a number of all-way stops on Sunset Boulevard.

Figure 4

Roadway Characteristics

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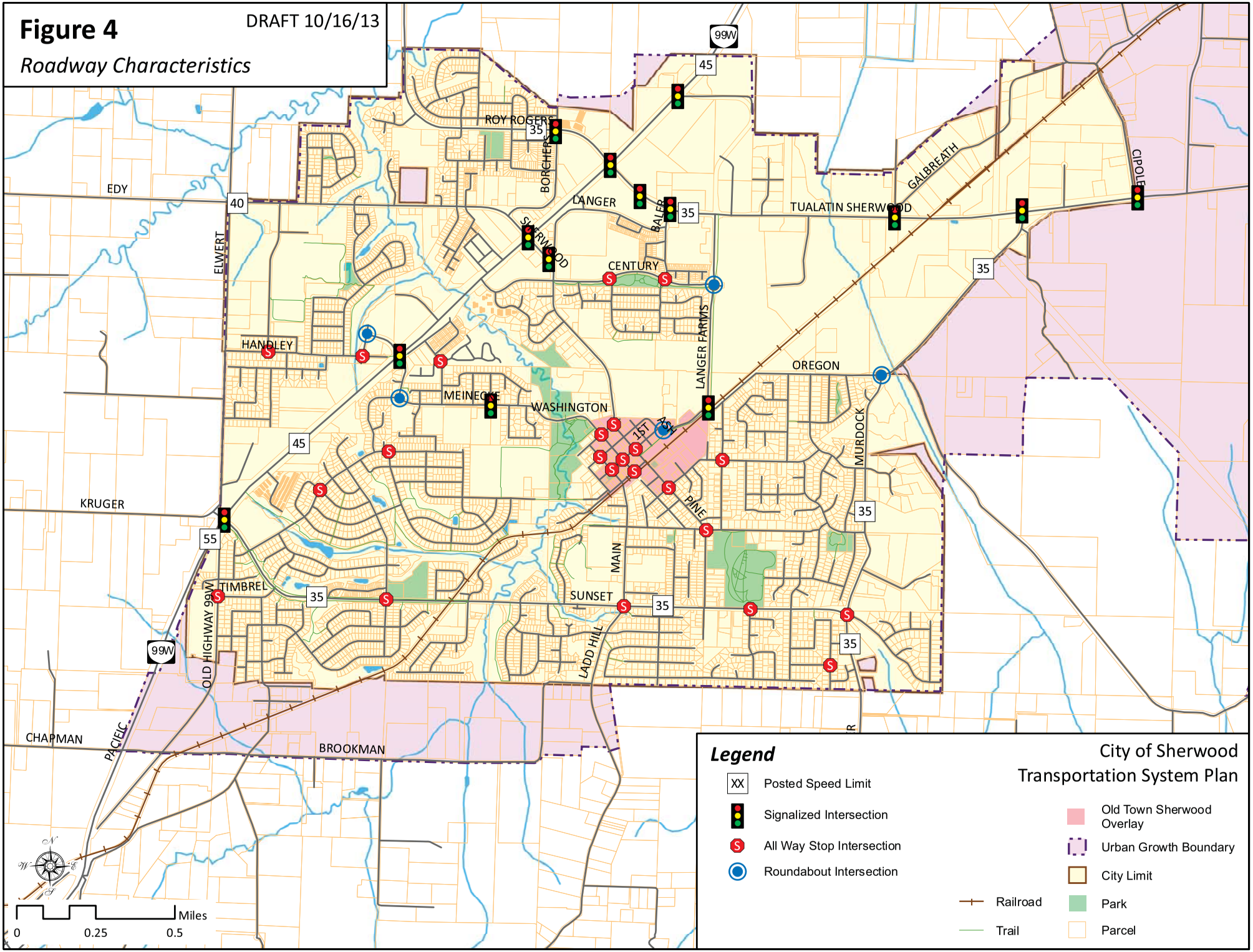

Pedestrian Facilities

Figure 5 shows the existing pedestrian facilities in Sherwood. Sidewalk connectivity is provided on a majority of the arterials, collectors, and local roadways including Tualatin-Sherwood Road and Sherwood Boulevard. In addition, connectivity and pedestrian linkages are relatively good for parks and schools. Roadways lacking sidewalk connectivity in key locations include the following:

- **Highway 99W** has significant gaps in sidewalk connectivity, especially a large portion south of Sherwood Boulevard that does not have sidewalks on either side of the highway.
- **Edy Road** along most of its length between Highway 99W and Elwert Road lacks sidewalks on at least one side of the road.
- **Division Street** along most of its length between Main Street and Mansfield Street lacks sidewalks on at least one side of the road.
- **Oregon Street** along most of its length between Langer Farms Parkway and Murdock Road lacks sidewalks on both sides of the road; however, the northern side of the road has undeveloped land.
- **12th Street** between Highway 99W and Sherwood Boulevard lacks sidewalks on the south side of the street.
- **Glen Eagle Neighborhood** lacks sidewalks along all streets (12th Street, Gleneagle Drive, Glenco Court, 11th Court, and 10th Street), including those that front homes.

Sherwood's streets have a mix of pedestrian facilities that include sidewalks and meandering paths.

Currently, trail facilities along Oregon St, Langer Farms Parkway and Century Drive connect Old Town to Tualatin Sherwood Road and Langer Park. In addition, the City of Sherwood is in the process of planning and constructing portions of the Cedar Creek Trail, which will connect to the regional Ice Age Tonquin Trail. The intended alignment of this trail will follow Oregon Street through Old Town and run along Cedar Creek to the north. In the short term, the nearest crossing of Highway 99W will be at Meinecke Road, but a grade-separated crossing of Highway 99W may be considered as a long-term

solution. This trail will serve as an important bicycle and pedestrian connection between land uses on the northwest side of Highway 99W and Old Town, as well as the other neighborhoods adjacent to the trail's alignment. It will also provide regional connectivity to the cities of Tualatin and Wilsonville to the east.

The railroad right-of-way is not a legal pedestrian use corridor. While pedestrian use is illegal, the railroad, which is rarely active, is sometimes used as a trail from southern/central neighborhoods to the high school, Stella Olsen Park, and Old Town. The illegal use by some pedestrians, indicates the desire for travel between these areas of the City. The railroad corridor will not be included in system connectivity analysis for pedestrians. However, the desire for travel between these key areas (southern/central neighborhoods and central/northern attractions) will be considered.

Street crossings are another important feature of Sherwood's pedestrian system. While controlled pedestrian crossings are provided at all major signalized intersections, there are some roadways where major intersections are spaced far apart, which results in crossing barriers for pedestrians. This is the case with Highway 99W, which only has five crossing locations in the three-mile section through town, with particularly long spacing on the 3/4-mile stretch between Sunset Boulevard and Meinecke Road.

The Highway 99W crossings are located at signals, and each signal only allows pedestrian crossings on one leg of Highway 99W (with the other crossing being closed). In addition, the west crosswalk on Sherwood Boulevard at the intersection of Langer Drive is also closed. These closures can increase the crossing movements required by pedestrians to reach their destination. In some cases, a pedestrian may be required to cross three legs on an intersection rather than the desired (closed) leg. This increases the travel time for pedestrians as well as potential conflicts with motor vehicles.

Another major feature impeding pedestrian mobility is the large area of developed land without public rights of way through the properties between Old Town and the residential area to the north. While this area contains schools, a church, and other uses, it does not provide dedicated pedestrian connections between Sherwood Boulevard and Langer Farms Parkway. There are also major gaps in the undeveloped areas of Sherwood. One area with an existing pedestrian gap includes the undeveloped land between Tualatin-Sherwood Road and the section of Oregon Street west of Murdock Road.

