Canby

Transportation System Plan

Prepared for

City of Canby

December 2010

DKS *Associates*
TRANSPORTATION SOLUTIONS

January 6, 2011

Matilda Deas
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170 NW 2nd Avenue
Canby, OR 97013

Subject: **Canby Transportation System Plan** P09042-002

Dear Matilda:

DKS Associates is pleased to submit the final Transportation System Plan to the City of Canby. This final report reflects comments and revisions collected from the Technical Advisory Committee, Citizen Advisory Committee, Planning Commission, and City Council. This completes our scope of work.

It has been a pleasure to work with you, and the rest of the TSP team, in completing this document that will direct transportation investments in the City of Canby for the next 20 years.

Regards,

***DKS** Associates*

Chris Maciejewski, P.E., P.T.O.E.
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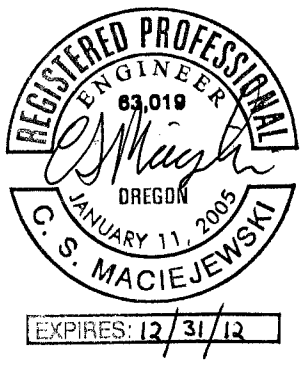

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Useful Abbreviations and Acronyms

- 30^{th} HV – 30^{th} Highest Hourly Volumes
- AASHTO – American Association of State Highway and Transportation Officials
- ADA – Americans with Disabilities Act
- ADT – Average Daily Traffic
- ATR – Automatic Traffic Recorder
- CAC – Citizen Advisory Committee
- CBD – Central Business District
- CIP – Capital Improvements Program
- FHWA – Federal Highway Administration
- HCM – Highway Capacity Manual
- HDM – Highway Design Manual
- ITS – Intelligent Transportation System
- LID – Local Improvement Districts
- LOS – Level of Service
- NTM – Neighborhood Traffic Management
- ODOT – Oregon Department of Transportation
- OHP – Oregon Highway Plan
- OTC – Oregon Transportation Commission
- PMT – Project Management Team
- ROW – Right of Way
- SDC – System Development Charges
- SR2S – Safe Routes to School
- STA – Special Transportation Area
- STIP – State Transportation Improvement Plan
- TAC – Technical Advisory Committee
- TAZ – Transportation Analysis Zone
- TDM – Travel Demand Management
- TPR – Transportation Planning Rule
- TSM – Transportation System Management
- TSP – Transportation System Plan
- UGB – Urban Growth Boundary
- URD – Urban Renewal District
- V/C – Volume to Capacity Ratio
- VMT – Vehicle Miles Traveled
- VPH – Vehicles Per Hour

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Chapter 1. Executive Summary

The City of Canby has recently completed a thorough review of its transportation system with this 2030 Transportation System Plan (TSP). This plan is aimed at fulfilling Oregon Transportation Planning Rule (TPR) requirements for comprehensive transportation planning in Oregon cities.

The TSP identifies existing and future transportation needs to guide future transportation investment in the City and determine how land use and transportation decisions can build on one another. It identifies specific transportation improvement projects and programs needed to support the City's goals and policies, serve planned growth through the year 2030, and improve safety and mobility for all travel modes in Canby.

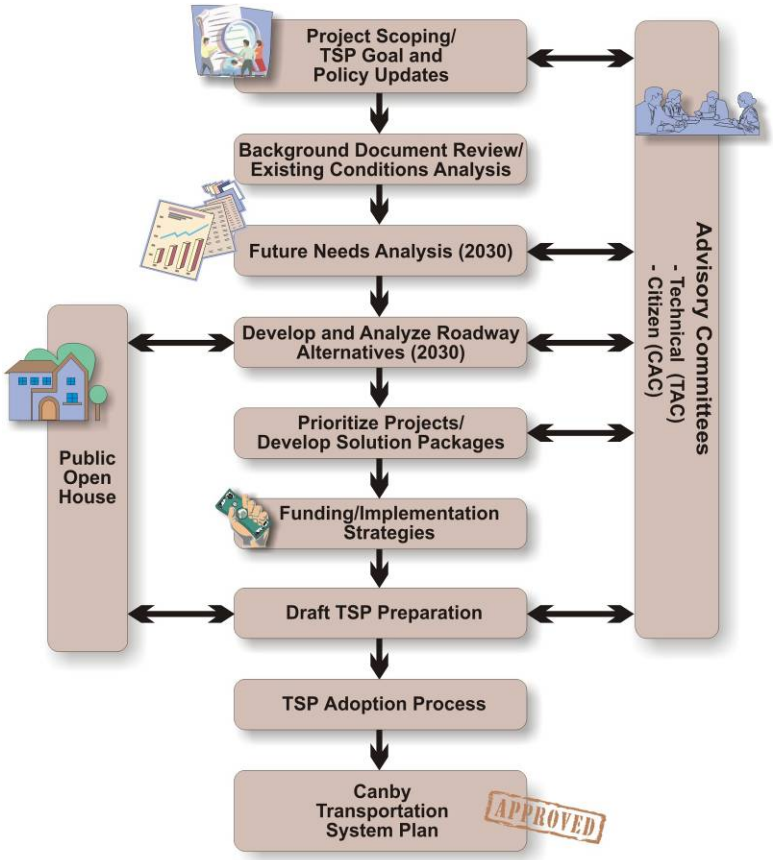
Public and Agency Participation

This plan was prepared with public and agency participation. It was developed in close coordination with City of Canby and ODOT staff and received input and direction from two advisory committees:

- **Technical Advisory Committee (TAC)** comprised of agency staff from Oregon Department of Transportation (ODOT), City of Canby (including on-call traffic engineer and civil engineer), and Canby Area Transit (CAT)
- **Citizen Advisory Committee (CAC)** comprised of citizen representatives from the city council and planning commission, neighborhood associations, pedestrian/bicycle advocate groups, and other volunteers

These two committees held five meetings each to review methods and findings, provide input and feedback throughout the alternatives selection process, and assist in reaching consensus on new recommendations.

In addition, two public open houses, four neighborhood meetings, one downtown area focus meeting, over 12 individual stakeholder briefings, and multiple public work sessions and hearings with the Planning Commission and City Council were held to allow citizens to comment on the plan, make suggestions, voice concerns, and provide feedback.



Planning Process

TSP Goals (Chapter 2)

There are nine goals that were determined at the beginning of the TSP process based on community feedback. These goals were used to guide the development of the TSP. The overall intent of the goals is to develop and maintain a transportation system that is safe, convenient, and economical.

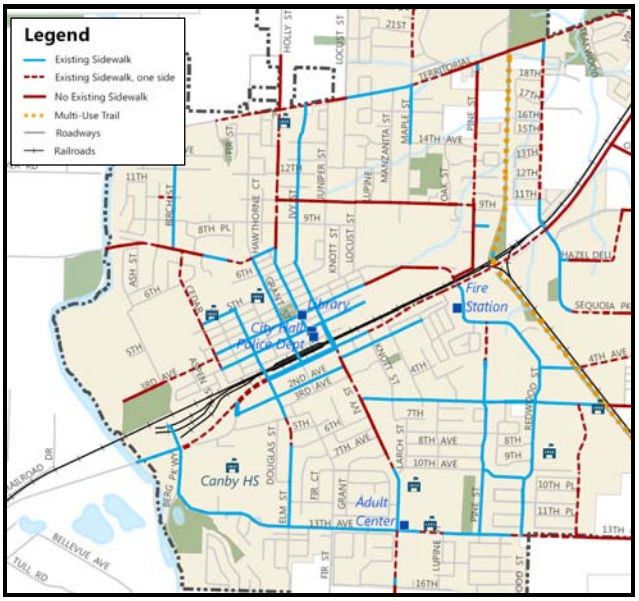
- Goal 1: Livability
- Goal 2: Safety
- Goal 3: Economic Vitality
- Goal 4: Sustainability
- Goal 5: Travel Choices
- Goal 6: Quality Design
- Goal 7: Reliability and Mobility
- Goal 8: Efficient and Innovative Funding
- Goal 9: Compatibility

Transportation Needs

Based on local land use growth within the Canby Urban Growth Boundary (UGB) and increased regional travel, future transportation needs in the year 2030 would be severe without significant investment in transportation improvements. The greatest problem areas can be grouped into the following key deficiencies:

- Lack of connectivity due to railroads, rivers, wetlands, and development patterns
- Lack of east-west capacity on OR 99E due to limited presence of parallel routes
- Lack of intersection turning capacity at key intersections

The capacity deficiencies throughout Canby indicate the need to not only invest in roadway projects that improve operations and capacity, but also to balance investment in other travel modes to provide improved travel choices and reduce the demand on the roadway system.



Segment of Pedestrian Facilities Figure (see Figure 3-2)

Available Funding

It is expected that approximately $36 million will be available for new transportation improvements projects and programs based on existing revenue sources. A portion of these funds would come from system development charges (SDCs), which could only be used to fund projects that increase transportation system capacity.

Projected Available Capital Improvement and Program Funds through 2030 (see Table 9-5)

Available Funds through 2030	21-Year Total
Discretionary Funds	
Total Non-SDC Revenue	$30,240,000
- Total Expenditures	- $17,745,000
= Total Discretionary Funds	**$12,495,000**
Total Funds	
Total Discretionary Funds	$12,495,000
+ Transportation System Development Charges (SDCs)	+ $23,520,000
= Total Available Funds	**$36,015,000**

Transportation Plans

The Canby Transportation System Plan includes the highest priority pedestrian, bicycle, and motor vehicle improvements projects that are feasible for the City to fund using existing revenue streams. Complementary plans, design standards, and implementing code and policies are also identified for each travel mode.

Pedestrian Plan (Chapter 5)

The recommended pedestrian facility improvements include constructing new sidewalks, filling in gaps in the sidewalk network, upgrading intersections and railroad crossings for safer pedestrian crossings, expanding and improving the connectivity of the shared-use path network, and other programs to encourage walking, such as Safe Routes to School.

Key projects include filling the sidewalks gaps along South Ivy Street and also along NE 4th Avenue from downtown to the fairgrounds.

Segment of Pedestrian Improvements Figure (see Figure 5-1)

Bicycle Plan (Chapter 6)

Bicycle improvements in Canby are aimed at closing the gaps in the bicycle network along arterial and collector roadways and providing multi-modal links to improve livability. Facility improvements include constructing and/or striping bike lanes, improving railroad crossings, expanding and improving the connectivity of the shared-use path network, and other programs to encourage bicycling, such as Safe Routes to School.

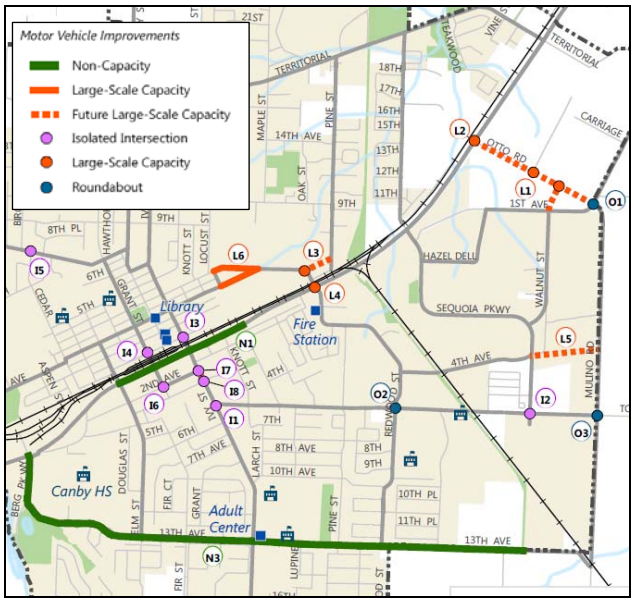
Key projects include providing bike lanes in Northeast Canby along Knights Bridge Road and North Holly Street, providing a multi-use trail along the railroad corridor, and converting a portion of North Holly Street into a Bicycle Boulevard. Improvements to pavement conditions at the railroad crossings near downtown are also planned.

Segment of Bicycle Improvements Figure (see Figure 6-1)

Motor Vehicle Plan (Chapter 7) and Financial Plan (Chapter 9)

The recommended motor vehicle improvements increase the capacity and connectivity of the transportation system and include roadway and intersection improvements. Because the entire city transportation network must work together as a whole, all improvements included in the Financially-Constrained Solutions Package are important components of the package.

The three primary locations of motor vehicle improvement projects are along South Ivy Street, near the Clackamas County Fairgrounds, and in northeast Canby in the vicinity of Otto Road. These projects will improve safety, capacity, and connectivity in order to help Canby prepare for future growth. In addition, multiple roundabouts are planned on the east side of the City that will enhance both roadway capacity and the aesthetic value of the Canby Pioneer Industrial Area.



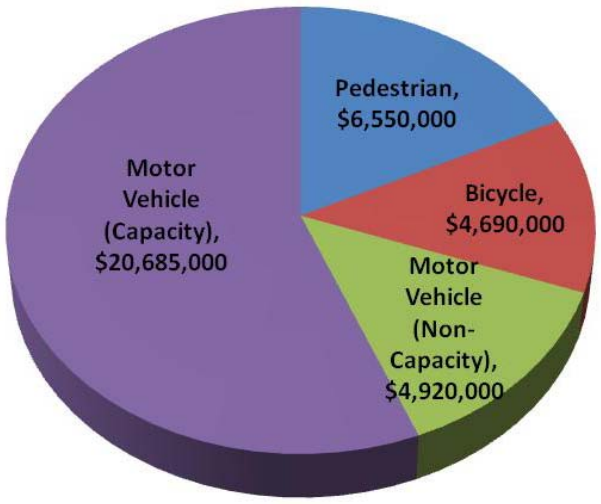
Segment of Motor Vehicle Improvements Figure (see Figure 7-10)

The city has also received approval of a request for ODOT designation of a Special Transportation Area (STA) for the downtown segment of OR 99E to promote pedestrian and bicycle and commercial activity. This designation also allows more flexible design and mobility standards.

The Financially-Constrained Solutions Package would cost approximately $36.8 million. It is expected that this package could be fully funded if the City slightly increases revenue streams. For example, the City could amend its transportation system development charge (SDC) methodology so that funds can be used for all modes and increases their SDC fee rates from $2,500 to approximately $2,580 per p.m. peak hour trip. Other options include development exactions and grant opportunities.

Financially-Constrained Solutions Package Planning Level Costs (see Table 9-6)

Transportation Mode	Planning Level Cost
Non-Capacity Improvements	
Pedestrian	$6,550,000
Bicycle	$4,690,000
Motor Vehicle (Non-Capacity)	$4,920,000
Total	**$16,160,000**
Capacity Improvements	
Motor Vehicle (Capacity)	$20,685,000
TOTAL	**$36,845,000**



Financially-Constrained Solutions Package Proportion of Project Costs by Mode

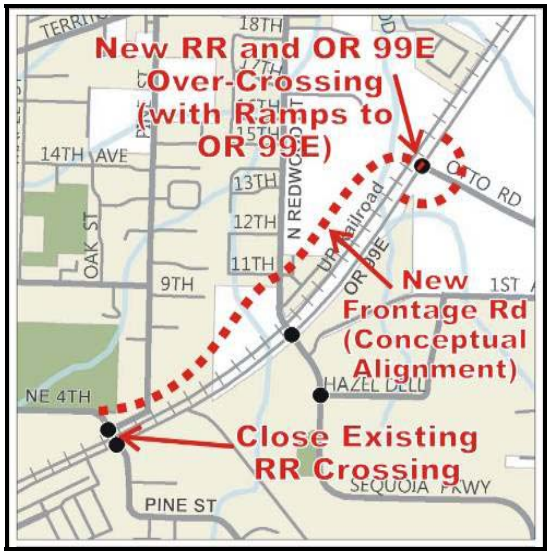
One limitation of the Financially-Constrained Solutions Package is that it doesn't fully address the bottlenecks from the downtown area trying to cross the railroad tracks to access OR 99E at North Grant Street, North Ivy Street, and 4th Avenue. Therefore, significant queuing may occur that spreads over several blocks during peak periods as the City reaches forecasted development levels in the future.

Another drawback to the Financially-Constrained Solutions Package is that not all intersections in the City would operate at desired levels through the year 2030. Specifically, the Ivy Street, Pine Street, and Sequoia Parkway traffic signals along OR 99E would exceed ODOT operating standards, and the realigned NE 4th Avenue/North Pine Street intersection would be overcapacity and experience high delays. The City may work with ODOT to pursue an Alternate Mobility Standard for OR 99E to address how this issue impacts long-term development potential.

The Preferred Solutions Package would improve traffic conditions at several locations by implementing two key roadway projects. First, it includes the Otto Road overcrossing (over OR 99E and the Union Pacific Railroad) and a frontage road connection to North Pine Street. It also includes the Berg Parkway Extension that would include a grade-separated railroad crossing from OR 99E to 3rd Street and the Sequoia Parkway Extension that would include a grade-separated railroad crossing from Township Road to SE 13th Avenue. However, this package would cost approximately $91.5 million, which is about $55 million higher than the Financially-Constrained Solutions Package.

However, while the Preferred Solutions Package is an improvement for roadway operating conditions over the Financially-Constrained Solutions Package, it still does not address the downtown queuing issues during peak periods.

The downtown queuing should be monitored by the City of Canby and additional capacity or traffic management improvements may be desired to alleviate congestion in the long-term.

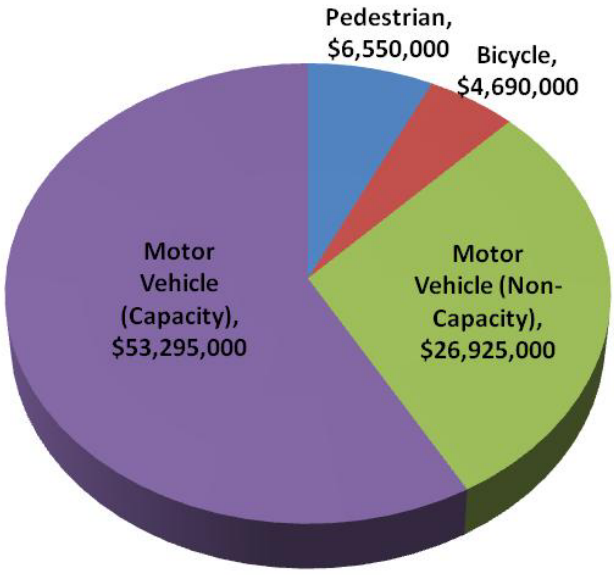


Additional Otto Road Improvements in Preferred Solutions Package (see Figure 7-12)

To afford the higher costs, the City would need to increase revenue streams. One way to do so would be to more than double SDC rates to approximately $6,100 to be more comparable to nearby communities. Other options include State and County contributions, City sources (e.g., increased taxes or Urban Renewal District funds), grants, and debt financing.

Preferred Solutions Package Planning Level Costs (see Table 9-7)

Transportation Mode	Planning Level Cost
Non-Capacity Improvements	
Pedestrian	$6,550,000
Bicycle	$4,690,000
Motor Vehicle (Non-Capacity)	$26,925,000
Total	**$38,165,000**
Capacity Improvements	
Motor Vehicle (Capacity)	$53,295,000
TOTAL	**$91,460,000**



Preferred Solutions Package Proportion of Project Costs by Mode

Additional Pedestrian, Bicycle, and Motor Vehicle Projects

Additional pedestrian, bicycle, and motor vehicle improvements projects that are not included in the solutions packages are documented in the Transportation Solutions Report (Appendix K). These project lists are a resource for selecting additional improvements as additional funding sources (such as grants, State or County contributions, or Urban Renewal District funds) become available.

Other Travel Modes (Chapter 8)

Other travel modes include transit, rail, water, air, and pipeline. Canby Area Transit (CAT) is currently engaged in a separate process of preparing a Transit Master Plan. The rail plan includes the pedestrian, bicycle, and motor vehicle improvement projects that were identified in each of their respective plans.

Implementation (Chapter 10)

The City of Canby has been provided with regulatory language that will implement the updated Transportation System Plan (TSP) and ensure consistency with the Oregon Transportation Planning Rule (TPR).

Chapter 2. Goals and Policies

Introduction

This chapter presents transportation goals and policies for the City of Canby. These goals and policies were used to guide the development of the 2030 Transportation System Plan (TSP) and the implementing ordinances for the City's development code. These goals and policies were reviewed by the Technical Advisory Committee (TAC), by the Citizen Advisory Committee (CAC) and their constituents, and by the public at an open house held in Canby on November 5, 2009.

Goals and Policies

Consistent with the Canby Comprehensive Plan,[1] the overall objective of this TSP is to assist the City of Canby "to develop and maintain a transportation system which is safe, convenient, and economical." Specific transportation goals for the City of Canby are listed below along with general descriptions and associated policies.

Goal 1: Livability

Design and construct transportation facilities to enhance the livability of the Canby neighborhoods and business community.

Policy a. Construct a seamless and coordinated transportation system that is accessible to all members of the community, is barrier-free, provides affordable and equitable access to travel choices, and serves the needs of all people and businesses, including people with low incomes, people with disabilities, children, and seniors.

Policy b. Protect Canby's "small town" quality of life through the design of transportation facilities that incorporate human or pedestrian-scale design elements and encourage community interaction.

Policy c. Protect residential neighborhoods from excessive through traffic and travel speeds by constructing needed multi-modal capacity improvement projects, modernizing key existing residential roads to arterial or collector standards, and implementing appropriate traffic calming measures on local streets.

Policy d. Provide an adequate truck route network with reasonable connectivity between the industrial areas and the regional road network, while limiting

[1] *City of Canby Comprehensive Plan*, Updated January 2007; Transportation Element, pg 92.

commercial and neighborhood conflicts. Protect residential neighborhoods, school zones, and parks from excessive truck traffic, noise, and pollutants.

Policy e. Work with Clackamas County to improve the Mulino Road railroad undercrossing to accommodate a truck route from areas southeast of Canby to OR 99E via Mulino Road and a new Otto Road extension, which would reduce reliance on SE 13th Avenue for freight movements.

Policy f. Pursue transportation improvements and policies that attenuate the Union Pacific Railroad noise level.

Policy g. Require all new or redeveloped residential areas and encourage other areas to install planter strips with street trees, including proper root barriers to preserve sidewalks, curbs, and streets.

Goal 2: Safety

Develop and maintain a safe and secure transportation system.

Policy a. Design and maintain safe and secure pedestrian and bicycle ways between residential neighborhoods, parks, schools, the Clackamas County fairgrounds, downtown Canby, and other activity centers. Sidewalks should be provided on all public streets within city limits, especially along South Ivy Street.

Policy b. Design and construct transportation-related improvements to meet applicable City and Americans with Disabilities Act (ADA) standards.

Policy c. Design safe and efficient vehicle, bicycle, pedestrian, and transit crossings at existing at-grade Union Pacific Railroad crossings, especially when high speed passenger rail service is provided in the future. Consider new grade separation projects to safely accommodate vehicles and/or bicycle, pedestrian and transit crossings.

Policy d. Develop a communication system to allow railroad personal to notify City police and fire dispatchers directly when they are about to block a major railroad crossing point, and for City dispatchers to notify the rail operator when there are stalled vehicles on the track.

