DKS 1050 SW 6TH AVENUE, SUITE 600 • PORTLAND, OR 97204 • 503.243.3500 • DKSASSOCIATES.COM

TECHNICAL MEMORANDUM #9

DATE: May 15, 2024

TO: Don Hardy | City of Canby

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

SUBJECT: City of Canby Transportation System Plan Update
Future Multimodal Needs

Project #: 23023-000

This memorandum summarizes how the multimodal transportation system in Canby is expected to operate in the future. The condition of the future transportation system depends on the growth in population and employment, future travel patterns (e.g., choice of modes, routes, and frequency of trips), and community investment decisions. Growth in population and the number of jobs is forecasted based on trends and knowledge of the city and region. Future travel patterns are more difficult to predict as the community's investment decisions and the economy can have significant effect on choice of modes and routes. The assessment is used to identify the needs of the transportation system and reflect where it can better accommodate the desired activities of the community. Needs were determined based on a comprehensive multimodal existing conditions analysis and projecting future conditions through the planning horizon (2043) based on assumed growth in households and employment, and the City transportation standards.

METHODOLOGY FOR ESTIMATING FUTURE TRAVEL

The 2043 transportation conditions in Canby were forecasted based on trips that new growth will generate, assuming no new investments in infrastructure beyond what is funded for construction already. It describes where the transportation system will perform satisfactorily and areas of the network likely to be congested or in need of investments to function adequately in the future. Subsequent memos for the TSP update will explore potential solutions for addressing future transportation system needs.

BASELINE STREET NETWORK IMPROVEMENTS

The baseline condition reflects the street network performance assuming only transportation projects with secured funding will be built. Other identified projects that are not fully funded will be evaluated as potential solutions in subsequent memos for the TSP update to validate their need in the future.

The following motor vehicle capacity projects have been completed or have funding identified in the Canby Transportation Plan study area through 2043:

- Walnut Street Extension, which will extend S Walnut Street from SE 1st Avenue to OR 99E, with a new signalized intersection at OR 99E.
- The 4th Avenue Extension, which will extend S 4th Avenue from S Mulino Road to Sequoia Parkway.
- The N Pine Street/4th Avenue project, which will realign this intersection. Figure 1 below shows the preliminary schematic of the realignment.

FUTURE ESTIMATES OF MOTOR VEHICLE TRIPS

Future land use changes and growth in population, housing, and employment within the Canby urban growth boundary (UGB) will have a significant impact on the existing transportation system and will create new travel demands. These growth projections and how they translate to new trips on the transportation network are key elements of the future conditions and performance analysis.

The Canby travel demand model is the primary tool used to determine future traffic volumes in Canby. The Canby model forecasts travel changes in response to future land use and transportation scenarios. This model translates estimated land uses into motor vehicle trips and assigns them to the roadway network. It is an informational tool to assist with decision making, providing objective and quantitative information exploring the potential impacts of alternative transportation system investments.

It should be noted that the analysis includes zone type changes in Area J, located in the northeast corner of the city within Transportation Analysis Zone (TAZ) 171. These zone type changes involved land use modifications within the impacted zones. The details of these changes are incorporated in a separate memo.

FORECASTED POPULATION AND EMPLOYMENT GROWTH

Understanding the influence of area land uses on the transportation system is a key factor in transportation system planning. The amount of land that is to be developed, the types of land uses, and their proximity to each other have a direct relationship to expected demands on the transportation system.

The Canby model includes forecasted land uses for the Canby UGB. The land uses reflect the Comprehensive Plan and growth assumptions identified for the year 2043. Complete land use data sets were developed for both the 2023 base year and 2043 future year with input from city staff. The housing and employment forecasts used for this TSP analysis relied on two key sources:

- City of Canby Housing Needs Analysis[1], which provided the population forecast data by housing type. This analysis was based on population forecasts from the Portland State University Population Research Center.

[1] City of Canby Housing Needs Analysis, November 30, 2023.

- City of Canby Economic Opportunities Analysis[2], which provided job growth by employment sector.

A summary of the existing land use estimates and future projections for the entire Canby UGB from which traffic growth estimates were made is listed in Table 1 and households and employment growth are also shown in Figure 1 and Figure 2, respectively.

The base 2023 land use inventory approximated the number of existing households by unit type (i.e., single-family detached, single-family attached and multi-family units) using data from the City of Canby Housing Needs Analysis, and the amount of existing employment by sector (i.e., retail, service, industrial and other, and educational employment) using data from the City of Canby Economic Opportunities Analysis. The existing land use corresponds to a population of 18,655 residents, and approximately 7,189 households and 7,666 jobs.