Figure 5

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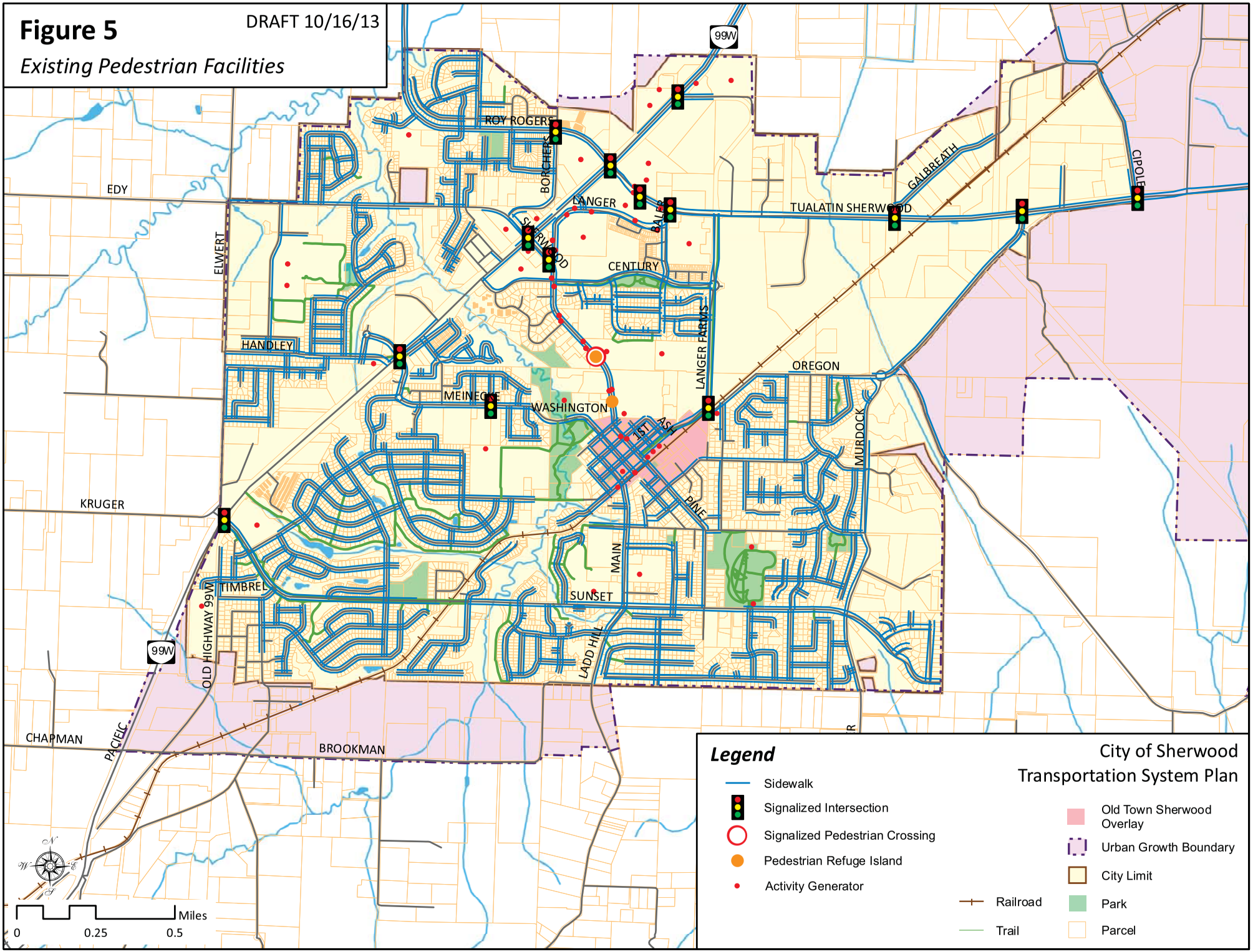
Existing Pedestrian Facilities



Bicycle Facilities

Figure 6 shows the existing bicycle facility inventory in Sherwood. Besides Highway 99W and Tualatin-Sherwood Road, most of the roadways do not provide bike lanes, although the majority of the residential road vehicle volumes and speed may be low enough (typically under 3,000 vehicles per day and 25 miles an hour) to be safe for bicycle travel. While the need for types of bicycle treatment vary by system context, typically roads with speeds lower than 25 miles an hour are appropriate for shared lanes, sharrows or bike boulevards. The current barriers to pedestrian travel (e.g., Highway 99W crossing opportunities, lack of connectivity north of Old Town, etc.) also affect bicyclists. The Tualatin-Sherwood Road bike lanes have been modified with an additional stripe to create "buffered bike lanes" that serve to create space and dedicated separation between bicyclists and motor vehicles.

Off-street path systems can serve both pedestrians and bicyclists and are typically preferred to on-street facilities. At the moment, Sherwood has existing trail facilities along Langer Farms Parkway, Century Drive, and Sunset Boulevard. Future trails are planned both within Sherwood and connecting to the southeast. The proposed Ice Age Tonquin Trail will connect Old Town to Highway 99W as well as Tonquin Road, the City of Tualatin, the City of Wilsonville, and the Willamette River to the east. This new trail will provide opportunities for bicycle users and pedestrians to make long distance commutes or recreational travel to nearby communities.

The bicycle lanes on Tualatin-Sherwood Road were restriped to create "buffered bike lanes" that serve to create space and dedicated separation between bicyclists and motor vehicles.

Figure 6

Existing Bicycle Facilities

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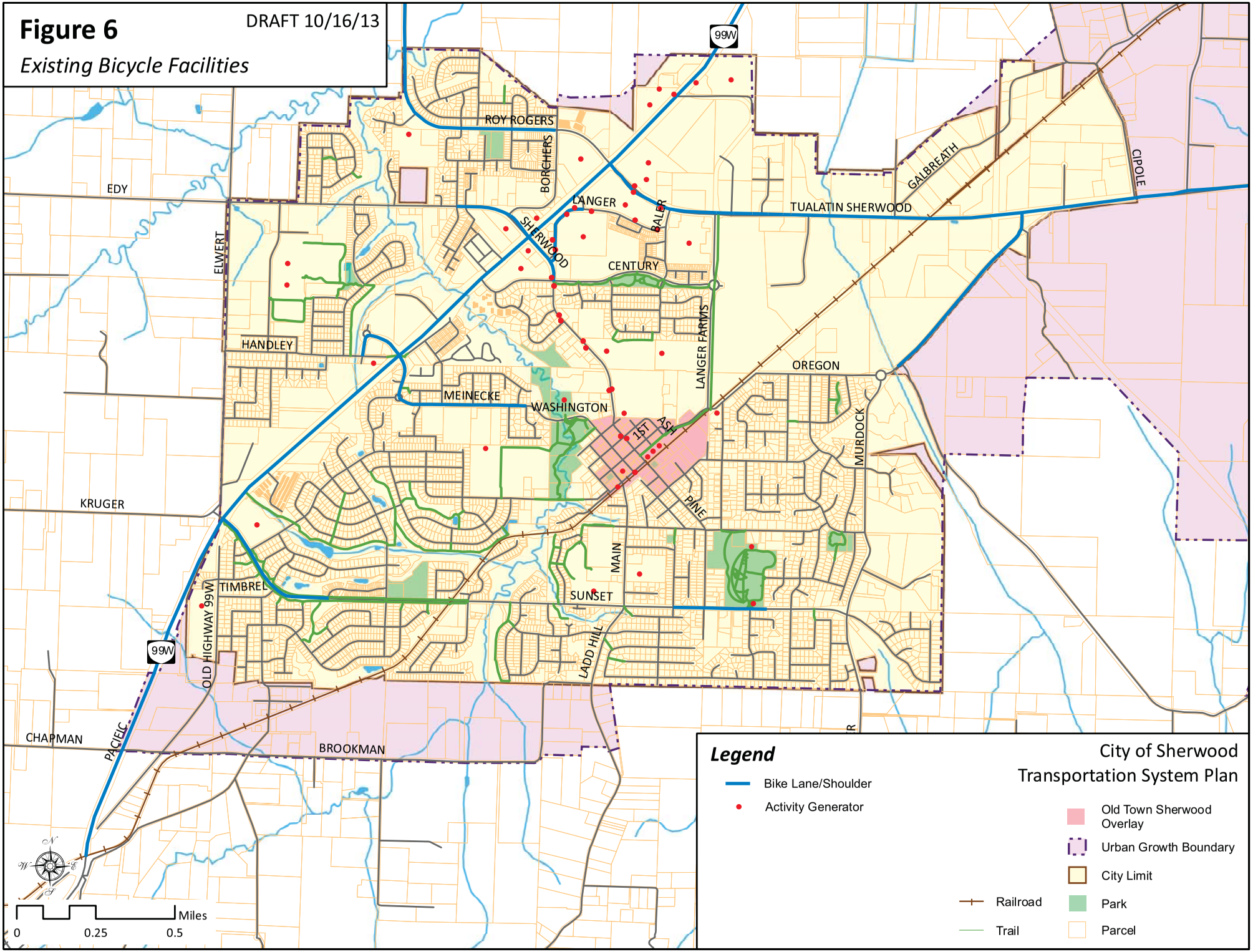