Policy e. Adopt and implement access control and spacing standards for all streets under the City's jurisdiction to improve safety and promote efficient through-street movement. Access control measures should be generally consistent with Clackamas County and ODOT access guidelines to ensure consistency on City, County, and State roadways

Policy f. Install traffic calming measures (e.g., pavement treatments at pedestrian crossings, driver speed feedback signs, speed humps, curb extensions, traffic circles, and diverters) at strategic locations to lower travel speeds and improve pedestrian safety.

Policy g. Increase the safety of bus stop locations by improving pedestrian accessibility and constructing bus pullouts along OR 99E and at other high traffic volume locations.

Policy h. Prior to completing an extension of Sequoia Parkway to SE 13th Avenue, complete a traffic safety study and construct improvements along SE 13th Avenue to manage vehicle speeds (improving compliance with a 25 mph speed zone) and to improve safety for pedestrians.

Goal 3: Economic Vitality

Promote the development of the City, Region, and State economies through the efficient movement of people, goods, and services.

Policy a. Ensure a safe and efficient freight system that facilitates the movement of goods to, from, and through Canby, the surrounding region, and the state while minimizing conflicts with other travel modes, residential areas, and schools.

Policy b. Balance local access to OR 99E with the need to serve regional traffic needs. Through the design review process, promote direct property access from lower classified/lower volume streets instead of from the highway.

Policy c. Provide transportation facilities that support existing and planned land uses, consistent with the City's Comprehensive Plan.

Policy d. Evaluate land development projects to determine possible adverse traffic impacts. Adopt additional standards that specifically address when detailed traffic analysis is required, what elements of analysis will be required for each case, and what constitutes an acceptable analysis.

Policy e. Ensure that all new development contributes a fair share toward on-site and off-site transportation system improvements.

Policy f. Enhance the vitality of the Canby downtown area by incorporating roadway design elements (e.g., signing, street lights, pavement markings, and traffic calming) and waiting to implement the recommended circulation modifications on Ivy Street and Grant Street until necessary to meet mobility standards on OR 99E.

Policy g. Work with the State and County to improve Canby's connection to I-5 to allow for improved commuter and commercial travel. In the short term, reduce delays at OR 99E/Barlow Road. In the long term, develop a more direct, efficient roadway between Canby and I-5.

Goal 4: Sustainability

Provide a sustainable transportation system that meets the needs of present and future generations.

Policy a. Encourage an energy-efficient transportation system.

Policy b. Provide transportation options that reduce reliance on the automobile and increase the use of other modes to minimize transportation system impacts on the environment. (See Goal 5: Travel Choices)

Policy c. Practice stewardship of air, water, land, wildlife, and botanical resources. Take into account the natural environments in the planning, design, construction and maintenance of the transportation system.

Policy d. Incorporate natural stormwater drainage systems in the design of new streets and street improvement projects, where feasible and appropriate.

Policy e. Reduce surface storm water impacts where possible through the use of permeable pavements, design, and construction of narrower streets and reduced parking requirements where appropriate and feasible.

Goal 5: Travel Choices

Plan, develop, and maintain a citywide transportation system consisting of convenient and integrated pedestrian, bicycle, transit, and motor vehicle facilities that provide access to local and regional destinations and allows individuals to reduce single-occupant vehicle trips.

Policy a. Construct sidewalks (with planter strips, see Policy 1.f) on both sides of all streets. Include sidewalk construction in all roadway improvement projects and implement local improvement districts (LIDs) when possible to complete and connect missing sidewalk throughout town.

Policy b. Install multi-use pathways connecting new developments to the existing transportation system for sites that will generate substantial pedestrian activity.

Policy c. Require new developments abutting the Molalla Forest Road multi-use pathway to provide or accommodate a pedestrian/bicycle access to the path unless it is not deemed necessary due to a nearby, convenient access.

Policy d. Notify and coordinate new development plans with the Canby School District to ensure that proposed developments provide safe pedestrian and bicycle routes to nearby schools.

Policy e. Construct bike lanes on all new arterials and collectors within the next 20 years or provide adequate parallel bicycle facilities.

Policy f. Stripe bike lanes on streets where existing pavement widths allow or incorporate shared bicycle route markings and other indicators to increase the visibility and safety of bicyclists.

Policy g. Use neighborhood connectors as bike routes with shared travel lanes.

Policy h. Connect Canby's bicycle network to regional bicycling facilities.

Policy i. Support transportation services for the handicapped.

Policy j. Act as liaison with Canby Area Transit and other agencies and communities engaged in supplying mass transit to, from, and within Canby.

Policy k. Establish and coordinate a car-pool/van-pool system for commuters traveling to Portland, Clackamas, or Salem metropolitan areas.

Policy l. Construct a park-and-ride lot near a key transit stop servicing the region.

Policy m. Support the expansion of nearby airports where Canby can expect to derive economic benefits from such improvements.

Goal 6: Quality Design

Establish and maintain a set of transportation design and development regulations that are sensitive to local conditions.

Policy a. Design streets to support their intended users.

Policy b. Integrate bicycle and pedestrian facilities into all street planning, design, construction, and maintenance activities.

Policy c. Promote context-sensitive transportation facility design, which fits the physical context, responds to environmental resources, and maintains safety and mobility.

Policy d. Study alternative roadway alignments/cross-sections and prevent the construction of any facilities which would hinder the later development of needed arterial or collector roadways.

Policy e. Minimize private property impacts.

Policy f. Minimize the impact that roadway construction has on traffic flow and site access.

Policy g. Work cooperatively with developers prior to or during the initial stages of site design.

Policy h. Require developers to include pedestrian, bicycle, and transit-supportive improvements within proposed developments and to adjacent rights-of way in accordance with adopted policies and standards.

Policy i. Require developments adjacent to undeveloped land to provide local street stubs that future developments can connect to.

Policy j. Require developments along rail lines to plan sites and transportation facilities to allow for rail service without blocking motor vehicle traffic. Require developments to install features to block rail noise and to provide barrier fences or walls as appropriate to ensure safety and reduce rail impacts.

Policy k. Work with ODOT and the Union Pacific Railroad to identify the appropriate location, function, and design of local street crossings of the rail line in the event that high speed passenger rail service is developed and operated through Canby.

Policy l. Coordinate with ODOT to install and maintain landscaping and other aesthetic treatments to OR 99E as part of highway projects or as a condition of adjacent development.

Policy m. Encourage planned unit developments along OR 99E to facilitate consolidated access to the highway. Consider adoption of site design standards and criteria for access to OR 99E to address driveway spacing and provide for pedestrian and bicycle access to the sidewalk and transit.

Goal 7: Reliability and Mobility

Develop and maintain a well-connected transportation system that reduces travel distance, improves reliability, and manages congestion.

Policy a. Enhance local street system connectivity wherever practical and feasible to reduce reliance on OR 99E by local traffic, decrease out-of-direction travel, and provide adequate access for emergency response vehicles and for the safety and convenience of the general public.

Policy b. Maintain traffic flow, mobility, and pavement condition on arterial and collector roadways.

Policy c. Facilitate truck movements by providing adequate turn lane storage and turning radii at intersections along truck routes and accesses used by trucks.

Policy d. Adopt City mobility standards to evaluate the impacts of growth on City facilities and to ensure sufficient capacity to accommodate future travel demand (vehicular, bicycle, pedestrian, etc.) along Canby's collector and arterial streets, and along OR 99E. The standard for signalized, all way stop, or roundabout intersections should be level of service D and a volume to capacity ratio equal to or less than 0.85. The standard for unsignalized two way stop control intersections should be level of service E and a volume to capacity ratio equal to or less than 0.90. Mobility should be evaluated by methods approved by the City Engineering or Public Works Department (e.g., Highway Capacity Manual or aaSidra for roundabouts). The City standard for OR 99E must meet or exceed the *Oregon Highway Plan* mobility standard for the highway.

Goal 8: Efficient and Innovative Funding

Efficiently allocate available funding for recommended transportation improvements and pursue additional transportation funding that includes innovative funding methods and sources.

- Policy a. Plan for an economically viable and cost-effective transportation system.
- Policy b. Identify and develop diverse and stable funding sources to implement recommended projects in a timely fashion and ensure sustained funding for transportation projects and maintenance.
- Policy c. Maximize the cost effectiveness of transportation improvements by prioritizing operational enhancements and improvements that address key bottlenecks.
- Policy d. Make maintenance and safety of the transportation system a priority.
- Policy e. Identify local street improvement projects that can be funded by ODOT to improve the state highway system.
- Policy f. Provide funding for local match share of jointly funded capital projects with other public partners.
- Policy g. Prioritize funding of projects that are most effective at meeting the goals and policies of the Transportation System Plan.
- Policy h. Encourage formation of Local Improvement Districts and use of other funding tools such as system development charges (SDCs) and street maintenance or other user fees.

Goal 9: Compatibility

Develop a transportation system that is consistent with the City's Comprehensive Plan and that coordinates with County, State, and Regional plans.

- Policy a. Coordinate and cooperate with adjacent jurisdictions and other transportation agencies to develop transportation projects that benefit the City, Region, and State as a whole.
- Policy b. Work collaboratively with other jurisdictions and agencies so the transportation system can function as one system.
- Policy c. Coordinate with other jurisdictions and community organizations to develop and distribute transportation-related information.
- Policy d. Review City transportation standards periodically to ensure consistency with Regional, State, and Federal standards.
- Policy e. Coordinate with the County and State agencies to ensure that improvements to County and State highways within the City benefit all modes of transportation

Policy f. Work with Clackamas County to transfer County public streets within the Canby Urban Growth Boundary (UGB) to the City once an equivalent County funding contribution to a one-inch overlay can be provided and the City has the remaining funds necessary to perform any needed improvements to develop the streets to meet urban street standards.

Policy g. Participate with ODOT and Clackamas County in the revision of their transportation system plans, and coordinate land development outside of the Canby area to ensure provision of a transportation system that serves the needs of all users.

Policy h. Participate in updates of the ODOT State Transportation Improvement Program (STIP) and Clackamas County Capital Improvement Program (CIP) to promote the inclusion of projects identified in the Canby TSP.

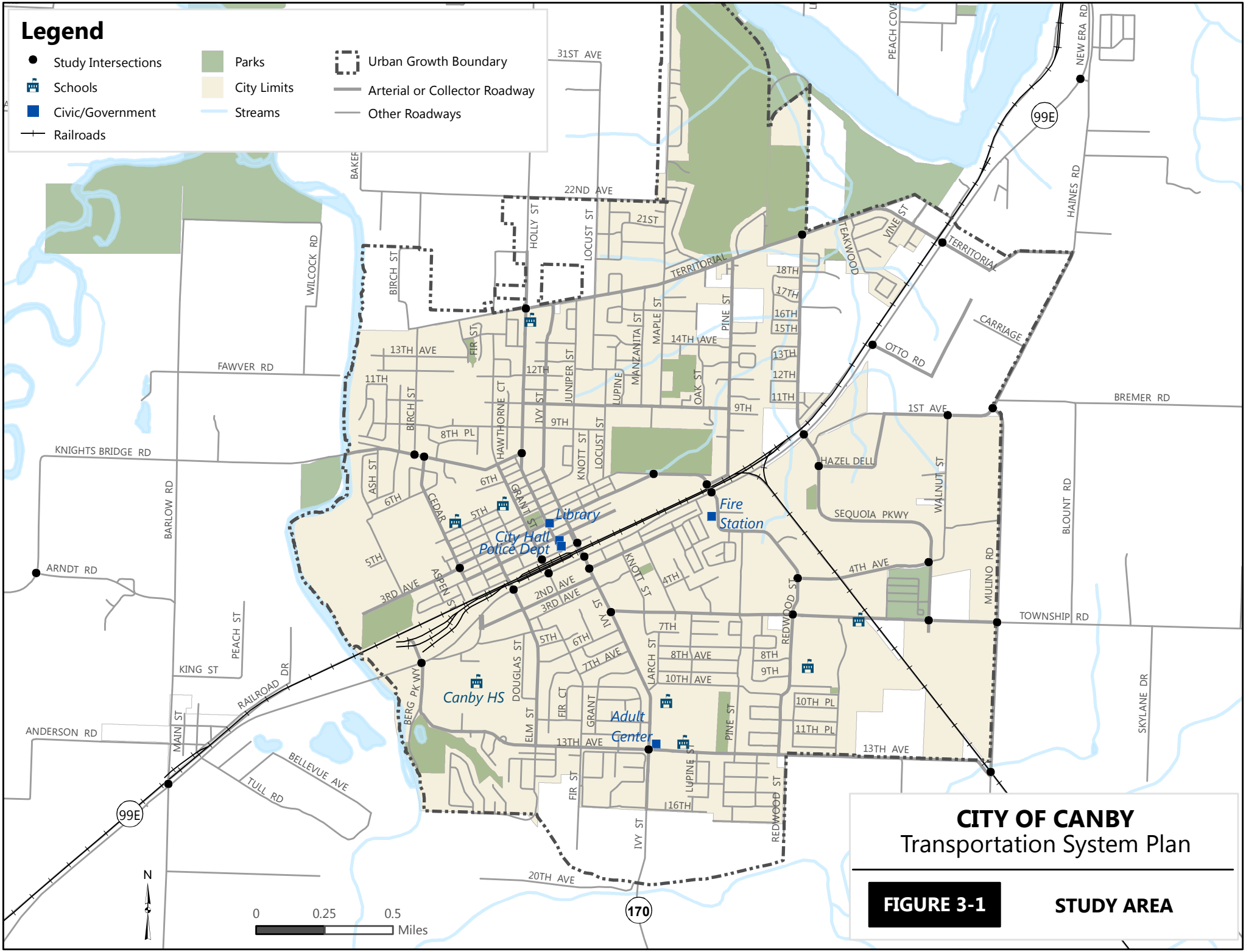
Chapter 3. Existing Conditions

Introduction

This chapter presents the type, location and efficacy of existing transportation facilities within the City of Canby. The focus of this chapter is to highlight elements of the current transportation system that do not serve the community well, whether they be limited accessibility by alternative modes, lack of connectivity, poor safety conditions or unacceptable traffic congestion. Each of the following sections concludes with a list of issues that will be carried forward for consideration in updating the relevant plan sections. We have reviewed all travel modes currently provided within the City's Urban Growth Boundary (refer to Figure 3-1 for an illustration).

The basis of our findings was taken from historical records and maps, along with a comprehensive inventory of travel patterns and conditions that was conducted during the spring and summer of 2009. A congestion assessment was made at the most heavily used intersections around the city, which included 31 intersections shown in Figure 3-1, and listed below:

- OR 99E/S Barlow Rd
- OR 99E/Berg Pkwy
- OR 99E/Elm St
- OR 99E/Grant St
- OR 99E/Ivy St
- OR 99E/Pine St
- OR 99E/Sequoia Pkwy
- OR 99E/Territorial Rd
- OR 99E/Haines Rd
- NE Territorial Rd/N Holly St
- NE Territorial Rd/N Redwood St
- Knights Bridge Rd/S Arndt Rd
- Knights Bridge Rd/N Birch St
- Knights Bridge Rd/N Cedar St
- NW 7th Ave/N Holly St
- NW 3rd Ave/N Cedar St
- NE 3rd Ave/NE 4th Ave
- NE 4th Ave/N Pine St
- NW 1st Ave/N Grant St
- NW 1st Ave/N Ivy St
- SE 1st Ave/S Walnut St
- SE 1st Ave/S Mulino Rd
- SE 2nd Ave/S Ivy St
- SE 4th Ave/S Redwood St
- SE 4th Ave/S Walnut Rd
- S Township Rd/S Ivy St
- S Township Rd/S Redwood St
- S Township Rd/S Mulino Rd
- SE 13th Ave/S Ivy St
- SE 13th Ave/S Mulino Rd
- Sequoia Pkwy/Hazel Dell Way


Legend
Study Intersections
Schools
Civic/Government
Railroads
Parks
City Limits
Streams
Urban Growth Boundary
Arterial or Collector Roadway
Other Roadways
CITY OF CANBY
Transportation System Plan
FIGURE 3-1
STUDY AREA
Canby HS
Adult Center
Library
City Hall
Police Dept
Fire Station
99E
170
N
0
0.25
0.5
Miles

Pedestrians

Livability in a community is partly defined by how safe and efficient pedestrian access is to various key destinations, such as schools, parks, and businesses. This section reviews the present pedestrian facilities and examines critical gaps and weaknesses that could be strengthened through better connections, safer street crossings or other measures. This existing conditions assessment will serve as a basis for identifying site-specific and system-wide pedestrian improvements in the City of Canby.

Pedestrian Facilities

Pedestrian travel is accommodated and enhanced by sidewalks, shared-use paths, crosswalks, curb ramps and other infrastructure. Figure 3-2 shows the current pedestrian network along arterials and collectors in the City of Canby. General observations were also made on key local streets, particularly as they relate to the schools and fairgrounds.

Sidewalks

It is common practice to provide sidewalks along arterial and collector streets so that pedestrian connectivity correlates with motor vehicle connectivity. In Canby, the majority of the arterial and collector streets have sidewalks on either one side or both sides of the street, as shown in Figure 3-2. However, many of the sidewalks are discontinuous and do not fully connect residential areas with schools, parks and short-distance retail (shopping) activities. Key locations where sidewalks are lacking are adjacent to the Clackamas County Fairgrounds and between the fairgrounds and downtown Canby. Sidewalks are also limited along OR 99E, and there are no street trees or other landscaping buffers on OR 99E to enhance the pedestrian experience by providing greater protection from vehicles, shade, and a more attractive walking environment.

The downtown core is another area where pedestrian accommodations are important. Canby's downtown pedestrian system is fairly complete with sidewalks on both sides of the street at most locations. In addition, there are a variety of complementary pedestrian facilities, including aesthetic treatments at intersections, ADA-compliant curb ramps, raised sidewalks, curb-extensions, and pedestrian-scale lighting. These features are especially prevalent along NW 2nd Avenue. Diagonal parking also creates a spatial buffer between pedestrians and motorists along sections of NW2nd and NW 3rd Avenues.

Shared-Use Paths

Shared-use paths are separated transportation facilities that provide improved access and circulation for non-motorized modes of travel. These paths also support multiple recreation activities, such as walking, bicycling, and inline skating. The Molalla Forest Road multi-use pathway is the main shared-use path in Canby and runs north/south through the eastern portion of the city. It is a logging road that was converted to a shared-use path and includes a bridge over both OR 99E and the adjacent Union Pacific Railroad tracks. North of OR 99E, the path passes through a developed residential area and has multiple accesses to the adjacent local roadways. South of OR 99E, it passes through the mostly undeveloped Canby Pioneer Industrial Area.

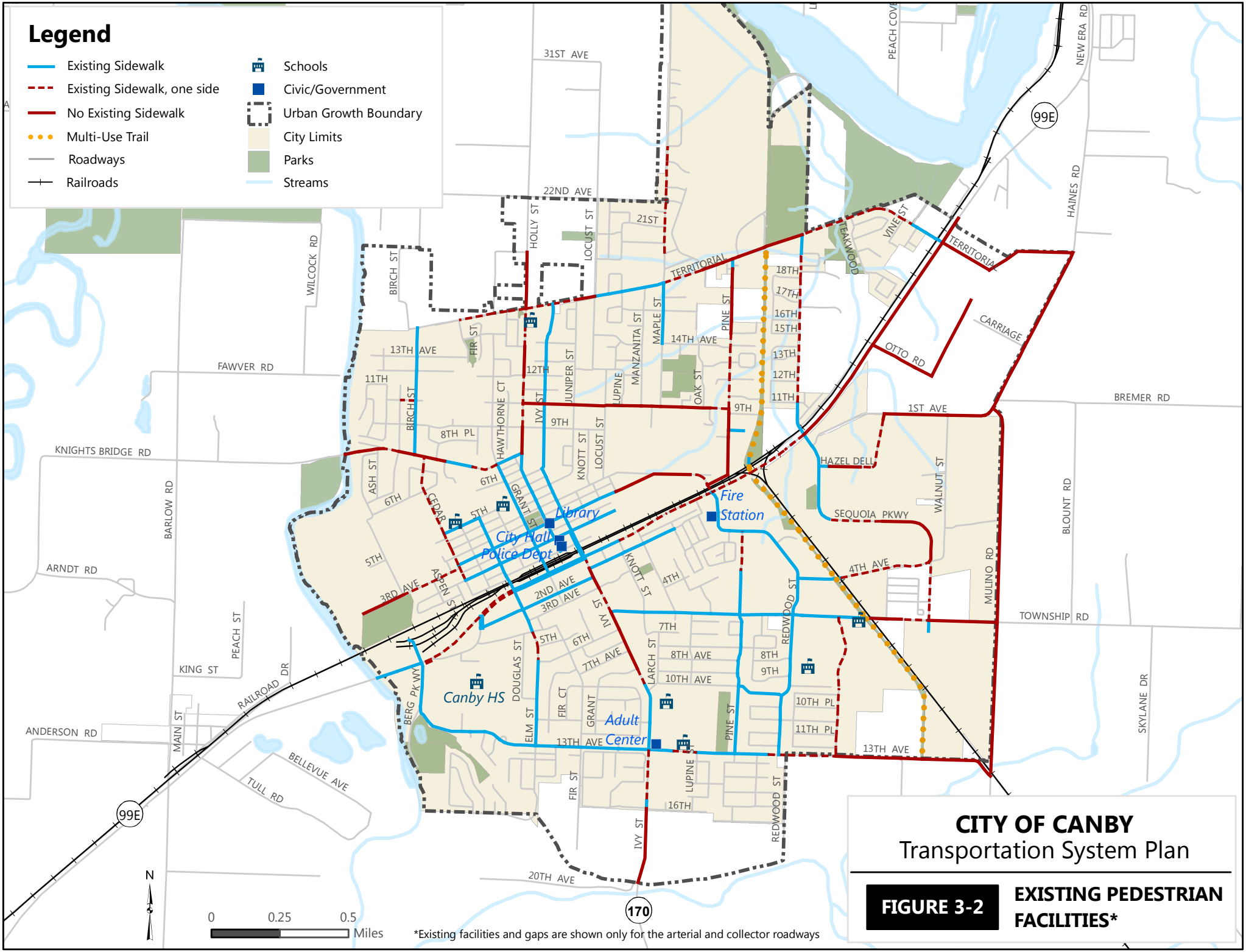
Street Crossings

Most pedestrian street crossings occur at intersections, and the quality of these crossings varies by location. Within downtown Canby, there are marked crosswalks and curb ramps at most intersections as well as at a few midblock locations, and these facilities are in good condition. Along OR 99E, protected crossings occur at the signalized intersections, but the majority of the curb ramps are in poor condition. The only unsignalized crossing of OR 99E is the grade-separated Molalla Forest Road multi-use path that crosses over the highway and railroad tracks (which is not accessible to pedestrians on OR 99E). Between Elm Street and Ivy Street, the highway crossings are spaced less than ¼ mile apart, which is considered adequate for accommodating pedestrians. To the west of Elm Street and to the east of Ivy Street, signalized highway crossings are spaced at ½ mile or greater.

On SE 13th Avenue in the southern portion of the city, there are newly installed striped pedestrian crossings with pedestrian refuge islands. These crossings calm traffic, acting as speed humps to reduce travel speeds and improve safety. They also have aesthetic features that help beautify the neighboring residential area.