The future 2043 land use projection is an estimate of the amount of each land use (household and employment) could reasonably accommodate given market conditions and current build-out of vacant or underdeveloped lands assuming Comprehensive Plan zoning. The projected land uses correspond to a year 2043 population projection of approximately 24,586 residents, and approximately 9,475 households (32 percent growth from 2023), and 10,633 jobs (39 percent growth from 2023).

As growth occurs to the year 2043, 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.

TABLE 1. CANBY UGB LAND USE SUMMARY

LAND USE / GROWTH CATEGORY	EXISTING 2023 QUANTITIES	TOTAL GROWTH 2023 TO 2043	FUTURE 2043 QUANTITIES
POPULATION*	18,655	5,931 (+32%)	24,586
HOUSEHOLD*			
SINGLE FAMILY DETACHED UNITS	4,907	1,167 (+24%)	6,074
SINGLE FAMILY ATTACHED UNITS	1,132	595 (+53%)	1,727
MULTI-FAMILY UNITS	1,150	524 (+46%)	1,674
TOTAL UNITS	***7,189***	***2,286 (+32%)***	***9,475***
EMPLOYMENT**			
RETAIL JOBS	807	200 (+25%)	1007
SERVICE JOBS	2,301	896 (+39%)	3,197
INDUSTRIAL AND OTHER JOBS	4,012	1,846 (+46%)	5,858

[2] City of Canby Economic Opportunities Analysis, March 17, 2023 (Revised May 18, 2023), FCS Group.

LAND USE / GROWTH CATEGORY	EXISTING 2023 QUANTITIES	TOTAL GROWTH 2023 TO 2043	FUTURE 2043 QUANTITIES
EDUCATION JOBS	546	25 (+5%)	571
TOTAL JOBS	***7,666***	***2,967 (+39%)***	***10,633***

Source: * City of Canby Housing Needs Analysis; ** City of Canby Economic Opportunities Analysis

