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TECHNICAL MEMORANDUM #7

DATE: October 16, 2023

TO: Don Hardy | City of Canby

FROM: Reah Flisakowski, PE; Kevin Chewuk, PTP; Anders Hart; Emily D'Antonio; Eileen Chai | DKS Associates

SUBJECT: City of Canby Transportation System Plan Update
Existing Multimodal Conditions

Project #: 23023-000

This memorandum summarizes the existing multimodal transportation conditions in the City of Canby. This summary includes information on existing facilities for walking, biking, transit, and motor vehicles. Additionally, it includes information on existing intersection operations, congestion, and safety trends. This information will serve as the basis for comparison to expected 2040 conditions outlined in future deliverables during Canby's ongoing Transportation System Plan update process.

FACTORS AFFECTING TRAVEL DECISIONS

Travelers often weigh a variety of factors when deciding how to commute to or from their destination. Whether the trip will be via motor vehicle, walking, bicycle, public transportation, scooter, or other mode, the choice is often a balance between ease and convenience of travel, travel cost, and travel time.

LAND USE AND KEY DESTINATIONS

Land use is a key component of transportation system planning. Where people live and where they go to work, shop, or access services and the distance between these key destinations has a large impact on how they get around and the demands they place on the transportation system.

Many trips also occur between community amenities within the City's planning area, including parks, civic (e.g., schools, libraries, community centers), essential retail and services (e.g., grocery stores, pharmacies), and medical uses. Several amenities are primarily located around Downtown Canby northwest of OR 99E, including the Canby Public Library, City Hall, the Thriftway grocery store, and a variety of bars and restaurants. Other major destinations include Canby High School southwest of Downtown, the Canby Adult Center at the intersection of S 13th Avenue and S Ivy Street, the Clackamas County Fairgrounds northeast of Downtown, and the Fred Meyer grocery store on OR 99E

at Sequoia Parkway. Major employment centers include Downtown and the growing Pioneer Industrial Area near the Fred Meyer supermarket.

Those destined for a park or school generally have a higher likelihood to walk or bicycle than those going to work or shopping. The distance of that destination also plays a role in mode choice. Trips that are shorter generally present a better opportunity to walk or bicycle, and longer distance trips more often are conducive to transit or motor vehicle modes. Residents in the City's planning area who work outside of it (as well as people who work in the City's planning area but live elsewhere) are likely to commute by motor vehicle due to distance and/or lack of adequate facilities. However, some commuters may choose walking, bicycling, or transit if the regional transportation system offers convenient and comfortable walking/biking facilities or transit services between destinations.

QUALITY AND AVAILABILITY OF FACILITIES

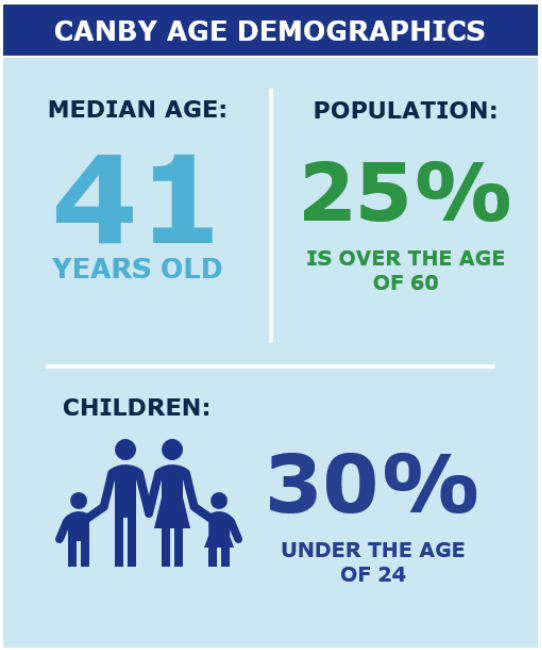
The availability of sidewalks, shared-use paths, curb ramps to provide wheelchair access, crosswalks, and bicycle facilities increases the comfort and access of those walking and biking. The lack of or poor quality of these facilities, particularly along or across higher volume or higher speed roadways, discourages people from utilizing non-motorized vehicle modes of transportation.

For transit, the distance to bus stops, frequency of service, route coverage, connections to other transportation modes, and amenities at stops are some of the factors that play a role in a user's decision to utilize it.

DEMOGRAPHICS

As shown in Table 1, residents of Canby have a median age of 41, with about 63 percent of residents 16 years or older within the civilian labor force. About 17 percent of the population is over the age of 65. Both age demographics are very similar to that of the region and state. There is a slightly larger Under 19 population compared to the county and the state.

The City is home to about 18,000 residents and will continue to see people of all ages and abilities walking, biking, and using transit[1].



[1] https://www.census.gov/quickfacts/fact/table/OR,canbycityoregon/LFE041221

TABLE 1: CANBY DEMOGRAPHICS

AGE	CANBY	CLACKAMAS COUNTY	OREGON
UNDER 19 YEARS	26%	24%	23%
20-24 YEARS	4%	5%	6%
25-44 YEARS	24%	26%	28%
44-59 YEARS	22%	20%	19%
60 YEARS AND OLDER	25%	25%	24%
MEDIAN AGE	40.8	41.6	39.6

ACS 5-Year Estimates (2021) Table S0101

POPULATION AND EMPLOYMENT GROWTH

As growth occurs to the year 2040, the demands on the City's transportation system will be influenced by changes in population, housing, and employment. These changes in travel demands will require better ways to manage the system, more choices for getting around, and targeted improvements to make the system safer and more efficient.

TRAVEL DEMANDS AND CHARACTERISTICS

The number of people who choose to walk, bike, ride transit, or drive along with the distances they travel is important for assessing how well existing transportation facilities serve the needs of users. Available data on travel demand, travel mode choice, and trip length are used to better understand travel behavior in the community and inform the needs analysis for the transportation system. The data presented in this section derives from the US Census Bureau on commuting trips. Future deliverables will include more detailed information on current and projected travel characteristics, such as total trips, mode choice, and trip growth.

DAILY PERSON TRIPS

Table 2 summarizes the total person trips (i.e., drive alone, shared ride, transit, walk, and bike trips) during an average weekday in the Canby planning area for year 2023 based on US Census Data and the 2009 travel demand model used in the previous TSP[2]. The transportation network in the planning area accommodates 15,800 daily person trips. Of these daily person trips in 2015, over 900 were bike, walk, or transit trips. Driving alone (i.e., single-occupant vehicle) is the dominant mode of transportation in Canby.

[2] Estimated from US Census American Community Survey 2021 5-Year Estimates, Table S0801 Commuting Characteristics by Sex. Note that the Census percentages are for workers over 16 commuting to work and are not estimates of total trips. People working from home were excluded from the Census commuting percentages and "taxicab, motorcycle, or other means [of transportation] were combined with "drove alone." These percentages were applied to an estimate of 2023 total person trips based on the 2009 and 2030 estimates of person trips from the travel demand model used to create Canby's current TSP.

TABLE 2: PERSON TRIPS IN CANBY PLANNING AREA

AVERAGE WEEKDAY PERSON TRIPS BY MODE	2023 DAILY PERSON TRIPS	PERCENT
DRIVE ALONE TRIPS (SOV)	13,716	87%
SHARED RIDE TRIPS	1,139	7%
TRANSIT TRIPS	315	2%
WALK TRIPS	543	3%
BIKE TRIPS	88	1%
TOTAL PERSON TRIPS	15,800	100%
TOTAL NON-SOV TRIPS	2,084	
TOTAL BIKE, WALK, TRANSIT TRIPS	946	

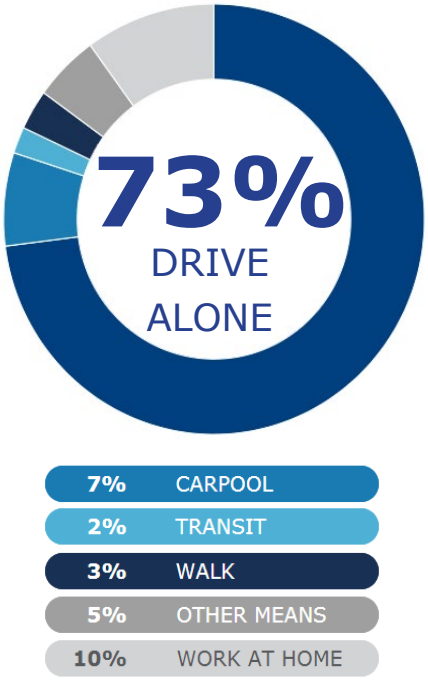
Note: The percentages in this table differ from those below because the percentage of commuters working from home was excluded from the total and "taxicab, motorcycle, or other means [of transportation] was combined with "drove alone."

COMMUTER TRIPS

Much of the traffic in the Canby planning area, especially during the more congested weekday peak periods, is related to employment. Residents in the Canby planning area who are employed predominantly commute to work outside of the planning area (85 percent), while jobs in the planning area are overwhelmingly filled by people who live outside of the planning area (82 percent)[3].

On average, about 73 percent of employed residents in the Canby planning area commute to work using single-occupant motor vehicles. About 7 percent of residents carpool to work and the remaining 20 percent work from home, walk, take transit, or use some other means of travel (see Figure 11).

About ten percent of employed residents in the Canby planning area worked from home according to the 2021 ACS 5-Year Estimates. Any increase in the remote work share will change the demand on streets, including when and how they travel.



Source: US Census Bureau, 2017-2021 American Community Survey

[3] US Census Bureau, OnTheMap. Home/Work Distance/Direction Analysis, 2020.

TRANSPORTATION SYSTEM FACTS

To address changing transportation needs within the City's planning area though 2040, the existing and future travel conditions must be considered. The transportation system review documented the existing pedestrian, bicycle, transit, and motor vehicle infrastructure. It also identified shortfalls and limitations regarding how people can travel within the City (such as lack of bike lanes or sidewalks). Solutions are identified in Chapter 5 for transportation infrastructure that is determined to not maintain acceptable service levels for residents.

STREET NETWORK

KEY STREETS

Major streets within the planning area include:

- OR 99E (ODOT facility), which runs east-west through the center of the city. The road provides a major connection with Clackamas and Portland to the north, and Woodburn and Salem to the south.
- Territorial Road (Canby jurisdiction) runs east-west as a northern border for the city. It connects to OR 99E in the northeast corner of the city's boundary.
- Sequoia Parkway (Canby jurisdiction) which runs north-south connecting the Pioneer Industrial Park to OR 99E.

Key streets that connect to OR 99E and provide access to neighborhoods are Ivy Street, SW 13th Ave, Mulino Road, and Pine Street. Key streets that connect to Territorial Road include Redwood Street, Ivy Street, Maple Street and Township Road.

LOCAL STREET CONNECTIVITY

Connecting the street grid is critical to an efficient, livable transportation network. New street connections distribute traffic and provide more route options. This is important for reducing greenhouse gas emissions and improving emergency responses. Also, a grid of smaller streets and shorter blocks is especially important for making it easier to walk, bike, and get to bus stops.

Most new Local streets will be built by new private development. When a private development project is approved, the builder or developer is required to provide a street network that complies with the current City standards. The connectivity standard in the existing TSP requires streets to be

provided at a minimum spacing of 600 feet in most cases (1,000 feet on arterials). These Local streets occur at more frequent intervals and are spaced closer than the larger streets (i.e., Arterial or Collector streets).

Local street connectivity in the current City limits was reviewed to identify areas that do not comply with the maximum street spacing standard of 600 feet or 1,000 feet on arterials. The major areas lacking connectivity include:

- The Clackamas County Fairgrounds--This large area limits north-south connectivity from NE 4th Avenue and N 10th Avenue and east-west connectivity from N Locust Street.
- Willamette Valley Country Club and Eco City Park--This area does not permit north-south connections from NE Territorial Road and east-west connections from N Maple Street.
- Philander Lee Elementary School--This sports complex restricts north-south and east-west connectivity north and east of SE 13th Avenue and S Ivy Street, including from S Pine Street and SE 10th Street.
- Canby High School--This campus limits local connectivity between SW Berg Parkway and SW 4th Avenue and S Douglas Street/S Elm Street.
- Maple Street Park--This park blocks east-west connectivity from N Oak Street.
- Howard Eccles Elementary School--The campus blocks north-south connections from NW 5th Avenue and east-west connections from N Cedar Street.
- Pioneer Industrial Area--Several blocks in this area are longer than 600 feet and have limited local connectivity. However, the industrial land use of this area tends to require less fine-grained connectivity than residential and commercial areas.

Should new development occur in any of these or other developed areas of the planning area, the connectivity standards should be met.

STREET NETWORK PERFORMANCE ASSESSMENT

Congestion and safety were reviewed for study intersections and streets in the City's planning area. This assessment shows how safe and efficient the street system is and provides information to identify potential improvement needs.

STUDY INTERSECTION OPERATIONS

Table 3 shows current study intersection operations[4], and the Appendix includes detailed Highway Capacity Manual reports for each intersection. Several study intersections experience some congestion during the weekday p.m. peak hours based on the study intersection operations presented in Table 3. These include the OR 99E/Ivy Street (v/c: 0.76) and OR 99E/Pine Street (v/c: 0.77) intersections. However, neither of these intersections has a v/c ratio that exceeds the respective ODOT mobility targets. Future analysis will present expected congestion traffic operations in year 2040.

[4] Count data collected in July 2023.

TABLE 3. EXISTING (2023) TRAFFIC OPERATIONS AT STUDY INTERSECTIONS

INTERSECTION	CONTROL	MOBILITY TARGET	V/C	LOS	DELAY (SEC)
OR 99E & BERG PKWY	Signal	0.90	0.54	C	24
OR 99E & ELM ST	Signal	0.90	0.66	C	23
OR 99E & GRANT ST	Signal	1.0 (STA)	0.55	A	10
OR 99E & IVY ST	Signal	1.0 (STA)	0.76	D	39
OR 99E & PINE ST	Signal	0.90	0.77	C	31
OR 99E & SEQUOIA PKWY	Signal	0.90	0.6	C	33
OR 99E & TERRITORIAL RD	Signal	0.85	0.65	B	16
KNIGHTS BRIDGE RD & N BIRCH ST	Two-way Stop	LOS D	0.43/0.21	A/B	8/14
KNIGHTS BRIDGE RD & N CEDAR ST	Two-way Stop	LOS D	0.15/0.23	A/C	9/16
KNIGHTS BRIDGE RD & N HOLLY ST	Two-way Stop	LOS D	0.10/0.38	A/B	8/15
NW 3RD AVE & N CEDAR ST	Two-way Stop	LOS D	0.03/0.16	A/B	7/10
NW 1ST AVE & N GRANT ST	All-way Stop	LOS D	0.24	A	9
NW 1ST AVE & N IVY ST	All-way Stop	LOS D	0.47	B	12
NE 3RD AVE & NE 4TH AVE	Two-way Stop	LOS D	0.00/0.01	A/A	0/10
NE 4TH AVE & N PINE ST	Two-way Stop	LOS D	0.00/0.18	A/B	0/11
NE TERRITORIAL RD & N HOLLY ST	All-way Stop	LOS D	0.35	B	11
NE TERRITORIAL RD & N REDWOOD ST	Two-way Stop	LOS D	0.21/0.33	A/C	8/19
SE 2ND AVE & S IVY ST	Two-way Stop	LOS D	0.27/0.26	A/B	8/14
S TOWNSHIP RD & S IVY ST	Two-way Stop	LOS D	0.23/0.24	A/C	8/18
SE 13TH AVE & S IVY ST	Signal	LOS D	0.54	B	11
SE 4TH AVE & S REDWOOD ST	Two-way Stop	LOS D	0.07/0.09	A/A	8/10
S TOWNSHIP RD & S REDWOOD ST	All-way Stop	LOS D	0.21	A	9
SEQUOIA PKWY & HAZEL DELL WAY	Signal	LOS D	0.38	C	35
SE 1ST AVE & S WALNUT ST	Two-way Stop	LOS D	0.05/0.02	A/A	8/9
SE 1ST AVE & S MULINO RD	Two-way Stop	LOS D	0.12/0.07	A/A	8/9
SE 4TH AVE & S WALNUT RD	All-way Stop	LOS D	0.16	A	9

INTERSECTION	CONTROL	MOBILITY TARGET	V/C	LOS	DELAY (SEC)
S TOWNSHIP RD & SEQUOIA PKWY	All-way Stop	LOS D	0.28	B	10
S TOWNSHIP RD & S MULINO ST	All-way Stop	LOS D	0.3	A	9
SE 13TH AVE & S MULINO RD	All-way Stop	LOS D	0.12	A	8
SE 13TH AVE & SEQUOIA PKWY	All-way Stop	LOS D	0.2	A	9

STREET NETWORK CONGESTION

This assessment identified locations on the roadway network that operate with some level of congestion under current conditions. These are locations where motorists may experience delays during peak hour travel. This baseline provides a metric for assessing the impacts of new developments on the transportation system.