Railroad Crossings

The Union Pacific Railroad and Oregon Pacific Railroad lines bisect the City of Canby and create a barrier to pedestrian travel. Pedestrian crossing facilities such as sidewalks and other safety features (e.g., striping or warning devices for the visually impaired) can help reduce the barrier effect of the railroad tracks. Most of the railroad crossings in Canby include sidewalks, with the main exceptions being at the Pine Street crossing of the Union Pacific Railroad line (near the Clackamas County Fairgrounds) and the South Township Road crossing of the Oregon Pacific Railroad line. However, none of the crossings include additional pedestrian safety devices, such as striping or audible warning devices for the visually impaired.



CITY OF CANBY
Transportation System Plan

FIGURE 3-2 **EXISTING PEDESTRIAN FACILITIES***

*Existing facilities and gaps are shown only for the arterial and collector roadways

Pedestrian Volumes

Pedestrian volumes were collected along with motor vehicle traffic counts at the study intersections. The counts were performed April 8, 2009, during a two-hour period when motor vehicle traffic was the highest. Most intersections had ten or fewer pedestrian crossing movements per hour. Locations with notably higher volumes included:

- Four study intersections on Ivy Street experienced significantly more pedestrian crossings (i.e., 25 hourly crossings on average).
- OR 99E at Ivy Street has 20 pedestrians during the peak hour.
- The greatest amount of study intersection pedestrian activity occurred on the north leg of the South Ivy Street/South Township Road intersection (33 crossings on the north leg during the peak hour).
- Elm Street and Grant Street also served higher pedestrian volumes, with approximately ten hourly OR 99E crossings at each street.

These counts capture a brief snapshot of pedestrian activity but likely do not capture the entire picture because peak pedestrian volumes don't necessarily occur at the same time as peak vehicle volumes. Weekend and/or midday or evening pedestrian activity may be significantly greater, especially around activity locations such as the fairgrounds, schools or farmers market. In the future, a better picture of existing pedestrian activity levels may be obtained by counting pedestrians at key locations during high activity periods. Some possible locations and timeframes of interest are near schools during the hours immediately prior to and immediately following the school day.

Safe Routes to School

Because schools are important pedestrian destinations for children, it is important to provide adequate pedestrian facilities along key travel routes between schools and the nearby neighborhoods they service. The Federal Safe Routes to School (SRTS) program assists community efforts to do so by providing funding for a wide variety of programs and projects. The Canby School District currently does not have a SRTS program. The following four elementary schools, two middle schools, and one high school in city limits would benefit from an SRTS program:

- **Eccles Elementary School** services the northwest part of town and is located on the northeast corner of the North Cedar Street/NW 5th Avenue intersection. It is adjacent to Knight Elementary School.
- **Knight Elementary School** services the north-central and northeast parts of town and is located on the northwest corner of the North Grant Street/NW 4th Avenue intersection. It is adjacent to Eccles Elementary School.
- **Lee Elementary School** services the south-central and southwest parts of town and is located on the southeast corner of the South Ivy Street/SE 10th Avenue intersection. It is adjacent to Ackerman Middle School.

- **Trost Elementary School** services the southeast part of town and is located on South Redwood Street just west of the intersection with SE 9th Avenue. It is adjacent to Baker Prairie Middle School.
- **Ackerman Middle School** services the west side of town and is located on the northeast corner of the South Ivy Street/SE 13th Avenue intersection. It is adjacent to Lee Elementary School.
- **Baker Prairie Middle School** services the east side of town and is located south of South Township Road and west of the Molalla Forest Road multi-use trail. It is adjacent to Trost Elementary School.
- **Canby High School** serves the entire city, with the campus extending south of the South Birch Street/SW 4th Avenue intersection all the way to SW 13th Avenue.

Pedestrian Collision History

The Oregon Department of Transportation provided collision data for 2003 through 2007. Within this time period, there were four reported collisions within the City of Canby that involved a pedestrian. In all reported instances the pedestrian was injured. The collisions occurred at the following locations:

Intersections

- Knott Street/NE 3rd Avenue
- OR 99E/Pine Street

Midblock Locations

- On NW 4th Avenue between Grant Street and Fir Street
- On NW 3rd Avenue between Ivy Street and Holly Street

The pedestrian collision locations are shown later in this chapter (see Figure 3-10). Three of the four collisions were in the vicinity of downtown Canby.

Existing Pedestrian Issues

Based on the existing pedestrian facilities inventory, the following issues were identified:

- OR 99E and the Union Pacific Railroad are major barriers to north/south travel across the city.
- Protected pedestrian crossings of OR 99E occur at the signalized intersections but for the most part the sidewalks and curb ramps are in poor condition.
- To the west of Elm Street and to the east of Ivy Street, signalized crossings of OR 99E are spaced at ½ mile or greater, which is not adequate for convenient crossings.
- Many of the sidewalks are discontinuous and do not fully connect residential areas with schools, parks and short-distance retail (shopping) activities. In particular,

sidewalks are lacking adjacent to the Clackamas County Fairgrounds and between the fairgrounds and downtown Canby.

- Sidewalks are lacking along significant portions of OR 99E.
- None of the railroad crossings include additional safety devices, such as striping or warning devices for the visually impaired. In addition, the following railroad crossings have issues of particular concern to pedestrians:
    - North Ivy Street crossing of Union Pacific Railroad has steeply inclined pedestrian approach on northwest corner and deteriorating curb on the northeast corner.
    - North Pine Street crossing of Union Pacific Railroad (near the Clackamas County Fairgrounds) does not have sidewalks,
    - South Township Road crossing of Oregon Pacific Railroad does not have sidewalks and the guardrails on either side of South Township Road force pedestrians towards the roadway.
- The Canby School District currently does not have a Safe Routes to School (SRTS) program.

Bicycles

Bicycling is the second-most common non-motorized mode of transportation (after walking) and contributes to the livability of Canby. Bicycles often use the same facilities as pedestrians; therefore to avoid overlap, this section focuses primarily on bicycle-specific facilities in the City of Canby. Following the facilities review, this section summarizes existing system deficiencies of the bicycle network. This assessment will serve as a basis for identifying site-specific and system-wide bicycle improvements in the City of Canby.

Facilities

Several types of bicycle facilities exist in Canby, including bike lanes, shoulder bikeways, shared-use paths (also known as trails or multi-use paths), and shared roadways. Figure 3-3 shows the current bike network. The inventory and assessment largely focused on the arterial and collector street system, as citywide transportation system plans typically do not address site-specific conditions on local streets. General observations were also performed on local streets identified as key bicycle routes, particularly as they relate to the schools and regional bike routes. Railroad crossings were also evaluated for bicycle safety.

Bike Lanes

The prior Canby TSP indicated that the intent is to provide bike lanes on all arterials and collectors, especially as new facilities are being constructed.[2] As shown in Figure 3-3, bike lanes are present on only some of the arterial and collector streets throughout Canby. They are more common among the newly constructed streets in the southern portion of the city. Some of the key locations lacking bike lanes are along OR 99E and in the northwest portion of the city. The major gap in bike lanes along Ivy Street is in the vicinity of OR 99E and the Union Pacific Railroad.

Shoulder Bikeways

Shoulder bikeways are another way to accommodate bicyclists and are a typical practice on major rural routes where there are higher traffic speeds. While they are not specifically striped as bike lanes and may serve other purposes (e.g., emergency pull-outs, additional width for turning movements), shoulder bikeways do provide adequate widths for bicycle traffic to be safely accommodated. As shown in Figure 3-3, the portions of OR 99E on the edges of town include shoulder bikeways, though between Elm Street and Berg Parkway on the west side of town there is only a shared bikeway on one side of the street. Although shoulder bikeways are appropriate in rural areas, as development occurs along a roadway, marked bike lanes should be established.

Shared Use Paths

Shared-use paths are separated transportation facilities that provide alternative circulation for non-motorized modes of travel. These paths also support recreation activities, such as walking, bicycling, and in-line skating. The Molalla Forest Road multi-use pathway is the

[2] *City of Canby Transportation System Plan (TSP)*, Adopted April 19, 2000.

main shared-use path in Canby and runs north/south through the eastern portion of the city. It is discussed in more detail earlier in this chapter in conjunction with the pedestrian facilities. It is also shown in Figure 3-3.

Shared Roadways

Most local streets in Canby are low speed/low volume roadways that function as shared roadways. These streets can accommodate bicyclists of all ages and currently have little need for dedicated bicycle facilities (e.g., bicycle lanes) with generally low vehicle volumes (3,000 ADT or less) and low posted speeds (25 mph or less). One of the roadway functional classes identified in the prior TSP is a "neighborhood connector." Roadways with this functional classification were specifically designated as bike routes with shared travel lanes.[3] However, speeding by motorists can create safety concerns for bicyclists on these neighborhood connectors, especially in locations where on-street parking forces a narrower travel way.

Bicycle Parking

Bicycle parking is an essential component of a community's bikeway network, and can significantly influence whether a person decides to complete a trip by bicycle. Chapter 16 of the City of Canby Municipal Code lists the minimum required number of bicycle parking spaces required for various land use categories.[4]

Railroad Crossings

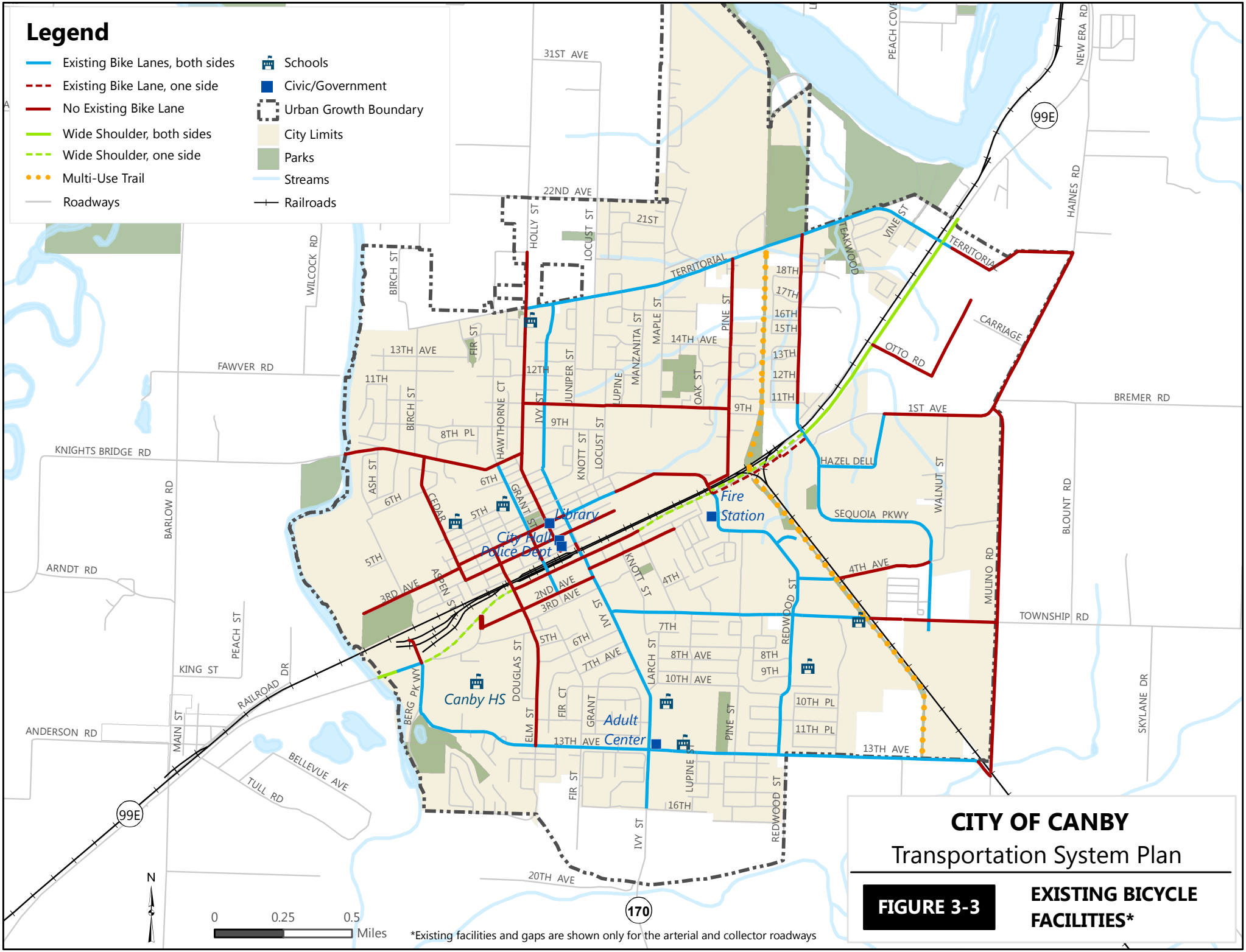
The Union Pacific Railroad and Oregon Pacific Railroad lines bisect the City of Canby and create a barrier to bicycle travel. The two most critical issues related to bicycle safety at railroad crossings are the angle at which the railroad intersects the bicycle facility (e.g., roadway) and the size of the gap next to and on the inside of the rail. These issues are most critical when the railroad track crosses at an angle of less than 45 degrees.

At most of the railroad crossings in Canby, the railroad tracks are perpendicular to the roadway and, therefore, are accommodating to bicyclists. Even at the two angled OR 99E crossings of the Oregon Pacific Railroad line, the multi-use path on the south side of OR 99E is aligned so that it shifts in order to cross the railroad tracks perpendicularly.

While the crossing angle is not a concern at Canby railroad crossings, there are gaps next to rails at most of the crossings, which is a safety concern. Through the main part of Canby, the gaps occur mostly at the auxiliary (i.e., southern) rail track primarily due to the deterioration of the adjacent asphalt fill. The mainline track crossings have concrete fillers that prevent large gaps from forming for the majority of the crossing, but some gaps have formed on the outer edges beyond the concrete fillers. The roadway surface is also uneven at some of the crossings, which is also a hazard to bicyclists.

[3] *City of Canby Transportation System Plan (TSP)*, Adopted April 19, 2000.

[4] *City of Canby Municipal Code - Title 16, Planning & Zoning*, Table 16.10.100



*Existing facilities and gaps are shown only for the arterial and collector roadways

CITY OF CANBY

Transportation System Plan

FIGURE 3-3

EXISTING BICYCLE FACILITIES*

Bicycle Volumes

Bicycle volumes were not counted at the study intersections; however, bicyclists were seen during summertime field visits at various locations on the edges of town and in the downtown core. Mostly recreational cyclists were seen using rural roads on the edges of town as well as the bike lanes along South 13th Avenue, while some commuters were seen in and near downtown. These are general observations; a better picture of existing bicycle activity levels could be obtained by counting bicyclists at key locations during known high activity periods, especially near schools during the hours immediately prior to and following the school day.

Bicycle Collision History

The Oregon Department of Transportation provided collision data for 2005 through 2007. Within this time period, there were no reported collisions involving a bicycle.

Existing Bicycle Issues

Based on the existing bicycle facilities inventory, the following issues were identified:

- Bike lanes are absent on some arterial and collector streets throughout Canby.
- Key locations lacking bike lanes are along OR 99E through town and in the northwest portion of the city.
- The main gap in bike lanes along North Ivy Street (which provides north/south travel for bicyclists in the center of the city) is in the vicinity of OR 99E and the Union Pacific Railroad.
- On OR 99E between Elm Street and Berg Parkway there is a wide shoulder on only one side of the street.
- Neighborhood connectors are designated as bike routes with shared travel lanes, but speeding by motorists can create safety concerns for bicyclists, especially in locations where on-street parking forces a narrower travel way.
- There are potential safety concerns for bicyclists at the following railroad crossings due to gaps adjacent to rails or uneven crossing surfaces:
    - North Elm Street crossing of Union Pacific Railroad has gaps adjacent to the rail, asphalt fill is breaking away, and the surface is rough.
    - North Grant Street crossing of Union Pacific Railroad has gaps adjacent to the rail.
    - North Pine Street crossing of Union Pacific Railroad has gaps adjacent to the rail.
    - South Township Road crossing of Oregon Pacific Railroad has gaps adjacent to the rail.

Transit

Transit systems provide a transportation option for the community as an alternative to private vehicles. Transit is particularly important for transit-depending populations: the elderly, disabled, youth, and those with low incomes. Transit use, particularly during peak commute hours, can help reduce traffic congestion and the need for roadway capacity improvements; as well as provide greenhouse gas reduction. Existing transit service, facilities, and issues in Canby are described in this section.

Transit Service

Transit service in Canby is principally provided by Canby Area Transit (CAT), which provides service within the city as well as to neighboring communities. There are four fixed CAT routes that run five days a week, are free to riders (with the exception of those traveling to or from Wilsonville using the Purple Line), and use buses that are ADA-accessible and equipped with bike racks. Prior to September 2009, the Green, Blue, and Orange Lines also operated on Saturdays, but now all routes only operate on weekdays. Operation of the Purple Line is shared with the South Metro Area Regional Transit (SMART) operated out of Wilsonville. In addition, the South Clackamas Transportation District (SCTD) provides weekday service between Canby and Molalla. Key route information is listed in Table 3-1, which includes a description of the routes' service areas, hours of operation, and headways. The four CAT routes are also shown in Figure 3-4.

Table 3-1: Key Route Information for Transit Service in Canby

Transit Route	Service Area	Hours of Operation	Frequency
CAT Green Line	In Canby north of OR 99E	Weekdays from 7:00 a.m. to 7:30 p.m.	1 hour
CAT Blue Line	In Canby south of OR 99E	Weekdays from 6:30 a.m. to 8:00 p.m.	1 hour
CAT Purple Line	Between Canby and Wilsonville	Weekdays from 6:00 a.m. to 7:30 p.m.	1 hour for a.m., midday, and p.m. peak periods; 2 hours in late morning and early afternoon
CAT Orange Line	Along OR 99E from Oregon City to Woodburn	Weekdays from 5:00 a.m. to 9:00 p.m.	30 min. for a.m. and p.m. peak hours; 1 hour for midday and late evening
SCTD Molalla to Canby	Between Canby and Molalla	Weekdays from 7:30 a.m. to 5:30 p.m.	1 to 2 hours

Source: www.canbyareatransit.org

Transit Facilities

Transit facilities within Canby include bus stops and a transit center. The main bus stops, along with all stops on OR 99E, are shown in Figure 3-4. The three main connection locations within the city are also identified.

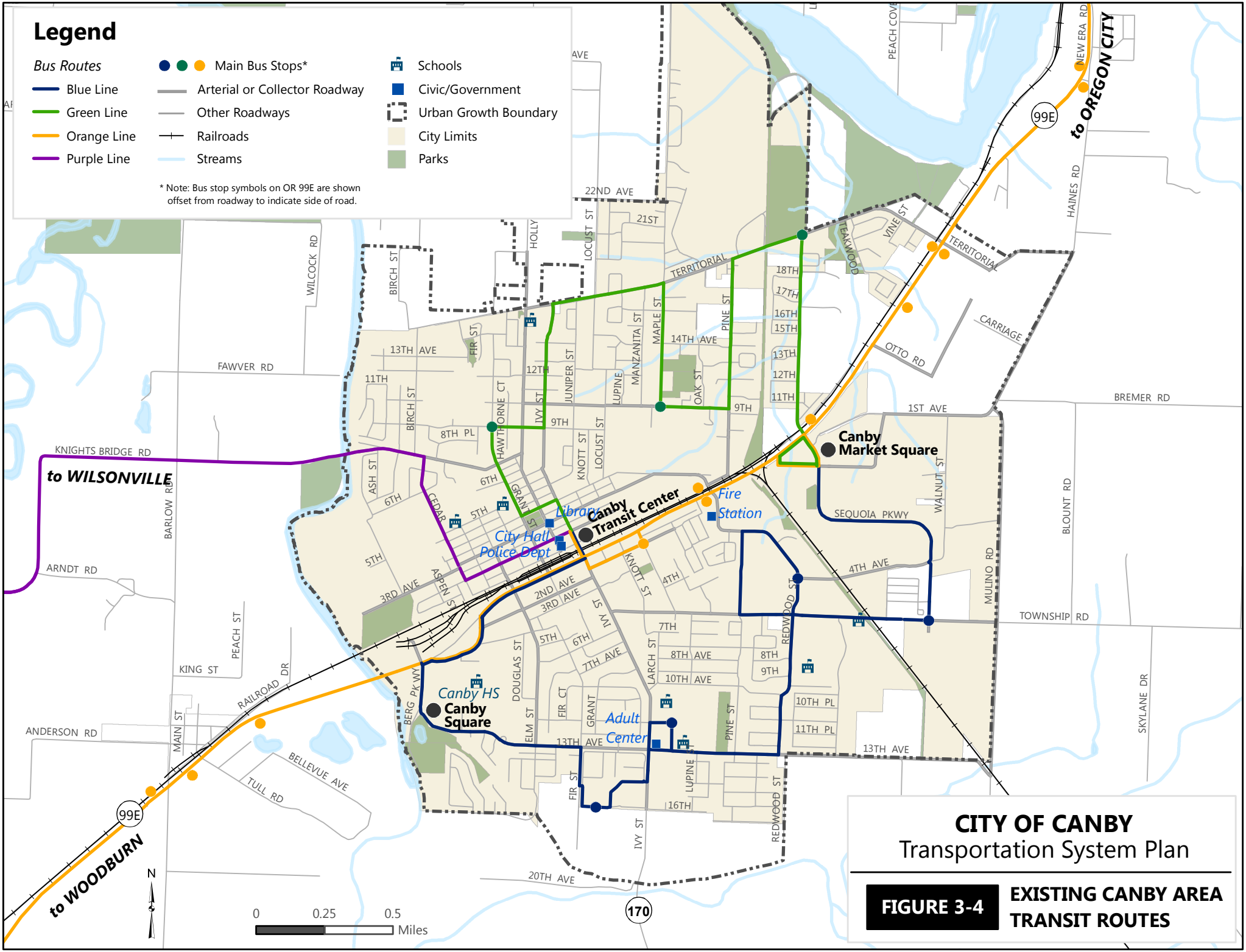


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FIGURE 3-4 **EXISTING CANBY AREA TRANSIT ROUTES**

Issues relating to the existing transit facilities were identified by CAT and are being addressed in the current development of a Transit Management Plan (TMP), including:

- There are eleven CAT bus stops along OR 99E within the project study area, and six of these are within the Canby UGB. Generally, sidewalks along OR 99E are absent, and would be a benefit to passengers. At a minimum landing pads are needed at most OR 99E bus stops, and critical locations were identified based on the ability of CAT busses to safely accommodate passenger boarding and alighting using the wheelchair lift. Needed shelter locations are also in the process of being identified as part of the TMP.
- The Canby Transit Center, located at the corner of North Ivy Street and NE 1st Avenue, provides connections to all four routes. Currently, CAT is on the verge of outgrowing the existing transit center. Because the existing location has no space available for growth, a new site will be needed. CAT has begun conversations to identify potential sites as part of the Downtown Railroad Parking Lot Redevelopment Concept Plan, but a specific location has not been selected. The relocation of the transit center is CAT's primary capital issue in Canby.
- The other two main transit connection locations are at Canby Market Center on the east end of town and Canby Square on the west end of town. These transfer points are located at private shopping centers and are in need of transit stop amenities (e.g., shelters, landing pads, and waiting areas), which will require agreements with the private land owners.
- Connectivity with nearby land uses and between other travel modes is also a transit issue. The main area of concern is along OR 99E between Ivy Street and Elm Street. Enhanced crosswalks and pedestrian access (including mid-block crossing treatments and other enhancements) are desired for the existing access points, and this issue has also been raised in the Downtown Redevelopment planning process. Currently, there are no park-and-ride facilities in Canby. If a park-and-ride is desired, the three main transfer points should be considered as preferred locations.