FIGURE 1. CANBY HOUSEHOLD GROWTH FROM 2023 TO 2043

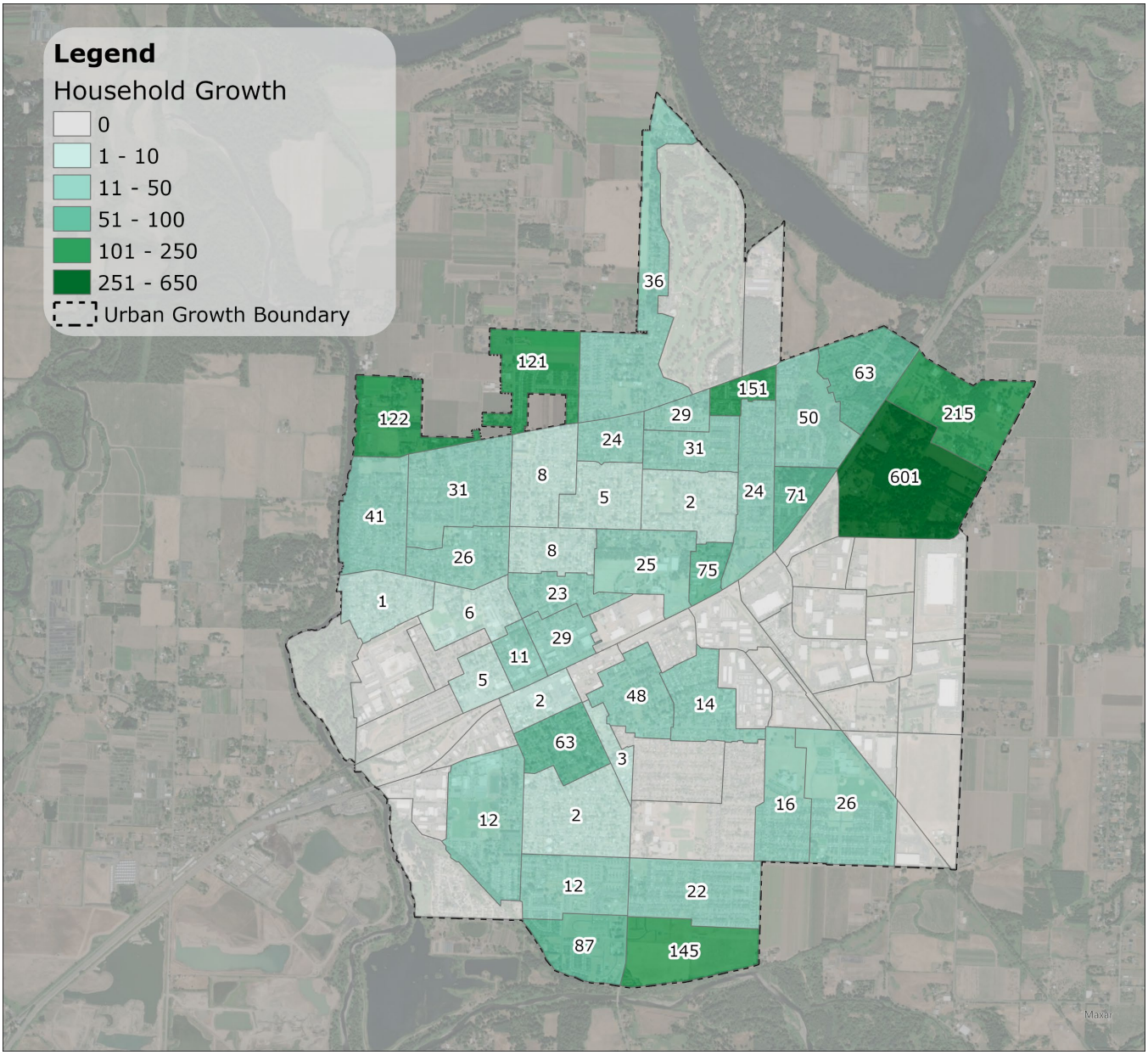
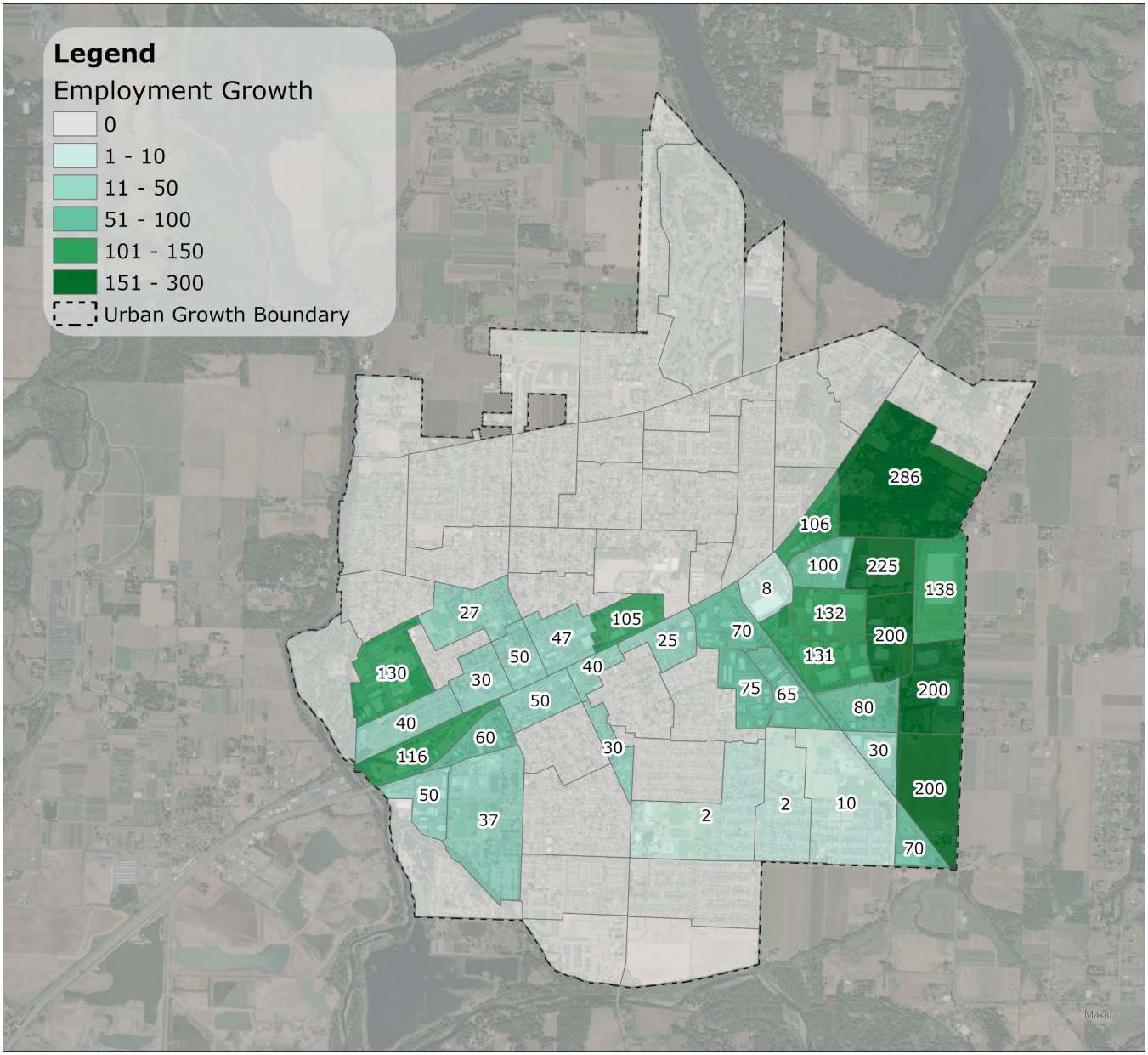


FIGURE 2. CANBY EMPLOYMENT GROWTH FROM 2023 TO 2043



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 and the travel demand model used to forecast traffic volumes in Canby.