Transit Facilities

Transit service is provided by the Tri-County Metropolitan District of Oregon (TriMet) and the Yamhill County Transit Area District (YCTA). TriMet provides service and connections within the Portland Metro region (such as to Tigard, Beaverton, Portland, etc.), while YCTA connects Sherwood to Yamhill County and Tigard. Figure 7 shows the bus routes and bus stops of each transit service provider. In addition, the Metro RTP identifies the TriMet stop located at Railroad Street and Washington Street in Old Town Sherwood as a major transit stop. TriMet also provides park-and-ride lots at two of its stops in Sherwood; these include Old Town Sherwood on Railroad Avenue and off of Tualatin-Sherwood Road at the Regal Cinemas parking lot.

TriMet Lines 93 and 94 connect Old Town Sherwood to Highway 99W and run to/from the north. The focus of the service is to connect Sherwood with Tigard, Downtown Portland, and the greater Portland Metropolitan Area. Line 93 runs from Old Town Sherwood (Railroad Street/Washington Street) to the Tigard Transit Center. It operates seven days a week and runs approximately every 30-45 minutes or less during the weekdays from 4:30 AM to 11:30 PM. During the weekends, Line 93 runs approximately the same schedule as the weekdays. The typical travel time on this route between Old Town Sherwood and the Tigard Transit Center is 20-25 minutes.

Line 94 is an Express bus that runs between Old Town Sherwood and Downtown Portland. It only operates on weekdays, with short headways during the peak commuting hours (in the peak direction only) and longer headways during the off-peak hours. In the northbound direction (to Downtown Portland) the bus runs from about 5:45 AM to 8 AM with service every 15 minutes or less. Then, from 8 AM to 5:15 PM it provides service every 45 minutes. In the southbound direction (to Sherwood) the bus runs from 7:30 AM to 2 PM every 45 minutes. Then, from 2:00 PM to 7:00 PM the bus provides service every 15 minutes or less. During peak hours, the typical travel time from Downtown Portland to Old Town Sherwood is approximately one hour.

Some bus stops in Sherwood include amenities such as benches and shelters.

In addition to the two TriMet bus lines, the YCTA operates three bus lines; Routes 44, 45x (Express), and 46S (Saturday). These bus lines all travel between McMinnville and Tigard, with stops at the various cities along the corridor, including Sherwood. The only stop in Sherwood is located on SW Langer Drive near Shari's. Route 44 runs from about 6:00 AM to 7:00 PM, with service every hour during peak times and every two hours during off-peak times. Line 45X operates only two trips every weekday, one at 7:00 AM in the southbound direction and one at 5:45 PM in the northbound direction, which serves those traveling from residences in Sherwood to Yamhill County (potentially for employment) during the typical commute times.

Figure 7

Existing Transit Facilities

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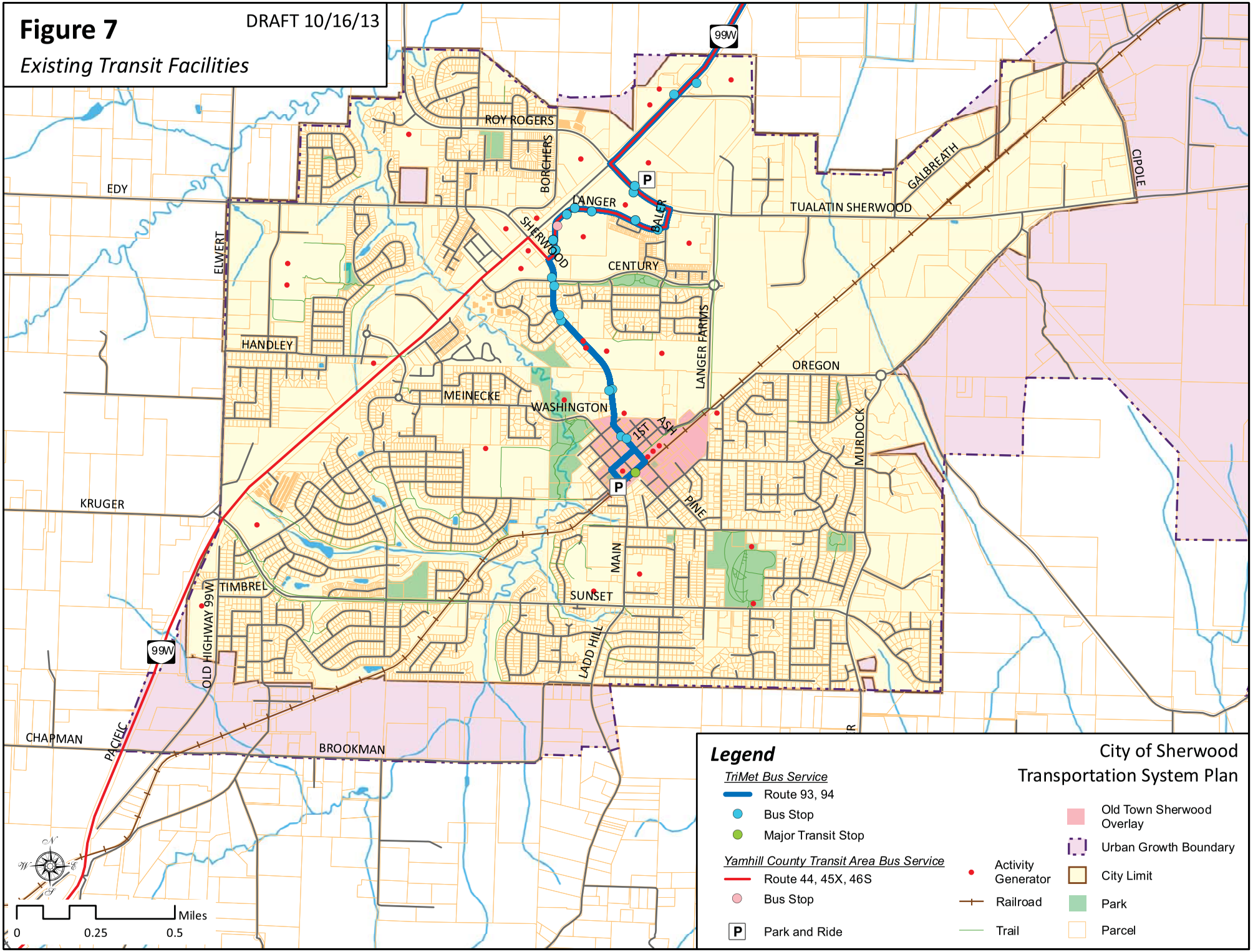