Connection with Rail or Amtrak Thruway Bus Service

Canby Area Transit does not have any existing connections with either passenger rail service or the associated Amtrak "Thruway" buses. Passenger trains currently use the Union Pacific mainline through Canby but do not stop. Amtrak Thruway buses do not stop in Canby, either, but they do not pass through Canby because they use I-5 to travel between Eugene and Portland. Therefore, even though CAT would like Canby to become a stop for at least the Thruway buses (so they could serve as a commuter line to downtown Portland) it is unlikely that requests would be granted. Furthermore, it is possible that passenger rail service may be moved off of the Union Pacific line in the near future; this would prohibit potential future connections.[5] Should future rail connections be possible,

[5] *ODOT Intercity Passenger Rail Study*, ODOT Rail Division, June 2009 Draft.

CAT recommends incorporating the old Train Depot into a transit center in the downtown area as part of the Downtown Railroad Parking lot redevelopment concept plan.

Vanpools and Carpools

Vanpools and carpools are other forms of shared transportation for commuters. These transportation options are primarily the responsibility of individual commuters, but the city can assist and encourage their formation and use.

In a vanpool, there is typically a monthly fee associated with each seat in the van as well as predetermined pick-up and drop-off times and locations. Currently there is one vanpool that has a stop in Canby. This vanpool is organized by Valley VanPool and in the morning travels between Portland and Salem, with an intermediate stop in Canby. In the evening, it returns from Salem to Portland via Canby. If there is demand, additional vanpools can be organized by interested individuals, employers, or the City through Valley VanPool (for Salem area destinations) or Metro VanPool (for Portland area destinations).

Carpools are not affiliated with or run by any organization; however, Metro sponsors CarpoolMatchNW.org. This is a website that helps match potential carpool candidates throughout the Portland Metropolitan Area, including those who live or work in Canby. Based on information provided by Metro, there are approximately 50 registered users that list Canby as their origin and four that list Canby as their destination. Metro did not have data compiled to indicate whether this use level is higher or lower than average for similar sized communities, though staff did indicate that there are more than 11,000 registered users on the website.

Existing Transit Issues

Based on the existing transit facilities inventory, the following issues were identified:

- A new, larger site is needed for the Canby Transit Center.
- Bus stops with shelters, landing pads, and waiting areas are needed at the Canby Market Center and Canby Square transfer points.
- Bus stops along OR 99E require buses to stop traffic in the right travel lane and may affect highway operations.
- Additional facilities are needed at the following bus stops along OR 99E:
    - Northbound stop adjacent to Spinning Wheel restaurant needs a landing pad, sidewalk, or similar improvement
    - Northbound stop at Territorial Road needs a landing pad, sidewalk, or similar improvement
    - Northbound stop at Haines Road should be moved 50 feet south of existing location

  - Southbound stop at Territorial Road needs a landing pad, sidewalk, or similar improvement
  - Southbound stop at Sequoia Parkway should be moved 30 feet north of existing location
  - Southbound stop at Pine Street needs a landing pad, sidewalk, or similar improvement

- CAT no longer provides Saturday service.
- Canby does not have a park-and-ride lot.
- Canby is serviced by only one vanpool; however, additional vanpools can be organized by interested individuals, employers, or the City if there is sufficient demand.

Motor Vehicles

The use of personal motor vehicles is the predominant transport mode for Canby residents, businesses and visitors. In addition, freight movement for medium and heavy trucks is an important aspect of the transportation system. Existing motor vehicle facilities, traffic and truck volumes, intersection operations, safety, and existing issues within Canby are described in this section.

Motor Vehicle Facilities

The motor vehicle system in Canby includes city streets, county roads, and state highways. The existing jurisdiction, classifications, standards, and physical conditions of these facilities are documented in this section.

Roadway Jurisdiction

The roadways within the study area fall under three main jurisdictions: the City of Canby, Clackamas County, and the Oregon Department of Transportation (ODOT). Roadway ownership and maintenance responsibilities depend on the roadway authority. In addition, required design and operation standards for each roadway and intersection vary by agency. A map showing the jurisdiction of study area roadways is included as Figure 3-5.

The only study area roadway under ODOT jurisdiction is OR 99E (Pacific Highway East). It is a Regional Highway designated as a truck route (but not a state Freight Route) and is the main corridor providing regional access. To the north it connects Canby to Oregon City, I-205, and the east side of the Portland Metropolitan Area. To the south it is a regional route that passes through multiple communities and cities and also provides access to I-5, particularly for origins or destinations to the south.

Clackamas County has jurisdiction of a few roadways within city limits and of all study area roadways outside city limits (with the exception of OR 99E and roadways within the Barlow UGB). The principal County roadways include Arndt Road, Township Road and portions of Knights Bridge Road, South Ivy Street (Canby-Marquam Highway), and SE 13th Avenue. Knights Bridge Road and Arndt Road are used as the primary route to northbound I-5 because they provide the most direct connection to the I-5 Charbonneau interchange. South Ivy Street (Canby Marquam Highway) provides access to the rural area to the south of Canby, and Township Road provides access to the rural area to the east of Canby.

The majority of roads within city limits are under city jurisdiction. The major city roads include Territorial Road and portions of South 13th Avenue and Ivy Street. Territorial Road is the major east/west arterial route in the northern part of the city, while South 13th Avenue is the major east/west arterial route in the southern part of the city. Ivy Street is the city's major north/south arterial route.

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FIGURE 3-5

ROADWAY JURISDICTION

Functional Classification

The functional classification of a roadway helps determine design features, speeds, and accessibility consistent with the intended function of the facility. Each road authority creates its own hierarchy of functional classification categories and determines the designated classification for each roadway.

The City of Canby has five main functional classification categories: highway, arterial, collector, neighborhood connector, and local street. Arterials provide mobility within and through town, local streets provide access to residents and businesses, and collectors provide a transition between arterials and local streets. Neighborhood connectors have elements of both collectors and local streets and are assigned to roadways whose primary functions are to provide local access to adjacent properties and to facilitate movements into, out of, and between neighborhoods. Because OR 99E is significantly different from all other streets in Canby, it was assigned its own functional classification (i.e., highway). A table identifying the specific street characteristics for each of the Canby functional classes was provided in the 2000 Canby TSP and is reproduced in Appendix C as part of the Background Document Review Memorandum. The Canby roadway functional classifications are shown in Figure 3-6.[6]

[6] *City of Canby Transportation System Plan (TSP)*, Adopted April 19, 2000.

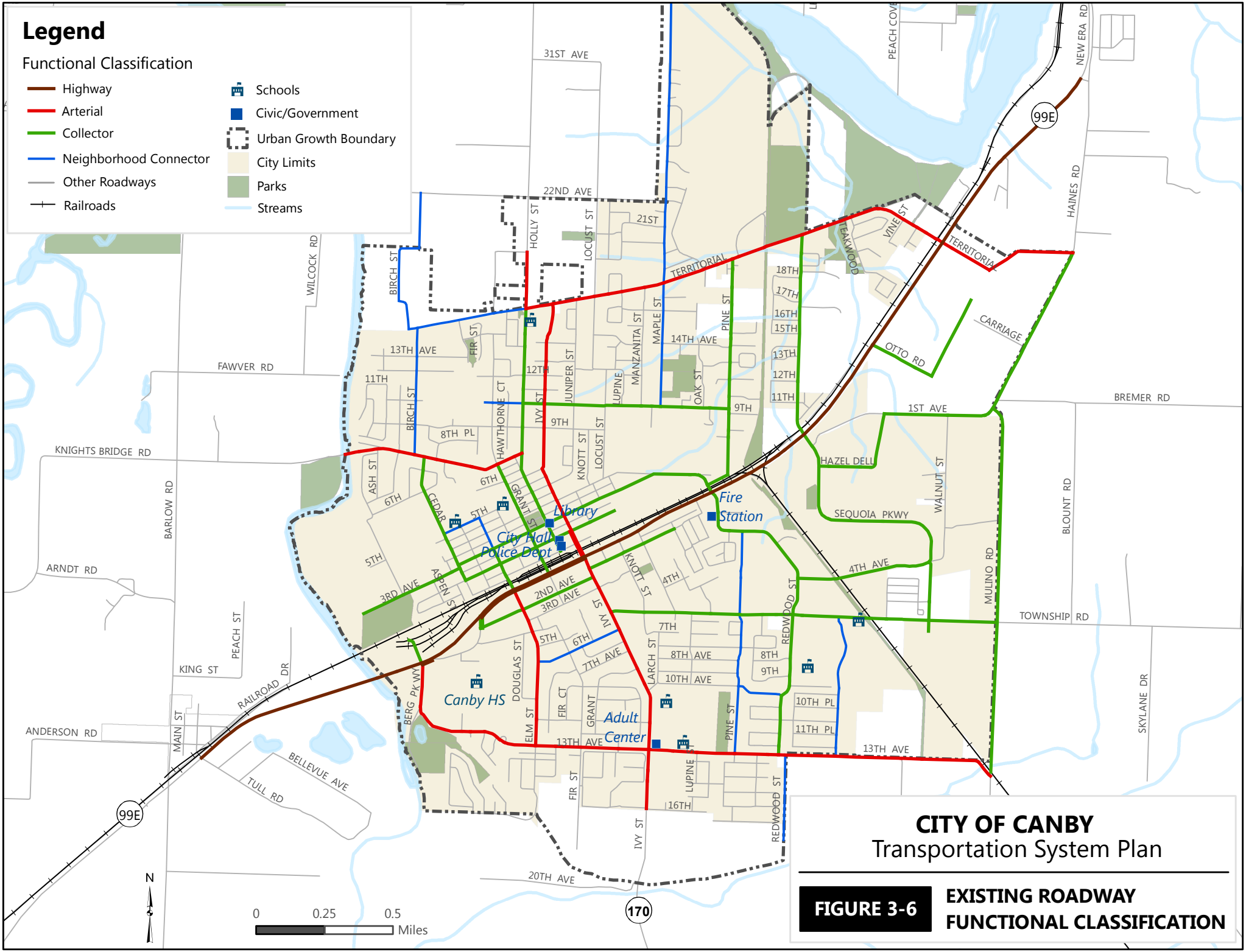

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FIGURE 3-6 **EXISTING ROADWAY FUNCTIONAL CLASSIFICATION**

Clackamas County also has designated functional classifications for key roadways in and around Canby. The applicable designations include major arterial, minor arterial, collector, and connector. The roadways in and near Canby that have Clackamas County classifications are listed below.

Major Arterials:

- OR 99E
- South Ivy Street
- North Holly Street
- Knights Bridge Road
- Arndt Road

Minor Arterials

- Barlow Road
- Township Road
- Territorial Road
- Holly Road (north of Canby)
- South Mulino Road (south of South Township Road)

Collectors

- SE 1st Avenue
- South Mulino Road (north of South Township Road)

Connectors

- SE and SW 13th Avenue
- North Redwood Street

Tables identifying the specific street characteristics for each of the County functional classes were provided in the Clackamas County Comprehensive Plan and are reproduced in Appendix B as part of the Background Document Review Memorandum.[7]

The Oregon Department of Transportation (ODOT) functionally classifies state highways. The *Oregon Highway Plan* indicates that OR 99E (Pacific Highway East) is designated as a Regional Highway and a truck route, but it is not a state Freight Route. The *Oregon Highway Plan* uses state highway classification, along with posted speeds and surrounding land use characteristics to set mobility and access management spacing standards for the highway.

[7] *Clackamas County Comprehensive Plan*, Latest text revision on Jan. 17, 2009; Chapter 5, Map V-2b.

Access Management Standards

Currently adopted access management standards for Canby, Clackamas County, and ODOT roadways call for minimum distances between access points on the same side of the street. The City of Canby access management standards in Table 3-2 below are from the 2000 Canby TSP[8] and Table 16.46.030 of the Municipal Design Code. These standards are generally consistent with current transportation guidelines and practices.

Table 3-2: City of Canby Access Management Standards

Functional Classification	Minimum Spacing	Residential Use	Commercial and Industrial Use
Arterial	300 feet	No direct access for private drives serving fewer than five dwellings	Shared access driveway consideration required as part of the design review application if spacing standards are not met. Major street left turn lanes determined through review.
Collector	150 feet	Shared access driveways are encouraged where appropriate to meet spacing standards.	Shared access driveways are encouraged. Major street left turn lanes determined through review.
Neighborhood Connector	75 feet	Shared access driveways are encouraged where necessary for spacing.	Maximum of one 45-foot wide access per 200 foot of frontage or fraction thereof.

Source: Table 4-1, City of Canby TSP, 2000.

Clackamas County access management standards are found in the Clackamas County Comprehensive Plan[9] and are shown in Table 3-3.

Table 3-3: Clackamas County Access Management Standards

Functional Classification	Land Access
Major arterial	Restricted[a]
Minor Arterial	Restricted if an alternative is available
Collector	Generally allowed, but residential driveways are limited[b]
Connector	Allowed
Local	Allowed
Alley	Allowed

[a] The County accepts the State's access control standards for State facilities.
[b] May be restricted on collectors with high volume, high access, impaired visibility, or other significant problems.

The access management standards are adopted by ODOT in the *Oregon Highway Plan* and OAR 734-051, the state access management rule, and vary depending on posted speed and adjacent land characteristics. The standards applicable to roadways within the study area are summarized in Table 3-4.

[8] *City of Canby Transportation System Plan (TSP)*, Adopted April 19, 2000.

[9] *Clackamas County Comprehensive Plan*, Latest text revision on Jan. 17, 2009; Chapter 5, Map V-2b.

Table 3-4: Applicable *Oregon Highway Plan* Access Management Standards

Highway Category[a]	Minimum Approach Spacing Standards[b] (by Posted Speed)			
	≥55 mph	*40,45 mph*	*30,35 mph*	*≤25 mph*
Regional Highway (rural)	990 feet	750 feet	600 feet	450 feet
Regional Highway (urban)	990 feet	750 feet	425 feet	350 feet

[a] OR 99E is classified by ODOT as a Regional Highway.
[b] Measurement of the approach road spacing is from center to center on the same side of the roadway.

Source: 1999 Oregon Highway Plan, Appendix C, Table 14

Existing driveway spacing along OR 99E through Canby was evaluated to determine conformity with OHP standards. The findings are listed in Table 3-5 by highway section. There are between five to ten times as many driveways on OR 99E through Canby above the OHP minimum access spacing standard, which increases the number of potential conflicts along the highway and restricts traffic flow due to slow moving vehicles entering and exiting the highway. Where possible through site redevelopment or as part of highway improvement projects, approaches should be consolidated or removed, particularly when a driveway can be provided to a side street or access can be shared with adjacent developments. Other possible treatments include the reconstruction of driveways or the installation of medians to limit movements to right-in/right-out. Urban approach standards apply to projects within the Canby UGB.

Table 3-5: OR 99E Existing Access Summary

Highway Section	Posted Speed	Segment Distance	Access Points[a]	
			Max Required to Meet OHP Spacing Standard	*Actual*[b]
Barlow Rd to Pudding River	55 mph	4,400 ft	4	20
Pudding River to Berg Pkwy	45 mph	830 ft	1	2
Berg Pkwy to Birch St	45 mph	1,420 ft	2	9
Birch St to Elm St	35 mph	800 ft	2	8
Elm St to Grant St	35 mph	680 ft	1	10
Grant St to Ivy St	35 mph	690 ft	1	8
Ivy St to Pine St	35 mph	2,670 ft	6	27
Pine St to Sequoia Pkwy	45 mph	1,970 ft	2	6
Sequoia Pkwy to Territorial Rd	45 mph	4,450 ft	6	11
Territorial Rd to Madrona Ln	45 mph	2,010 ft	2	2
Madrona Ln to Haines Rd	55 mph	2,080 ft	2	4

[a] All access points are included (i.e., public streets and private driveways).
[b] Instances where two access points are directly across from one another are counted as only one access point.

Posted Speeds

An inventory of posted speeds along the arterial and collector roadways in Canby is shown in Figure 3-7. The majority of the streets within the UGB have posted speed limits of 25 miles per hour (mph). Arterial roadways outside of downtown and residential areas have higher speeds, ranging from 30 mph to 40 mph. A few of the collectors in the industrial areas have 35 mph posted speeds.

One location of note is on Knights Bridge Road on the edge of town. At this location, Knights Bridge Road transitions from a 45 mph rural road to a 25 mph neighborhood street. This transition occurs over a short distance, most of which is on an uphill climb. This situation contributes to many drivers choosing to travel at higher-than-posted speeds on the 25 mph neighborhood street.

Truck Routes

Trucks play an important role in the economical movement of raw materials and finished products, and efficient truck movement should be a goal of a city's transportation network; however, it is important that other goals, including neighborhood livability, public safety, and minimized roadway maintenance costs not be overlooked when considering the accommodation of trucks. Truck mobility and routing is especially important in Canby due to the high proportion of industrial land and limited access to I-5.

The designation of truck routes can encourage efficient movements while also directing truck traffic away from neighborhoods and other locations of concern. Existing truck routes were identified in the City of Canby Comprehensive Plan and are shown in Figure 3-8.[10] OR 99E is also a designated route on the national freight network. Therefore, future improvements on the highway will need to address any reductions of capacity pursuant to ORS 366.215. On the whole, truck routes follow the major routes into, out of, and through the City of Canby, including:

- OR 99E
- Knights Bridge Road
- South Ivy Street
- North Holly Street
- Territorial Road
- SW 13th Avenue

In addition, there are other truck routes in Canby that are designated to serve particular purposes. In the northwest part of town, Baker Drive, NW 3rd Avenue, and North Elm Street are designated to provide access to the small industrial pocket along Baker Drive. Trucks used to leave this industrial pocket by heading north through the residential area, but North Baker Street was converted to one-way in an attempt to better enforce the truck restriction through the neighborhood. Truck routes are also designated on South Pine Street and NE 4th Avenue to provide truck access to the Clackamas County fairgrounds.

[10] *City of Canby Comprehensive Plan*, Updated January 2007.

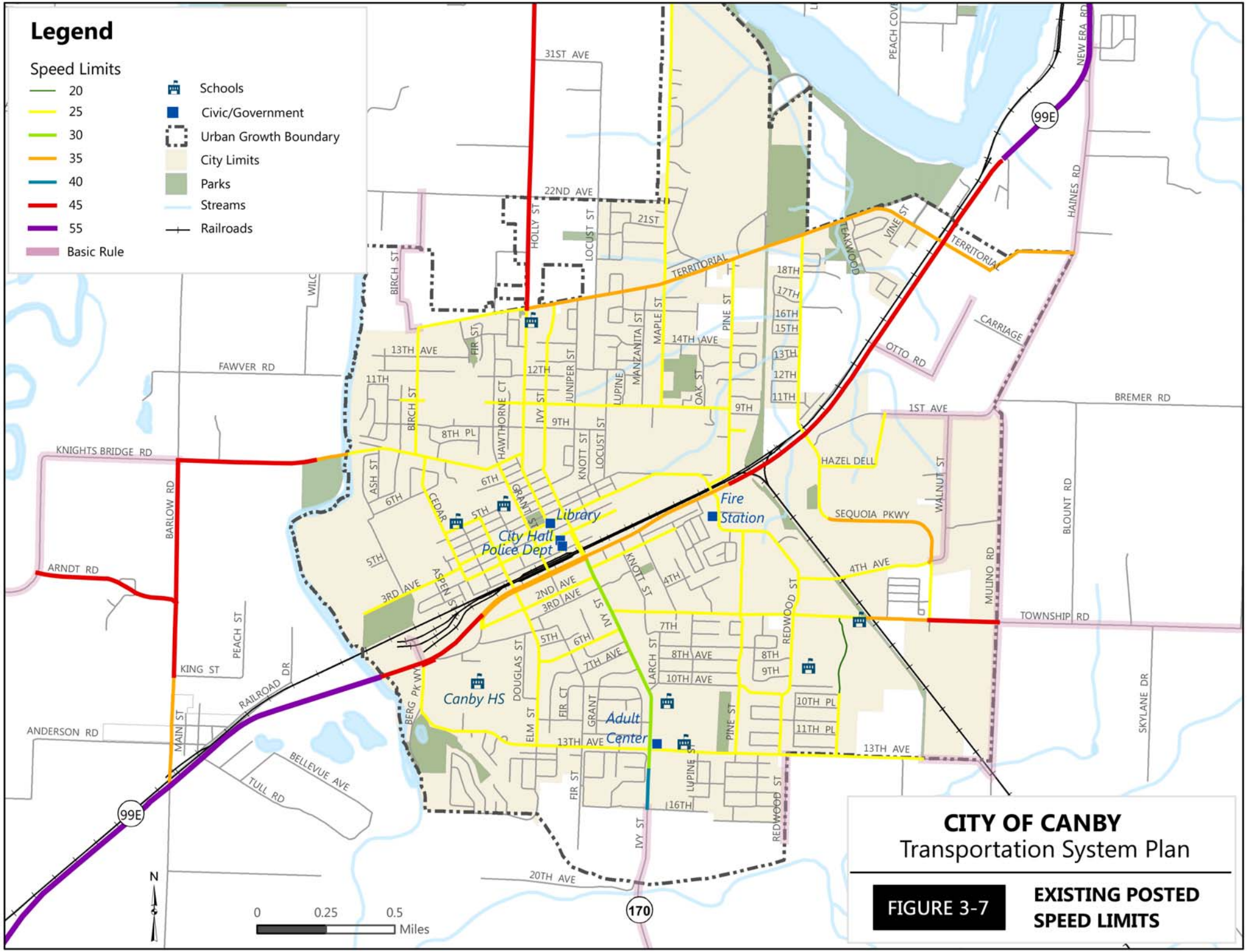

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FIGURE 3-7

EXISTING POSTED SPEED LIMITS

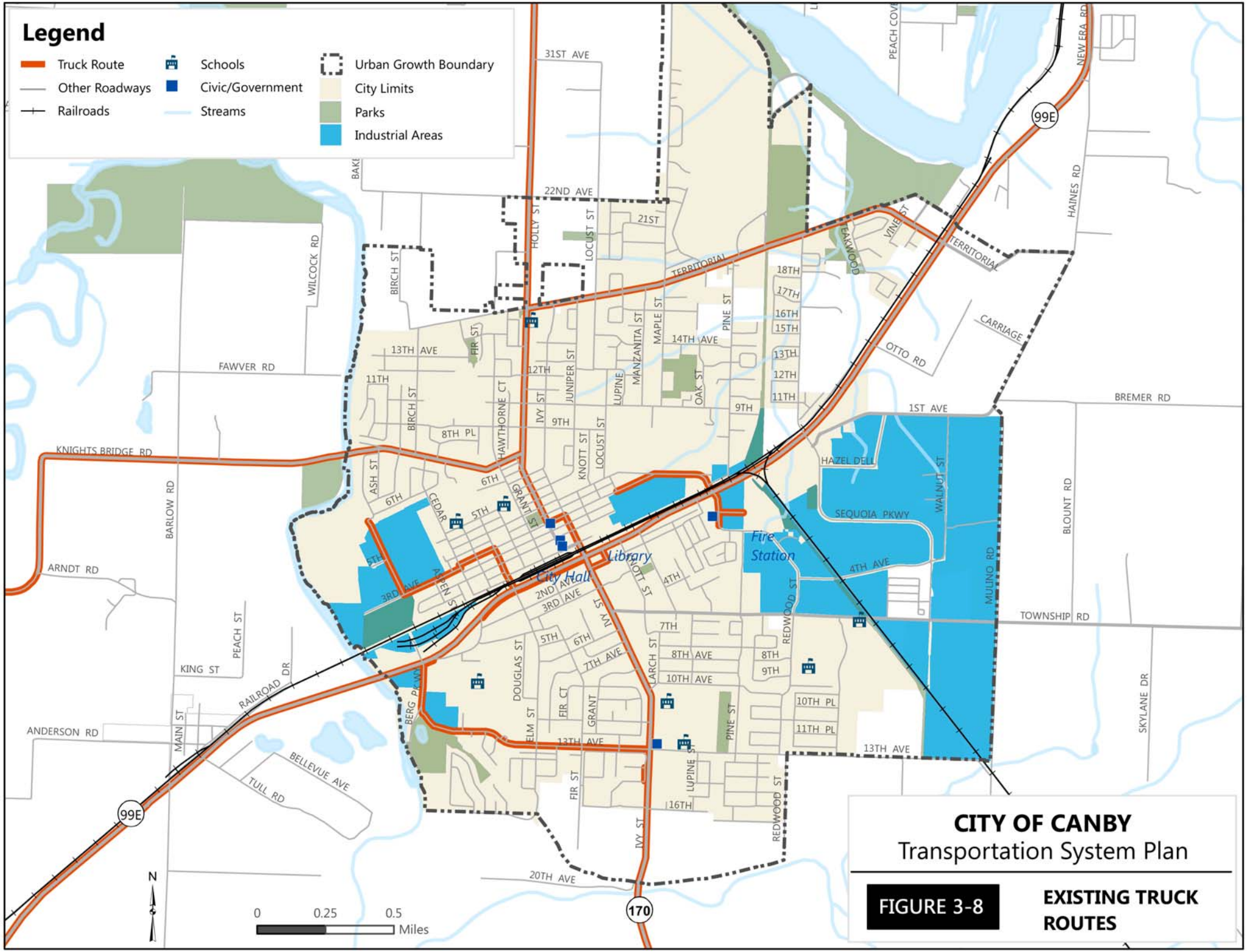

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FIGURE 3-8

EXISTING TRUCK ROUTES

At various locations throughout the city, truck routes pass through residential neighborhoods. While undesirable for the residents, at some locations this routing is necessary to provide truck access to industrial lands. For example, the industrial pocket in the northwest part of town is bounded by the Molalla River on one side and residential uses on the other three sides. Trucks either need to continue to use residential roads or a very costly improvement is needed (i.e., either a bridge over the Molalla River that connects to OR 99E or Barlow Road or a tunnel under the Union Pacific Railroad track to connect to OR 99E at Berg Parkway).