Figure 1 displays the results of the street network congestion analysis. The displayed conditions are based on the current street network and the mileage calculation is based on the length of the analyzed street segment associated with the point of congestion. The a.m. congestion was assessed at 8:00 a.m. on a typical Wednesday and the p.m. congestion was assessed at 4:30 p.m. on a Wednesday using Google Maps Typical Traffic. As shown, some minor congestion is expected along segments of OR 99E and along the roads that intersect with it near the intersection. There is also some delay along NW 10th Ave and SW 13th Avenue. The road segment with the largest delay is SW 4th Avenue.

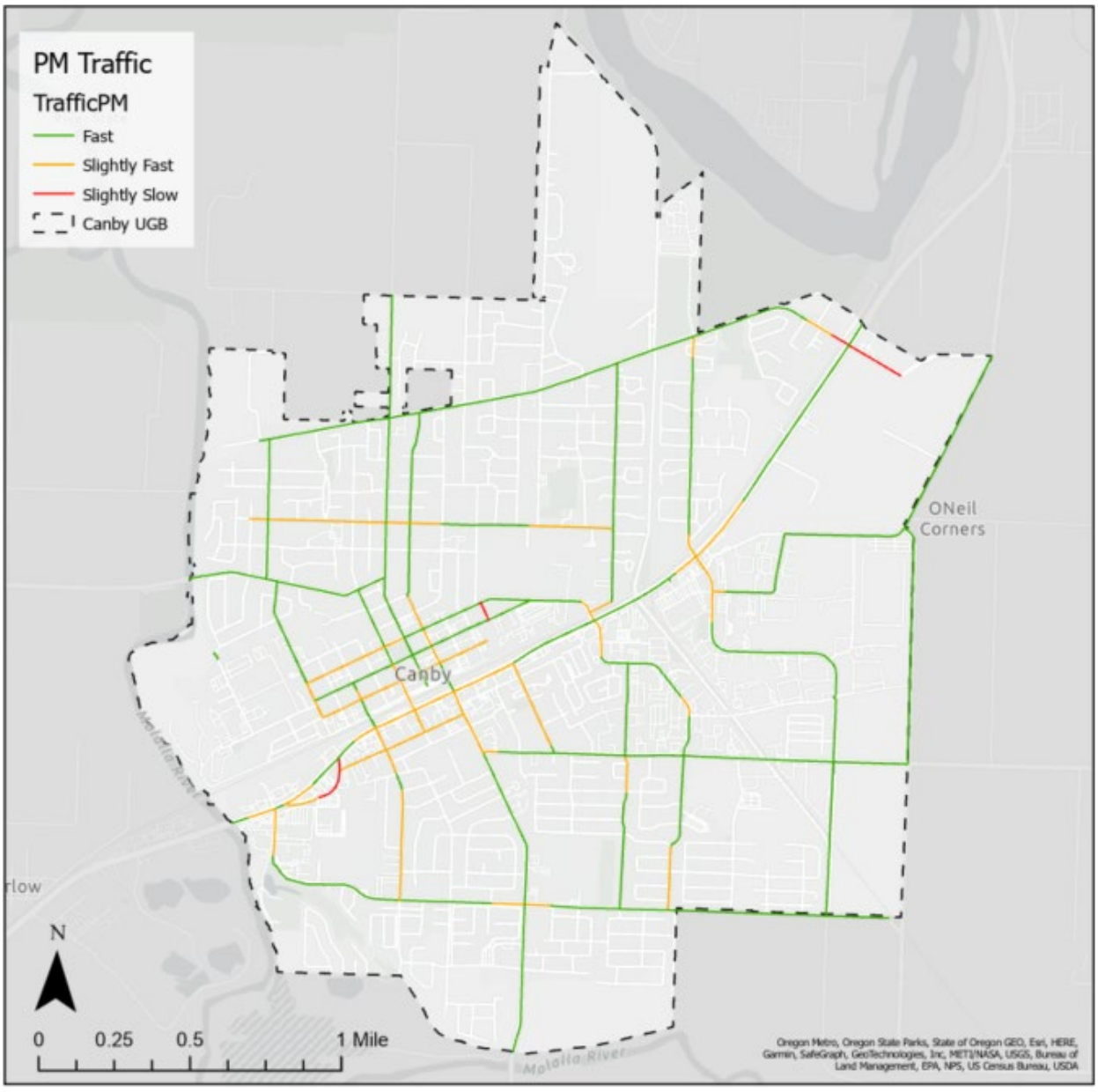


FIGURE 1: STREET NETWORK CONGESTION

STREET NETWORK SAFETY

Figure 2 and Table 4 show data for the 5-year period between 2017 and 2021, with 458 collisions occurring in the City's planning area. Of these collisions, nine involved a pedestrian, eight involved a bicyclist, and 441 involved a vehicle or multiple vehicles. Of the total collisions,

- One fatal injury collision was recorded.
  - During daytime with clear weather, a head-on collision occurred along OR 99E east of downtown Canby between S Locust Street and S Pine Street.
  - The striking driver, sustaining fatal injury, was reported to have physical illness and was suspected of marijuana use. The driver failed to maintain their lane and drove left of center on two-way road, colliding with a stationary vehicle.
- Five collisions with serious injury were recorded.
  - Three collisions occurred along OR 99E.
    - During daytime in rainy conditions, a physically ill driver veered off the roadway and struck a building at the intersection of OR 99E and S Ivy Street (study intersection #4).
    - During daytime with clear weather, an eastbound through driver failed to avoid the vehicle ahead and struck a stationary vehicle near the intersection of OR 99E and S Pine Street (study intersection #5).
    - During nighttime in wet conditions without streetlights, a westbound left turning vehicle was struck by an eastbound through vehicle at the intersection of OR 99E and Sequoia Parkway (study intersection #6).
  - A driver consumed alcohol and drove recklessly, departed the road and struck a fixed object near the intersection of N Maple Street and NE 34th Place during nighttime in wet conditions without streetlights.
  - A distracted driver driving in excess of the posted speed limit failed to yield the right-of-way to a pedestrian at the intersection of NW 3rd Avenue and N Elm Street during nighttime in rainy conditions.

Collision types[5] vary within the City of Canby, but the majority involved turning movement (149, 33 percent), rear-end (124, 27 percent), and angle (71, 15 percent) collisions, as shown in Figure 2.

- 74 percent of the turning movement crashes were due to drivers failing to yield the right-of-way. The remaining turning crashes were mainly due to the driver disregarding traffic signal, performing an improper turn, and distracted driving.
- Almost half of the angle crashes were caused by the driver failing to yield the right-of-way. The rest of angle crashes were mainly caused by drivers passing stop signs or red flashers and disregarding traffic signals.

[5] Collision Type is a one-character alphanumeric code. It refers to the angle or direction of impact between vehicles based on their intended path of travel, or to the type of first impact; Oregon Department of Transportation Crash Analysis and Coding Manual, September 2019.

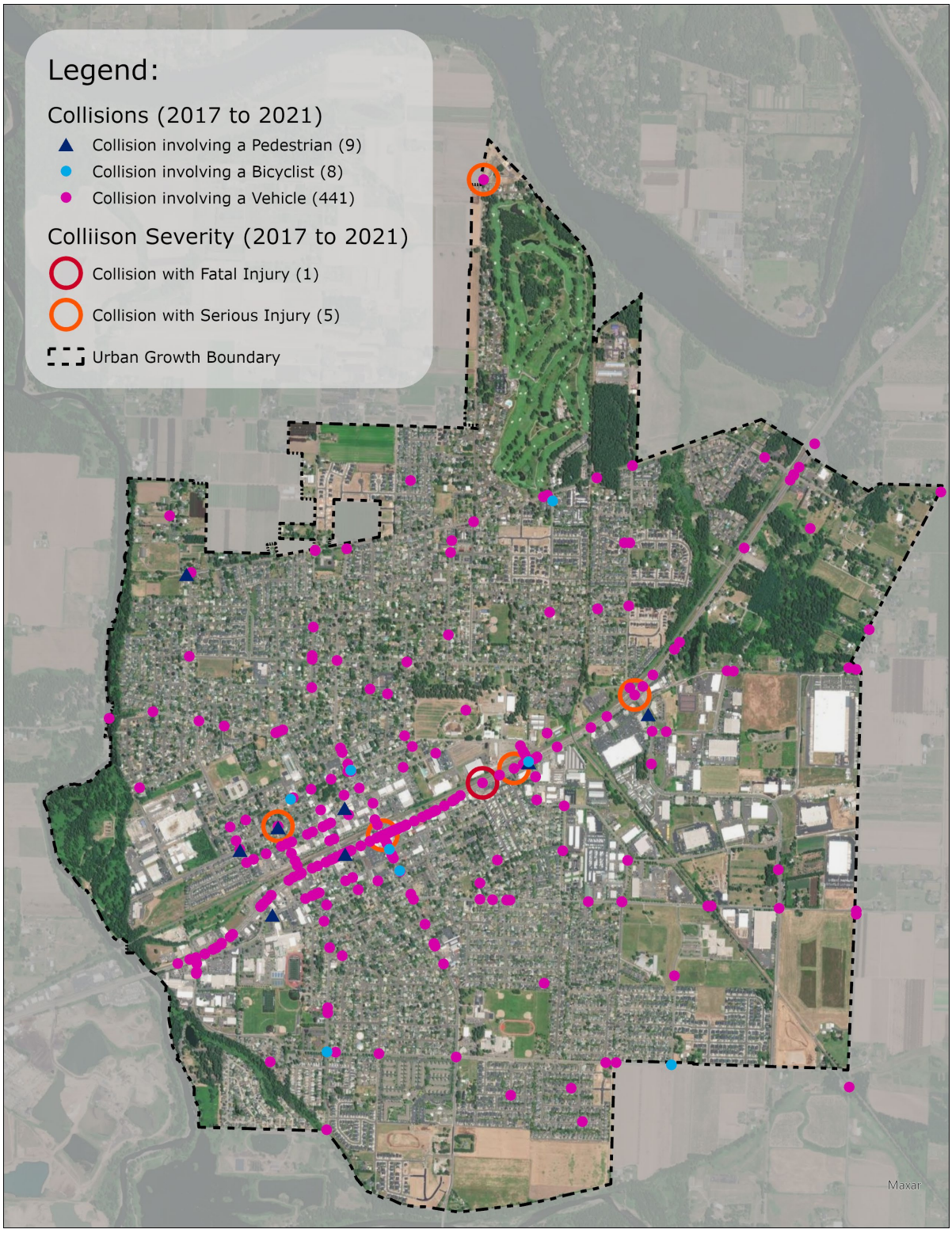


FIGURE 2. STREET NETWORK SAFETY

TABLE 4: SAFETY IN THE CANBY PLANNING AREA

	ALL COLLISIONS	COLLISIONS INVOLVING VEHICLE(S) ONLY	COLLISIONS INVOLVING PEDESTRIANS	COLLISIONS INVOLVING BICYCLISTS
TOTAL COLLISIONS (2017 TO 2021)	458	441	9	8
TOTAL COLLISIONS PER CAPITA*	0.024	0.024	0.0005	0.0004
COLLISIONS WITH FATALITIES	1	1	0	0
TOTAL FATALITIES	*1*	*1*	*0*	*0*
COLLISIONS WITH SIROUS INJURIES	5	3	2	0
TOTAL SIROUS INJURIES	*5*	*3*	*2*	*0*

Source: ODOT Crash Analysis and Reporting Unit. Reported collision data from 2017 to 2032 for the City of Canby planning area.

* Per capita calculations are divided by the 2021 City of Canby population estimate of 18,731 from Portland State 2022 Annual Population Report Tables, https://www.pdx.edu/population-research/population-estimate-reports.

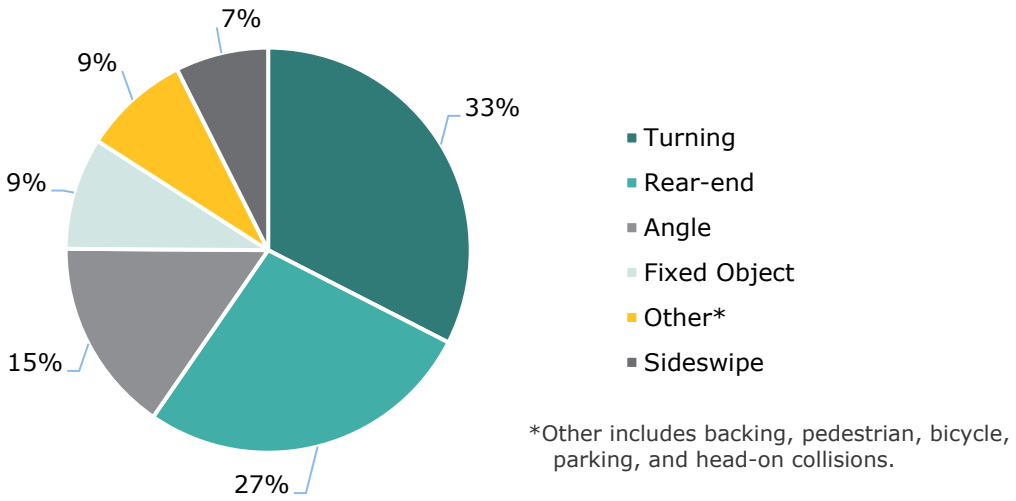


FIGURE 3. COLLISION TYPE WITHIN THE CITY OF CANBY (2017-2021)

Collision Summary at Study Intersections

The most recent five years of available collision data at the study intersections was obtained from ODOT and used to evaluate the collision history[6]. There were 138 crashes recorded at the study intersections over the five-year period (see Table 5), with the most crashes occurring at OR 99E/Ivy Street intersection.

There were no fatalities at the study intersections over the five-year period, although 78 of the crashes resulted in an injury. There were four crashes involving people walking and biking at the study intersection, including two at OR 99E/Pine Street intersection, one at NW 3rd Avenue/N Cedar Street intersection, and one at SE 2nd Avenue/S Ivy Street intersection.

The most common collision types that occurred at the study intersections were turning, rear-end, and angle crashes, with many of these occurring along OR 99E signalized intersections. Many of these crashes were due to drivers failing to yield the right-of-way and disregarding traffic signal. There were 16 turning crashes at OR 99E/S Ivy Street intersection, mainly due to drivers making improper turning movement.