PM PEAK TRIPS

The increase in the number of residents and jobs in the Canby planning area increases the overall number of trips generated. Table 2 summarizes the total trips (i.e., drive alone, shared ride, transit, walk, and bike trips) during the p.m. peak hour of an average weekday in the Canby planning area for the years 2023 and 2043 based on US Census Data and the Canby travel demand model[3]. The transportation network in the planning area accommodates 12,213 trips during the p.m. peak hour of an average weekday as of 2023, and that number is estimated to increase by over 3,500 through 2043, to 16,199 trips if the land develops according to the land use assumptions during the p.m. peak hour of an average weekday. Of these trips, 1,889 were bike, walk, or transit trips in 2023, and that amount is expected to increase by over 600 through 2043, to 2,505 p.m. peak hour trips. Drive alone trips (i.e., single occupant vehicle) are expected to increase by over 3,000 through 2043 during the p.m. peak hour of an average weekday.

TABLE 2: AVERAGE WEEKDAY PM PEAK TRIPS IN CANBY PLANNING AREA

AVERAGE WEEKDAY TRIPS BY MODE (PM PEAK)	2023 TRIPS*	2043 TRIPS*	TRIP GROWTH (2023-2043)
DRIVE ALONE TRIPS (SOV)	9,349	12,401	3,052
SHARED RIDE TRIPS	975	1,293	318
TRANSIT TRIPS	378	501	123
WALK TRIPS	1,259	1,670	411
BIKE TRIPS	252	334	82
TOTAL TRIPS	**12,213**	16,199	3,986
TOTAL NON-SOV TRIPS	**2,864**	3,798	935
TOTAL BIKE, WALK, TRANSIT TRIPS	**1,889**	2,505	616

Source: 2022 ACS data, Daily Household Travel Survey (ODOT, 2019) and the Canby travel demand model.

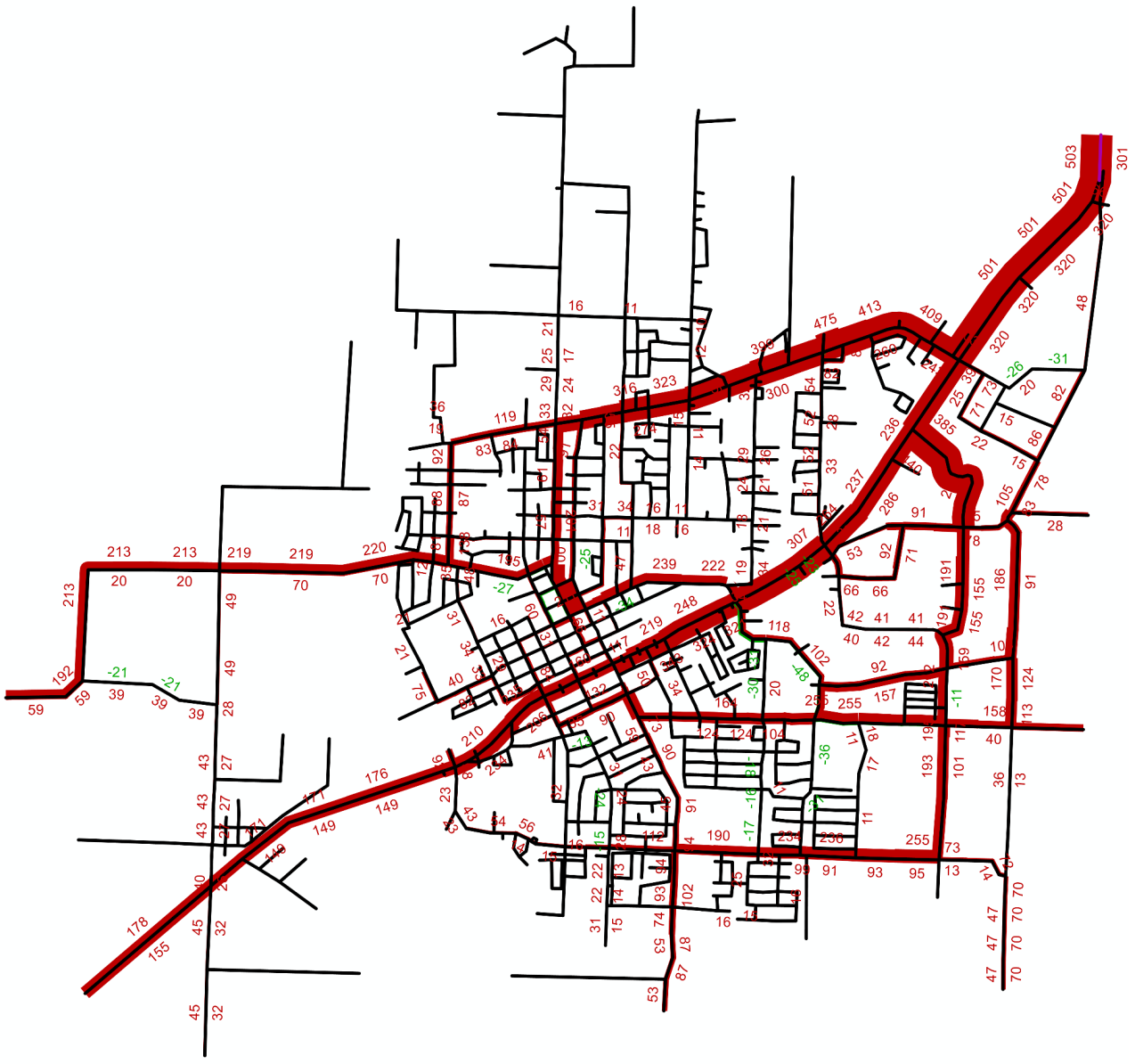
* This analysis assumes the mode split remains the same in the years 2023 and 2043.