Another designated truck route of concern is on SW 13th Avenue. A portion of this area is residential and there are nearby schools and parks. East of Ivy Street, SE 13th Avenue is also a concern because future development of the Canby Pioneer Industrial Area would likely increase truck traffic on this road, especially if Sequoia Parkway is extended to connect to SE 13th Avenue as indicated in the Industrial Area Master Plan.

Intersection Traffic Control and Lane Geometry

All study area intersections in Canby are either signalized or stop controlled; there are no roundabouts located in or near the City of Canby. Figure 3-9 shows the stopped approaches and traffic signals along with the existing traffic volumes.

A few of the study intersections have atypical intersection controls and configurations worth noting, including:

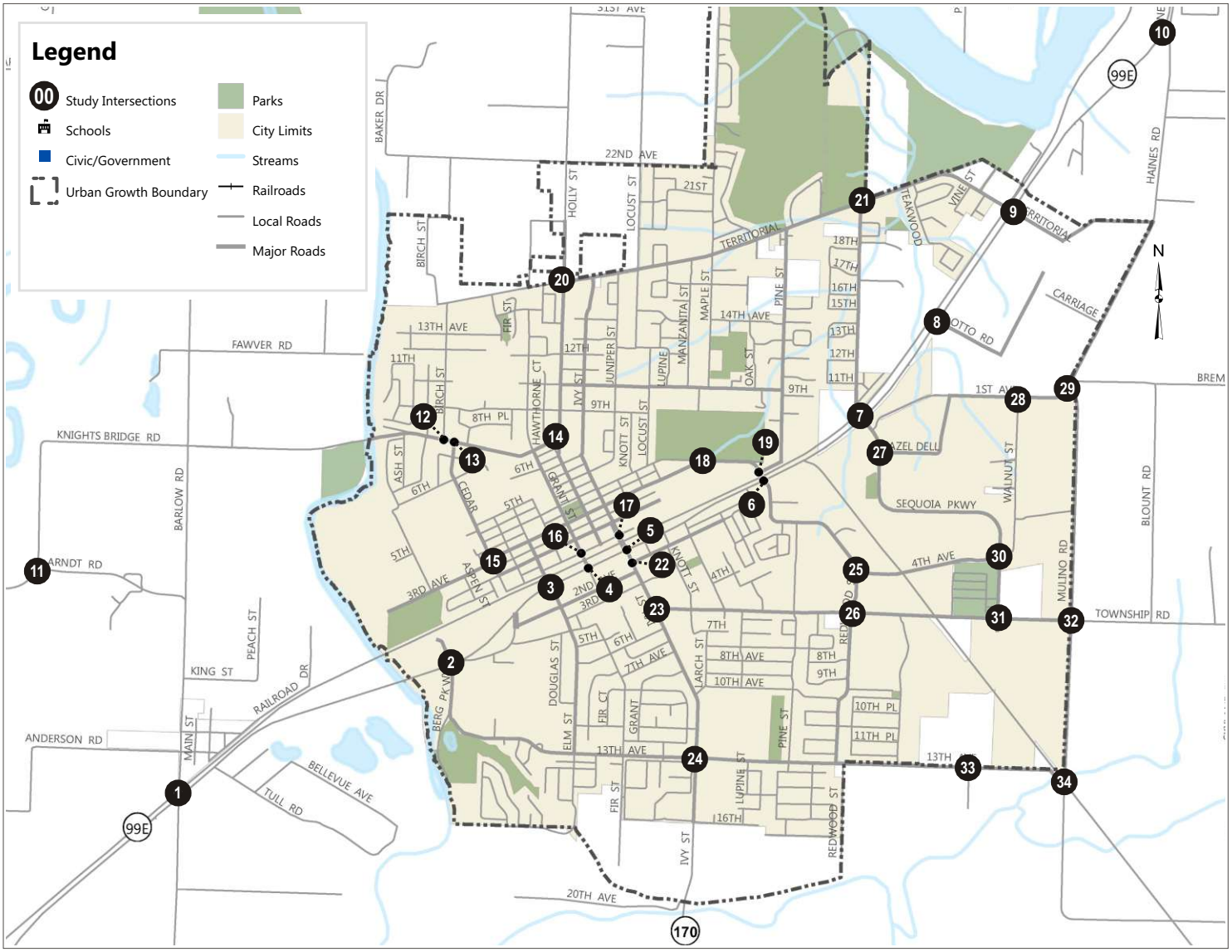
- North Grant Street/NW 1st Avenue – three of the four approaches are stop controlled while the northbound approach has a free movement (to prevent queues from backing up onto the railroad crossing).
- North Ivy Street/NW 1st Avenue - three of the four approaches are stop controlled while the northbound approach has a free movement (to prevent queues from backing up onto the railroad crossing).
- Mulino Road/SE 13th Avenue – both the southbound and eastbound approaches are stop controlled, while the northbound approach has a free movement (this intersection, which is adjacent to a railroad under crossing and has limited sight distance).
- North Cedar Street/NW 3rd Avenue – east and west legs are offset, but the intersection still operates as one junction.
- South Redwood Street/SE 4th Avenue – east and west legs are offset, but the intersection still operates as one junction.
- North Pine Street/NE 4th Avenue – intersection within 50 feet of the North Pine Street crossing of the Union Pacific Railroad, which creates a confusing traffic pattern.

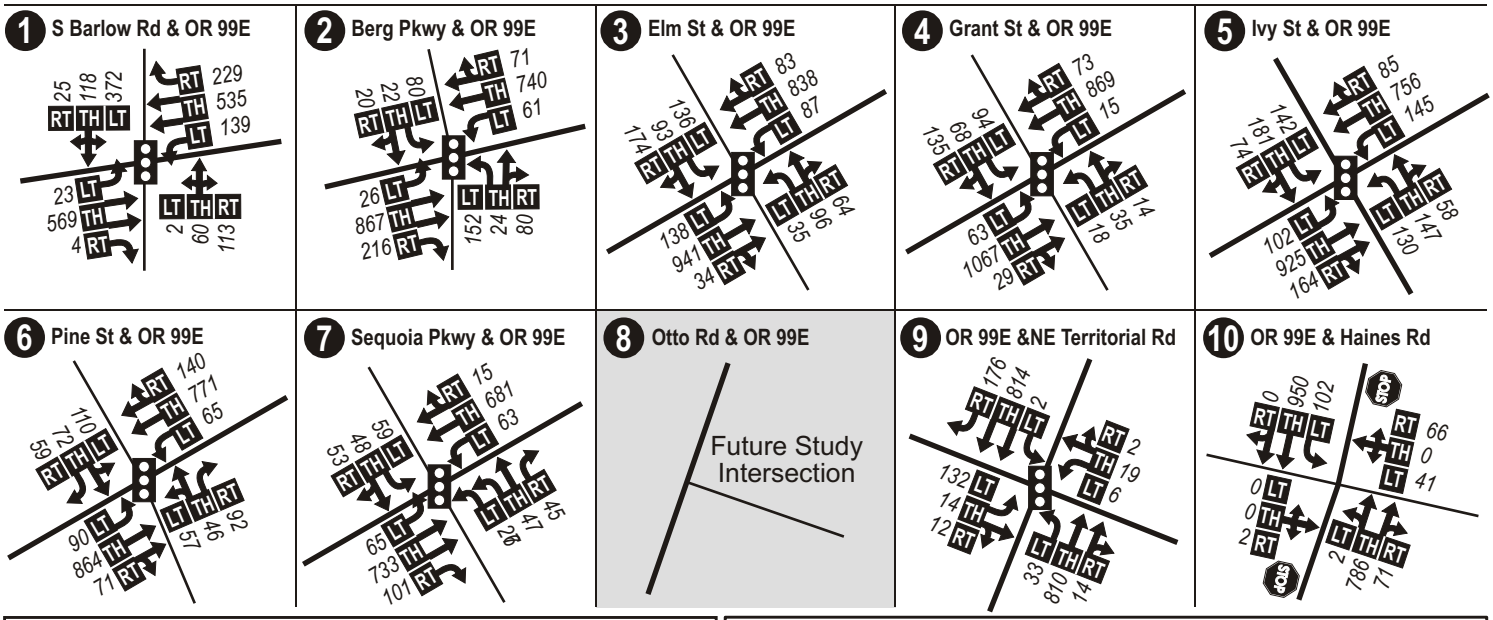
Motor Vehicle Design Volumes

Motor vehicle turn movement volumes were counted at most study intersections during the p.m. peak hour on April 8, 2009. This count date was selected because it was estimated to be a typical school day corresponding to typical local conditions. Historical counts were used at the remaining study intersections (OR 99E/Pine Street, OR 99E/Sequoia Parkway, Sequoia Parkway/SE Hazel Dell Way, South Township Road/SE Sequoia Parkway) and were balanced to be consistent with the April 2009 counts.

In addition, the *Oregon Highway Plan* specifies that the 30th Highest Hourly Volumes (30th HV), as measured from yearly count data, should be used for highway design and analysis purposes because it represents the typical peak hour during the peak month of the year.[11] Because April is not the peak month of the year for OR 99E traffic, a seasonal adjustment factor was applied only to the highway through volumes to account for seasonal variation. The seasonal adjustment factor was estimated using ODOT's 2009 Seasonal Trend Table because (1) there are no nearby automatic traffic recorder (ATR) stations on OR 99E and (2) throughout the region there are no ATR locations that have similar volumes and expected seasonal characteristics. Commuters are the main highway users, and interpolation of the 2009 Seasonal Trend Table for April 8th indicates that a commuter route should have a seasonal adjustment factor applied to the highway volumes. The OR 99E through volumes were factored by 1.03 to determine base year analysis volumes for the study intersections. The base year volumes are provided in Figure 3-9a/b.

[11] *Developing Design Hour Volumes*, ODOT Analysis Procedure Manual, Chapter 4, September 2006.





Intersection Detail Legend

- *00* - 30th Highest Hour Traffic Volume*
- LT TH RT (Left•Thru•Right) - Volume Turn Movement
- ← - Lane Configuration
- Traffic Signal
- STOP - Stop Sign

*See note on Figure 3-9b

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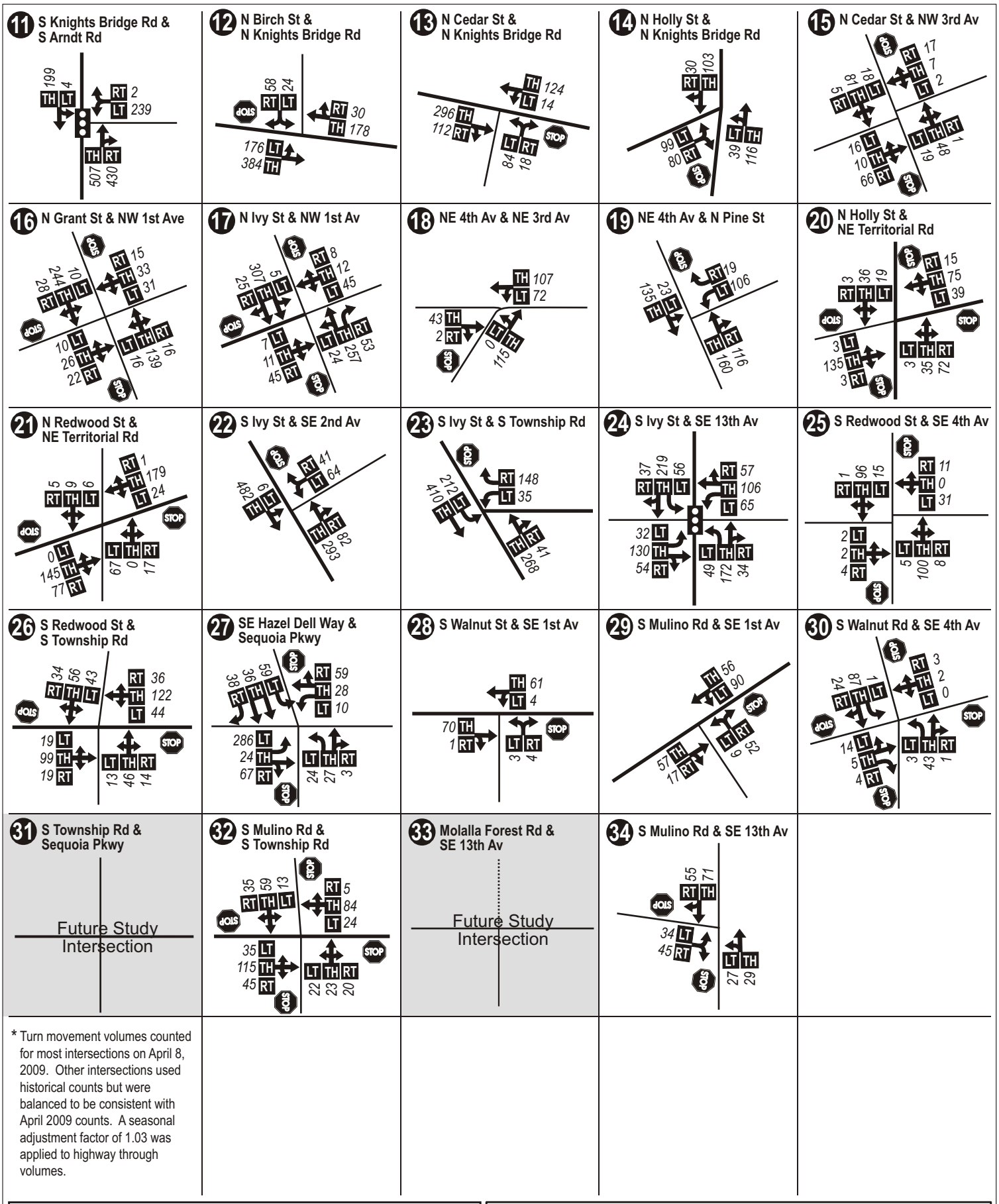
FIGURE 3-9a ***EXISTING 2009 VOLUMES (SHEET 1 OF 2)***



* Turn movement volumes counted for most intersections on April 8, 2009. Other intersections used historical counts but were balanced to be consistent with April 2009 counts. A seasonal adjustment factor of 1.03 was applied to highway through volumes.

Intersection Detail Legend

- *00* - 30th Highest Hour Traffic Volume*
- LT TH RT (Left, Thru, Right) - Volume Turn Movement
- ← - Lane Configuration
- Traffic Signal
- STOP - Stop Sign

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FIGURE 3-9b ***EXISTING 2009 VOLUMES (SHEET 2 OF 2)***

Heavy Vehicles

Heavy vehicle volumes and percentages were collected at the study intersections in conjunction with the April 2009, turn movement counts. Table 3-6 lists the truck percentages for the key corridors in Canby during the p.m. peak hour as well as the approximate number of trucks. The key corridors include the truck routes and other arterials with higher truck percentages. As shown in the table, on most of the main truck corridors, approximately 3 percent of the motor vehicles are trucks, with the greatest amount of truck activity occurring on OR 99E and along the truck route connecting the highway to the industrial pocket near Baker Street (via NW 3rd Avenue and Elm Street). These volumes are only for the p.m. peak hour, and traffic patterns may vary significantly throughout the day depending on local and regional shipping and delivery schedules.

Table 3-6: Heavy Vehicle Activity on Truck Routes

Truck Route or Other Arterial	Approximate Base Year Truck Volumes	
	Heavy Vehicle Percent	*Number of Trucks per Hour*
OR 99E	3%	50
NW 3rd Ave-Elm St (Industrial Pocket near Baker St)	3%	25
NE 4th Ave-Pine St (County Fairgrounds)	3%	15
S 13th Ave	3%	15
Ivy St	2%	15
Holly St (North of City)	4%	10
Knights Bridge Rd	2%	5
Territorial Rd	2%	5

Traffic Operations

Base year traffic operations were analyzed at the 31 study intersections. The focus is on intersections because they are controlling bottlenecks of traffic flow and the ability of a roadway system to carry traffic efficiently is typically diminished around intersections. Prior to presenting the analysis results, commonly used intersection operation performance measures are explained, and the applicable thresholds that have been incorporated into agency operating standards are discussed.

Intersection Performance Measures

The level of service (LOS) is a performance measure that is similar to a "report card" rating and is based on average vehicle delay. Level of service A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. Level of service D and E are progressively worse operating conditions. Level of service F represents conditions where average vehicle delay has become excessive and demand is near capacity; this condition is typically evident in long queues and delays, with delays often being difficult to measure because congestion may extend into and be affected

by adjacent intersections. The average delay value (in seconds) corresponding to each level of service designation, along with additional level of service descriptions, are provided in Appendix C.

The unsignalized intersection level of service calculation evaluates each movement separately to identify problems (typically left turns from side streets). The calculation is based on the average total delay per vehicle for stop-controlled movements (typically on the minor side street or left turn movements). Level of service (LOS) F indicates that there are insufficient gaps of suitable size to allow minor street traffic to safely enter or cross the major street. This is generally evident by long delays and queuing on the minor street.

Level of service F may also result in more aggressive driving, with side street vehicles accepting shorter gaps, which increases the likelihood of collisions. It should be noted that the major street traffic moves without delay and the LOS F is for side-street or left turns, which may be only a small percentage of the total intersection volume. It is for these reasons that level of service results must be interpreted differently for signalized and unsignalized locations.

The volume-to-capacity (V/C) ratio is another performance measure and represents the level of saturation (i.e. what proportion of capacity is being used). It is given as a decimal (typically between 0.00 and 1.00) and is determined by dividing the peak hour traffic volume by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced. If the ratio is greater than 1.00, the intersection, lane, or movement is oversaturated and usually results in excessive queues and long delays. Queues that extend a significant distance beyond an intersection can cause safety concerns if drivers do not expect them and are forced to stop quickly or when there are side streets that vehicles turn into or out of between queued vehicles. In addition, under congested conditions drivers are often willing to take more risks or to make last second decisions to try to avoid delay.

Operating Standards

Intersection operating standards are agency-specific and apply to intersections under the roadway authority's jurisdiction. Oregon Department of Transportation operating standards are given as volume to capacity (v/c) ratios based on roadway classification, designations, and posted speed limits.[12] The Clackamas County operating standard is LOS D for all arterials and collectors.[13] The City of Canby operating standards are LOS D for signalized and all-way-stop-controlled intersections and LOS E for two-way-stop-controlled intersections.[14] The mobility standards for the study intersections are given in Table 3-7, along with intersection operating analysis results.

[12] *1999 Oregon Highway Plan - Amendment*, The Oregon Department of Transportation, July 2005.

[13] *Clackamas County Comprehensive Plan*, Latest text revision on Jan. 17, 2009; Chapter 5.

[14] *City of Canby Transportation System Plan (TSP)*, Adopted April 19, 2000.

Existing Operating Conditions

Existing traffic operations were analyzed at the 31 study intersections based on the *2000 Highway Capacity Manual (HCM)* methodology[15] for signalized and unsignalized intersections. The analysis was performed for the 2009 base year analysis volumes (which correlate with the 30th highest hour) to determine the existing LOS, average delay, and V/C ratios at each intersection. As discussed previously, the North Grant Street/NW 1st Avenue, Ivy Street/1st Avenue, and Mulino Road/SE 13th Avenue intersections have atypical stop control. Because HCM methodology is not available for calculating operating conditions at these intersections, they were analyzed as all-way stop controlled, which provides conservative operating results.

Table 3-7 summarizes the existing base year operating conditions at the Canby TSP study intersections. The following two study intersections do not meet applicable standards under existing conditions:

- OR 99E/South Barlow Road
- OR 99E/Haines Road

Both of these intersections are under ODOT jurisdiction and are on the far edges of the study area. On the east end of the study area, the unsignalized OR 99E/Haines Road intersection exceeds operating standards due to high delays experienced by westbound minor street traffic. The main delay occurs for vehicles turning left from Haines Road onto OR 99E as they wait for available gaps to enter the traffic stream. On the west end of the study area, the OR 99E/South Barlow Road intersection exceeds operating standards due the high southbound left-turning volume (from Barlow Road onto OR 99E), which is operating near capacity.