TABLE 5: SUMMARY OF COLLISIONS AT STUDY INTERSECTIONS

STUDY INTERSECTION	TOTAL CRASHES	COLLISION TYPE				COLLISION SEVERITY			COLLISION FLAG	
		TURNING	REAR-END	ANGLE	OTHER	FATAL	INJURY	PDO*	PED	BIKE
OR 99E/BERG PKWY	**13**	8	4	1	0	0	9	4	0	0
OR 99E & ELM ST	**19**	10	6	3	0	0	10	9	0	0
OR 99E & GRANT ST	**9**	0	7	1	1	0	5	4	0	0
OR 99E & IVY ST	**31**	16	7	3	5	0	22	9	0	0
OR 99E & PINE ST	**15**	5	4	3	3	0	9	6	1	1
OR 99E & SEQUOIA PKWY	**9**	2	6	1	0	0	5	4	0	0
OR 99E & TERRITORIAL RD	**8**	4	2	1	1	0	4	4	0	0
KNIGHTS BRIDGE RD & N BIRCH ST	**0**	0	0	0	0	0	0	0	0	0
KNIGHTS BRIDGE RD & N CEDAR ST	**1**	0	1	0	0	0	0	1	0	0
KNIGHTS BRIDGE RD & N HOLLY ST	**0**	0	0	0	0	0	0	0	0	0
NW 3RD AVE & N CEDAR ST	**2**	1	0	0	1	0	1	1	1	0
NW 1ST AVE & N GRANT ST	**1**	0	0	1	0	0	0	1	0	0

[6] ODOT reported collisions for January 1, 2017, through December 31, 2021.

STUDY INTERSECTION	TOTAL CRASHES	COLLISION TYPE				COLLISION SEVERITY			COLLISION FLAG	
		TURNING	REAR -END	ANGLE	OTHER	FATAL	INJURY	PDO *	PED	BIKE
NW 1ST AVE & N IVY ST	**3**	0	0	2	1	0	2	1	0	0
NE 3RD AVE & NE 4TH AVE	**0**	0	0	0	0	0	0	0	0	0
NE 4TH AVE & N PINE ST	**2**	1	1	0	0	0	1	1	0	0
NE TERRITORIAL RD & N HOLLY ST	**2**	2	0	0	0	0	0	2	0	0
NE TERRITORIAL RD & N REDWOOD ST	**1**	1	0	0	0	0	1	0	0	0
SE 2ND AVE & S IVY ST	**2**	0	1	0	1	0	2	0	0	1
S TOWNSHIP RD & S IVY ST	**2**	1	1	0	0	0	1	1	0	0
SE 13TH AVE & S IVY ST	**5**	1	0	4	0	0	0	5	0	0
SE 4TH AVE & S REDWOOD ST	**1**	1	0	0	0	0	1	0	0	0
S TOWNSHIP R & S REDWOOD ST	**2**	0	1	1	0	0	2	0	0	0
SEQUOIA PKWY & HAZEL DELL WY	**6**	2	2	2	0	0	1	5	0	0
SE 1ST AVE & S WALNUT ST	**0**	0	0	0	0	0	0	0	0	0
SE 1ST AVE & S MULINO RD	**0**	0	0	0	0	0	0	0	0	0
SE 4TH AVE & S WALNUT RD	**0**	0	0	0	0	0	0	0	0	0
S TOWNSHIP RD & SEQUOIA PKWY	**1**	1	0	0	0	0	0	1	0	0
S TOWNSHIP RD & S MULINO ST	**2**	0	0	2	0	0	1	1	0	0
SE 13TH AVE & S MULINO RD	**1**	1	0	0	0	0	1	0	0	0
SE 13TH AVE & SEQUOIA PKWY	**0**	0	0	0	0	0	0	0	0	0
TOTAL	**138**	**57**	**43**	**25**	**13**	**0**	**78**	**60**	**2**	**2**

Source: ODOT Crash Analysis and Reporting Unit. Reported collision data from 2017 to 2021.

* PDO = Property Damage Only

Collision Summary at Rail Crossings

In addition, the Union Pacific study rail crossings along the segment between S Elm Street and NE Territorial Road has two reported incidents in the past five years[7], one in 2018 and another in 2022 at S Ivy Street[8] crossing. Both incidents included a train striking a pedestrian and resulting in fatalities. It should be noted that the rail contains two tracks, increasing the risks associated with pedestrian crossing when two trains approach from opposite directions due to the limited visibility. Additionally, pedestrian crossings lack protection, as no gates are provided on the sidewalk to prevent people from crossing when a train is passing.

Pedestrian Safety

There were nine pedestrian-involved crashes over the past five years. Of these crashes,

- Two occurred along OR 99E near S Grant Street (study intersection #3 in the downtown area) and S Pine Street (study intersection #5).
- Two at NW 3rd Avenue and N Elm Street in the downtown area.
- One near NW 3rd Avenue and N Cedar Street (study intersection #11 near the downtown area).
- One along SW 2nd Avenue near S Birch Street.
- One along N Holly Street in between NW 2nd Street and NW 3rd Street.
- One along S Sequoia Parkway near SE 1st Avenue.
- One along NW Territorial Road near N Birch Street.

Pedestrians sustained serious injuries in one crash at NW 3rd Ave/N Elm Street intersection, as discussed under the section introduction. Minor and possible injuries to pedestrians were sustained in the rest of the crashes. Five pedestrian-involved crashes were due to drivers not yielding the right-of-way with other contributing factors including pedestrian illegally in the roadway, driver speeding, driver distracted driving, and other improper driving behavior. Time of day and lighting conditions varied across pedestrian crashes, with four crashes occurring during daylight, four occurring at night, and one occurring at dawn.

The dominant trends observed in the crash data for pedestrian-involved crashes indicate that actions aimed at improving driver yield rates for pedestrians would be valuable in reducing the number of pedestrian-involved crashes. Engineering countermeasures to achieve this include ensuring adequate signing indicating pedestrian crossing locations and state laws on yielding, providing and enhancing lighting at crossings and locations with high pedestrian traffic, modifying traffic signal phasing to reduce pedestrian conflict opportunities, or improving roadside pedestrian visibility.

The data also indicates that actions focusing on motorist behaviors may be effective, including targeted enforcement and education efforts in the downtown area and along OR 99E. These could include actions such as police enforcement of crosswalk laws through staged crossings, or efforts to increase general compliance with red lights and stop signs.

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[7] Crossing Accident Report, U.S. Department of Transportation, Federal Railroad Administration. Reported collision data from 2018 to 2022.

[8] Grade Crossing ID: 760042H

Bicycle Safety

There were eight bicycle-involved crashes over the past five years. Of these crashes:

- One occurred at OR 99E and S Pine Street (study intersection #5).
- Two along S Ivy Street at SE 2nd Avenue (study intersection #18) and SE 3rd Street near the downtown area.
- Two along NW 4th Street at N Fir Street and N Ivy Street.
- Two along SW 13th Street at S Elm Street and S Teakwood Street.
- One along N Pine Street near N Territorial Road.

A cyclist sustained minor injuries in six of the crashes, while possible injuries were sustained in the rest of the crashes. Three of the crashes were due to drivers failing to maintain their lanes, other contributing factors including drivers failing to yield the right-of-way, passing the stop signs, distracted driving, and other improper driving behavior. The vast majority of bicycle crashes occurred during the day.

The dominant trends observed in the crash data for bicycle-involved crashes indicate that actions aimed at improving driver yield rates at intersections, specifically while turning, would be valuable in reducing the number of bicycle-involved crashes. Engineering countermeasures to achieve this include actions to increase the visibility of bicycling and encourage drivers to expect bikes at intersections, such as by providing highly visible space for bicycles and signing. Other engineering approaches include reducing conflict opportunities at intersections, such as through bike boxes or bike-specific signal phasing.

Ensuring a comprehensive bicycle network, including crossing opportunities, can also reduce conflicts between bicycles and motor vehicles. Effective bicycle detection at signals, and an evaluation of stop-controlled intersections along popular biking routes, may promote bicyclist adherence to traffic control devices.

The data also indicates that actions focusing on motorist and bicyclist behaviors may be effective, including targeted enforcement and education efforts in the downtown area and along OR 99E.

Intersection Collision Analysis

The observed crash rate for intersections is a function of the number of crashes and the annual average daily traffic (AADT). Each intersection is grouped into a reference population based on intersection control type and urban or rural area classification. The crash rates (crashes per million entering vehicles) for each intersection were compared to two different standards:

- A critical crash rate compares performance to other similar intersections in the study area, and
- A 90th percentile crash rate which is based on similar intersections throughout the state (obtained from the OSOT's Analysis Procedures Manual Exhibit 4-1).

The full calculations are provided in the Appendix. Table 6 shows these crash rates for study intersections where crashes were reported. Intersections that had observed crash rates greater than either the critical or 90th percentile crash rate were flagged as study focus areas for further consideration.

As shown in Table 6, crash rates calculated at most study intersections are well below this threshold, indicating the frequency of collisions is typical for the volume of traffic served. The exceptions are

the intersections of OR 99E/Ivy Street and NW 3rd Avenue/N Cedar Street intersections. A summary of these intersections is provided below.

- **OR 99E/Ivy Street:** this is a signalized four-leg intersection. Most of the collisions were turning/rear-end type (23 of the 31 total collisions). 12 of the collisions were caused by drivers failing to yield the right-of-way, five were caused by driver disregarding traffic signal, five were caused by drivers failing to avoid other vehicles, four were caused by driver not paying attention, three were due to drivers making improper turns, one was caused by driver being careless, and one related to physically ill driver.
- **NW 3rd Avenue/N Cedar Street:** this is an offset four-leg intersection with stop control of the side street approaches on NW 3rd Avenue. One collision was turning type where the driver was making an improper turn and one collision involved pedestrian where the driver was failing to yield the right-of-way. The intersection serves as a truck route for accessing the industrial area located to the west, which may be a contributing factor.

TABLE 6: STUDY INTERSECTION COLLISION ANALYSIS

STUDY INTERSECTION	TOTAL COLLISIONS	OBSERVED CRASH RATE (PER MEV)	CRITICAL CRASH RATE (PER MEV)	90TH PERCENTILE CRASH RATE (PER MEV)	OVER CRITICAL CRASH RATE
OR 99E & BERG PKWY	**13**	0.28	0.43	0.86	No
OR 99E & ELM ST	**19**	0.38	0.43	0.86	No
OR 99E & GRANT ST	**9**	0.19	0.43	0.86	No
OR 99E & IVY ST	**31**	0.55	0.42	0.86	**Yes**
OR 99E & PINE ST	**15**	0.28	0.42	0.86	No
OR 99E & SEQUOIA PKWY	**9**	0.18	0.43	0.86	No
OR 99E & TERRITORIAL RD	**8**	0.16	0.43	0.86	No
KNIGHTS BRIDGE RD & N BIRCH ST	**0**	0.00	0.22	0.29	No
KNIGHTS BRIDGE RD & N CEDAR ST	**1**	0.08	0.24	0.29	No
KNIGHTS BRIDGE RD & N HOLLY ST	**0**	0.00	0.27	0.29	No
NW 3RD AVE & N CEDAR ST	**2**	0.47	0.65	0.41	**Yes**
NW 1ST AVE & N GRANT ST	**1**	0.14	0.53	0.41	No
NW 1ST AVE & N IVY ST	**3**	0.22	0.42	0.41	No
NE 3RD AVE & NE 4TH AVE	**0**	0.00	0.37	0.29	No
NE 4TH AVE & N PINE ST	**2**	0.21	0.28	0.29	No
NE TERRITORIAL RD & N HOLLY ST	**2**	0.17	0.44	0.41	No

STUDY INTERSECTION	TOTAL COLLISIONS	OBSERVED CRASH RATE (PER MEV)	CRITICAL CRASH RATE (PER MEV)	90TH PERCENTILE CRASH RATE (PER MEV)	OVER CRITICAL CRASH RATE
NE TERRITORIAL RD & N REDWOOD ST	**1**	0.07	0.41	0.41	No
SE 2ND AVE & S IVY ST	**2**	0.12	0.22	0.29	No
S TOWNSHIP RD & S IVY ST	**2**	0.11	0.21	0.29	No
SE 13TH AVE & S IVY ST	**5**	0.24	0.51	0.86	No
SE 4TH AVE & S REDWOOD ST	**1**	0.22	0.40	0.29	No
S TOWNSHIP RD & S REDWOOD ST	**2**	0.25	0.50	0.41	No
SEQUOIA PKWY & HAZEL DELL WAY	**6**	0.34	0.39	0.41	No
SE 1ST AVE & S WALNUT ST	**0**	0.00	0.50	0.29	No
SE 1ST AVE & S MULINO RD	**0**	0.00	0.36	0.29	No
SE 4TH AVE & S WALNUT RD	**0**	0.00	0.51	0.41	No
S TOWNSHIP RD & SEQUOIA PKWY	**1**	0.08	0.43	0.41	No
S TOWNSHIP RD & S MULINO ST	**2**	0.20	0.47	0.41	No
SE 13TH AVE & S MULINO RD	**1**	0.18	0.36	0.29	No
SE 13TH AVE & SEQUOIA PKWY	**0**	0.00	0.30	0.29	No

Excess Proportion of Specific Crash Type Analysis

The excess proportion of specific crash type analysis looks at the proportion of crash types (i.e., rear-end, turning movement, angle, etc.) for each intersection and compares it with the average for the reference population to determine if certain types of crashes are more prevalent than would be expected. A reference population must contain at least five intersections to be valid. In addition, at least two crashes of the same type are necessary to calculate the excess proportion for that intersection[9].

Crash types with an excess proportion greater than 0.1 were flagged as a safety focus area. Table 7 presents only the flagged study intersections and shows that rear-end and angle collisions are the most commonly overrepresented crash type at study intersections. Along OR 99 E, more rear-end collisions were observed than expected at S Berg Parkway and S Ivy Street. More angle collisions were observed at OR 99E and Sequoia Parkway.

[9] Analysis Procedures Manual Version 2, Oregon Department of Transportation

TABLE 7. SUMMARY OF STUDY INTERSECTIONS WITH EXCESS PROPORTION OF SPECIFIC CRASH TYPES (2017-2021)

#	STUDY INTERSECTION	FLAGGED	CRASH TYPE	EXCESS PRPORTION
1	OR 99E & Berg Parkway	Yes	Rear	0.43
4	OR 99E & Ivy Street	Yes	Rear	0.32
6	OR 99E & Sequoia Parkway	Yes	Angle	0.68

Note: The excess proportion of specific crash type analysis looks at the proportion of crash types for each intersection and compares it with the average for the reference population to determine if certain types of crashes are more prevalent than should be expected. For example, an excess proportion of 0.32 means that are 32 percent more observed rear-end crashes than the calculated threshold for four-leg signalized intersections in this population.