[3] Mode shares are based on the travel mode shares for the state of Oregon in the Report "Personal Travel in Oregon, A Snapshot of Daily Household Tavel Patterns", ODOT, 2019. The mode shares were applied to the estimates of p.m. peak motor vehicle trips from Canby's travel demand model for the years 2023 and 2043.

Figure 3 below shows the increment of raw model traffic growth between 2023 and 2043 for the design hour. Overall, OR 99E, N Territorial Road, the new Walnut Street Extension (described in a subsequent section), and S 13th Avenue are expected to see some of the highest increases in traffic volumes through 2043.

While the travel demand forecast tools were calibrated to local conditions and volumes, raw volumes from the tools are not used for capacity analysis. Rather, motor vehicle turn movement volume forecasts were developed using post-processing methods consistent with the ODOT APM V2. The post-processing methodology involves estimating trip growth at the intersection approach level (i.e., volume differences between base and future forecast tools), scaling the growth by the number of forecast years (i.e., total forecast years divided by difference in forecast tool years), and adding these volumes to existing traffic counts.

FIGURE 3: RAW MODEL TRAFFIC GROWTH IN THE P.M. PEAK HOUR (2023-2043)



WHERE TRANSPORTATION IMPROVEMENTS MAY BE NEEDED

Review of the expected growth throughout the city and existing gaps and deficiencies of the transportation system identified the following locations as possible candidates for improvements.

STREET NETWORK PERFORMANCE ASSESSMENT

An increase in motor vehicle travel leads to an increase in congestion. Travel activity, as reflected by p.m. peak hour motor vehicle trips beginning or ending in Candy, is expected to increase significantly through 2043. Through trips (i.e., trips that neither begin nor end in Canby) are also expected to increase through 2043 and are generally representative of increased growth in statewide travel and in neighboring cities.

Study intersection operations were analyzed in the same manner as was done for existing conditions[4]. Forecasted intersection capacity and level of service were compared to applicable agency mobility standards to identify where significant congestion is likely to occur. Table 3 shows study intersection operations based on 2043 forecasted volumes, and the Appendix includes detailed Highway Capacity Manual reports for each intersection. Bold red text indicates intersections with v/c ratios or LOS ratings over their respective mobility targets. Several study intersections are expected to exceed their mobility during the 2043 weekday p.m. peak hour based on the operations presented in Table 3 and shown in Figure 4. These include the OR 99E/Ivy Street (v/c: 1.11),OR 99E/Pine Street (v/c: 1.16), OR 99E/Sequoia Parkway (v/c: 0.92), and OR 99E/Territorial Road (v/c: 0.88) intersections. Two stop-controlled intersections are expected to exceed their LOS mobility targets on the minor approach. There are NE Territorial Road/N Redwood Street (LOS F) and S Township Road/Ivy Street (LOS E), both of which are anticipated to experience over LOS E on their minor approaches. The intersections at Knights Bridge Road/N Holly Street, Knights Bridge Road/N Cedar Street, and S Walnut Street/SE 1st Avenue are expected to operate right at the LOS D mobility target on the minor approach as well.