Table 3-7: 2009 Base Year Operating Conditions at Study Intersections

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized					
OR 99E/S Barlow Rd	ODOT	≤ 0.75	32.3	C	**0.86**
OR 99E/Berg Pkwy	ODOT	≤ 0.75	15.7	B	0.51
OR 99E/Elm St	ODOT	≤ 0.85	26.2	C	0.68
OR 99E/Grant St	ODOT	≤ 0.85	12.8	B	0.55
OR 99E/Ivy St	ODOT	≤ 0.85	34.6	C	0.80
OR 99E/Pine St	ODOT	≤ 0.85	21.0	C	0.56
OR 99E/Sequoia Pkwy	ODOT	≤ 0.75	21.3	C	0.47
OR 99E/Territorial Rd	ODOT	≤ 0.75	9.8	A	0.46

Table 3-7 continued on next page.

[15] *2000 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000.

(Continued) Table 3-7: 2009 Base Year Operating Conditions at Study Intersections

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized (Continued)					
Knights Bridge Rd/S Arndt Rd	Clackamas Co.	LOS D	8.1	A	0.59
SE 13th Ave/S Ivy St	Clackamas Co.	LOS D	10.6	B	0.40
All-way Stop Controlled					
S Township Rd/S Mulino Rd	Clackamas Co.	LOS D	8.9	A	0.29
SE 13th Ave/S Mulino Rd	Clackamas Co.	LOS D	7.7	A	0.17
NE Territorial Rd/N Holly St	City of Canby	LOS D	8.5	A	0.20
NW 1st Ave/N Grant St	City of Canby	LOS D	9.9	A	0.42
NW 1st Ave/N Ivy St	City of Canby	LOS D			
SE 4th Ave/S Walnut Rd	City of Canby	LOS D	7.2	A	0.19
Two-way Stop Controlled					
OR 99E/Haines Rd	ODOT	≤ 0.70	> 80	B/F	**0.94**
SE 2nd Ave/S Ivy St	Clackamas Co.	LOS D	19.9	A/C	0.32
S Township Rd/S Ivy St	Clackamas Co.	LOS D	16.7	A/C	0.27
SE 1st Ave/S Mulino Rd	Clackamas Co.	LOS D	9.4	A/A	0.09
Knights Bridge Rd/N Birch St	City of Canby	LOS E	15.0	A/C	0.20
Knights Bridge Rd/N Cedar St	City of Canby	LOS E	13.6	A/B	0.25
Knights Bridge Rd/N Holly St	City of Canby	LOS E	12.1	A/B	0.29
NW 3rd Ave/N Cedar St	City of Canby	LOS E	10.0	A/B	0.14
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	10.5	A/B	0.13
NE 4th Ave/N Pine St	City of Canby	LOS E	12.9	A/B	0.23
NE Territorial Rd/N Redwood St	City of Canby	LOS E	13.2	A/B	0.18
S Township Rd/S Redwood St	City of Canby	LOS E	14.5	A/B	0.28
S Township Rd/Sequoia Pkwy	City of Canby	LOS E	10.2	A/B	0.06
S Hazel Dell Way/Sequoia Pkwy	City of Canby	LOS E	17.1	A/C	0.55
SE 4th Ave/S Redwood St	City of Canby	LOS E	10.5	A/B	0.07
SE 1st Ave/S Walnut St	City of Canby	LOS E	9.0	A/A	0.05

Signalized and All-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Intersection
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold values do not meet standards.

Two-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Worst Approach
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement (typically a major movement)
Bold values do not meet standards.

Traffic Safety

Traffic safety is a key consideration. When evaluating existing transportation facilities, locations with high collision rates may indicate facility characteristics that affect safety. The Oregon Department of Transportation (ODOT) maintains a database of all collisions reported to police that meet specific property damage or severity thresholds. The ODOT Safety Priority Index System (SPIS) is a ranking system used to identify high accident locations on state highways. Data from these resources are discussed in this section.

Collision Data

Collision data obtained from ODOT included all collision records for the City of Canby between 2003 and 2007. A review of the five years of data indicates that the five main signalized intersections along OR 99E through downtown Canby experience the greatest number of collisions, with the Ivy Street and Pine Street intersections being the most critical. Table 3-8 shows the total collisions between 2003 and 2007 as well as per year for each of these intersections. These intersections are also identified in Figure 3-10.

Table 3-8: High Collision Locations

Intersection	Collisions between 2003 and 2007	
	Total Collisions	*Collisions per Year*
OR 99E/Ivy St	46	9.2
OR 99E/Pine St	44	8.8
OR 99E/Grant St	25	5.0
OR 99E/Elm St	21	4.2
OR 99E/Sequoia Pkwy	16	3.2

The ODOT collision data include four collisions involving pedestrians, as discussed in the pedestrian section of this chapter. One fatal collision occurred in January of 2005 on Knights Bridge over the Molalla River (i.e., on Knights Bridge Road). It was a rainy day with icy roads and a westbound vehicle left the roadway and hit a tree in the ditch. The pedestrian-related and fatal collisions are shown in Figure 3-10.

Safety Priority Index System (SPIS)

The Safety Priority Index System (SPIS) is a ranking method developed by ODOT for high accident locations on state highways. The SPIS scores are developed based upon crash frequency, severity, and rate. A prioritized list is created for each region and categorized by percentile. The OR 99E/Ivy Street intersection is in the top five percent of statewide SPIS sites; therefore, a more detailed analysis was conducted for this intersection and potential countermeasures were identified. The OR 99E/Pine Street intersection is the only other location in the top 15 percent; additional analysis was not performed for this intersection because it is not in the top ten percent.

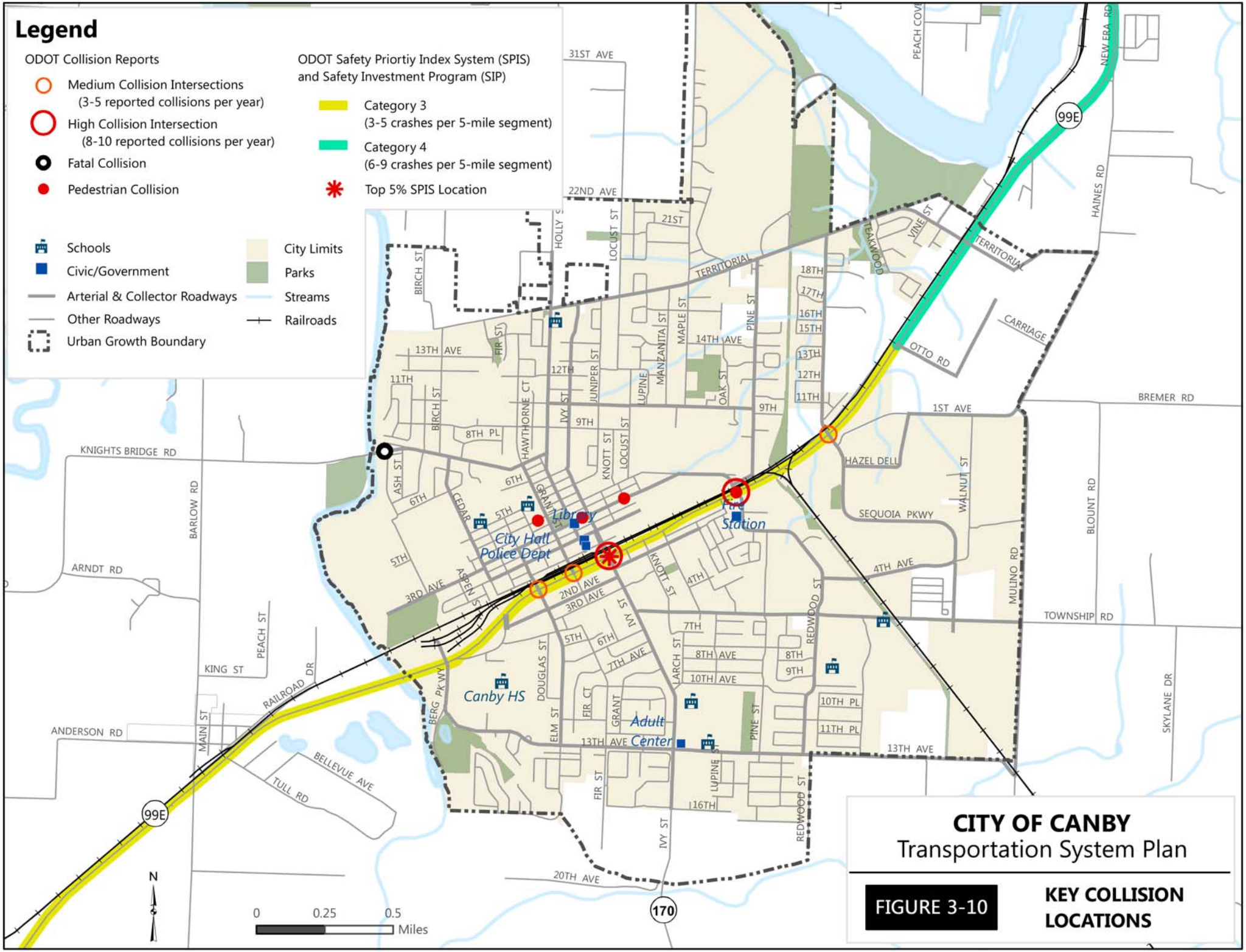

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FIGURE 3-10

KEY COLLISION LOCATIONS

The OR 99E/Ivy Street collision analysis included the evaluation of the severity and type of crashes at the intersection. A breakdown of collisions by severity is provided in Table 3-9. As shown, half of the reported collisions resulted in injuries, but there were no fatalities. In addition, the intersection collision rate is estimated to be 1.18 collisions per million entering vehicles. This rate exceeds the 1.0 threshold rate typically used to indicate whether the intersection has an above-average rate.

Table 3-9: ODOT Collision History Breakdown by Severity (2003-2007)

Intersection	Collisions (by Severity)				Collisions Per year	Collision Rate[b]
	Fatal	*Injury*	*PDO*[a]	***Total***		
OR 99E/Ivy St	0	23	23	46	9.2	1.18

[a] PDO = Property damage only.
[b] Collision rate = average annual collisions per million entering vehicles (MEV); MEV estimates based on 23,000 ADT indicated by ODOT on their 2007 traffic flow map.

A breakdown of OR 99E/Ivy Street collisions by type is provided in Table 3-10. As shown, the majority of collisions are rear-end, angle, and turning movement collisions, which is typical at a signalized intersection.

Table 3-10: ODOT Collision History Breakdown by Type (2003-2007)

Intersection	Average Collisions per Year (by Type)						
	Rear-End	*Angle*	*Turning Movement*	*Side-swipe*	*Bike/ Ped*	*Other*	***Total***
OR 99E/Ivy St	19	13	9	2	0	3	46
Percent of Total	*41%*	*28%*	*20%*	*4%*	*0%*	*7%*	*41%*

Specific treatments with the potential to reduce collisions and improve intersection safety include the following:

- Add right-turn lanes, especially for the OR 99E approaches
- Improve access management in the vicinity of the intersection (e.g., closing or consolidating driveways, installing a raised median on OR 99E)
- Improve visibility and sight distance by relocating or removing the building on the southwest corner
- Improve pedestrian crossing treatments

Existing Issues

Based on the existing motor vehicle facilities inventory and operational analysis, the following issues were identified:

- Two intersections (i.e., OR 99E/Barlow Road and OR 99E/Haines Road) do not meet *Oregon Highway Plan* mobility standards.
- There is poor safety performance at the OR 99E/Ivy Street and OR 99E/Pine Street intersections. These intersections had the greatest number of collisions between 2003 and 2007 and were identified as top five percent and top 15 percent Safety Priority Index System (SPIS) sites, respectively.
- Along most of OR 99E through Canby, there are between four to ten times more driveways than *OHP* minimum access spacing standards. The significant number of nonconforming accesses increases the number of potential conflicts along the highway and reduces traffic flow due to slow moving vehicles entering and exiting the highway.
- Knights Bridge Road on the west edge of town has an abrupt change in speed limit. Many drivers enter the city traveling at higher-than-posted speeds on the 25 mph neighborhood street.
- Truck routes transect residential neighborhoods, specifically near the industrial pocket in the northwest part of town and along 13th Avenue in the southern part of town.

Rail

Existing rail facilities were evaluated based on field inventories and information provided by ODOT Rail.[16] Quiet zone considerations are also discussed in this section.

Rail Facilities

There are two rail lines in Canby, as shown in Figure 3-11. The Union Pacific Railroad owns the north-south mainline (parallel to OR 99E) and attached sidings and spurs. The Oregon Pacific Railroad owns the southeasterly branch line. The two lines interchange near the pedestrian/bicycle bridge over OR 99E (i.e., between the OR 99E/Sequoia Parkway and OR 99E/Pine Street intersections).

There are nine public and one private at-grade railroad crossings, as well as two grade separated crossings within the Canby UGB. The locations of the crossings are shown in Figure 3-11, and an inventory of crossing controls and characteristics is provided in Table 3-11.

Table 3-11: Railroad Crossing Inventory

Cross Street	Number of Traffic Lanes	Number of RR Tracks	Crossing Controls	Sidewalks or Bike Lanes?
Union Pacific Rail Line (crossings listed from west to east)				
Barlow Rd[a]	3	1	Flashing Lights with Gates	None
N Elm St	3	2	Flashing Lights with Gates	Sidewalks
N Grant St	3	2	Flashing Lights with Gates	Sidewalks
N Ivy St	3	2	Flashing Lights with Gates	Sidewalks
N Pine St	3	2	Flashing Lights with Gates	None
N Redwood St	3	1	Flashing Lights with Gates	Sidewalks
Private Driveway	1	1	Stop Signs, No Gates	None
NE Territorial Rd	3	1	Flashing Lights with Gates	Sidewalks
Oregon Pacific Rail Line (crossings listed from north to south)				
OR 99E (east)	4	1	Flashing Lights with Gates	Sidewalks on north side
OR 99E (west)	4	1	Flashing Lights with Gates	Sidewalks on north side
SE 4th Ave	2	1	Grade-Separated (Vehicle Bridge)	Sidewalks
SE Township Rd	2	1	Flashing Lights with Gates	None
S Mulino Rd	2 (narrow)	1	Grade-Separated (Rail Bridge)	None

[a] Located outside of the Canby UGB.

[16] Email from Michael "Swede" Hays, ODOT Rail, September 23, 2009.


Legend
Schools
Civic/Government
Parks
City Limits
Streams
Railroads
Railroad Crossing
Grade-Separated
At-Grade Gated, Public
At-Grade Ungated, Private
Urban Growth Boundary
Arterial or Collector Roadway
Other Roadways
Union Pacific Railroad
Oregon Pacific Railroad
Library
City Hall
Police Dept
Fire Station
Canby HS
Adult Center
99E
170
N
0
0.25
0.5
Miles
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FIGURE 3-11
RAIL FACILITIES

ODOT Rail regulates out to the stopping sight distance (SSD) on all approaches to a public crossing, up to a maximum of 500 feet out and no less than 100 feet. The SSD is based on posted speed of the road. The intersections and driveways located within the ODOT Rail SSD area of each crossing are listed in Table 3-12.

Table 3-12: Intersections within ODOT Rail Regulation Area (By Rail Crossing)

Cross Street	Stopping Sight Distance (Speed Limit)	Intersections within ODOT Rail Regulation Area (Distance from RR Crossing)
Union Pacific Rail Line (crossings listed from west to east)		
Barlow Rd	250 ft (35 mph)	OR 99E/Barlow Rd (100 ft south), Several Driveways (150 ft, 250 ft north)
N Elm St	155 ft (25 mph)	OR 99E/Elm St (100 ft south) N Elm St/NW 1st Ave (50 ft, 100 ft[a] north)
N Grant St	155 ft (25 mph)	OR 99E/Grant St (100 ft south) N Grant St/NW 1st Ave (100 ft north)
N Ivy St	155 ft (25 mph)	OR 99E/Ivy St (100 ft south) N Ivy St/N 1st Ave (100 ft north)
N Pine St	155 ft (25 mph)	OR 99E/Pine St (50 ft south) N Pine S/NE 4th Ave (50 ft north)
N Redwood St	155 ft (25 mph)	OR 99E/Sequoia Pkwy (50 ft south) Various Driveways (75 ft, 150 ft north)
NE Territorial Rd	250 ft (35 mph)	OR 99E/Territorial Rd (50 ft south) Various Driveways (50 ft, 100 ft north)
Oregon Pacific Rail Line (crossings listed from north to south)		
OR 99E (east)	360 ft (45 mph)	-
OR 99E (west)	360 ft (45 mph)	Driveway (50 ft west)
SE Township Rd	250 ft (35 mph)	Various Driveways (100 ft, 125-250 ft[b] east)

[b] The east and west legs of the N Elm Street/NW 1st Avenue are offset.

[b] There is no delineated driveway on the south side of SE Township Road, but the entire parking area has direct access.

Rail Service

Passenger rail service is provided daily by AMTRAK on the Union Pacific Railroad line, and there are six passenger trains a day between Portland and Salem. The Union Pacific Railroad also provides service to between 20 and 25 freight trains per day.[17] There is also freight service on the Oregon Pacific Railroad line.

[17] *ODOT Intercity Passenger Rail Study*, ODOT Rail Division, June 2009 Draft.

Quiet Zone Considerations

Currently, trains sound their locomotive horns while approaching and entering at-grade rail crossings in Canby. The Federal Railroad Administration (FRA) has indicated that in order for locomotive horn sounding to not be required in Canby, all applicable Quiet Zone (QZ) requirements must be met.[18] The focus of the QZ requirements is to seal up rail crossings in such a way as to minimize the chance of motorists running around lowered signal gates. There are two main ways to meet QZ requirements:

- Equip each public at-grade crossing with supplementary safety measures (SSMs), which include the following treatment alternatives:
  - Four-quadrant gate system (gates for each direction of traffic on each approach)
  - Gates with medians or channelization devices that deny drivers the option of circumventing the approach lane gates
  - One-way street with gates completely blocking all approach lanes
  - Permanent closure
  - Temporary closure during designated quiet periods (only for a Partial Quiet Zone)
- Improve one or more individual crossings such that the rail corridor has a Quiet Zone Risk Index at or below the Nationwide Significant Risk Threshold or the Risk Index With Horns

The first option listed above—installing SSMs at all at-grade crossings—would be costly to construct, particularly because each SSM must meet specific design requirements. The second option may only require SSMs at a few locations or possibly allow modified SSMs instead, but other factors are calculated into the index levels used to determine whether Canby would be qualified as a QZ. Therefore, detailed crossing inventories and analysis would be needed and may be costly. A yearly reassessment may also be required as the Nationwide Significant Risk Threshold changes annually.

Under both options listed above, meeting requirements and applying for a QZ can be a complex and costly process. In general terms, the fewer grade crossings a community has, the easier it is to obtain a QZ. The ODOT Rail Division must be involved in the process and would work with Canby to update the crossing inventory information using required vehicle traffic information from Canby. In addition, the construction of SSM's that Canby would make to qualify for a QZ must also be approved through an Order issued by the ODOT Rail Division.

[18] Train Horn Final Rule as amended on August 17, 2006; Federal Register/ Vol. 71, No. 159 / Thursday, August 17, 2006 / Rules and Regulations

Existing Issues

The following railroad related issues were identified:

- The railroad is a major barrier to north/south travel across the city for other transportation modes.
- The majority of railroad crossings have nearby intersections within the Safe Stopping Distance.
- Significant noise levels are created by trains traveling through the city, though these may be attenuated by qualifying for a Quiet Zone (QZ) designation and through city building code requirements for new development.

Air

Regional and international air service for passengers and freight is provided at the Portland International Airport (PDX), which is located approximately 20 miles north of Canby and is accessible via OR 99E and Interstate-205. The Aurora State Airport and Mulino Airport are located less than ten miles from Canby and provide local commercial service and private aircraft use.

Water

The Canby Ferry is operated by Clackamas County and provides motor vehicle, bicycle, and pedestrian service across the Willamette River. The ferry connects Canby to Pete's Mountain Road and West Linn to the north and operates seven days a week during the entire year whenever there is a vehicle to transport from 6:45 a.m. to 9:15 p.m. The ferry can carry up to six cars (two lanes of three cars) and charges a nominal fee, except for pedestrians or bicyclists, who travel free. Large trucks can also be accommodated by using multiple car stalls. Clackamas County tracks ferry use, and over 50 percent of use occurs in the afternoon between 12:00 p.m. and 6:00 p.m. with the peak being between 4:00 and 6:00 p.m. On average, there are between three and four vehicles per boat trip.

Historically, the Willamette River has been used for the shipment of raw timber and other bulk goods. Current use of the river as a transportation route is limited to barge shipment of sand and gravel as well as some floats of timber. Recreational boating on the Willamette River is popular year-round.

Pipeline

Pipeline transportation in and through the Canby urban area includes transmission lines for electricity, cable television, and telephone services, and pipeline transport of water, sewer, and natural gas.

Recent Financial Revenues and Expenditures

Transportation related revenues and expenditures for the City of Canby over the last five years were provided by City staff. Averages are shown in Table 3-13 for City revenues and in Table 3-14 for City expenditures. The tables also list the revenues from two new sources that were recently enacted (i.e., local gas tax and street maintenance fee).

Table 3-13: Average Transportation Related Revenues over Last Five Years

Transportation Revenue Source	Description	Average Annual Amount
State/Federal Funds		
State Highway Fund (gas taxes)	Dispersed annually to cities and counties throughout Oregon based on relative population and number of registered vehicles. Must be used for road-related expenses.	$655,000
Federal Fund Exchange	Federal money channeled through the State. Not intended for maintenance but can be used for any improvements in roadway right-of-way. Provided to City as a reimbursement following qualifying expenditures.	$170,000
Grants	One-time, project specific grants.	$210,000
City Funds		
Local Gas Tax	Tax collected on gasoline sales in City to be used for road-related expenses. Recently enacted (2009 was first year of revenue).	$235,000
Construction Excise Tax	Tax issued on construction permits.	$75,000
Erosion Control or Street Repair Fee's	Charges for services.	$15,000
Miscellaneous Revenue	Minor sources not accounted for elsewhere.	$15,000
Interest Revenue	Interest earned from Street Fund and Street Revenue Fund balance.	$10,000
Street Maintenance Fee	Reoccurring fee charged to all utility users based on expected traffic generation. Must be used for maintenance expenses. Recently enacted (2009 was first year of revenue).	$255,000
Urban Renewal (transportation related improvements)	Borrowed money for improvements (including transportation) in specified geographical area (see section on Urban Renewal Fund). Future taxes from properties in improved area will be used to repay loans (i.e., tax increment financing).	$565,000
Transportation System Development Charges (SDCs)	One-time fee charged to new developments based on land use and size. Must be used for roadway capacity improvements.	$480,000
	TOTAL AVERAGE ANNUAL TRANSPORTATION REVENUE	**$2,685,000**

Table 3-14: Average Transportation Related Expenditures over Last Five Years

Transportation Expenditure	Description	Average Annual Amount
General Maintenance and Operations		
Personal Services	Contribution to staff wages and benefits.	$360,000
Material and Services	Office expenses, roadway maintenance and construction supplies, contractor work, and consulting engineer fees	$205,000
Capital Outlay Equipment	Cost of equipment used by City staff.	$20,000
Maintenance	General roadway maintenance and repair.	$75,000
Capital Improvements		
Transportation System Development Charges (SDCs)	See description provided in Revenues table.	$345,000
Federal Fund Exchange	See description provided in Revenues table.	$170,000
Grants	See description provided in Revenues table.	$210,000
Other Capital Projects		$255,000
Urban Renewal (transportation related improvements)	See description provided in Revenues table.	$565,000
Operating Transfer to General Fund	Street Fund contributions to other City needs.	$65,000
Operating and Reserve Transfer To Fleet	Street Fund contributions to other City needs.	$90,000
Operating Transfer to Technical Services	Street Fund contributions to other City needs.	$5,000
TOTAL AVERAGE ANNUAL TRANSPORTATION EXPENDITURE		**$2,365,000**

As shown in the tables, in an average year in the recent past (when the two new revenue sources are included), the City has received $2,685,000 in revenue and spent $2,365,000 in expenditures, which corresponds to a $320,000 surplus. This does not necessarily indicate that future years will continue to have a surplus. In fact, for the 2008-2009 fiscal year (ending June 30, 2009), there was an unanticipated shortfall that resulted from the volatility of the economy over the last few months of the fiscal year.[19] This shortfall caused the Street Fund to expend some reserves. To prevent further use of reserves, the proposed budget for the 2009/2010 fiscal year includes reducing personnel costs by reassigning two city staff positions to other departments. It is unclear whether this will only reduce costs in the short-term. Also, Oregon state gas tax receipts have been declining; however, the Oregon legislature recently passed a 6 cent gas tax increase that will come into effect by the year 2011. Therefore, state gas tax revenues are expected to increase again.