Roadway Segment Safety

In addition to individual intersections, segment crash rates along OR 99E between the major study intersections were calculated to complement the intersection-based analysis and provide a more complete picture of roadway safety. Segment crash rates are determined by dividing the number of crashes everywhere on the segment by the total vehicle traffic along the segment and are reported in crashes per million vehicle miles traveled (MVMT). The calculated crash rates were compared against the critical crash rate for other similar segments in the study area. Table 8 presents the segment crash rate results along OR 99E within the study area. Three segments were identified as having high crash rates. All segments are in the downtown area and provide five lanes with a two-way-left-turn lane, with posted speed limit of 35 miles per hour and high frequency of access. The three segments are:

- OR 99E from S Elm Street to S Grant Street: There were 13 reported crashes that occurred along the segment. Out of the 13 crashes, 62 percent involved rear-end collisions and 50 percent of the rear-end crashes were due to driving failing to avoid the vehicle ahead. The rest of the crashes involved turning movement, where driver failing to yield the right-of way when accessing the businesses.
- OR 99E from S Grant Street to S Ivy Street: There were 13 reported crashes along this segment. The majority involved rear-end (54 percent) and turning (31%) collisions, and there was one pedestrian-involved collision. Of the total crashes, 38 percent were attributed to drivers not yielding the right-of-way.
- OR 99E from S Ivy Street to Pine Street: There were 51 reported crashes along this segment. The majority of the crashes involved turning (53 percent), rear-end (24 percent), and sideswipe (14 percent) collisions. 49 percent of the total crashes were caused by drivers failing to yield the right-of-way and 12 percent were caused by driver making an improper lane change.

TABLE 8. SEGMENT CRASH RATE ALONG OR 99E WITHIN THE STUDY AREA (2017 TO 2021)

HIGHWAY (LIMITS)	DISTANCE (MILES)	TOTAL COLLISIONS (2017 TO 2021)	OBSERVED CRASH RATE (PER MVMT)	CRITICAL CRASH RATE (PER MVMT)	OVER CRITICAL CRASH RATE
OR 99E (BERG PKWY TO S ELM ST)	0.42	28	1.55	1.58	No
OR 99E (S ELM ST TO S GRANT ST)	0.13	13	2.33	1.97	**Yes**
OR 99E (S GRANT ST TO S IVY ST)	0.13	13	2.29	1.96	**Yes**
OR 99E (S IVY ST TO PINE ST)	0.51	51	2.29	1.53	**Yes**
OR 99E (PINE ST TO SEQUOIA PKWY)	0.39	6	0.37	1.60	No
OR 99E (TERRITORIAL RD)	0.83	6	0.17	1.45	No

Safety Priority Index System (SPIS) Assessment

The SPIS provides another method for identifying crash hot spots on roadways throughout Oregon. This method considers the rate, frequency, and severity of crashes to produce a rating, with the highest rates sites statewide (often those within the top 10 percent) being considered for potential safety improvements. There were three sites in the top 10 percentile of the SPIS locations for the most recent analysis (2021). The identified locations are listed and discussed below.

- OR 99 E and SW Berg Parkway: This is a signalized four-leg intersection located west of downtown Canby within the industrial zones. There were 13 crashes reported from 2017 to 2021. 62 percent of the total crashes involved turning movement and 31 percent involved rear-end collisions. 50 percent of the turning collisions were caused by drivers disregarding traffic signals. The intersection is flagged under the excess proportion analysis.
- OR 99 E and S Ivy Street: The intersection is in downtown Canby and was flagged as a high crash rate intersection. The discussion at the intersection is discussed in the above section.
- OR 99 E and S Juniper Street: This is a three-leg intersection with stop-control on the side street and located in downtown Canby. The intersection is between the segment of S Ivy Street and S Pine Street along OR 99E, which was flagged as a study focus area from the roadway segment analysis, as discussed in above section.

Summary of Findings

Based on the crash analyses documented above, Table 9 summarizes the several areas within the study area that were flagged as safety focus areas.

TABLE 9. SUMMARY OF STUDY LOCATIONS FLAGGED IN SAFETY EVALUATION

LOCATION	CRITICAL CRASH RATE	EXCESS PROPORTION	SPIS	OTHER KEY FINDINGS
STUDY INTERSECTION				
OR 99E & SW BERG PKWY		x	x	• Excess proportion of rear-end collisions.
OR 99E & S IVY ST	x	x	x	• Excess proportion of rear-end collisions. • Rail crossing west of the intersection involved two pedestrian collisions in fatalities.
OR 99E & SEQUOIA PKWY		x		• Excess proportion of angle collisions.
NW 3RD AVE & N CEDAR ST	x			• Involved one pedestrian collision.
SEGMENT ALONG OR 99E				
S ELM ST TO S GRANT ST	x			
S GRANT ST TO S IVY ST	x			• Involved one pedestrian collision
S IVY ST TO PINE ST	x		x	• SPIS at Juniper Street

Safety improvements will be evaluated within the study area and potential safety countermeasures that may reduce the likelihood of crashes regarding the types and their associated reduction factors[10] are documented in the below sections. The feasibility of these countermeasures will be further refined through further evaluations.

Several locations were flagged as safety focus areas as noted in Table 9. Turning, rear-end, and angle collisions were reported the most within the study area, where rear-end and angle collisions are the most commonly overrepresented crash type at study intersections. Potential safety countermeasures to improve safety at the study intersections and along the OR 99E corridor could include:

- Rear-end collisions were commonly represented along OR 99E at SW Berg Parkway and S Ivy Street.

[10] Crash Reduction Factor List, ODOT.

- Replacing incandescent traffic signal bulbs with light emitting diodes (LEDs) can reduce rear-end collisions by 17 percent.
- Installing actuated or coordinated flashing beacons as advance warning can reduce rear end collisions by 36 percent.
- Providing overhead lane-use signs can reduce rear-end collisions by 10 percent.

- S Ivy Street
  - 52% of the collisions at OR 99E/S Ivy Street intersection involved turning movement. Left-turning traffic calming treatments (e.g., hardened centerline) can reduce left-turning collisions by 10 percent.
  - Installing hinged pedestrian gate skirts on the sidewalks at the rail crossing can reduce descending gate violations by 78 percent and horizontal gate violations by 54 percent[11].
- Angle collisions were commonly represented at OR 99E/Sequoia Parkway. Installing advance warning signs (e.g., signal ahead) can reduce angle collisions by 35 percent.
- Collisions occurred at NW 3rd Street/N Cedar Street involved turning and pedestrian potentially due to limited visibility as an offset intersection and being as a truck route accessing an industrial area.
  - Improving intersection warning (e.g., pavement marking, striping, and signage) can reduce collisions by 20 to 30 percent.
  - Converting the intersection to an all-way stop control can reduce angle collisions by 75 percent.
  - Installing continental crosswalk markings and advance pedestrian warning signs can reduce pedestrian collisions by 15 percent.
- Installing street trees where the speed limit is less than 25 miles per hour to manage driving speed can reduce collisions by 10 percent.
- Restricting left-turning and crossing movements at a few intersections along OR 99E from S Elm Street to Pine Street by making them right-in, right-out access only. This can be accomplished by installing a pork chop island on the minor streets and/or installing raised median in the center-turn lane.

[11] USDOT FRA, Effect of Gate Skirts on Pedestrian Behavior at a Highway-Rail Grade Crossing Final Report, 2013.

WALKING NETWORK

Walking supports healthy lifestyles, is an easy and economical way to travel, and is well suited for people of many ages and abilities. In this plan, "walking" and "pedestrian" are terms that include people who walk independently or use canes, wheelchairs, other walking aids, or strollers. Approximately three percent of commuters in the City walk to work, with two percent utilizing public transportation, which often includes walking at the beginning or end of the trip[12]. In addition to the work commute trips, walking trips are made to and from recreational areas, shopping areas, schools, and other key destinations in the City's planning area. Continuous and direct sidewalk connections to all key destinations and along all streets, in addition to safe crossing opportunities along major roadways, are essential to encourage walking and transit use.

The pedestrian network in the City's planning area, shown in Figure 4, is summarized in the following sections and is composed of sidewalks and pedestrian trails and accessways. An assessment of pedestrian facility gaps is also summarized later in this chapter.

SIDEWALKS

Most sidewalks within the City are five feet and width but range between 4 feet and 8 feet. Sidewalks around major streets like OR 99E tend to be wider than those within residential streets.

TRAILS AND ACCESSWAYS

Trails or accessways can serve both recreational and transportation needs for pedestrians. Most are considered shared-use paths and are well suited for citywide pedestrian and bicycle travel, and others offer only recreational opportunities for pedestrians. They can be separated or adjacent to the streets right-of-way and provide linear park facilities for pedestrian travel. Some trails offer pedestrians shortcuts, enabling them to connect from one street to another, a park, a trail, or a major destination such as a school or shopping area.

https://www.traillink.com/trail-gallery/logging-road-trail/

There are currently about two miles of trails or accessways in the City. The major trail in the City is the Logging Road Trail or Molalla Forest Road trail. The trail is entirely paved and runs from SE 13th Ave to a little north of Territorial Road in Eco Park.

[12] US Census Bureau, 2017-2021 American Community Survey Table S0801

STREET CROSSINGS

Busy streets with fast moving traffic are a barrier to people walking or biking. Enhanced crossings are more than a crosswalk marking on the pavement. They may have traffic signals, flashing beacon systems, refuge islands, or bulb-outs. Table 10 below summarizes the marked crossings of arterial streets in Canby.

TABLE 10: MARKED CROSSINGS OF ARTERIAL STREETS

ARTERIAL	CROSS STREET	LEGS WITH MARKED CROSSING	INTERSECTION CONTROL
OR 99E	BERG PKWY	All	Signalized
	ELM ST	All	Signalized
	GRANT ST	All	Signalized
	IVY ST	All	Signalized
	PINE ST	All except east	Signalized
	SEQUOIA PKWY	All except west	Signalized
	TERRITORIAL RD	All	Signalized
IVY ST	SW 13TH AVE	All	Signalized
	SW 11TH AVE	North	Minor street stop
	SW 6TH PL	North	Minor street stop
	SE TOWNSHIP ROAD	South and East	Minor street stop
	SE 3RD AVE	North	Minor street stop
	NW 1ST AVE	All except south	Minor street stop
	NW 2ND AVE	All	Minor street stop
	NW 3RD AVE	All	Minor street stop
	NW 5TH AVE	All	Minor street stop
GRANT ST	NW 1ST AVE	All	Minor street stop
	NW 2ND AVE	All	All-way stop
	NW 3RD AVE	All	All-way stop
	NW 4TH AVE	All	All-way stop
	NW 5TH AVE	North and east	Minor street stop
	NW 6TH AVE	All (offset intersection)	Minor street stop
	N KNIGHTS BRIDGE RD	East and West	All-way stop
N KNIGHTS BRIDGE RD	N CEDAR ST	South and east	Minor street stop
SW 13TH AVE	S BIRCH CT	South and east	Minor street stop
	S ELM ST	All	All-way stop
	S FIR ST	South and east	Minor street stop

ARTERIAL	CROSS STREET	LEGS WITH MARKED CROSSING	INTERSECTION CONTROL
	S LARCH ST	South and east	Minor street stop
	S LUPINE ST	South and east	Minor street stop
	S PINE ST	All	Minor street stop
	S PONDEROSA ST	South and east	Minor street stop
	SEQUOIA PKWY	North only	All-way stop

The marked crosswalks on OR 99E at Elm, Grant, and Ivy Streets are spaced 700-750 feet apart, while the distance between the Ivy St crossing and the one at Pine St is over half a mile. The distance between that crossing at the one at Sequoia Parkway is about 2000 feet, and the distance between that crossing at the crossing at NE Territorial Road is 0.85 miles. This exceeds the commercial corridor Urban Context Design Guidance from the ODOT Highway Design Manual, which suggests spacing of 500 to 1,000 feet between crossings. These long distances between crossings make it difficult for people walking to traverse OR 99E. This spacing is also greater than the typical distance a pedestrian will walk and could result in out of direction travel for pedestrians wishing to cross OR 99E. The presence of the Union Pacific rail line contributes to the paucity of crossings of OR 99E. Additionally, many of these intersections, especially on OR 99E require people walking to cross long distances due to the width of the roadway. This condition degrades the pedestrian experience and may discourage people from walking.

CURB RAMPS AND ACCESSIBLE DEVICES

Adding curb ramps and accessible devices to intersections or pedestrian crossings helps people with disabilities get around. Curb ramps make it easier for people using walking aids to get off and on a sidewalk. Adding accessible devices to traffic signals or beacons helps people with visual or hearing disabilities know when it is safe to cross the street.

The Americans with Disabilities Act (ADA) governs how we serve people with hearing, vision, and mobility disabilities. Many intersections in older parts of the City lack ADA compliant ramps, which provide important connections between sidewalks, making it easier to cross streets and handle the vertical drop at curbs. However, new curb ramps continue to be installed with recurring maintenance along streets in the City. Many curb ramps are ADA compliant in Downtown Canby, though gaps remain. Outside of Downtown, many locations have ADA-compliant ramps, but not consistently. For example, the intersection of N Locust Street and NE 10th Avenue has ADA-compliant curb ramps on the northwest and southwest corners, but not the northeast and southeast corners, which also lack sidewalks. Another gap exists at the intersection of SE 13th Avenue and S Redwood Street, where there are an ADA-compliant curb ramp on the north corners, but not the southwest corner of the intersection, where the sidewalk on the south side of SE 13th Avenue ends.