Legend

TriMet Bus Service
- Route 93, 94
- Bus Stop
- Major Transit Stop

Yamhill County Transit Area Bus Service
- Route 44, 45X, 46S
- Bus Stop

P Park and Ride

Activity Generator
Railroad
Trail

Old Town Sherwood Overlay
Urban Growth Boundary
City Limit
Park
Parcel

City of Sherwood
Transportation System Plan

Freight Routes

Efficient truck movement plays a vital role in the economical movements of raw materials and finished products. The designation of through truck routes provides for this efficient movement while at the same time maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. The Washington County TSP identifies through truck routes in the Sherwood areas as Highway 99W and Tualatin-Sherwood Road/Roy Rogers Road, which are shown in Figure 8. In addition, Highway 99W (a Statewide facility) has several designations related to mobility and goods movements, including National Highway System, National Network, Freight Route, and Reduction Review Route.[2] These designations can limit reductions to vehicle-carrying capacity and (under the Reduction Review Route designation) subjects proposed reductions to review.

Other Modes

There are four other transportation modes often considered for transportation systems: rail, pipeline, air, and water. Sherwood does not have any designated airports/heliports or navigable waterways. However, it does have rail and pipeline facilities, which are shown in Figure 9.

The rail line in Sherwood is operated by Portland & Western (P&W), a sister company of Willamette & Pacific (W&P) Railroad and a subsidiary of Genesee & Wyoming Incorporated. The line runs northeast-southwest through Sherwood and generally parallels Highway 99W between McMinnville and Tigard. The majority of rail crossings in the Sherwood area are gated, with the exceptions being at-grade (ungated) crossings at Brookman Road and Middleton Road (both located outside the City but within the UGB). Further south of Sherwood, the rail has a grade-separated crossing of Highway 99W.

Northwest Natural operates several high-pressure pipelines that serve Sherwood. These lines run along Elwert Road, Cipole Road, Tualatin-Sherwood Road, and Oregon Street. In addition, Kinder Morgan operates a petroleum gas line (gasoline and diesel) that runs from the Port of Portland to Eugene through the eastern part of Sherwood.

Both BPA and PGE transmission lines are located in Sherwood and generally run northwest from Tonquin Road near Tualatin. These lines cross existing roadways, including Oregon Street south of Tualatin-Sherwood Road and Tualatin-Sherwood Road east of Langer Farms Parkway. The lines constrain future roadway network layout and connections. The lines run through the Tonquin Employment Area and were considered during the concept planning process.

[2] *1999 Oregon Highway Plan*, The Oregon Department of Transportation, May 1999.

Figure 8

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Existing Through Truck Routes