[19] City of Canby Oregon Adopted Budget 2009-2010.

Chapter 4. Future Needs

Introduction

This chapter summarizes the projected future transportation needs of the City of Canby through the year 2030. The needs are based on a future conditions analysis that assumes build-out of the City's Urban Growth Boundary (UGB), background growth from regional travel patterns, and limited investment in the future transportation network. Only improvement projects that are in-process or financially committed are included in future transportation network assumptions, which allows this TSP update to fully evaluate the range of alternatives for addressing future growth demands within Canby.

The traffic forecasting tool used for the future needs analysis was a travel demand projection methodology based on a city land use inventory and transportation modeling tool that assigns trips to the roadway considering where delay is occurring. In this chapter, the travel demand methodology and land use assumptions are documented. Then, the future needs are given for the principal modes, including: pedestrian, bicycle, transit, motor vehicle, and rail. These future needs are in addition to those identified in the existing conditions analysis described in Chapter 3.

Future Travel Demand and Land Use

Future travel demand in the City of Canby was estimated using a travel forecasting tool developed specifically for the city that reflects local land use patterns and transportation network performance. The travel demand forecasting methodology and land use assumptions are summarized in this chapter, with detailed discussion provided in the Future Forecasting Memorandum (see Appendix G).

Travel Demand Forecasting Methodology

The travel forecasting methodology used to develop future projections for this Transportation System Plan (TSP) update are based on an enhancement of the Cumulative Analysis approach, as defined in the Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU) *Analysis Procedures Manual*.[20] Generally, the travel forecast tool developed for Canby is a simplified version of a traditional 4-step travel demand model approach (Trip Generation, Trip Distribution, Model Choice, and Trip Assignment) applied for large urban areas such as Portland. The simplified approach

[20] *Analysis Procedures Manual (APM)*, Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU), Last Updated July 2009, pgs. 61-74

was chosen for this project because developing a full travel demand model would require substantial budget and time. However, the simplified tool focuses on the same key objectives as a more robust travel demand model: how future growth will increase traffic volumes within the transportation network.

General growth patterns from Metro's transportation model in the surrounding area were utilized and there are several components to the simplified forecast tool that actually make it more detailed, and therefore more useful, for analyzing local system needs. For example, the roadway network considered in the forecast tool includes every roadway within the study area, not just arterials and collectors. In addition, trips are assigned to the detailed roadway network based on delays from intersection operations specific to each intersection, not just general macroscopic link delays. Also, the land use forecasts feeding the travel forecast tool are based on a detailed parcel-level inventory and projection that provides more accuracy than general zone-based forecasts commonly used in larger urban areas. The result of these features is a tool that can evaluate the details of local transportation issues and guide the development of transportation options that consider how best to manage the system by providing capacity for major corridors and protecting the livability of the local streets.

Key inputs and the resulting traffic volumes estimated by the travel forecast tool are summarized in the following sections. Inputs include the city roadway network and land uses.

Roadway Network

The roadway network included in the Canby TSP forecast tool consists of all local, collector, and arterial streets within the Canby Urban Growth Boundary (UGB) as well as key roadways to the east and west of Canby. The forecast tool was calibrated for the existing year 2009 roadway network, including adjustments to roadway speeds to capture local circulation patterns. Calibration results and discussion are provided in the Future Forecasting Memorandum (see Appendix G).

To forecast future needs, a year 2030 baseline network was developed by incorporating in-process or financially-committed improvements into the existing network. The one capacity-related improvement that is planned for construction in the near future is the paving and realignment of Walnut Road serving the Canby Pioneer Industrial Park.[21] Walnut Road currently is a narrow road connecting SE 1st Avenue with the Sequoia Parkway/SE 4th Avenue intersection. It will be widened, with the southern portion realigned to form a new three-leg intersection with Sequoia Parkway approximately 500 feet north of the SE 4th Avenue intersection.

[21] The City has other roadway projects that are planned for construction, but they consist of repaving or reconstructing roadways without adding additional motor vehicle travel lanes or changing intersection locations.

Land Use

Land use is a key factor affecting traffic demands placed on Canby's transportation system. The location, density, type, and mixture of land uses have a direct impact on traffic levels and patterns. An existing 2009 land use inventory and a future 2030 land use projection were performed for every parcel within the Canby UGB and aggregated into each of the 72 transportation analysis zones (TAZs), which represent the sources of vehicle trip generation within the city. A map of the Canby TAZs is provided in the Future Forecasting Memorandum (see Appendix G).

The existing 2009 land use inventory approximated the number of households and the amount of retail employment, service employment, educational employment, and other employment that currently exist in each TAZ. These land uses correspond to a population of approximately 15,165 residents.

The future 2030 land use projection is an estimate of the amount of development each parcel could accommodate at expected build-out of vacant or underdeveloped lands assuming Comprehensive Plan zoning (shown in Figure 4-1). The one exception is within the Northeast Canby Concept Plan area, which is located in northeast Canby between OR 99E, Territorial Road, Haines Road, and SE 1st Avenue, where land uses consistent with the Northeast Canby Concept Plan[22] were assumed.

[22] *Draft NE Canby Concept Plan*, Prepared by Parametrix; June 8, 2005; A review of the plan can be found in Appendix A (Technical Memorandum #2: Background Document Review).

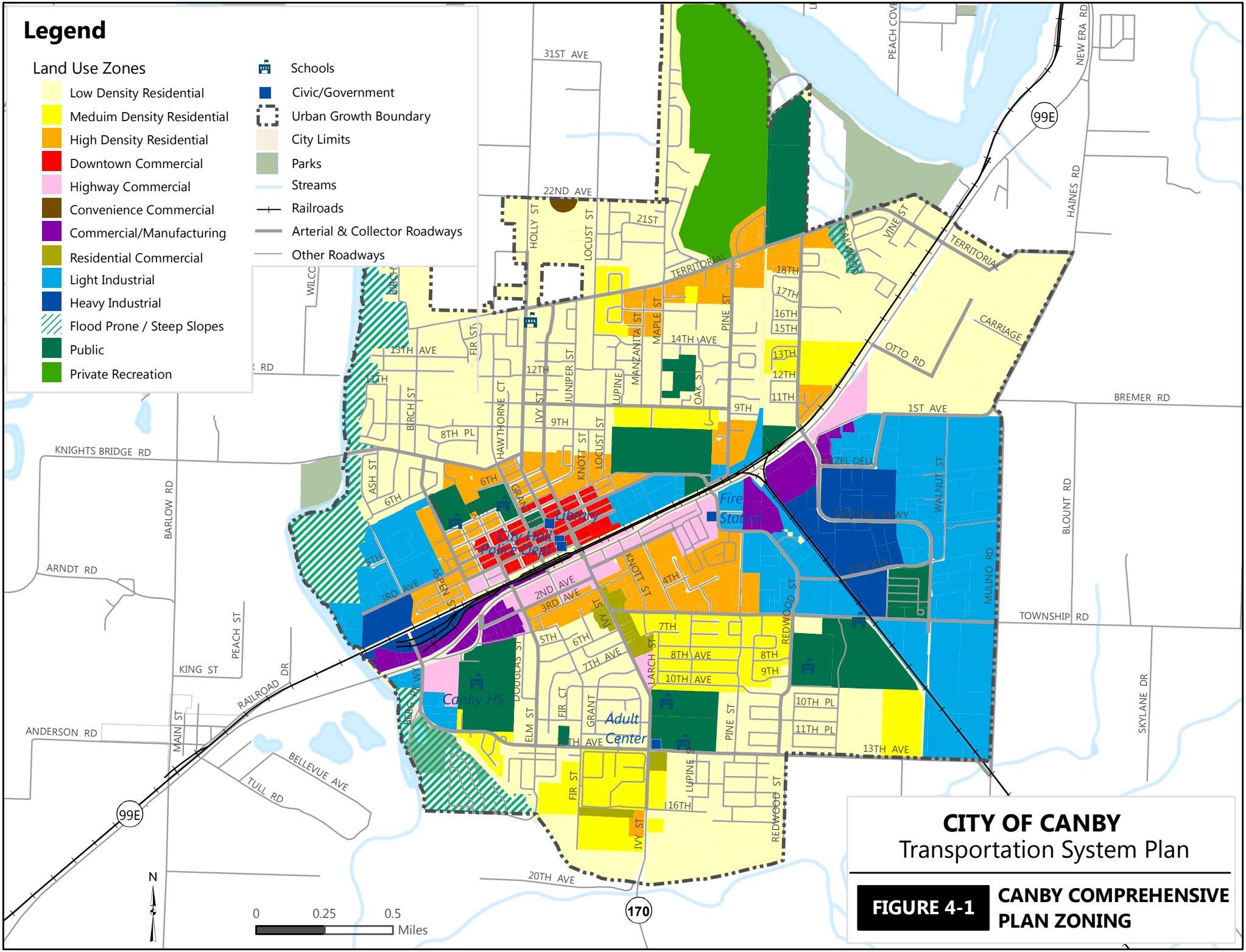

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FIGURE 4-1 **CANBY COMPREHENSIVE PLAN ZONING**

The existing land use estimates and future projections within the Canby UGB are listed in Table 4-1. Detailed land use data by TAZ is provided as supplementary material in the Future Forecasting Memorandum (see Appendix G). The projected land uses correspond to a year 2030 population projection of approximately 26,100 residents.[23]

Table 4-1: Canby UGB Land Use Summary

Land Use	Existing 2009 Land Use	Projected Growth from 2009 to 2030	Projected 2030 Land Use
Households			
Total Households	**6,127**	**4,403 (+72%)**	**10,530**
Employees			
Retail Employees	624	715 (+115%)	1,339
Service Employees	1,004	644 (+64%)	1,648
Educational Employees	409	257 (+63%)	666
Other Employees	1,928	3,007 (+156%)	4,935
Total Employees	**3,965**	**4,623 (+117%)**	**8,588**

The Future Forecasting Memorandum (see Appendix G) also documents the p.m. peak hour trip generation levels estimated to be produced by the land uses within the City's UGB. Existing land uses in 2009 are estimated to generate 10,400 peak hour trip ends and future land uses in 2030 are expected to generate 19,800 peak hour trip ends. The trip levels reported are trip ends within Canby, which means they are the origins or destinations of trips.[24] Therefore, Canby is estimated to have traffic growth of 9,400 trip ends between 2009 and 2030.

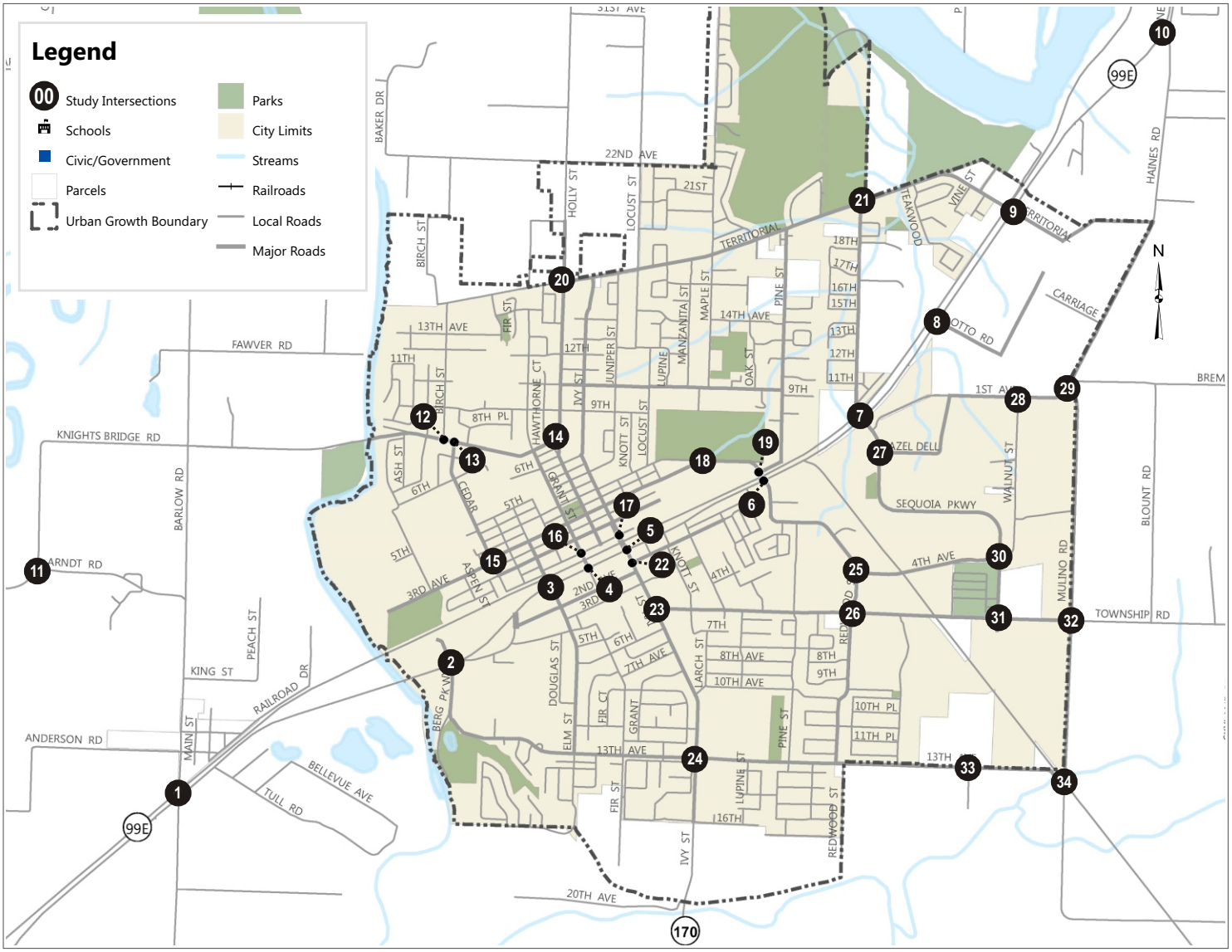
Future Traffic Volumes

The results of the travel forecast process were used to develop year 2030 baseline traffic volumes, which are shown in Figure 4-2a/b. These intersection turn movement volumes were developed by applying a post-processing technique of the travel forecast estimates following NCHRP 255 methodology, which basically adds future growth to existing traffic volumes.[25] The roadways experiencing the most significant growth include OR 99E, South Township Road, South Mulino Road, South Haines Road, Knights Bridge Road, and NE Territorial Road. Raw model output volume plots are shown in the Future Forecasting Memorandum (see Appendix G).

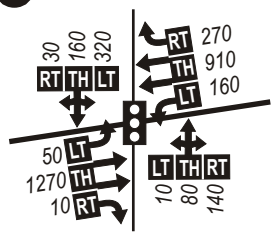
[23] The population forecasts referenced for this TSP Update are based only on household forecasts and do not consider changes in household size from existing conditions. The existing ratio of population per household (2.5) was calculated by estimating the existing number of households in the City and dividing by the City's latest population total. This ratio does not align with other planning work the City has conducted based on census data, which used a population per household rate of 2.7. The population forecast listed in this TSP is informational only. The number of households, not the population, is used in the TSP to determine future trip generation.

[24] A more detailed explanation of trip ends is provided in Appendix F (Technical Memorandum #3: Future Forecasting).

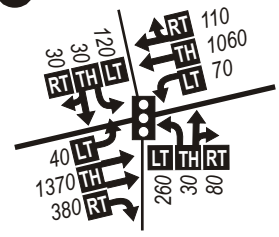
[25] *Highway Traffic Data for Urbanized Area Project Planning and Design - National Cooperative Highway Research Program Report 255*, Transportation Research Board, Washington D.C., 1982.



1 S Barlow Rd & OR 99E

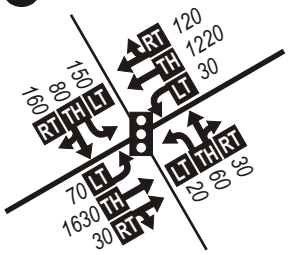


2 Berg Pkwy & OR 99E

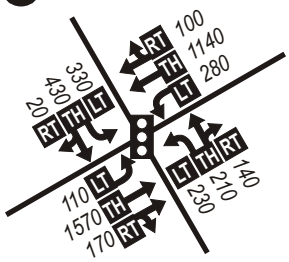


3 Elm St & OR 99E

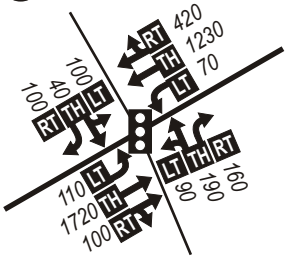
4 Grant St & OR 99E



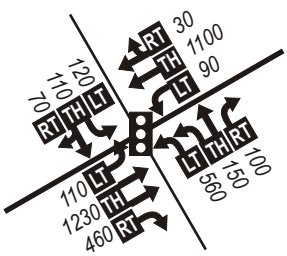
5 Ivy St & OR 99E



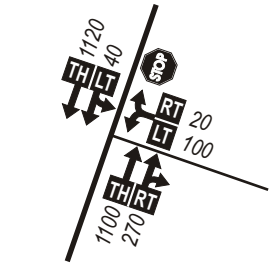
6 Pine St & OR 99E



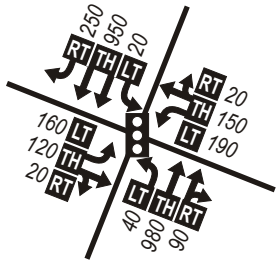
7 Sequoia Pkwy & OR 99E



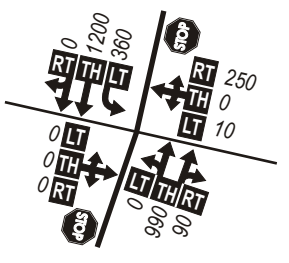
8 Otto Rd & OR 99E



9 OR 99E &NE Territorial Rd



10 OR 99E & Haines Rd



Intersection Detail Legend

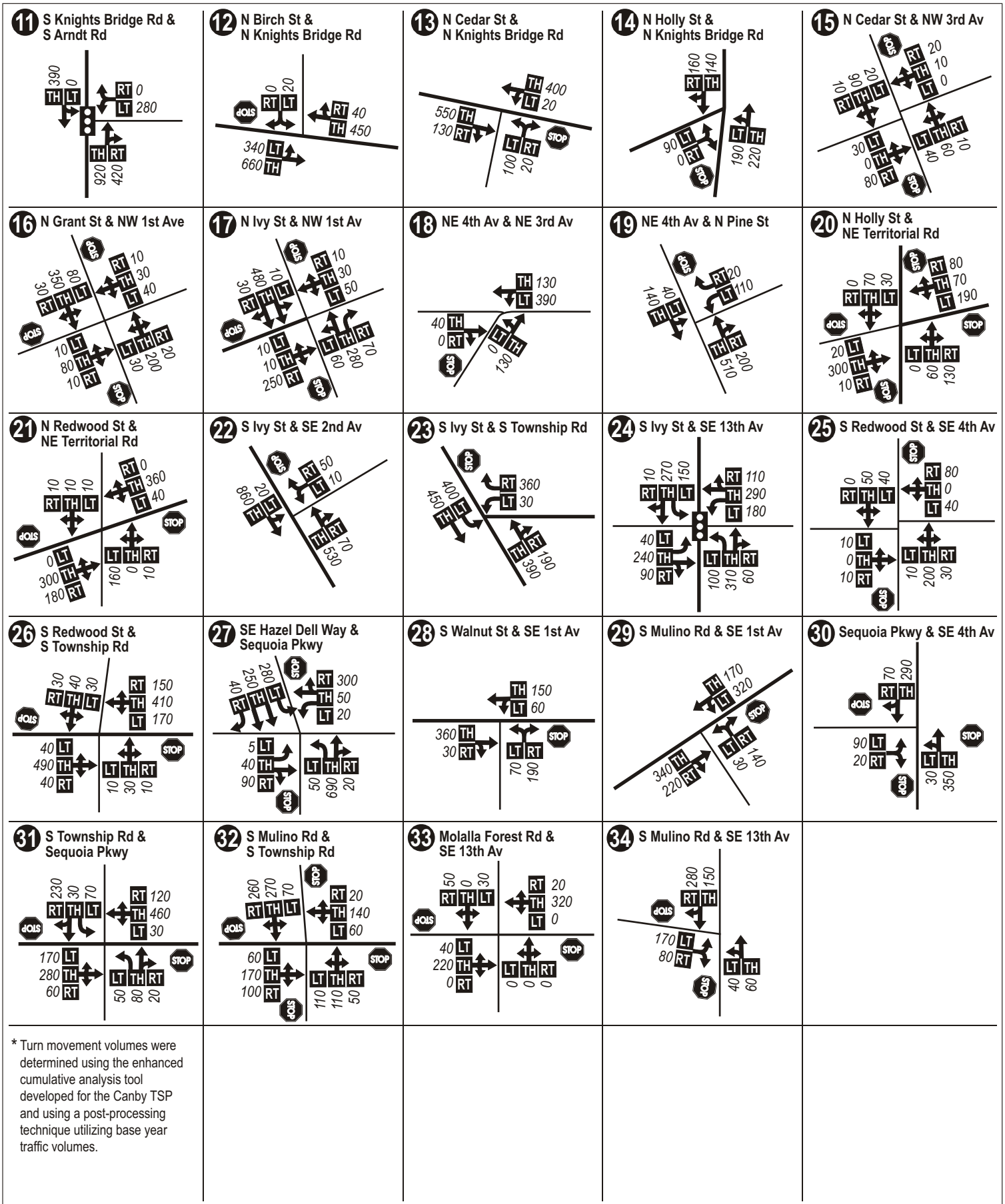
- *00* - 30th Highest Hour Traffic Volume*
- LT TH RT (Left•Thru•Right) - Volume Turn Movement
- ← - Lane Configuration
- Traffic Signal
- STOP - Stop Sign

*See note on Figure 4-2b

CITY OF CANBY
Transportation System Plan

FIGURE 4-2a

FUTURE 2030 BASELINE VOLUMES (SHEET 1 OF 2)



* Turn movement volumes were determined using the enhanced cumulative analysis tool developed for the Canby TSP and using a post-processing technique utilizing base year traffic volumes.