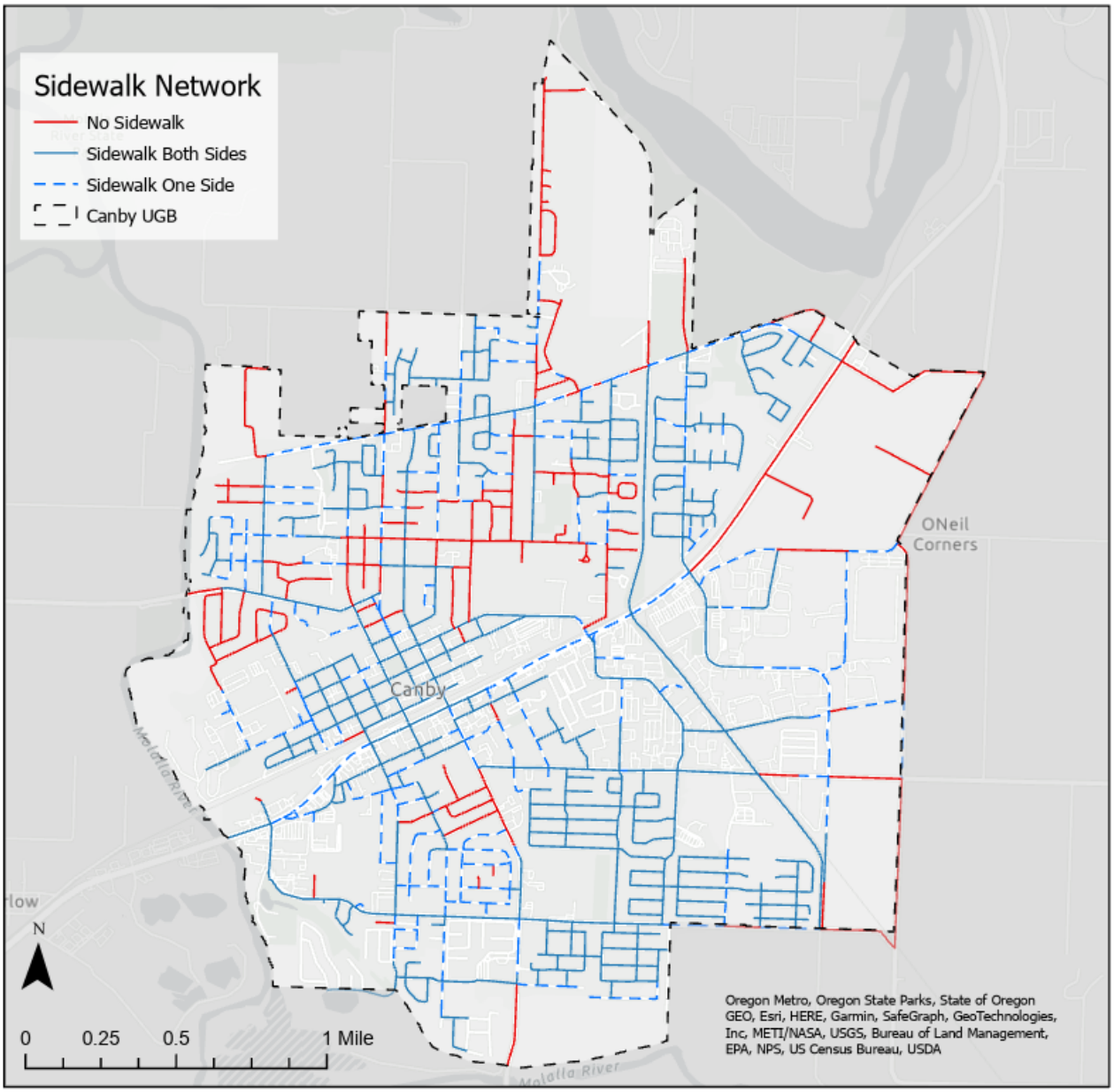


FIGURE 4: SIDEWALK NETWORK

PEDESTRIAN NETWORK PERFORMANCE ASSESSMENT

PEDESTRIAN FACILITY GAPS

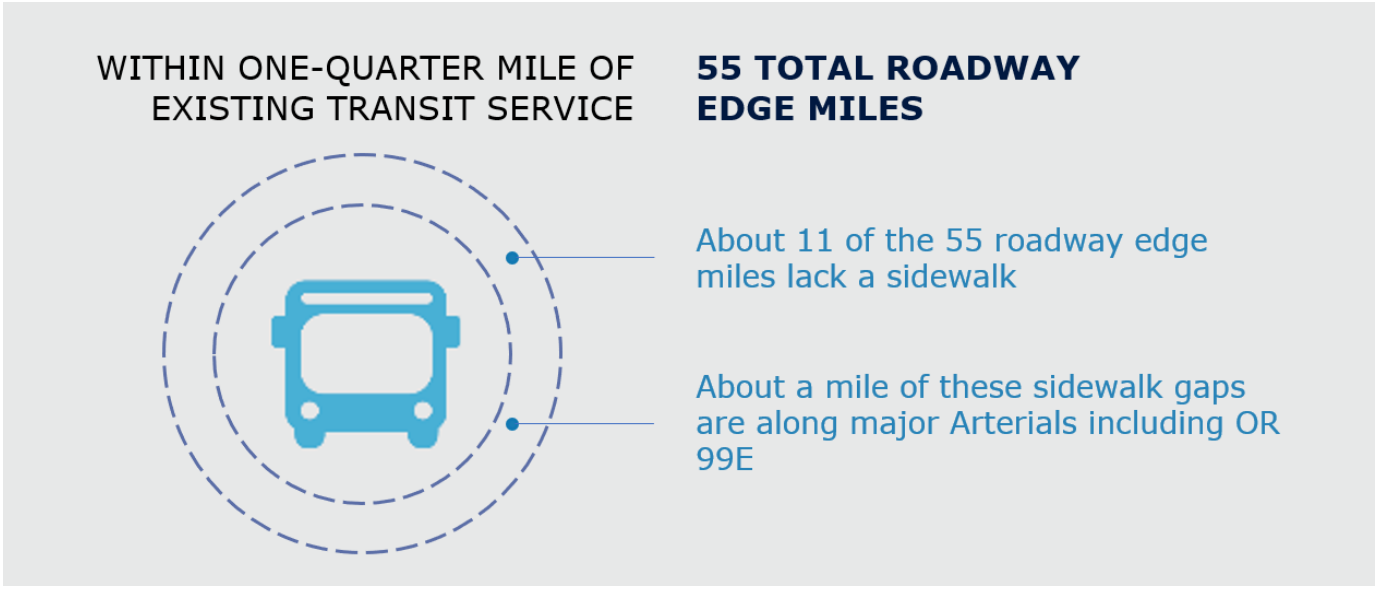
As shown in Figure 4, the pedestrian network is relatively complete within the current City limits. Most new residential developments have a full sidewalk system with relatively few gaps. There are still major gaps in the system where there are sidewalks only on one side of the road or no sidewalks at all. This is more evident in the part of the City north of OR 99E than the area south. There are also gaps in the network near the edges of the boundary especially the eastern boundary of the city along Mulino Road. Critical gaps in the planning area occur along a few segments of OR 99E. Some gaps also occur along low-volume and low-speed local streets throughout the planning area, although in many cases this condition is acceptable, and is less critical than the gaps along the major streets.

A total of 80 miles of street within the Canby UGB were analyzed for sidewalk condition. This included collectors, arterials, and connectors within the boundary. It did not include local and private roads. Of these 80 miles of roadway, 18 miles do not have a sidewalk and around 40 miles have sidewalk only on one side. This analysis assumes all streets should have sidewalks on both sides, but in some cases low volume and speed streets may be suitable without a sidewalk or with a sidewalk on only one side.

Sidewalk Coverage Near Transit

One-quarter mile walking distance is an acceptable distance for gauging a transit stop's walkable area. This distance is based on the distance people are typically willing to walk to transit. Transit access coverage is estimated based on the actual street network surrounding the stops.

The sidewalk gaps are shown in Figure 5. Of the streets within one-quarter mile of existing transit service, about 11 of the total 55 street miles lack a sidewalk (or 20 percent of the street miles). About 1 mile of these sidewalk gaps are along arterial streets, mainly along OR 99E east of Sequoia Parkway as well as a small gap on Ivy Street South of OR 99E. Other gaps in the network exist on the streets to the south of Knights Bridge Road near the western UGB border and along NE 10th Ave. See the Pedestrian Level of Traffic Stress discussion later in this chapter for more information on the condition of these crossings.



Sidewalk Coverage Near Community Amenities

Sidewalk gaps near community amenities were also evaluated, including places of commerce, schools, parks, and libraries (see the Appendix for the location of these destinations). The following analysis is based on a half-mile distance to these destinations.

The analysis study area with a half-mile radius around all mapped community amenities covers much of the sidewalk network within the city. Of the 151 miles of potential sidewalk, there are 33 miles of missing sidewalk. There is a gap in the network near Eccles and William Knight Elementary School as well as Canby Community Preschool due to a lack of sidewalks on local roads as well as NW 10th, N Locust St, and N Grant St.

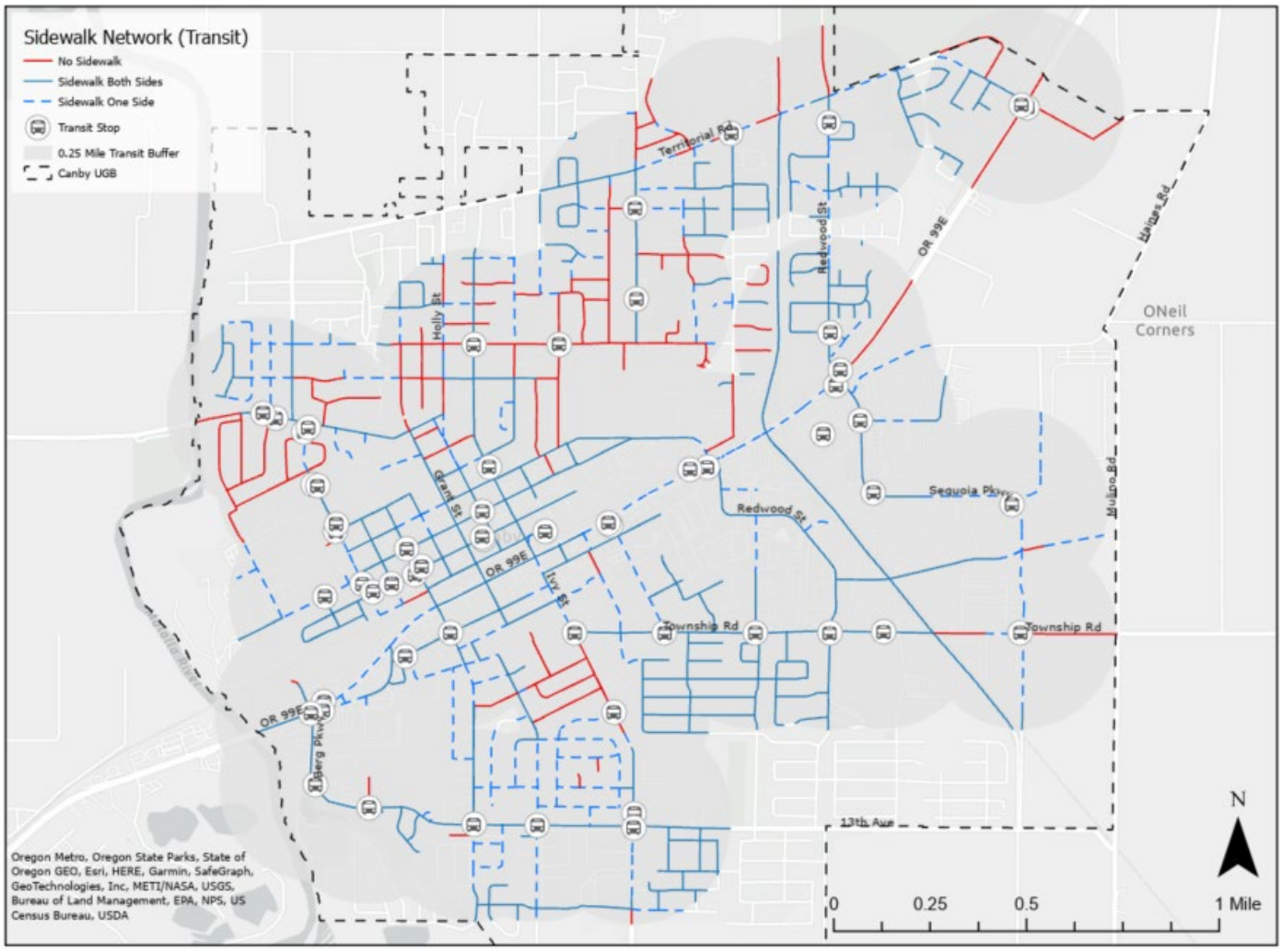


FIGURE 5: SIDEWALK GAPS NEAR TRANSIT LINES AND STOPS

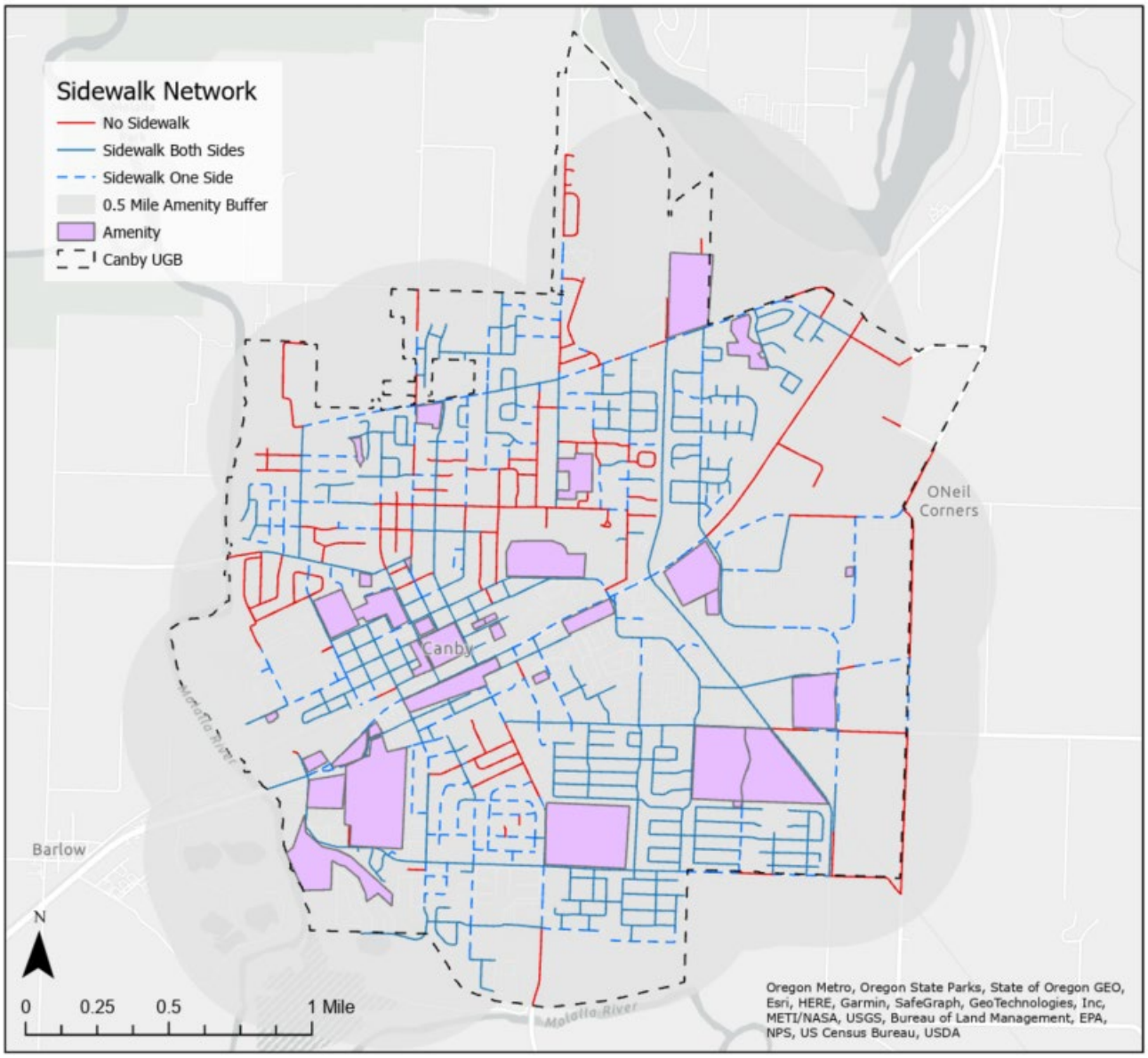


FIGURE 6: SIDEWALK NETWORK NEAR COMMUNITY AMENITIES

PEDESTRIAN LEVEL OF TRAFFIC STRESS

The pedestrian level of traffic stress (LTS) evaluation provides a metric to understand a multimodal user's perception of the safety and comfort of the transportation network. This method was used to understand key gaps and barriers to walking to be addressed through targeted improvements.

The LTS evaluation generates a ranking (i.e., low, moderate, high, or extreme stress) of the relative safety and comfort of a segment or intersection for pedestrians based on roadway and intersection characteristics (e.g., land use context, number of lanes, travel speed and volume, intersection control, type and width of buffer, and the presence and condition of any bicycle or pedestrian facilities). The LTS rating scale recognizes that as vehicle speeds and volumes increase, enhanced pedestrian facilities are needed to maintain a system that is accessible and comfortable for all users.

The results of the pedestrian LTS evaluation are summarized in Figure 7. A pedestrian walking along roughly 83 percent of streets analyzed within the City's planning area will experience a low or moderate level of stress. The analysis includes all arterial and collector streets within the Urban Growth Boundary. This is generally representative of the many low-volume and speed streets that exist in the city. Extreme or high level of stress is experienced along 17 percent of streets, mainly those with the highest speeds and traffic volumes. This includes parts of OR 99E, Mulino Road, and Township Road. These areas are predominantly in the eastern half of the city close to the UGB border.

As redevelopment and frontage improvements occur through 2040, streets will be built to align with the City standards. These standards require high-quality facilities, and an emphasis on safe, convenient, and comfortable travel in alignment with the multimodal level of traffic stress targets to contribute towards a network-wide lower-stress pedestrian experience.