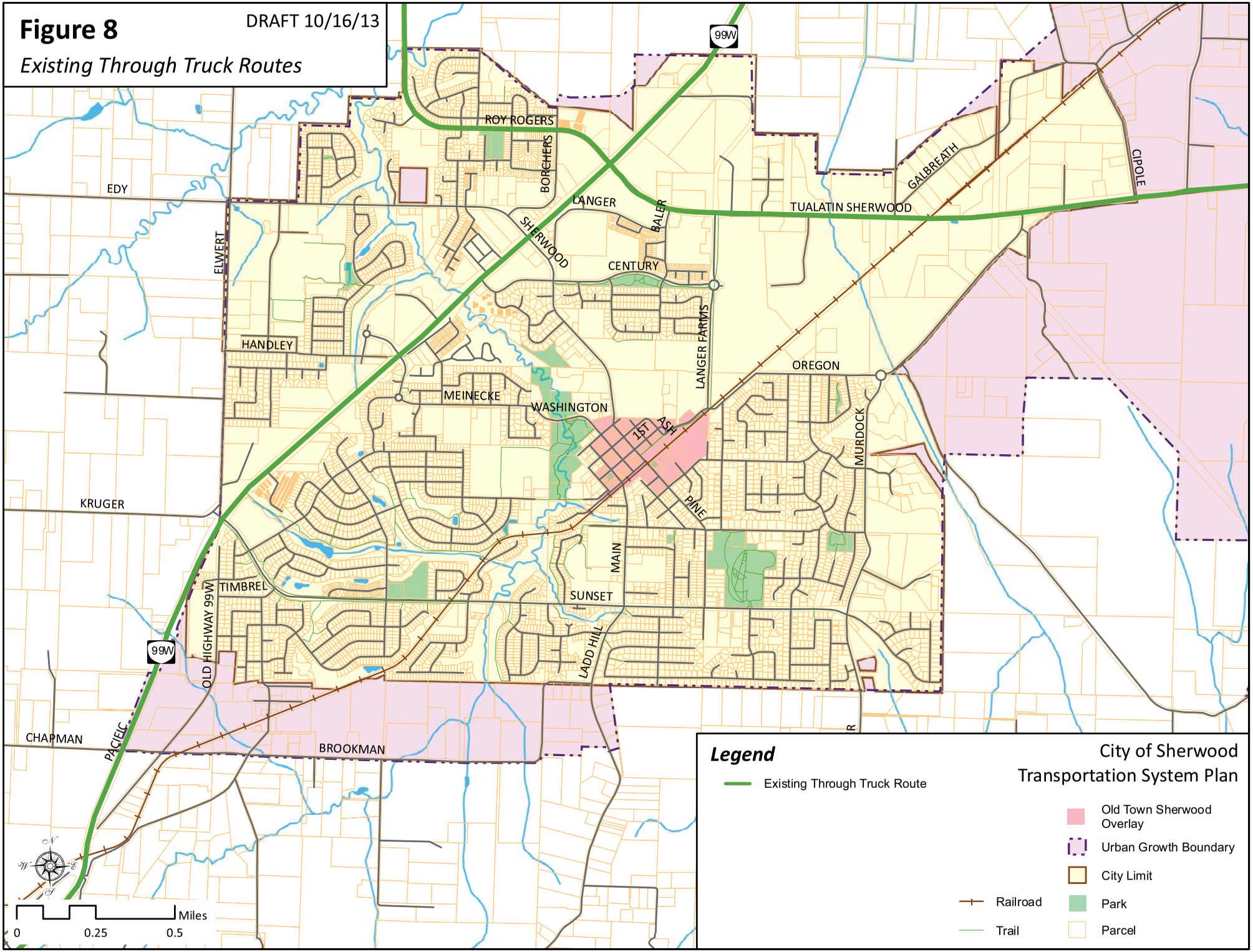

Figure 9

Other Existing Modes

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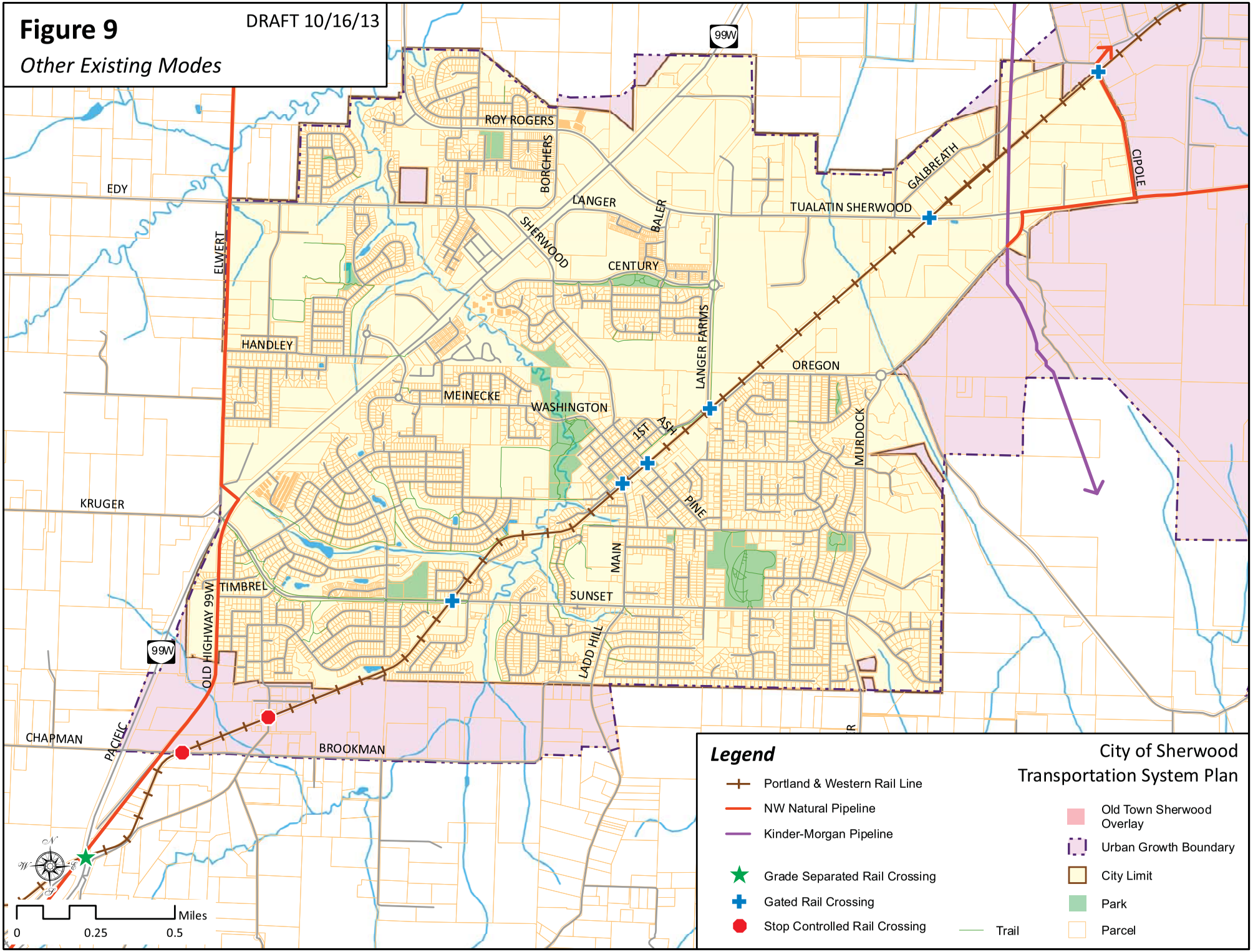


Safety Analysis

A safety analysis of roadways within Sherwood was performed using recent collision data. In addition, the Oregon Department of Transportation (ODOT) and Washington County both have Safety Priority Index Systems (SPIS) that rank locations by collision frequency and severity that were reviewed for the Sherwood area.

Collision Data

Collision data from the past five calendar years (2008 through 2012) was obtained from ODOT and reviewed to identify the location and characteristics of all collisions involving pedestrians or bicyclists. In addition, the data was reviewed for any fatal collisions, but none occurred within Sherwood during this time period. Other auto-auto collisions were separately analyzed for higher incident locations (next section). Figure 10 shows the locations of the pedestrian and bicycle collisions in Sherwood between 2008 and 2012. There were 10 pedestrian-related collisions and 11 bicycle-related collisions. A significant cluster of both types of collisions occurred in the vicinity of the Highway 99W/Sherwood Boulevard intersection. Other general locations including pedestrians or bicycles included the Old Town and area along Sunset Boulevard.

Washington County SPIS

Washington County's Safety Priority Index System (SPIS) prioritizes which intersections are in the greatest need of safety improvements based on three years of collision data. The County's current SPIS list includes collisions that occurred between 2007 and 2009. The SPIS prioritization is derived from factors such as the number of collisions, the type of collisions, the collision severity, and traffic volumes. The collision data only includes those collisions reported to the Oregon Department of Transportation. In addition, the County SPIS list only includes intersections that have at least one county controlled approach and where three or more crashes (or one or more severe injury or fatal crash) occurred at the intersection over the three year period. Sherwood has five intersections on the most recent County SPIS list. Table 1 lists each intersection along with the number of collisions by severity. These locations were further examined in the Collision Trend Analysis section.

Table 1: Washington County SPIS Rankings in Sherwood (2007-2009)

Ranking	Street	Cross Street	Total Collisions	Fatal Collisions	Injury Collisions
29	Highway 99W	Tualatin-Sherwood Rd/Roy Rogers Rd	42	0	21
40	Elwert Rd/ Sunset Blvd	Highway 99W	25	0	11
63	Oregon St	Tualatin-Sherwood Rd	27	0	12
73	Cipole Rd	Tualatin-Sherwood Rd	25	0	11
87	Gerda Ln	Tualatin-Sherwood Rd	10	0	6

ODOT SPIS

The Oregon Department of Transportation (ODOT) also uses a SPIS to identify which state highway sections experience the greatest number and highest severity of collisions. ODOT updates its SPIS list annually based on the most recent three years of collision data. ODOT's most recent SPIS list is from 2012 (calculated using crash data from based on 2009-2011). The 2012 SPIS list identifies the following segments of Highway 99W in Sherwood as being in the top 10% (or higher) locations in the state:

- MP 14.91 to MP 15.09 (Tualatin-Sherwood Road intersection) is a top 5% SPIS location.
- MP 16.61 to MP 16.73 (Elwert Road/Sunset Boulevard intersection) is a top 5% SPIS location
- MP 15.92 to MP 16.01 (Meinecke Road intersection) is a top 10% SPIS location.

The first two locations identified on the ODOT SPIS list were also identified on the Washington County SPIS list. The Highway 99W/Meinecke Road intersection does not include any County roads and so would not have been evaluated by Washington County.

Collision Trend Analysis

Collision trends were analyzed for the six locations identified as ODOT and/or Washington County SPIS locations using ODOT collision records from the past five calendar years (2008 through 2012). Table 2 lists the collision breakdown by type for each of the locations, which all occurred at signalized intersections.

Table 2: Collision Summary of ODOT and Washington County SPIS Locations (2008 to 2012)

Intersection	Total	By Severity		By Type						
		Injury	*PDO**	*Rear-End*	*Turn Mvmt*	*Fixed Object*	*Side-swipe*	*Angle*	*Bike/ Ped*	*Other*
Hwy 99W/Roy Rogers Rd/ Tualatin-Sherwood Rd	81	42	39	56	10	2	6	4	0	3
Tualatin-Sherwood Rd/Cipole Rd	62	36	26	59	1	0	1	0	0	1
Hwy 99W/Elwert Rd/Sunset Blvd	58	33	25	48	6	2	0	2	0	0
Tualatin-Sherwood Rd/Oregon St	47	23	24	33	10	2	1	0	0	1
Tualatin-Sherwood Rd/Gerda Ln	44	30	14	37	3	2	0	0	0	2
Hwy 99W/Meinecke Rd	38	20	18	21	8	6	1	2	0	0
TOTAL COLLISIONS	***330***	***184***	***146***	***254***	***38***	***14***	***9***	***8***	***0***	***7***
Percent of Total	***100%***	***56%***	***44%***	***77%***	***11%***	***4%***	***3%***	***3%***	***0%***	***2%***

*Note: PDO – Property Damage Only

Approximately half of the collisions resulted in injuries at most locations. The exception is the Tualatin-Sherwood Road/Gerda Lane, where more than two-thirds of the collisions resulted in injuries. At all of the intersections, the large majority of collisions were rear-ends, which is common at signalized intersections on high speed/high volume facilities.