[4] Technical Memorandum #7: Existing Multimodal Conditions, October 16, 2023

TABLE 3. PM PEAK HOUR 2043 TRAFFIC OPERATIONS AT STUDY INTERSECTIONS

INTERSECTION	CONTROL	MOBILITY TARGET	V/C	LOS	DELAY (SEC)
OR 99E & BERG PKWY	Signal	0.90	0.71	C	32
OR 99E & ELM ST	Signal	0.90	0.88	C	31
OR 99E & GRANT ST	Signal	1.0 (STA)	0.71	B	11
OR 99E & IVY ST	Signal	1.0 (STA)	**1.11**	E	72
OR 99E & PINE ST	Signal	0.90	**1.16**	E	80
OR 99E & SEQUOIA PKWY	Signal	0.90	**0.92**	D	49
OR 99E & TERRITORIAL RD	Signal	0.85	**0.88**	C	27
KNIGHTS BRIDGE RD & N BIRCH ST	Two-way Stop	LOS D	0.56/0.47	A/C	10/23
KNIGHTS BRIDGE RD & N CEDAR ST	Two-way Stop	LOS D	0.28/0.44	A/D	9/25
KNIGHTS BRIDGE RD & N HOLLY ST	Two-way Stop	LOS D	0.28/0.62	A/D	8/35
NW 3RD AVE & N CEDAR ST	Two-way Stop	LOS D	0.04/0.22	A/B	7/11
NW 1ST AVE & N GRANT ST[1]	Two-way Stop	LOS D	0.14/0.14	A/B	8/14
NW 1ST AVE & N IVY ST[1]	Two-way Stop	LOS D	0.11/0.28	A/C	9/20
NE 3RD AVE & NE 4TH AVE	Two-way Stop	LOS D	0.00/0.02	A/B	0/12
NE 4TH AVE & N PINE ST	Two-way Stop	LOS D	0.13/0.33	A/C	9/19
NE TERRITORIAL RD & N HOLLY ST	All-way Stop	LOS D	0.52	B	14
NE TERRITORIAL RD & N REDWOOD ST	Two-way Stop	LOS D	0.39/0.61	**A/F**	9/59
SE 2ND AVE & S IVY ST	Two-way Stop	LOS D	0.36/0.40	A/C	9/19
S TOWNSHIP RD & S IVY ST	Two-way Stop	LOS D	0.28/0.42	**A/E**	9/48
SE 13TH AVE & S IVY ST	Signal	LOS D	0.68	B	15
SE 4TH AVE & S REDWOOD ST	Two-way Stop	LOS D	0.08/0.23	A/B	8/12
S TOWNSHIP RD & S REDWOOD ST	All-way Stop	LOS D	0.53	B	13
SEQUOIA PKWY & HAZEL DELL WAY	Signal	LOS D	0.55	C	34
SE 1ST AVE & S WALNUT ST	Two-way Stop	LOS D	0.13/0.77	A/D	8/34

INTERSECTION	CONTROL	MOBILITY TARGET	V/C	LOS	DELAY (SEC)
SE 1ST AVE & S MULINO RD	Two-way Stop	LOS D	0.20/0.28	A/B	8/13
SE 4TH AVE & S WALNUT RD	All-way Stop	LOS D	0.29	B	13
S TOWNSHIP RD & SEQUOIA PKWY	All-way Stop	LOS D	0.79	C	17
S TOWNSHIP RD & S MULINO ST	All-way Stop	LOS D	0.46	B	13
SE 13TH AVE & S MULINO RD	All-way Stop	LOS D	0.22	A	9
SE 13TH AVE & SEQUOIA PKWY	All-way Stop	LOS D	0.44	B	12
OR 99E & WALNUT ST*	Signal	LOS D	0.73	B	19

*New Intersection

[1] This is a three-way stop controlled but is assumed to be a two-way stop to provide HCM analysis results. It should be noted this assumption results in higher side street delay.

STREET NETWORK CONGESTION

This assessment identified locations on the roadway network that operate with some level of congestion based on the forecasted 2043 conditions. These are locations where motorists may experience delays during the p.m. peak hour travel. This baseline provides a metric for assessing the impacts of new developments on the transportation system.

Figures 4 displays the result of the street network and study intersection congestion analysis for the p.m. peak hour in 2043. The link congestion data is from the travel demand model used to forecast future volumes and represents raw model volumes (not post-processed volumes). As shown, OR 99E is expected to experience medium to heavy congestion through Canby in the p.m. peak hour in 2043, with link-level v/c ratios over 0.75. Other street segments that experience congestion are Ivy Street between OR 99E and Township Road, Sequoia Parkway between SE 1st Avenue and SE Hazeldell Way, and NE Territorial Road between N Pine Street and OR 99E.

Table 4 summarizes the number and percentage of lane-miles in Canby experiencing congestion in 2023 and 2043. For this analysis, the following two thresholds were considered:

- **Severe congestion,** defined as streets and intersections operating with a v/c ratio over 0.99 during the p.m. peak hour.
- **Congestion,** defined as streets operating with a v/c ratio between 0.90 and 0.99 during the p.m. peak hour.

Under existing conditions, about 0.3 percent of Canby's street network experiences congestion during the p.m. peak hour. In 2043, about 4.2 percent of the network is expected to experience moderate or severe congestion, largely along OR 99E, as discussed above.