Equally important is the pedestrian experience while crossing streets. These locations are often when a pedestrian experiences some of the highest levels of stress and delay, particularly along major streets with high travel speeds and traffic volumes. This memorandum does not explicityly analyze pedestiran crosssing LTS, but the Street Crossings section above describes the location of marked crossings on arterial streets.

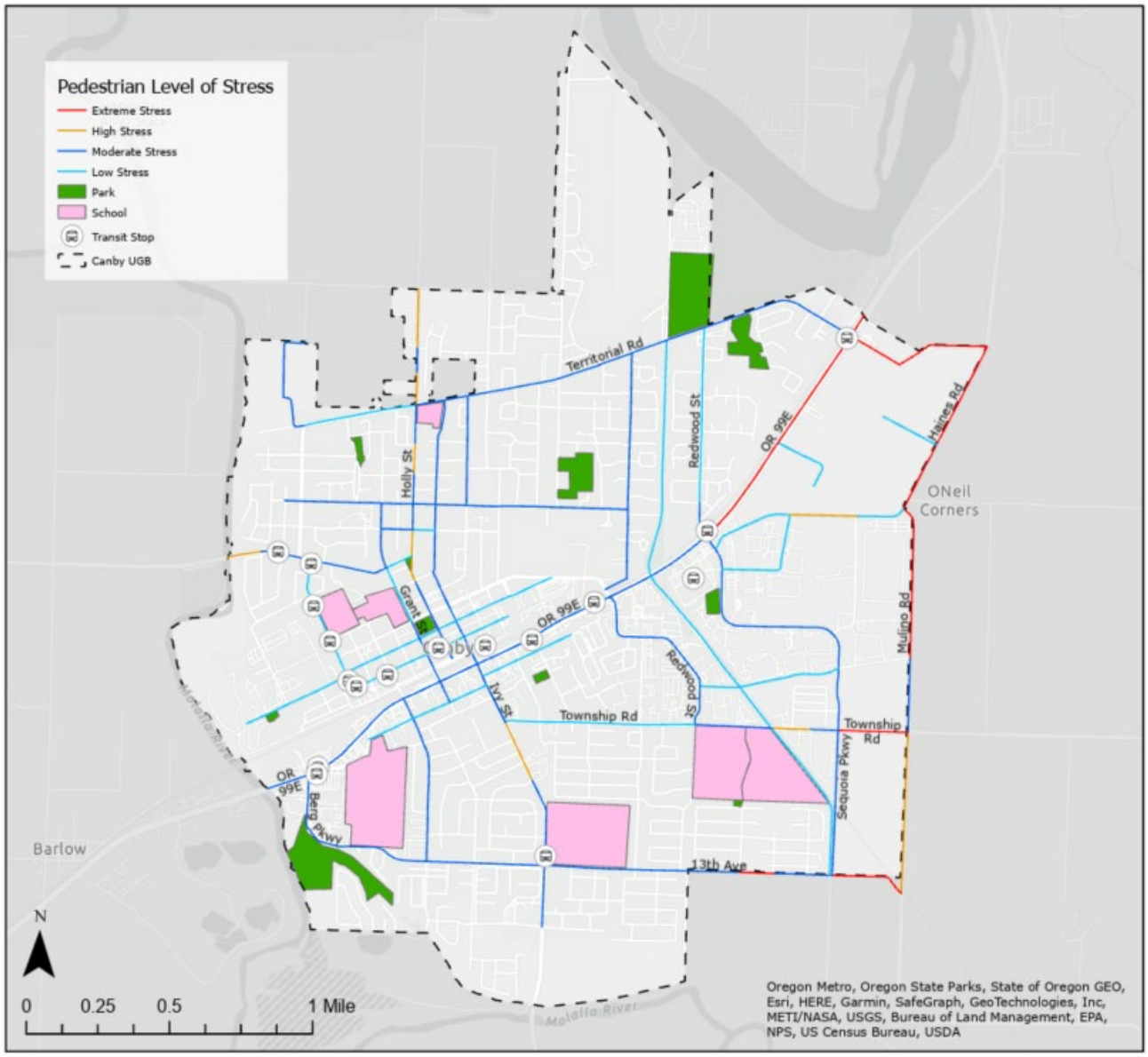


FIGURE 7: PEDESTRIAN LEVEL OF TRAFFIC STRESS

BIKING NETWORK

Bicycling is important for both transportation and recreation in the Canby planning area. This includes people who bike to work and school, recreation, or running errands. Riding bicycles also plays a key role in the transportation system's ability to support healthy and active lifestyles and provide a viable alternative to the automobile. While walking tends to be a competitive choice for trips under half a mile, bicycling tends to be suited for longer trips of three miles or longer. Canby's relatively compact size makes biking a great choice for many trips, with local jobs and housing typically in bikeable proximity.

The bicycle network in the City's planning area, shown in Figure 8, is summarized in the following sections and is composed of bike lanes, roadway shoulders, shared roadways, and bicycle paths.

BIKE FACILITIES

Within the Canby UGB there are around 35 miles of bike lanes. Ivy Street is a major north south corridor for biking within the city. For the east west connectivity there are lanes on Territorial Road, 13th Ave, and Township Rd. There are also portions of bike lane along OR 99E, though there isn't a continuous path on the entire roadway. The majority of lanes in the city range between five and six feet wide and run adjacent to the vehicle travel way. There are two stretches of enhanced bike facilities in the city, one on S Mulino Rd and SE 1st Ave. S Mulino Rd has a bike lane heading southbound with a striped buffer between S Township Road and 4th Ave. SE 1st Ave has a striped buffer lane between S Walnut Rd and S Mulino Rd.

OR 99E has a six-foot eastbound bike lane that begins about 450 feet east of the Logging Forest Road overcrossing. This lane continues to Sequoia Parkway, where it becomes a shoulder bike lane with variable width. The shoulder on the eastbound side of the road continues for a long distance, but striping indicating the presence of a bike lane (the painted cyclist symbol) ends just east of the intersection with Sequoia Parkway. In the westbound direction, OR 99E has shoulders wider than five feet for most of its lengths in Canby, though there is no striping indicating the presence of a bike lane.

The 2023 ODOT Highway Design Manual (HDM)[13] provides standards and guidance for the design of ODOT facilities. The HDM includes design recommendations for cross-section elements, such as sidewalks and travel lanes that vary by land-use context. OR 99E most closely matches the Commercial Corridor context for most of its length in Canby and transitions to the Suburban Fringe context east of Sequoia Parkway/N Redwood Street. Table 11 below presents the HDM recommendations for bicycle facilities for the Commercial Corridor and Suburban Fringe contexts.

TABLE 11: HIGHWAY DESIGN MANUAL RECOMMENDATIONS FOR BICYCLE FACILITIES

DESIGN ELEMENT	COMMERCIAL CORRIDOR WIDTH GUIDANCE	SUBURBAN FRINGE WIDTH GUIDANCE
Separated Bicycle Lane	8 to 7 ft.	Same

[13] https://www.oregon.gov/odot/Engineering/Pages/Hwy-Design-Manual.aspx

DESIGN ELEMENT	COMMERCIAL CORRIDOR WIDTH GUIDANCE	SUBURBAN FRINGE WIDTH GUIDANCE
On-Street Bicycle Lane (not including buffer)	6 to 5 ft.	6 ft.
Bicycle/Street Buffer (preferred for On-Street Lane)	5 to 2 ft.	Same
Right Side Shoulder (if travel lane adjacent to curb)	4 to 0 ft.	6 to 0 ft.
On-Street Parking	N/A	N/A

These widths and facility types do not align with the preferred bike facilities along parts of OR 99E, especially the segment north and east of Sequoia Parkway. The HDM indicates that higher-speed and volume roads require more robust separation of people biking from vehicles. This segment of OR 99E has a posted speed of 45 m.p.h. and average annual traffic volumes over 20,000, so higher levels of separation are appropriate there.

Most local streets in the City's planning area have slow speeds and few vehicles on them. When vehicular volumes and speeds are low, most people feel most comfortable bicycling in the shared roadway as they are able to maintain steady paths and riding speeds with limited pressure to move over for passing motor vehicles. Sometimes signs and pavement markings are added to these routes and the intersections with busy streets may be modified to make them easier to cross (e.g., adding all-way stop control or restricting vehicle movements).

BICYCLE PATHS

The bike network is further knit together by using new and existing shared-use paths and accessways. Shared use paths are well suited for citywide bicycle travel and can be separated or adjacent to the streets right-of-way and provide linear park facilities for bicycle travel. Accessways provide shortcuts for people biking connecting one street to another street, a park, trail, or a major destination, like a school or shopping area. Any shared use path or accessway open to bicycle travel should have at a minimum, paved surface of 10 feet to allow for shared pedestrian and bicycle travel.

There is currently a 2.5-mile paved trail within Canby called the Logging Forest Road. Vehicle traffic is not allowed on that trail.

BICYCLE PARKING

End-of-trip bicycle facilities are a fundamental component of a bicycle network. The lack of safe and secure facilities for either short-term or long-term parking can be an obstacle to promoting bicycle riding. Short-term parking accommodates visitors, customers, and others expecting to depart within two hours. It requires a standard rack, appropriate location and placement, and weather protection. Long-term parking accommodates employees, students, residents, commuters,

and others who park for more than two hours. This parking requires a secure, weather-protected manner and location. Short-term bicycle parking is available at the Canby Cinema, the Canby Library, several intersections in Downtown, the Canby Transit Center, the Fredy Meyer and Safeway grocery stores, and Canby High School. Bicycle parking is required with new multi-family residential, commercial industrial, and institutional development in the City[14].

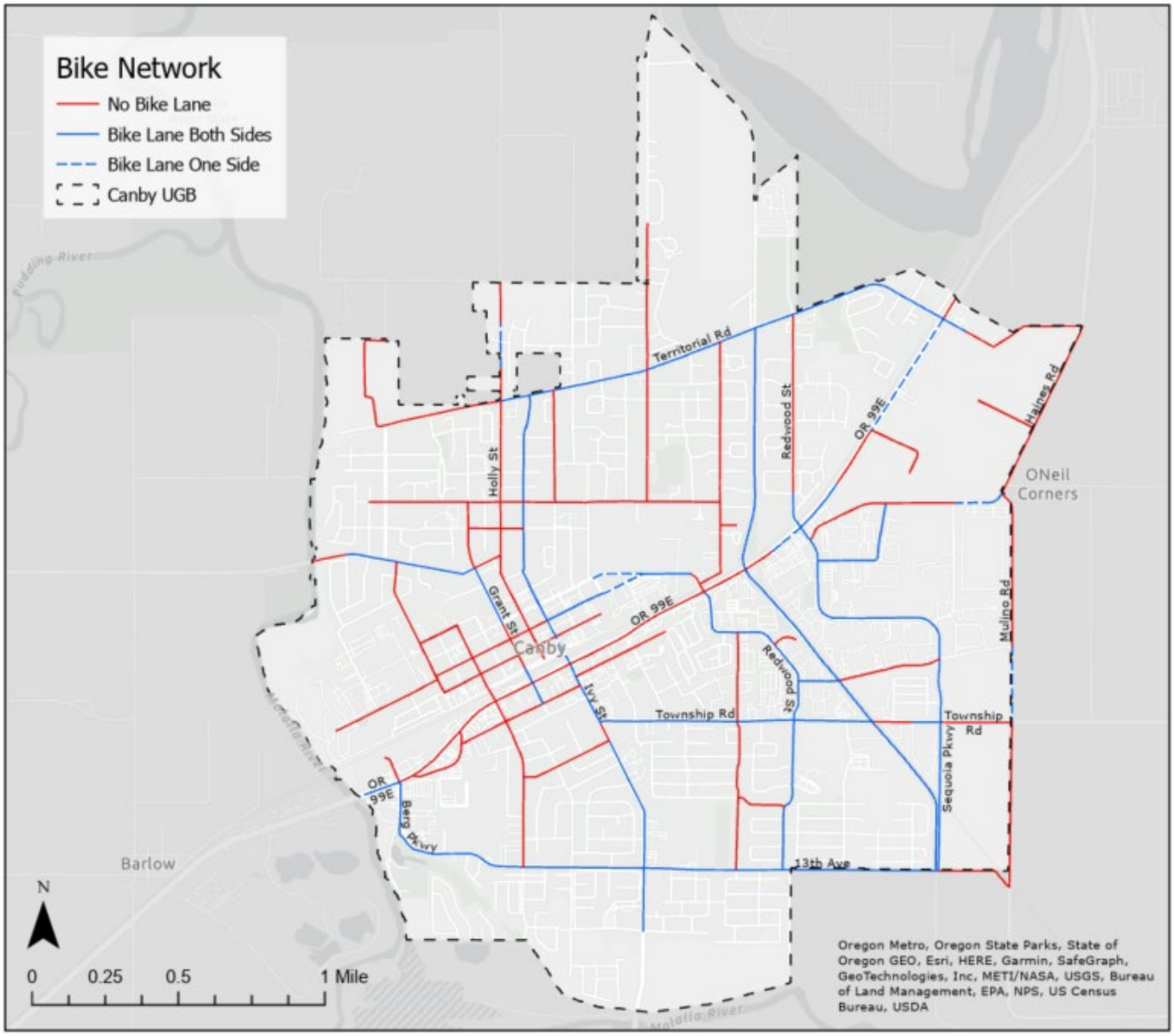


FIGURE 8: BICYCLE FACILITIES

[14] Canby Municipal Code 16.10.100

BICYCLE NETWORK PERFORMANCE ASSESSMENT

BICYCLE FACILITY GAPS

Of the over 50 miles of potential bikeways along major arterials and collectors in the City's planning area today, there are currently 36 miles of lanes, and 8 miles or about 16 percent do not have bike facilities. The northwest part of the planning area (i.e., west of Ivy Street and north of OR 99E) has the lowest share of bikeways complete.

Bicycle Facility Coverage Near Transit

Two to three miles is typically an accepted distance for gauging a transit stop's bikeable area. This distance is loosely based on the amount people who are willing to bike to transit. Given this distance covers most of the City's planning area, a shorter distance of one-half mile was used to identify bicycle facility coverage nearest transit stops. Transit access coverage is estimated based on the same street network previously examined.

Of the streets within one-half mile of existing transit service, about 17 of the total 31 street miles lack any type of bike facility (or 55 percent of the street miles). Most of these gaps are along OR 99E as well as Cedar Street and 2nd Ave. All of these roads contain stretches with no bicycle facilities directly adjacent to transit stops.

Bike Facility Coverage Near Community Amenities

Bike facility gaps near community amenities were also evaluated, including parks, schools, and libraries (see the Appendix for the location of these destinations). The analysis uses a half mile radius around these locations based on the actual street network, though it would be easy for cyclists to travel two or three miles when thinking of a 15-minute bike shed. Similar to the transit analysis, a two- or three-mile buffer would cover the entire bicycle network.

Since the half mile buffer covers the majority of roadways previously analyzed within the UGB, the gaps in the network are the same for community amenities as it is for the entire network (see Figure 10). Major bikeway gaps in regard to access to amenities are near the commercial areas along OR 99E and Eccles and William Knight Elementary Schools.