A closer review of the six intersections indicated that the major cause of collisions, which primarily applied to the rear-end collisions, was "following too close" (190 collisions or 60%). Other causes included "careless" (29 collisions or 9%), "too fast for conditions" (28 collisions or 8%), and "other improper driving" (25 collisions or 7%). A summary of each location follows.

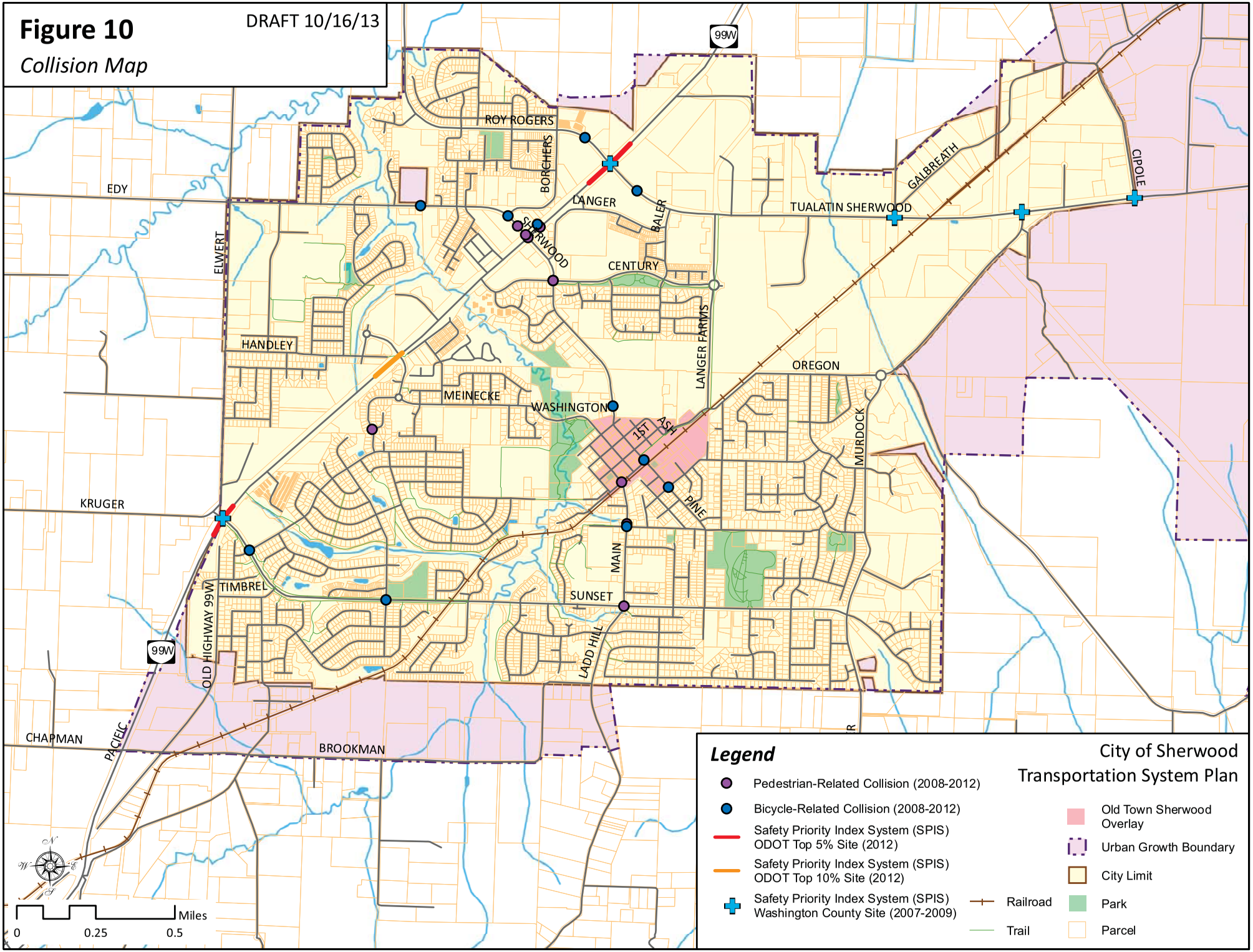
- **Highway 99W/Tualatin-Sherwood Road/Roy Rogers Road:** The majority of the collisions occurred along Highway 99W in either direction and varied in distance from the intersection. This pattern of rear-end collisions is common at signalized intersections on high speed/high volume facilities. In addition, there were a number of collisions on the side street approaches as well. Eight of the ten turning movement collisions occurred on Tualatin-Sherwood Road and involved vehicles turning right to travel north-eastbound on Highway 99W. This indicates a pattern that could be attributed to the yield condition and geometry of the right turn movement. Vehicles starting to turn on the yield movement and then suddenly stopping before entering the highway may cause the following vehicle (that is anticipating that the first vehicle will enter the highway) to collide. The geometry and traffic control for this movement is subject to change with the Washington County improvements that are currently under design. The congestion-related collision patterns at this location (rear-end and misjudged gap-entry) may increase along with future traffic growth.
- **Tualatin-Sherwood Road/Cipole Road:** Nearly all of the collisions occurred on Tualatin-Sherwood Road and slightly more occurred in the eastbound direction (34 collisions) versus the westbound direction (26 collisions). In addition, almost one-third (19 of 62 collisions) involved more than two vehicles, which is a very high proportion of collisions and may indicate sudden breaking, possibly due to unanticipated stopping. The rear-end collision pattern is related to congestion and may be due to the mix of the rural nature of the area with urban levels of congestion. While these crashes may increase in the future along with traffic growth, the pattern also may decrease as the area becomes more urbanized and developed.
- **Highway 99W/Elwert Road/Sunset Boulevard:** Nearly all of the collisions occurred along Highway 99W, with nearly two-thirds occurring in the southbound direction. The collisions varied in distance from the intersection, and the horizontal and vertical curvature in Highway 99W may be a contributing factor. The rural nature of this location may also contribute to driver expectancy issues related to drivers being unprepared to stop. The congestion related collision patterns on Highway 99W could increase along with future traffic growth. However, the crash frequency could decrease as the area becomes more urbanized and drivers anticipate congestion and stopping on the highway.