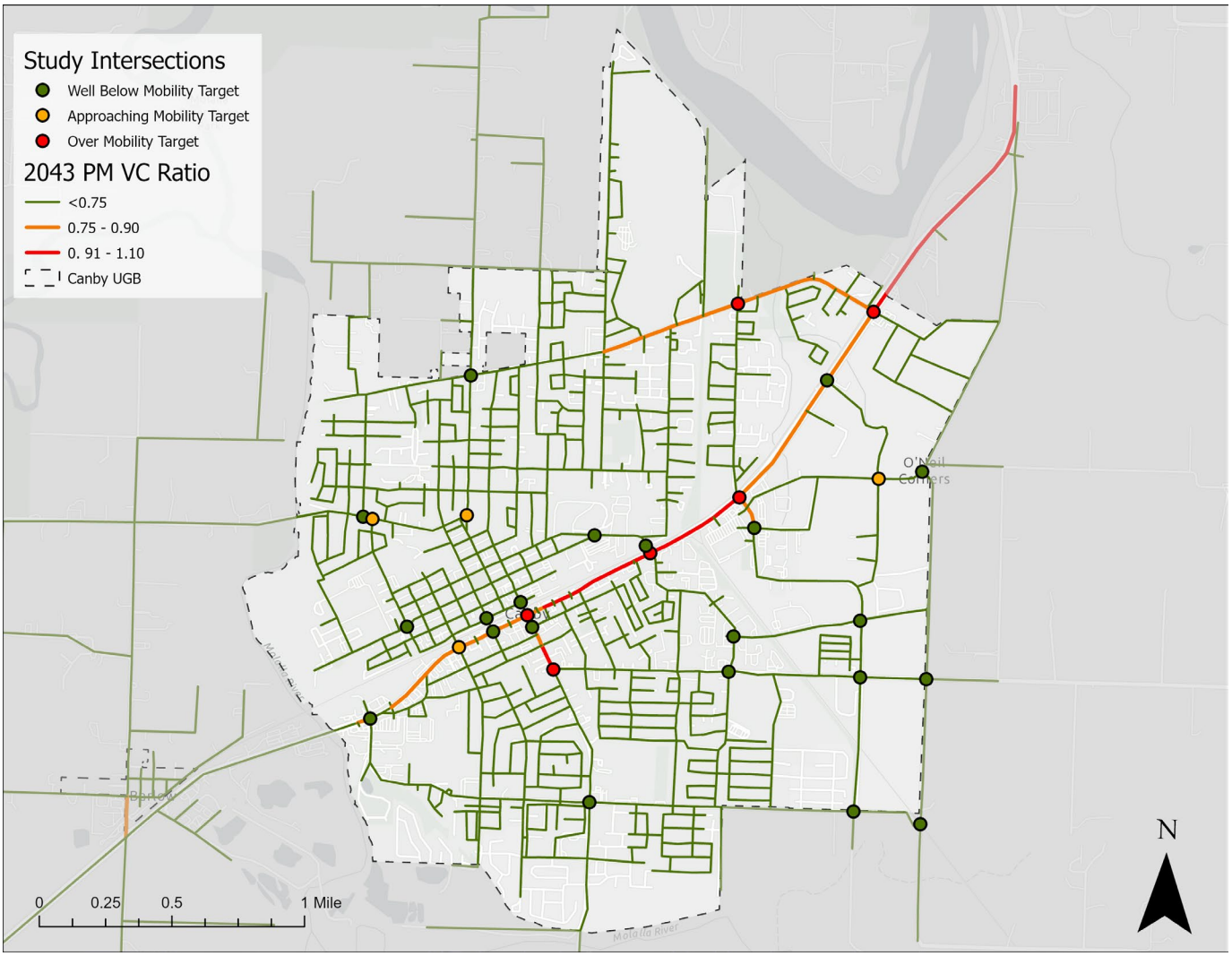
TABLE 4: VEHICLE CONGESTION IN CANBY PLANNING AREA

PM PEAK CONGESTED VEHICLE LANE MILES	2023 BASE YEAR		2043 HORIZON YEAR	
	TOTAL MILES	SHARE OF TOTAL FACILITY MILES	TOTAL MILES	SHARE OF TOTAL FACILITY MILES
TOTAL LANE MILES*	**155.04**	**100%**	**199.56**	**100%**
TOTAL CONGESTED LANE MILES	**0.54**	**0.3%**	**8.37**	**4.2%**
SEVERELY CONGESTED MILES (>0.99)	**0.00**	**0%**	**7.79**	**3.9%**
CONGESTED MILES (0.90 <= V/C <= 0.99)	**0.54**	**0.3%**	**0.58**	**0.3%**

Source: Canby Travel Demand Model (base year: 2023, future year: 2043). The mileage calculation is based on the length of the modeled network link associated with the point of congestion. It does not include the length of the queuing that may occur as a result of the congested link.