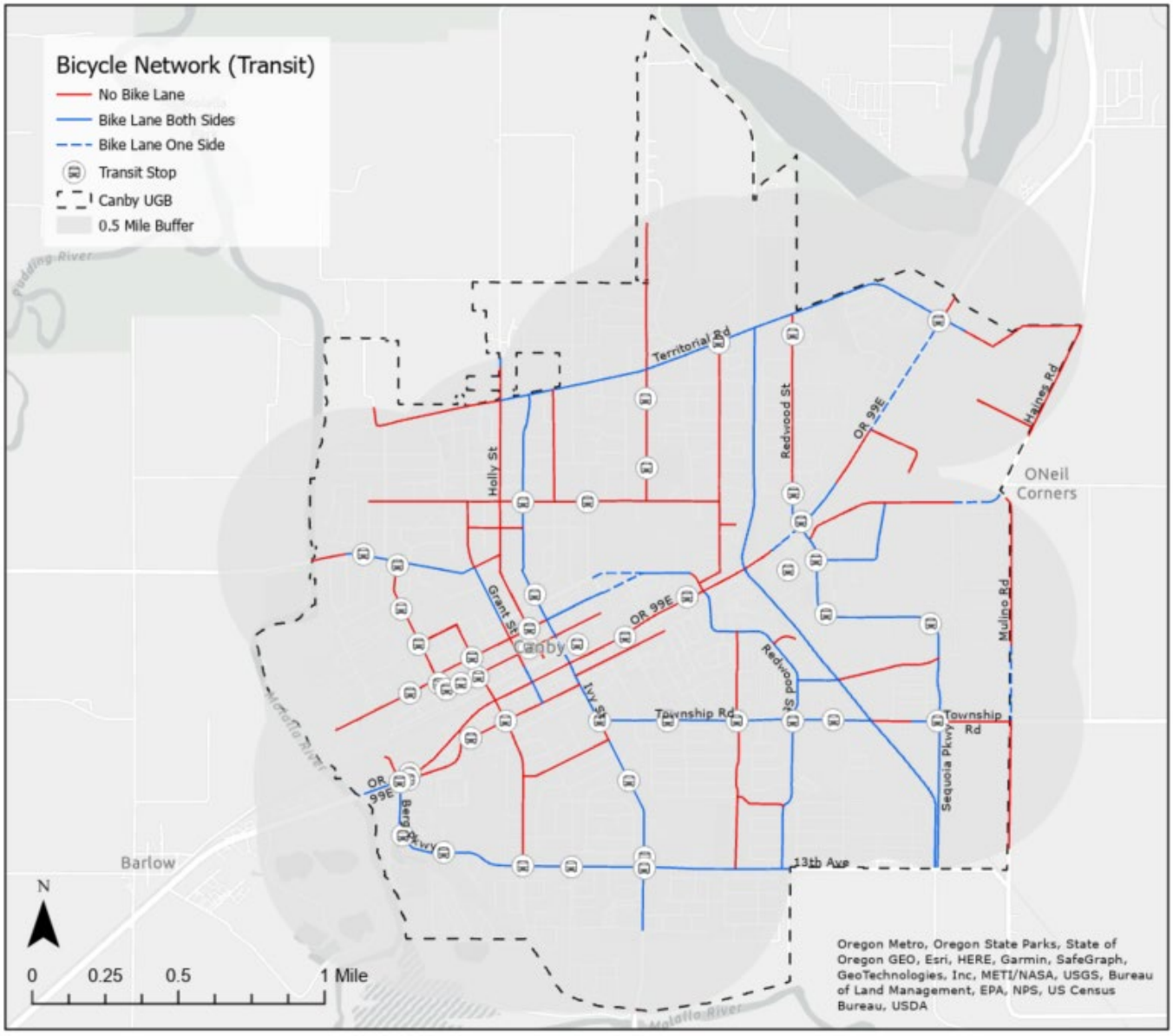


FIGURE 9: BICYCLE FACILITY GAPS NEAR EXISTING TRANSIT

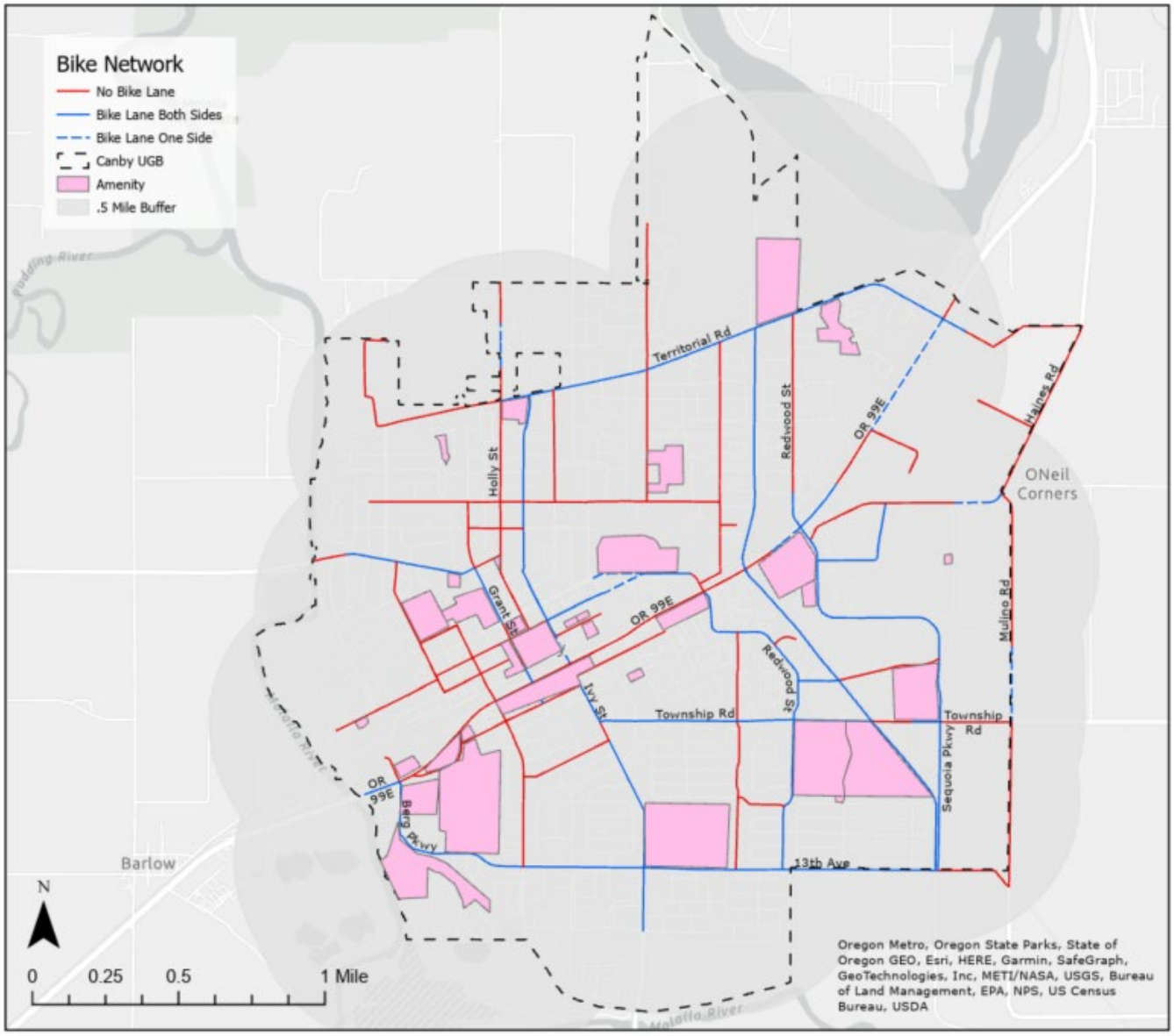


FIGURE 10: BIKE FACILITY GAPS NEAR COMMUNITY AMENITIES

BICYCLE LEVEL OF TRAFFIC STRESS

The bicycle level of traffic stress (LTS) evaluation provides a metric to understand a cyclist's perception of the safety and comfort of the transportation network. This method was used to understand key gaps and barriers to biking to be addressed through targeted improvements.

The LTS evaluation generates a ranking (i.e., low, moderate, high, or extreme stress) of the relative safety and comfort of a segment or intersection for bicyclists based on roadway and intersection characteristics (e.g., land use context, number of lanes, travel speed and volume, intersection control, type and width of buffer, and the presence and condition of any bicycle or

pedestrian facilities). The LTS rating scale recognizes that as vehicle speeds and volumes increase, enhanced bicycle facilities are needed to maintain a system that is accessible and comfortable for all users.

The results of the bicycle LTS evaluation are summarized in Figure 11. A bicyclist riding along roughly 72 percent of the streets analyzed within the City's planning area will experience a low or moderate level of stress. This is representative of the many low-volume and speed local streets, which are reasonably comfortable for bicycling today. In contrast, an extreme or high level of stress is experienced along 28 percent of streets, mainly arterial and collector streets with the highest speeds and traffic volumes. This includes the extent of OR 99E, Haines Road, Mulino Road, Holly Street, and parts of 13th Avenue.

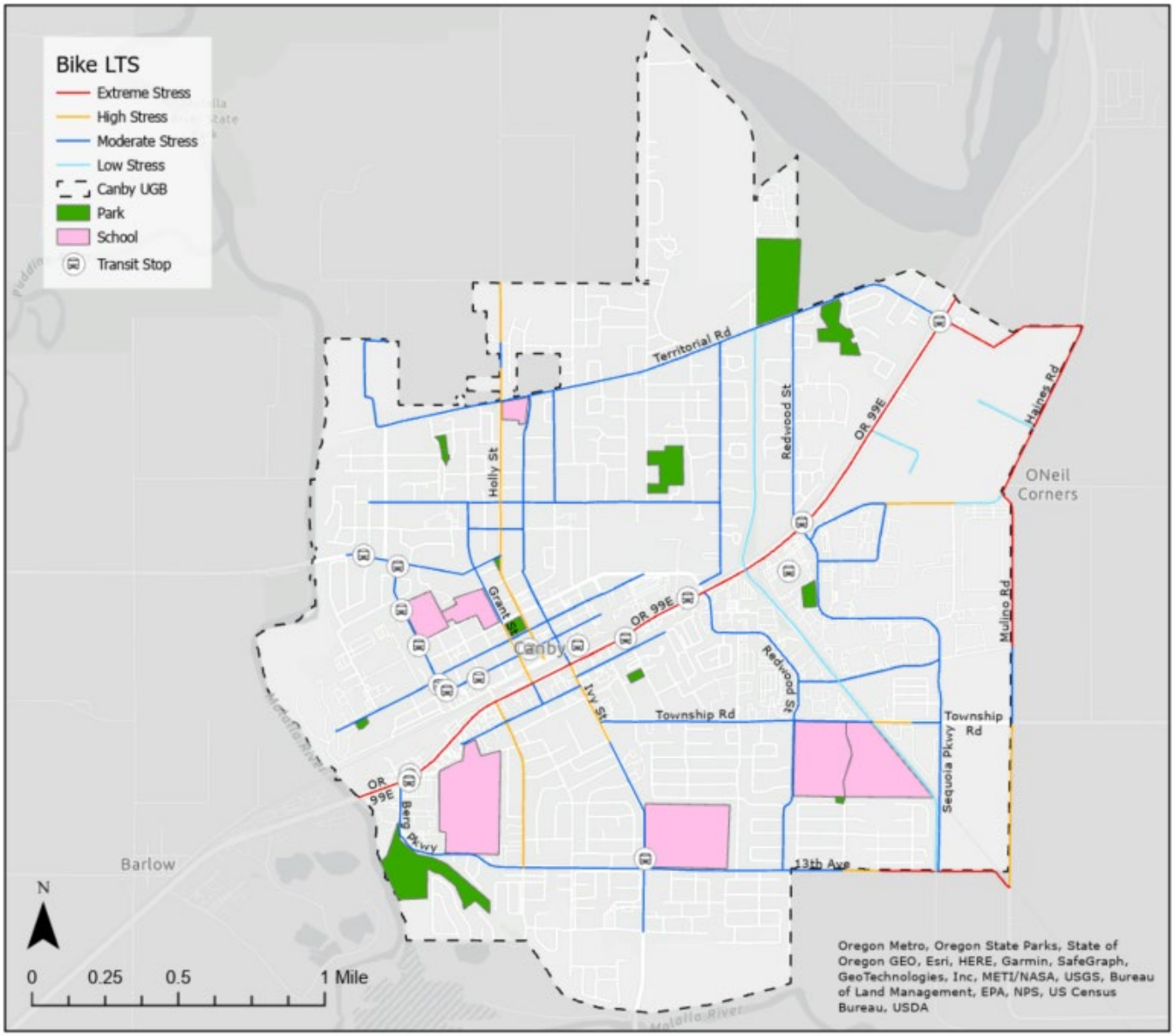


FIGURE 11: BICYCLING LEVEL OF TRAFFIC STRESS

TRANSIT

Canby Area Transit (CAT) provides fixed-route and paratransit service to Canby, while South Clackamas Transportation District (SCTD) and South Metro Area Regional Transit (SMART) provide additional fixed-route bus service as described below. The City's main transit facility is the Canby Transit Center, which is located on NW 1st Avenue between N Grant Street and N Ivy Street.

FIXED BUS ROUTES

CAT operates two fixed-route bus line in Canby. Route 99X, which runs between Oregon City and Woodburn via Canby. Stops in Canby are at:

- OR 99E and SW Berg Parkway
- Canby Transit Center
- OR 99E and S Locust Street
- OR 99E and S Sequoia Parkway
- OR 99E near Haines Road

This route features a Monday-Friday schedule with 45-minute headways between about 5:00 a.m. and 11:00 p.m. and Saturday service with 60-minute headways between 8:00 a.m. and about 6:00 p.m.

CAT's other fixed-route bus line is the Canby Loop, which is free to ride. The service operates Monday-Saturday as of Fall 2023 and includes 32 stops throughout Canby. The line operates Monday through Friday, 6:00 a.m. to 7:41 p.m., and on Saturday, 8:00 a.m. to 9:46 p.m. The Canby Loop service is funded from a combination of state grants and financial support from local businesses. Figure 12 shows the existing CAT bus stops and routes in Canby.

South Clackamas Transportation District also operates its Molalla to Canby route between those two cities, with stops in Canby at the Canby Transit Center and the Canby Market/Fred Meyer on Sequoia Parkway. This route runs between 6:30 a.m. and 6:15 p.m. on weekdays with 60-minute headways[15].

South Metro Area Regional Transit (SMART)'s 3x line connects Canby with Wilsonville. This route has stops at the Canby Transit Center and the N Cedar St and NW 2nd Avenue intersection near Downtown Canby. Service on this line is Monday-Friday between 5:30 a.m. and 6:54 p.m., with 30- to 66-minute headways[16].