- **Tualatin-Sherwood Road/Oregon Street:** Compared with the other SPIS intersections, this intersection had proportionally more turning movement collisions (21%), and half of the turning collisions (five of ten collisions) involved a vehicle making the westbound left turn from Tualatin-Sherwood Road onto Oregon Street with most of these occurring during the PM peak hour (four of five collisions). This pattern is likely related to congestion and could be a result of a number of related issues including drivers near the end of queue following other vehicles beyond the protected green indication. In addition, the traffic signal at this location was modified in June 2008 to allow "permitted" (flashing yellow) left turn movements that require the turning vehicle yield to oncoming traffic. Misjudgment of the oncoming vehicle speeds may have contributed to turning movement collisions at this location. Additional growth and traffic volume is likely to increase these congestion-related collision patterns.
- **Tualatin-Sherwood Road/Gerda Lane:** Similar to the Cipole Road intersection, nearly all of the collisions occurred on Tualatin-Sherwood Road. However, the directionality of collisions was reversed and the majority occurred in the westbound direction (27 collisions) instead of the eastbound direction (16 collisions). Just over half of these collisions (14 of 27 collisions) occurred during the midday or p.m. peak periods (11 a.m. to 1 p.m. or 4 p.m. to 6 p.m.), likely due to higher traffic volumes. A traffic signal was installed at this intersection in late December 2010. Two of the turning movement collisions (which are typically more dangerous) occurred before the signal was installed. The third incident, while classified as a turn movement, occurred after the signal was installed and was related to a bus following a vehicle too closely and hitting it while it yielded to a pedestrian in the crosswalk. Therefore, no traditional turn movement collisions (typically made with a vehicle going straight and hitting a conflicting left turning vehicle) occurred after the signal was installed. As is generally typical for other locations, the rate of rear-end collisions at this location increased following the installation of the traffic signal. Only 8 of the 44 collisions occurred during 2008 through 2010, while 36 occurred in the two years (2011 and 2012) following the traffic signal installation. This high incidence of rear-end collisions is likely to increase with future traffic growth along Tualatin-Sherwood Road.
- **Highway 99W/Meinecke Road:** Nearly all of the collisions occurred along Highway 99W and varied in distance from the intersection. Slightly more occurred in the southbound direction (16 of the 27 collisions on Highway 99W). This patterns of rear-end collisions is similar to the trend present at the other SPIS locations. However, this location also includes a higher portion of turn movement collisions. Half of the turn movement collisions involved multiple vehicles making a northbound right from Meinecke onto Highway 99W. These incidents may be related to overly-aggressive drivers similar to the pattern at Highway 99W/Tualatin-Sherwood Road. The third observation present at this location is related to the higher number of fixed object collisions that involve vehicles driving into the ditch. This pattern may be related to drivers misjudging the separated medians at each leg of the intersection, which has a greater separation than other intersections.

Figure 10

Collision Map

DRAFT 10/16/13



Transportation Funding

The City of Sherwood utilizes a number of revenue sources to fund the construction, operation, and maintenance of its transportation system. While transportation funding is commonly viewed as a user fee system (where system users pay for infrastructure through motor vehicle fees such as gas tax, registration fees, or transit fares), much of what the public views as new construction is commonly funded (partially or fully) through property tax levies, traffic impact fees, and required improvements by land development. In addition, a great share of motor vehicle user fees is used for road maintenance, operation, and preservation of the system rather than construction of new system capacity. Sherwood's budget over the last five year period was reviewed to estimate the amount of transportation revenue and expenses that are likely to occur on an annual basis.

Table 3 lists the yearly funding sources Sherwood is expected to have available to meet its transportation system needs. It also lists the City's ongoing transportation-related operational and maintenance expenses. The $1,982,000 yearly revenue is expected to exceed the $1,467,000 of ongoing yearly expenses by $515,000. This amount would be available for capital improvement projects and would provide a total of approximately $11.3 million through year 2035. However, additional construction may be facilitated through project-specific grants, intergovernmental contributions, or other means. Following the table, general descriptions of the City's funding sources and expenses are provided. In addition, potential new transportation system funding sources are identified and discussed.

Table 3: Sherwood's Yearly Transportation System Funding and Expenditures

Revenue and Expenditure Sources	Annual Amount	Use or Restrictions
Revenue		
State Apportionment of Vehicle Taxes	$995,000	Road-related expenditures
Washington County Gas Tax Allocation	$66,000	Road-related expenditures
Street Maintenance Fee	$261,000	Street maintenance only
Street Light Fee	$201,000	Street lights only
City and County SDC and TDT Charges	$250,000*	Capacity improvements only
Misc. Revenue (Operations)	$10,000	
Misc. Revenue (Capital Improvements)	$65,000	
Sidewalk Fee	Temporary	Only a 5-year program
Developer Exactions	Varies	Frontage or off-site improvements based on traffic impacts
Urban Renewal District	Varies	Approved projects within URD boundaries
Total Revenue	**$1,982,000**	
Expenses (Non-Capital)		

Revenue and Expenditure Sources	Annual Amount	Use or Restrictions
Administrative Services / Personnel	$787,000	Paid with tax allotments
Street Lighting (Electricity)	$180,000	Paid by Street Light Fee
Street/Landscape Repair and Maintenance	$500,000	Paid by Street Maintenance Fee
Total Expenses	**$1,467,000**	
Funds Available for Capital Improvements	**$515,000**	

Note: * SDC Estimate to be refined based on future growth assumptions.

Current Funding Sources and Expenditures

The City of Sherwood uses multiple funding sources to pay for the construction, operation, and maintenance of its transportation infrastructure and services. Two key financial policies that guide its funding choices[3] are: (1) the City of Sherwood will identify sustainable revenue levels and, to the extent possible, current operations will be funded by current sustainable revenues and (2) one-time revenues will be used for one-time expenditures or as contributions to reserves and will not be used to pay for established services. In general, the City observes the following practices:

- Improvements driven by new development are principally paid for using transportation system development charges (SDCs) and developer contributions.
- Improvements made to reduce blight and attract development within the City's urban renewal district (URD) are paid for by the district. Approved projects within the URD boundaries expire in year 2021.
- Other improvements undertaken by the City are paid for using a combination of various city funds depending on project components (e.g., streets, sidewalks, lighting, stormwater, etc.), some of which are paid for using a utility fee.
- Pedestrian and bicycle facilities are constructed as part of roadway projects or paid for as park improvements.
- Staff time (i.e., planning, engineering, and other administration) and supply costs are charged to the Streets Operating Fund for time spent working on transportation-related tasks and projects.

State Apportionment of Vehicle Taxes

The State of Oregon Highway Trust Fund collects various taxes and fees on fuel, vehicle licenses, and permits. A portion is paid to cities annually on a per capita basis. By statute, the money may be used for any road-related purpose. Sherwood uses it for street operating needs. Gas taxes are the primary revenue source for the Oregon Highway Trust Fund and are collected as a fixed amount per gallon of

[3] 2013-2014 Adopted Budget, City of Sherwood

gasoline served. Because there is no adjustment for inflation, the buying power of these funds has decreased over time; however, in 2010 the state legislature voted to raise the tax from 24 cents to 30 cents per gallon, which has boosted recent revenues. The State of Oregon has also considered and tested other means of collecting fees based on total miles traveled within the State, rather than on a per-gallon basis.

Washington County Gas Tax Allocation

A portion of the Washington County gas tax is distributed to cities. Sherwood uses its funds to help cover its transportation system operating expenses.

Street Maintenance Fee

The City of Sherwood charges a street maintenance fee to residential and commercial customers on their monthly utility bills. These funds go directly towards regular road repairs (i.e. patching, signage, stripe painting), exercises for longevity (i.e. crack and slurry sealing), and reconditioning (i.e. replacing an entire street). Residential customers are charged a monthly fee of $2.00 per household, while commercial customers are charged $2.00 per equivalent surface unit (ESU) per month.

Street Light Fee

The City of Sherwood charges a street light fee to residential and commercial customers on their monthly utility bills. While Portland General Electric (PGE) performs the work on the lights, the City budgets for routine and irregular maintenance for safety. Residential customers are charged a monthly fee of $2.32 per household, while commercial customers are charge $0.67 per equivalent surface unit (ESU) per month.

Sidewalk Fees

The City of Sherwood currently has two different sidewalk fees that it charges residential and commercial customers on their monthly utility bills. However, both of these fees are part of five-year programs. The first is a "Safe Sidewalks Fee" that is being used to build new sidewalks, especially in the high foot-traffic areas around schools. The "Sidewalk Repair Fee" provides funds to assist homeowners in repairing cracked and broken sidewalks in front of their homes to reduce tripping hazards. These fees were started in Fiscal Year 2012/2013. Since the five-year program is not expected to extend through the TSP horizon year of 2035, these revenues were not included in the average annual revenue for projecting total funds in 2035.