Notes: *Total lanes miles include the length of all street segments, multiplied by the number of lanes.

FIGURE 4: 2043 LINK AND STUDY INTERSECTION CONGESTION IN THE P.M. PEAK HOUR



FUTURE WALKING, BIKING, AND TRANSIT NETWORK ASSESSMENT

Methodology for determining future needs for walking, biking, and transit in Canby begins with an assessment of who is walking, biking, and taking transit now and where they are traveling. Technical Memorandum #7 (Existing Multimodal Conditions) answers these questions for pedestrians, bicyclists and transit riders and details existing conditions of the infrastructure.

The existing facilities were then compared to major growth areas of the city, and in proximity to key destinations, such as schools, parks, transit stops, shopping and employment. A review of the city shows that the walking and biking infrastructure is inadequate in some anticipated major growth areas, which mostly consist of rural unimproved streets today, and near some key destinations, which have the potential to attract significant walking and biking trips. The inadequate walking and biking infrastructure further hinders transit riders, as these users typically utilize these facilities at the beginning and end of their trip.

METHODOLOGY TO ADDRESS DEFICIENCIES

A list of potential pedestrian and bicycle network improvement projects will be developed in Technical Memorandum #9 based on streets with pedestrian deficiencies. A street is considered deficient for walking if it meets one or more of the following conditions:

- Arterial or collector street without pedestrian facilities, and/or without bicycle facilities or adjacent corridor with bicycle facilities.
- "Poor" qualitative pedestrian and/or bicycle assessment rating.
- Qualitative pedestrian and/or bicycle assessment rating less than "good" in close proximity to parks, schools, transit stops, or other important destinations.

KEY NETWORK NEEDS

Findings s from the evaluation of the existing and future no-build transportation system are summarized below. These recommendations provide guidance to help establish areas of focus for future investments to build upon the positive attributes and address the shortcomings of the baseline transportation system.

PEDESTRIAN NETWORK NEEDS

- Develop a citywide low-stress walking network that maximizes safety and access to amenities.
- Increase low-stress pedestrian facility miles, while decreasing extreme or high-stress miles through new or enhanced existing facilities.
- Install ADA compliant pedestrian curb ramps at intersections.
- Evaluate potential protected crossing opportunities along major streets, including OR 99E and collectors.
- Review locations of pedestrian collisions for potential improvements while also focusing on high-risk locations that have not yet experienced crashes.

BICYCLE NETWORK NEEDS

- Develop a citywide low-stress bicycle network that provides accessibility to destinations and enhances safety for all users.
- Increase low-stress bicycle facility miles, while decreasing Extreme or High stress miles through new or enhanced existing facilities.
- Evaluate potential protected crossing opportunities along OR 99E and collectors.
- Review locations of bicycle collisions and evaluate other high-risk locations for safety improvements.

TRANSIT NETWORK NEEDS

- Increase the completeness of pedestrian and bicycle facilities near transit stops.
- Evaluate potential enhanced crossing opportunities on OR 99E near existing transit stops.
- Consider potential alignments for transit expansion and ensure network designs that can adequately serve it.
- Focus on opportunities to improve transit stop amenities (e.g., shelters, benches).

VEHICLE NETWORK NEEDS

- Decrease the amount of congested lane miles through strategic vehicle network improvements, and investments in non-driving modes (e.g., expanded transit service and active transportation investments).
- Explore projects at intersections along arterial streets that are expected to be severely congested.
- Explore improvements along OR 99E to address identified high-crash locations and other high-risk streets and intersections.
- Improve connectivity of streets in the City through implementation of recommended transportation facility and access spacing standards.
- Assess opportunities to support electric vehicle adoption and use (i.e., public and private charging infrastructure).

ADDITIONAL SAFETY NEEDS

- The OR 99E/Ivy Street and NW 3rd Avenue/N Cedar Street intersections experienced higher-than-expected crash rates between 2017 and 2021. On the segment level, the section of OR 99E between Elm Street and Pine Street experienced a higher-than-expected crash rate during that period. These hotspots would benefit from safety improvements. As traffic volumes increase, rear-end and angle crashes may be expected to increase in frequency.
- There were nine pedestrian-involved crashes and eight bicycle-involved crashes between 2017 and 2021, and these figures are likely to increase as the City's population increases. Building out Canby's low-stress walking and biking networks will enhance safety and help prevent future crashes involving vulnerable road users, including people walking and biking.
- Assess railroad crossings for multimodal safety enhancements.
- Addressing the impacts of evolving vehicle technologies (i.e., autonomous and connected vehicles (CAVs), city fleet safety upgrades) and proactively identifying high-risk characteristics of the street network, including at locations that have not yet experienced crashes.