[15] https://www.sctd.org/canby

[16] https://www.ridesmart.com/transit/page/3x-canby

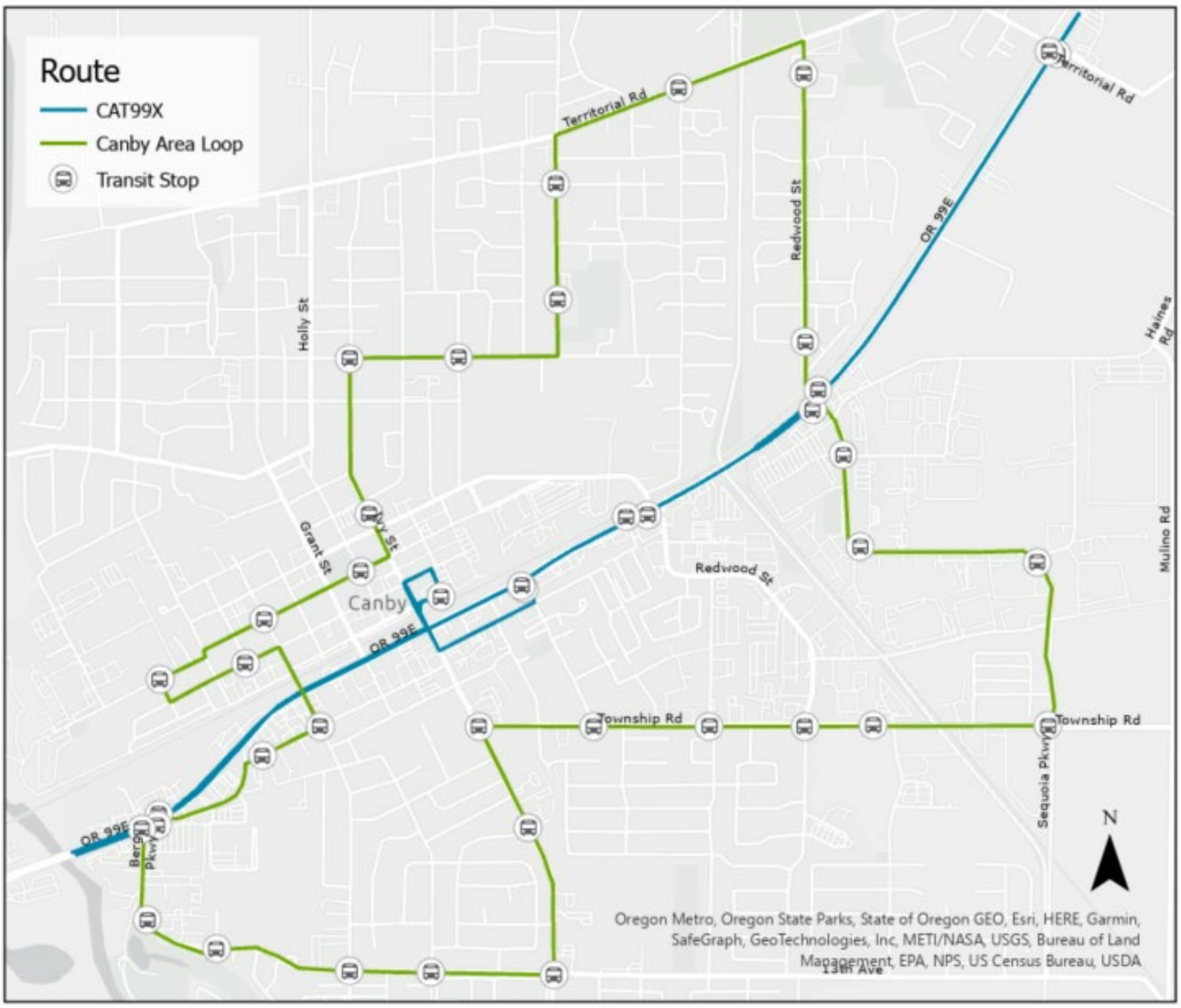


FIGURE 12: CANBY AREA LOOP AND 99X ROUTE MAP

PARATRANSIT SERVICE

CAT provides two options for curb-to-curb paratransit service[17]:

- **Complementary Paratransit (CPS)** provides Dial-A-Ride service for those with special needs who are unable to access fixed route service. CPS is a service provided in compliance with the 1990 Americans with Disabilities Act (ADA). The service operates 5:00 a.m. to 8:00 p.m., Monday through Friday and 8:00 a.m. to 6:30 p.m. on Saturday. The trip fare is $1.00 on weekdays and free on Saturday. Travel is limited to destinations within the Canby Urban Growth Boundary and for select purposes to Oregon City.

[17] https://www.canbyoregon.gov/area-transit/page/dial-ride

- **General Public (GP) Dial-a-Ride** offers limited service to anyone traveling within the Canby Urban Growth Boundary. The service operates between 8:00 a.m. to 6:00 p.m., Monday through Saturday on a first-come, first-served and space-available basis. The trip fare is $1.00 on weekdays and free on Saturdays. The General Public Dial-A-Ride service is designed to utilize unused capacity on the federally required Complementary Paratransit Service (CPS).

ACCESS TO TRANSIT

The TSP prioritizes transit access and identifies the percent of households within 1/4 mile of the bus stops along the Canby Area Transit routes (99X & Canby Loop) and areas of the planning area within 1/4 mile of the South Clackamas Transportation District and South Metro Area Regional Transit Route's as well. Figure 13 displays this analysis. Currently, about 73 percent of the total households in the planning area have access to one of these routes. Households that lack access are close to the UGB border in the northwestern portion of the planning area and the southeastern portion of the planning area. About 65 percent of households in the current City limits have access to Canby Area Transit Routes. Households west of Grant Street and north of NW 6th Ave lack access as well as households east of Pine Street and south of SE 10th Ave.

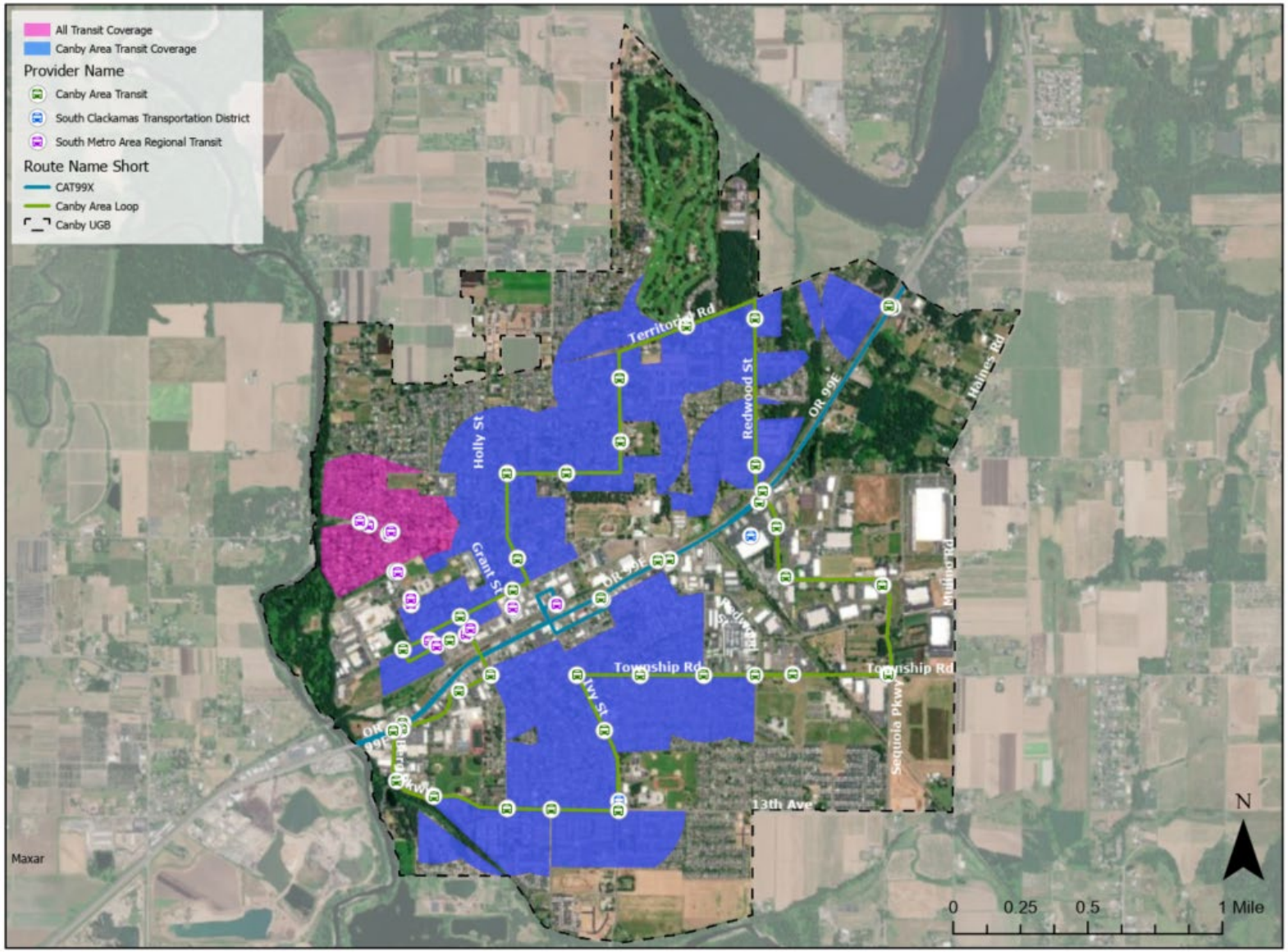


FIGURE 13: TRANSIT ACCESS FOR EXISTING TRANSIT ROUTES

RAIL NETWORK AND CROSSINGS

There are two rail lines in Canby: Union Pacific railroad tracks parallel OR 99E and the Oregon Pacific Railroad line that run southeast-northwest through Canby parallel to the Logging Road Trail. At-grade crossings of the Union Pacific line are at N Elm Street, N Grant Street, N Ivy Street, N Pine Street, N Redwood Street, and NE Territorial Road. The Oregon Pacific tracks have an at-grade crossing of OR 99E about 750 feet northeast of the OR 99E-NE Pine Street intersection and SE Township Road. All of these crossings have lights and gates that activate when trains approach, and some have additional overhead warning lights (see Table 12 for details). These crossings do not have physical barriers providing protection for people walking and biking on sidewalks and bike lanes.

Details on the rail crossings in Canby intersections are summarized in Table 12. The Union Pacific crossings typically see about 15 daily train movements[18], including 9 freight trains and 6 passenger trains each day. Half of the train movements occur during the day between 6 a.m. and 6 p.m. with the remainder occurring in the evening and night between 6 p.m. and 6 a.m. The crossings on the Oregon Pacific line typically see fewer crossings. Until recently, there was a second crossing of the Oregon Pacific Line on OR 99E, just east of the Logging Road Trail, but it has been removed as of 2023.

The long train lengths block the at-grade road, pedestrian, and bikeway crossings at times during the day, making it difficult for people to get around them and creating long delays for people. This blockage creates a barrier between the northern and southern sides of Canby, especially because there are no grade-separated crossings of the Union Pacific tracks in the City.

[18] Crossing Inventory Report, U.S. Department of Transportation, Federal Railroad Administration; https://railroads.dot.gov/safety-data/crossing-and-inventory-data/crossing-inventory-lookup

TABLE 12: EXISTING CHARACTERISTICS AT STUDY RAIL CROSSINGS

RAIL CROSSING (USDOT CROSSING ID)	ROADWAY CROSSING PROTECTION	PEDESTRIAN CROSSING PROTECTION	TRAIN CROSSINGS PER DAY	AVERAGE TRAIN SPEED
UNION PACIFIC RAIL LINE				
BARLOW RD (760047S)	Roadway gates	None (No sidewalks)	15 9 (freight) 6 (passenger)	25-50 m.p.h.
NE ELM ST (760044W)	Roadway gates/overhead lights	None (sidewalks)		
NE GRANT ST (760043P)	Roadway gates/overhead lights	None (sidewalks both sides)		
NE IVY ST (760042H)	Roadway gates/overhead lights	None (sidewalks both sides)		
NE PINE ST (760041B)	Roadway gates/overhead lights	None (sidewalk one side only)		
NE REDWOOD ST (760039A)	Roadway gates	None (sidewalks both sides)		
PRIVATE DRIVEWAY (760038T)	Stop sign, no gates	No (No sidewalk)		
NE TERRITORIAL ROAD (760037L)	Roadway gates/overhead lights	None (sidewalks and bike lanes both sides)		
OREGON PACIFIC RAIL LINE				
OR 99E (760202U)	Roadway gates/overhead lights	None (sidewalk)	<1 (freight, 5 per week)	2-5 m.p.h.
SE TOWNSHIP RD (760205P)	Roadway gates	None	4 (freight)	1-10 m.p.h.

FREIGHT NETWORK

Efficient truck movement plays a vital role in the economical movement of raw materials and finished products. The designation of through truck routes provides for this efficient movement, while maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. Through Canby, OR 99E has various freight destinations by the State and Federal governments, as summarized below.

- **State Highway Freight System:** OHP Goal 1, Policy 1C addresses the need to balance the movement of goods and services with other uses. It states that the timeliness of freight movements should be considered when developing and implementing plans and projects on freight routes. Through Canby, OR 99E is classified as a National Freight Route.
- **Reduction Review Routes:** ORS 366.215 requires review of all potential actions that will alter, relocate, change, or realign a Reduction Review Route that could result in permanent reductions in vehicle-carrying capacity. Reduction of vehicle-carrying capacity means a permanent reduction in the horizontal or vertical clearance of a highway section, by a permanent physical obstruction to motor vehicles located on useable right-of-way subject to Commission jurisdiction, unless such changes are supported by the Stakeholder Forum. If ODOT identifies that an action may result in a reduction of vehicle-carrying capacity, a Stakeholder Forum (consisting of at a minimum, a bicycle representative, pedestrian representative, a trucking industry representative, a mobile home manufacturing representative, an oversize load freight representative, a representative of automobile users, and a representative from any affected city, county or Metropolitan Planning Organization) will be convened to help advise ODOT regarding the effect of the proposed action on the ability to move motor vehicles through a section of highway. Through Canby, OR 99E is classified as a Reduction Review Route.

The current Canby TSP also designates truck routes. These routes are:

- N Holly St north between Knights Bridge Road and the UGB boundary
- N Knights Bridge Road
- S Ivy Street south of OR 99E
- SW 13th Avenue west of S Ivy Street
- S Redwood Street north of S Township Road
- 4th Avenue east of S Redwood Street
- Sequoia Parkway between S Township Road and OR 99E
- S Mulino Road
- NE Territorial Road between N Holly Street and OR 99E
- OR 99E
- NE 4th Avenue/NE Pine Street between N Locust Street and OR 99E
- NW 3rd Avenue between N Baker Street and N Elm Street
- N Baker Street between NW 3rd Avenue and NW 6th Avenue

These routes facilitate truck traffic to and from Canby's industrial areas which include the Pioneer Industrial area on the east side of the city, as well as through freight traffic.

AIR NETWORK

The Aurora State Airport (FAA LID: UAO) is located west of Canby on the east side of the Portland-Hubbard Highway and south of I-5. This is a state-owned, public-use airport and facilitates business jet, training, and air ambulance traffic, with approximately 94,655 annual operations[19].

Regional and international air service for passengers and freight is provided via Portland International Airport (PDX). The airport is located approximately 25 miles (around 30 minutes by car) northeast of Canby and is connected via I-5, I-84 and I-205.

WATERWAY NETWORK

The Willamette River is a navigable waterway north of Canby. The Canby Ferry is a car and walk-on ferry service that provides access between Canby and Wilsonville. The service connects N Holly Street in Canby with SW Mountain Road on the Wilsonville side. The service is open between 9 a.m. and 6 p.m. (excluding holidays) and only when the river level is above 70 feet. The ferry does not have a set schedule, but rather operates on an as-needed basis[20].

There is also a boat ramp at Molalla River State Park north of Canby; this point can be accessed via River Park Place, which connects to N Holly Road.

PIPELINE NETWORK

There are no natural gas pipelines in Canby's planning area. The nearest pipeline is operated by Northwest Natural Gas and runs north-south along Barlow Road south of Barlow (west of Canby) and crosses OR 99E in Barlow[21].

[19] https://www.oregon.gov/aviation/airports/pages/airports/uao.aspx, accessed October 2, 2023

[20] https://www.clackamas.us/roads/ferry.html, accessed October 2, 2023

[21] https://pvnpms.phmsa.dot.gov/PublicViewer/, accessed October 2, 2023