Washington County Transportation Development Tax (TDT)

The County Transportation Development Tax (TDT) is a tax on new development, approved by voters in 2008 to replace the previous tax, known as the Traffic Impact Fee (TIF). The tax is currently being phased in and has one more step increase. The TDT was approved by voters as a tax and as such is not limited by existing state statute in terms of how it is calculated or applied, though it does generally conform to statutory SDC requirements.

The Washington County TDT is levied on all new development based upon the amount of traffic added by the development and can only pay for new infrastructure needed to serve growth. TDT monies collected for development within incorporated cities are distributed back to those cities for their use on street projects in the community. There are limitations to the type of street projects that can be funded by TDT monies, and all projects must be approved by the Washington County Coordinating Committee, which consists of City and County elected officials representing each community. In order to obtain credit for the County's TDT, a project that is being constructed must appear on the County's TDT CIP list and must be built above Sherwood's minimum facility standard. The credit is only applicable for the cost portion above Sherwood's minimum facility standard.

Sherwood System Development Charges (SDCs)

The City's system development charges (SDCs) are assessed on all new residential and commercial construction within the city. These funds can only be used to construct capacity-related transportation improvements or provide a capital recovery element to compensate for existing capacity paid for by current users. The City of Sherwood currently charges $3,011.94 per single-family dwelling unit, which corresponds with one PM peak hour trip. The fee amount changes for other land use types, and the basis for the deriving the fee was the amount of traffic generated by those uses. In order to get credits for the City's SDC fee, an improvement must be to a collector roadway or higher classification and also appear on the City's CIP list.[4] Because of Washington County's TDT, which is remitted to the City when development occurs in city limits, the City's SDC fees are reduced appropriately to avoid double charging developers.

Miscellaneous Revenue

The City of Sherwood receives revenue from minor sources, such as project inspections, interest earnings, and other sales and services.

State/Regional Grants and Program Funds

The City of Sherwood applies for various grant opportunities to fund transportation projects. The City was recently awarded $5 million from Metro for the Cedar Creek Trail through the regional flexible funds program. While the various programs and grants are generally very competitive, they can provide valuable resources and opportunities. Some of these potential grant or program opportunities include Regional Flexible Funds, Enhance and Fix-It, and the Highway Safety Improvement Program (HSIP).

Developer Exactions

Exactions are improvements constructed by developers as conditions of development. Developers are generally required to mitigate traffic impacts, which may include frontage improvements and, in some cases, offsite improvements depending upon their level of traffic generation and the impact to the transportation system.

[4] Memorandum: Clarification of Credits Available for Road Construction, Sherwood Community Development Department, September 11, 2012.

Urban Renewal District

Sherwood's Urban Renewal District (URD), authorized in ORS 457, is a tax-funded district within the city that was formed in 2000 following an extensive public process. The URD is funded with the incremental increases in property taxes that result from construction of applicable improvements. This type of tax increment financing has been used in Oregon since 1960. Uses of the funding include, but are not limited to, transportation projects. Total projected transportation funding over the life of the district is $17.5 million. Approximately $16.5 million of the tax increment financing is assumed in selected street improvement projects identified in the URD and TSP.

Limitations of the District are geographic in nature with the URD covering about 15% of Sherwood. Because of the funding mechanism and its resulting cash flow over time, the City has made use of debt capacity in order to construct needed facilities.

New Funding Sources and Opportunities

The City of Sherwood may consider additional funding sources to ensure it has sufficient funds to construct needed transportation improvements. Transportation program funding options range from local taxes, assessments, and charges to state and federal appropriations, grants, and loans. All of these resources can be constrained based on a variety of factors, including the willingness of local leadership and the electorate to burden citizens and businesses, the availability of local funds to be dedicated or diverted to transportation issues from other competing City programs, and the availability and competitiveness of state and federal funds. Nonetheless, it is important for the City to consider all of its options and understand where its power may exist to provide and enhance funding for its transportation system.

The following funding sources have been used by other cities to fund the capital and maintenance aspects of their transportation programs. There may be means to begin to or further utilize these sources, as described below, to address Sherwood's transportation needs:

- **General Fund Revenues**: At the discretion of the City Council, the City can allocate General Fund revenues to pay for its Transportation program. (General Fund revenues primarily include property, use taxes, and any other miscellaneous taxes and fees imposed by the City.) This allocation is completed as a part of the City's annual budget process, but the funding potential of this approach is constrained by competing community priorities set by the City Council. General Fund resources can fund any aspect of the program, from capital improvements to operations, maintenance, and administration. Additional revenues available from this source to fund new aspects of the Transportation program are only available to the extent that either General Fund revenues are increased or City Council directs and diverts funding from other City programs.
- **Voter-Approved Local Gas Tax**: Communities such as Sandy, Woodburn, and Tillamook have adopted local gas taxes by public vote. In Sandy, the tax is 1 cent per gallon, paid to the City

monthly by distributors of fuel. The process for presenting such a tax to voters will need to be consistent with Oregon State law as well as the laws of the City of Sherwood.

- **Local Improvement District Assessment Revenue**: Subject to voter approval, the City may set up Local Improvement Districts (LIDs) to fund specific capital improvement projects within defined geographic areas, or zones of benefit. LIDs impose assessments on properties within its boundaries. LIDs may not fund ongoing maintenance costs. They require separate accounting, and the assessments collected may only be spent on capital projects within the geographic area. A vote by citizens representing 33% of the assessment can terminate a LID and overturn the planned projects so projects and costs of a LID must meet with broad approval of those within the boundaries of the LID.
- **Direct Appropriations**: The City can seek direct appropriations from the State Legislature and / or U.S. Congress for transportation capital improvements. There may be projects identified in the Plan for which the City may want to pursue these special, one-time appropriations.
- **Special Assessments**: A variety of special assessments are available in Oregon to defray costs of sidewalks, curbs, gutters, street lighting, parking and CBD or commercial zone transportation improvements. These assessments would likely fall within the Measure 50 limitations. A regional example would be the Westside LRT where the local share of funding was voter approved as an addition to property tax.
- **Employment Taxes**: TriMet collects a tax for transit operations in the Portland region through payroll and self employment taxes. Approximately $145 million are collected annually in the Portland region for transit.

Also, while not direct funding sources, debt financing can be used to mitigate the immediate impacts of significant capital improvement projects and spread costs over the useful life of a project. Though interest costs are incurred, the use of debt financing can serve not only as a practical means of funding major improvements, but is also viewed as an equitable funding strategy, spreading the burden of repayment over existing and future customers who will benefit from the projects. The obvious caution in relying on debt service is that a funding source must still be identified to fulfill annual repayment obligations.

- **Voter-Approved General Obligation Bond Proceeds:** Subject to voter approval, the City can issue General Obligation (G.O.) bonds to debt finance capital improvement projects. G.O. bonds are backed by the increased taxing authority of the City, and the annual principal and interest repayment is funded through a new, voter-approved assessment on property city-wide (a property tax increase). Depending on the critical nature of any projects identified in the Transportation Plan, and the willingness of the electorate to accept increased taxation for transportation improvements, voter-approved G.O. bonds may be a feasible funding option for specific projects. Proceeds may not be used for ongoing maintenance.

- **Revenue Bonds:** Revenue bonds are debt instruments secured by rate revenue. In order for the City to issue revenue bonds for transportation projects, it would need to identify a stable source of ongoing rate funding. Interest costs for revenue bonds are slightly higher than for general obligation bonds, due to the perceived stability offered by the "full faith and credit" of a jurisdiction.