Intersection Detail Legend

- *00* - 30th Highest Hour Traffic Volume*
- LT TH RT (Left•Thru•Right) - Volume Turn Movement
- ← - Lane Configuration
- Traffic Signal
- STOP - Stop Sign

CITY OF CANBY
Transportation System Plan

FIGURE 4-2b ***FUTURE 2030 BASELINE VOLUMES (SHEET 2 OF 2)***

Future Pedestrian Needs

Future pedestrian needs in Canby were assessed in two ways. First, roadways with sidewalk gaps were identified where future motor vehicle volumes are expected to exceed 3,000 vehicles per day or speeds exceed 25 miles per hour (mph). Motor vehicle volumes and speeds above these levels are typically uncomfortable for pedestrians when there are no sidewalks. Second, specific intersections and corridors were identified where vehicle speeds and/or future traffic volumes would trigger the need to provide additional pedestrian crossing enhancements. The trigger criteria were based on recommendations provided in a Federal Highway Administration (FHWA) report addressing crosswalks at uncontrolled locations.[26]

Future Pedestrian Issues

The future pedestrian issues listed below were identified *in addition* to the existing pedestrian issues discussed in Chapter 3:

- Sidewalk gaps will be problematic on the following high speed and/or high traffic volume roadways:
    - OR 99E (on north side east of South Knott Street and on both sides east of Sequoia Parkway)
    - Knights Bridge Road
    - North Holly Street (from Knights Bridge Road to NW Territorial Road)
    - Territorial Road (NW, NE, and SE)
    - NE 4th Avenue (adjacent to the Clackamas County Fairgrounds)
    - NE 3rd Avenue (east of North Locust Street)
    - Old Pacific Highway (near Canby High School)
    - South Haines Road
    - Otto Road
    - SE Sequoia Parkway
    - SE Hazel Dell Way
    - SE 1st Avenue
    - South Walnut Street
    - South Mulino Road
    - South Township Road (east of Sequoia Parkway)
    - SE 13th Avenue (east of South Redwood Street)

[26] *Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Locations*, Federal Highway Administration (FHWA), November 2000.

- Pedestrian crossing enhancements will be considered at the following locations in conjunction with the TSP alternatives analysis:
  - The north leg of the South Ivy Street/South Township Road intersection is a location where existing counts already indicate a high pedestrian crossing volume (33 pedestrian crossings during p.m. peak hour). Because of the increased volumes on South Ivy Street, there is a major concern for pedestrian safety and crossing accommodations.
  - South Township Road east of Sequoia Parkway has higher travel speeds (40 mph); therefore, the need for crossing treatments should be evaluated if future development of nearby pedestrian generators is proposed.
  - OR 99E between Ivy Street and Pine Street (approximately one-half mile) does not have any pedestrian crossings. One or two crossings should be examined, especially on the west end of this section of roadway where there is development on both sides of the highway.
  - OR 99E between Sequoia Parkway and the eastern edge of the Canby UGB (approximately one mile) has only one pedestrian crossing (i.e., at the signalized intersection with Territorial Road). The possible signalization of an improved Otto Road intersection would add a second pedestrian crossing. One or two additional crossings should be examined, but may not be feasible given the current 45 mph speed limit on this section of OR 99E.
  - South Mulino Road has higher travel speeds (speed limit not posted, so the 55 mph basic rule applies); therefore, the need for crossing treatments should be evaluated if future development of nearby pedestrian generators is proposed. Adjacent land uses consist primarily of farmland, but the comprehensive plan provides for future industrial development.
  - South Haines Road has higher travel speeds (speed limit not posted, so the 55 mph basic rule applies); therefore, the need for crossing treatments should be evaluated if future development of nearby pedestrian generators is proposed. Adjacent land uses consist of existing residences with direct access to the road, and there is potential for future urban residential development.

Future Bicycle Needs

Future bicycle needs were assessed by identifying bicycle lane gaps where future motor vehicle volumes are expected to exceed 3,000 vehicles per day and speeds exceed 25 mph. Motor vehicle volumes and speeds below these levels would be similar to a residential street where cycling in a shared travel lane is comfortable for the majority of cyclists.

Future Bicycle Issues

The future bicycle issues listed below were identified *in addition* to the existing bicycle issues discussed in Chapter 3:

- As bike lanes are planned for arterial and collector roadways, the following locations should be considered higher priority given their projected motor vehicle volume and speed:
  - OR 99E
  - Ivy Street (between North 1st Avenue and South 2nd Avenue)
  - North Holly Street
  - Knights Bridge Road
  - North Redwood Street
  - Elm Street (between NW 3rd Avenue and SW 4th Avenue)
  - SE Territorial Road
  - South Haines Road
  - SE 1st Avenue
  - Otto Road
  - South Mulino Road
  - South Township Road (east of Sequoia Parkway)
  - NE 4th Avenue (adjacent to the Clackamas County Fairgrounds)
  - NE 3rd Avenue (east of North Locust Street)
- In addition, these non-arterial/collector locations should be evaluated to determine if bicycle enhancements are needed:
  - South Walnut Street
  - Old Pacific Highway (near Canby High School)
  - North Birch Street (between Knights Bridge Road and NW Territorial Road)
  - NW Territorial Road (between North Birch Street and North Holly Street)

Future Transit Needs

Future transit needs are currently being identified by Canby Area Transit (CAT) and will be addressed in their Transit Management Plan (TMP). Future transit needs include route changes to address potential increases in transit demand. Two new routes are being proposed and are listed in Table 4-2. These routes connect Canby to nearby employment centers (i.e., Salem and Clackamas Town Center).

Table 4-2: Proposed Future Canby Area Transit Routes

Transit Route	Service Area	Hours of Operation	Frequency
New CAT Line A	Between Canby and Salem Transit Mall	Weekdays from 5:00 a.m. to 10:00 a.m. and 2:30 p.m. to 7:00 p.m.	30 minutes
New CAT Line B	Between Canby and Clackamas Town Center (via I-205)	Weekdays from 6:30 am to 9:00 pm and Weekends 9:00 a.m. to 5:00 pm	1 hour

Source: Draft Canby Area Transit Master Plan

Changes to bus frequency and hours of operation are also proposed for existing routes, as shown in Table 4-3. The increased number of routes and bus frequency will require a larger transit center, as discussed in Chapter 3. Additional stops for the CAT Orange Line have been identified along OR 99E outside of the Canby UGB.

Table 4-3: Proposed Changes to Existing Routes

Transit Route	Characteristic	Existing	Proposed Change
CAT Green Line	Frequency	1 hour	30 minutes
	Hours of operation	Weekdays from 7:00 a.m. to 7:30 p.m.	Weekdays from 6:30 a.m. to 8:30 p.m.
CAT Blue Line	Frequency	1 hour	30 minutes
CAT Purple Line	Frequency	1 hour for a.m., midday, and p.m. peak periods; 2 hours in late a.m. and early p.m.	30 minutes for a.m. and p.m. peak periods; 1 hour during midday
CAT Orange Line	Frequency	Weekdays from 5:00 a.m. to 9:00 p.m.	Weekdays and weekends from 5:00 a.m. to 10:00 p.m.
SCTD Molalla to Canby	Frequency	1 to 2 hours	1 hour

Source: Draft Canby Area Transit Master Plan

Future Motor Vehicle Needs

Future motor vehicle needs through the year 2030 were assessed based on the study intersection traffic volumes, which were determined from the future forecasting methodology and shown previously in Figure 4-2a/b. The associated intersection operations are provided in Table 4-4 and were determined based on *2000 Highway Capacity Manual* methodology.[27]

As indicated in Table 4-4, the majority of the OR 99E intersections are expected to exceed mobility standards. The worst operations would be at the two unsignalized intersections on the east side of Canby (i.e., OR 99E/Otto Road and OR 99E/Haines Road), where side-street demands are roughly twice the available capacity. The two signalized intersections with the worst operating conditions are the OR 99E/Ivy Street and OR 99E/Barlow Road intersections, both of which are forecast to have demands well in excess of intersection capacity. These key locations and others projected to exceed capacity would experience excessive vehicle delays and long vehicle queues that could lead to operational and safety impacts at other intersections or rail crossings.

There are also multiple study intersections under Clackamas County and City of Canby jurisdiction whose operations would exceed the applicable mobility standards. One roadway of particular concern is South Township Road, where all of the study intersections would exceed standards due primarily to minor street delay. The South Hazel Dell Way/Sequoia Parkway intersection is of concern, as operations would exceed standards and volumes would exceed capacity.

Table 4-4: Projected 2030 Operating Conditions at Study Intersections

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized					
OR 99E/S Barlow Rd	ODOT	≤ 0.75	>80	F	**1.21**
OR 99E/Berg Pkwy	ODOT	≤ 0.75	23.6	C	**0.81**
OR 99E/Elm St	ODOT	≤ 0.85	>80	F	**1.08**
OR 99E/Grant St	ODOT	≤ 0.85	21.2	C	0.81
OR 99E/Ivy St	ODOT	≤ 0.85	>80	F	**1.43**
OR 99E/Pine St	ODOT	≤ 0.85	48.1	D	**1.00**
OR 99E/Sequoia Pkwy	ODOT	≤ 0.75	52.1	D	**0.95**
OR 99E/Territorial Rd	ODOT	≤ 0.75	19.5	B	0.75
Knights Bridge Rd/S Arndt Rd	Clackamas Co.	LOS D	30.0	C	0.91
SE 13th Ave/S Ivy St	Clackamas Co.	LOS D	18.7	B	0.78

Table 4-4 continued on next page.

[27] *2000 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000

(Continued) Table 4-4: Projected 2030 Operating Conditions at Study Intersections

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
All-way Stop Controlled					
S Township Rd/S Mulino Rd	Clackamas Co.	LOS D	>50	**F**	1.50
SE 13th Ave/S Mulino Rd	Clackamas Co.	LOS D	14.9	B	0.68
NE Territorial Rd/N Holly St	City of Canby	LOS D	14.6	B	0.58
NW 1st Ave/N Grant St	City of Canby	LOS D	16.8	C	0.75
NW 1st Ave/N Ivy St	City of Canby	LOS D	16.0	C	0.68
SE 4th Ave/Sequoia Pkwy	City of Canby	LOS D	18.1	C	0.72
Two-way Stop Controlled					
OR 99E/Otto Rd	ODOT	≤ 0.70	>50	B/F	**1.87**
OR 99E/Haines Rd	ODOT	≤ 0.70	>50	C/F	**> 2.0**
SE 2nd Ave/S Ivy St	Clackamas Co.	LOS D	24.2	A/C	0.38
S Township Rd/S Ivy St	Clackamas Co.	LOS D	>50	**B/F**	0.87
SE 1st Ave/S Mulino Rd	Clackamas Co.	LOS D	>50	**B/F**	0.92
Knights Bridge Rd/N Birch St	City of Canby	LOS E	>50	**A/F**	0.58
Knights Bridge Rd/N Cedar St	City of Canby	LOS E	33.8	A/D	0.51
Knights Bridge Rd/N Holly St	City of Canby	LOS E	32.4	A/D	0.45
NW 3rd Ave/N Cedar St	City of Canby	LOS E	10.7	A/B	0.18
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	14.9	A/B	0.36
NE 4th Ave/N Pine St	City of Canby	LOS E	27.7	A/D	0.49
NE Territorial Rd/N Redwood St	City of Canby	LOS E	>50	**A/F**	0.82
S Township Rd/S Redwood St	City of Canby	LOS E	>50	**A/F**	1.40
S Township Rd/Sequoia Pkwy	City of Canby	LOS E	>50	**A/F**	1.63
S Hazel Dell Way/Sequoia Pkwy	City of Canby	LOS E	>50	**B/F**	> 2.0
SE 4th Ave/S Redwood St	City of Canby	LOS E	12.5	A/B	0.21
SE 1st Ave/S Walnut St	City of Canby	LOS E	21.9	A/C	0.60
SE 13th Ave/Molalla Forest Rd	City of Canby	LOS E	14.6	A/B	0.19

Signalized and All-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Intersection
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold values do not meet standards.

Two-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Worst Approach
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement (typically a major movement)
Bold values do not meet standards.

Future Motor Vehicle Issues

Based on future traffic volume projections, the following future issues are *in addition* to the existing motor vehicle issues discussed in Chapter 3:

- Three key corridors should be examined for corridor-wide improvements:
  - OR 99E would exceed standards at most study intersections, with particular concerns at Otto Road, Haines Road, Ivy Street, and Barlow Road.
  - South Township Road would exceed standards at all study intersections.
  - Sequoia Parkway would exceed standards at the northernmost study intersections in proximity to OR 99E
- Other locations of concern:
  - There would be a bottleneck on OR 99E between Sequoia Parkway and Pine Street, where parallel connections are limited due to the railroad. This highway section would also reach the limits of a 5-lane roadway.
  - North Birch Street (classified as a neighborhood connector) would continue to be used as a cut-through route (instead of Holly Street) between Knights Bridge Road and NE Territorial Road (especially in the eastbound direction).
  - South Haines Road is expected to be used as a main connection between the Canby Pioneer Industrial Area and OR 99E to the northeast. If it is intended to serve industrial area traffic, South Haines Road and applicable intersection movements should be improved to accommodate increased traffic, including trucks. Otherwise, improved connectivity to OR 99E from the Canby Pioneer Industrial Area should be provided at a more convenient location.
  - Northbound traffic would divert away from South Ivy Street and cut through the adjacent neighborhood in order to use South Elm Street to access OR 99E. This would likely be due to congestion at the OR 99E/Ivy Street intersection.

Future Rail Needs

Future rail needs were identified based on information provided by ODOT Rail.[28, 29] The expectation is that both passenger and freight rail traffic will grow over time. This expectation is in-line with current policies promoting increased energy efficiency in the movement of people and goods. However, one key uncertainty for rail service through Canby is whether the existing intercity passenger rail line will stay on the Union Pacific Railroad mainline through Canby or move to the parallel Oregon Electric corridor. ODOT Rail is currently performing a study of long-run costs for the two options, and though a decision has not yet been reached, draft recommendations call for shifting passenger rail to the Oregon Electric line. If a change in the passenger rail line does occur, it is not expected to be for at least five to ten years.

If passenger rail service remains in Canby, it is expected that the six existing daily passenger trains will increase to 14 daily passenger trains by 2030. Freight train frequency is also likely to increase from between 20 to 25 existing daily freight trains to as many as 30 to 35 daily freight trains by 2030. The higher frequency of both passenger and freight trains is expected to necessitate the use of a second main track through Canby. Two adjacent tracks (i.e., a mainline track and an auxiliary track) currently exist through most of the city, and it may be possible to convert the auxiliary track to a mainline track. This conversion would still require the construction of an auxiliary track at another location. Another option may be to install a third track through town. The likely location for the third track would be on the northwest side the current Union Pacific tracks (i.e., adjacent to the tracks and within the railroad right-of-way).

Union Pacific is also studying the possibility of increasing train speeds through Canby. Currently, speeds are 60 mph for passenger trains and 50 mph for freight trains. The potential plan is to increase them to 79 mph for passenger trains and 60 mph for freight trains. The main limiting factor for train speeds through Canby is the nearby New Era hill approximately one mile northeast of Canby. Trains going up the hill towards Canby do not have sufficient time once reaching the top to accelerate to a speed beyond 80 mph, and trains approaching the hill from Canby must slow down in order to safely maneuver the hill due to the sharp curve at its bottom. Therefore, it is realistic to expect that 80 mph is the highest speed (i.e., the ultimate speed) that will be achieved by trains through Canby.

If industries in Canby intend to utilize rail service, the best location for rail access is on the Oregon Pacific short line in the southeast quadrant. Using a short line or auxiliary line is better suited to providing loading service so that the mainline can focus on providing through service. Therefore, the Canby Pioneer Industrial Area is in the preferred location to accommodate rail access. However, the City and industries need to discuss options with the railroads before assuming that new spur connections or train stops will be accommodated by the rail operators.

[28] Phone Conversation with Bob Melbo, ODOT Rail, October 7, 2009.

[29] *ODOT Intercity Passenger Rail Study*, ODOT Rail Division, June 2009 Draft.

ODOT Rail staff has indicated that reducing train crashes with vehicles, pedestrians, and bikes is possible by closing at-grade crossings, preventing trespassing on railroads, and providing grade-separated crossings. "If having smooth, safe traffic movement is indeed a sustainable priority for the community, they must plan for grade-separated crossings. Such planning may require folks to envision life without any grade crossings in Canby, and further envision realignment of the street network to utilize grade separated crossings strategically sited around the greater urban area. A community serious about safety and mobility should plan its transportation systems around those basic realities. The cost of constructing grade separated crossings is significant, but a city the size of Canby needs only a few of them for vehicles and maybe one downtown for bike and ped users. Both the problems associated with grade crossings, and the cost of constructing grade separated crossings, will increase significantly over the time span discussed in the draft TSP."[30]

Future Rail Issues

The following railroad related issues were identified and are *in addition* to the existing rail issues discussed in Chapter 3:

- Passenger and freight rail frequency are likely to increase, but it has yet to be determined if the existing passenger rail line through Canby will be moved to a parallel corridor (i.e., no longer pass through Canby).
- The higher frequency of passenger and freight trains will likely necessitate the use of a second mainline track through Canby. This would require one of the following:
    A. A new mainline track to be constructed adjacent to the existing track
    B. The conversion of the existing auxiliary track to a mainline track and the construction of a new auxiliary track in another location
- Higher train speeds can be expected in the future. The potential plan is to increase passenger train speeds from 60 mph to 79 mph and freight train speeds from 50 mph to 60 mph. Due to the nearby New Era Hill, 80 mph is the highest speed likely to be achieved by trains through Canby at any time in the future.
- The increased train frequency will worsen the barrier effect of the rail corridor on the transportation network within Canby because it will result in more gate-down time. It is not clear what impact the increase in train speeds will have on the barrier affect because the higher speeds reduce the amount of gate-down time (trains pass through more quickly) but there may be safety implications from higher speed trains. The impact of more gate-down time and safety near rail crossings should be considered when evaluating future transportation improvements.
- As train service and speeds increase, there is a potential for the frequency and severity of crashes between vehicles, pedestrians, and cyclists with trains to also increase.

[30] Email from Michael "Swede" Hays, ODOT Rail, November 9, 2009.

Chapter 5. Pedestrian Plan

Introduction

Pedestrian facilities play an important role in helping Canby provide multi-modal transportation alternatives, meet transportation performance standards, and serve future growth. The Canby Pedestrian Plan presented in this chapter aims to provide safe, continuous, and accessible pedestrian facilities throughout Canby. This plan includes improvement projects and complementary policies that the City should implement to improve Canby's pedestrian network.

Prior to presenting the improvement projects and complementary policies, this chapter provides background discussion of typical pedestrian use, a summary of existing pedestrian facilities and issues within Canby, and projected future pedestrian needs.

Background of Typical Pedestrian Travel

The most common need for a city's pedestrian system is to provide a safe and interconnected network that accommodates walking trips less than one mile in length. Other key issues are system continuity, connectivity, pedestrian amenities, crossing facilities, street lighting, and safety. A lack of safe facilities and gaps in the system often cause the most significant problems for pedestrians traveling within a city.

There are many purposes for pedestrian trips, but they can generally be grouped into three categories:

- Residential based trips – home to school, home to home, home to retail, home to park, home to transit, home to entertainment
- Service based trips – multi-stop retail trips, work to restaurant, work to services, work/shop to transit
- Recreational based trips – home to park, exercise trips, casual walking trips

Residential trips need a set of interconnected sidewalks radiating out from homes to destinations within one-half to one mile, and many of these trips are made by youth and children. Beyond one mile (i.e., approximately 20 minutes of walking time), walking trips of this type become substantially less common.

Service based trips require direct, conflict-free connectivity between uses (for example, downtown with its main street that connects multiple destinations). Service based trips need a clear definition of connectivity. This requires mixed use developments to locate front doors which relate directly to the public right-of-way and provide walking links

between uses within one-half mile. In addition, transit service plays an important role for connecting pedestrians from residential areas to downtown. Therefore, the location of bus stops is an important consideration for pedestrians.

Recreational walking trips have different needs and are often preferred on off-street trails, well landscaped sidewalks, and near unique environmental features (i.e., creeks, trees, and farmland). It is also likely that users may initially drive to access a recreational facility.

Each of these categories were considered when determining needs within Canby and recommended improvement projects, as described in the following sections.

Existing Pedestrian Facilities and Issues

Existing pedestrian facilities and issues in Canby are documented in detail in "Chapter 3: Existing Conditions." Based on the existing pedestrian facilities inventory, the following issues were identified:

- OR 99E and the Union Pacific Railroad are major barriers to north/south travel across the city.
- Protected pedestrian crossings of OR 99E occur at the signalized intersections but for the most part the sidewalks and curb ramps are in poor condition.
- To the west of Elm Street and to the east of Ivy Street, signalized crossings of OR 99E are spaced at ½ mile or greater, which is not adequate for convenient crossings.
- Many of the sidewalks are discontinuous and do not fully connect residential areas with schools, parks and short-distance retail (shopping) activities. In particular, sidewalks are lacking adjacent to the Clackamas County Fairgrounds and between the fairgrounds and downtown Canby.
- Sidewalks are lacking along significant portions of OR 99E.
- None of the railroad crossings include additional safety devices, such as striping or warning devices for the visually impaired. In addition, the following railroad crossings have issues of particular concern to pedestrians:
    - North Ivy Street crossing of Union Pacific Railroad has steeply inclined pedestrian approach on northwest corner and deteriorating curb on the northeast corner.
    - North Pine Street crossing of Union Pacific Railroad (near the Clackamas County Fairgrounds) does not have sidewalks,
    - South Township Road crossing of Oregon Pacific Railroad does not have sidewalks and the guardrails on either side of South Township Road force pedestrians towards the roadway.
- The Canby School District currently does not have a Safe Routes to School (SRTS) program.

Projected Future Pedestrian Issues

Based on the future growth projections and corresponding system needs discussed in "Chapter 4: Future Needs," the following future pedestrian issues were identified:

- Sidewalk gaps will be problematic on the following high speed and/or high traffic volume roadways:
  - OR 99E (on north side east of South Knott Street and on both sides east of Sequoia Parkway)
  - Knights Bridge Road
  - North Holly Street (from Knights Bridge Road to NW Territorial Road)
  - Territorial Road (NW, NE, and SE)
  - NE 4th Avenue (adjacent to the Clackamas County Fairgrounds)
  - NE 3rd Avenue (east of North Locust Street)
  - Old Pacific Highway (near Canby High School)
  - South Haines Road
  - Otto Road
  - SE Sequoia Parkway
  - SE Hazel Dell Way
  - SE 1st Avenue
  - South Walnut Street
  - South Mulino Road
  - South Township Road (east of Sequoia Parkway)
  - SE 13th Avenue (east of South Redwood Street)
- Pedestrian crossing enhancements should be considered at the following locations:
  - The north leg of the South Ivy Street/South Township Road intersection is a location where existing counts already indicate a high pedestrian crossing volume (33 pedestrian crossings during p.m. peak hour). Because of the increased volumes on South Ivy Street, there is a major concern for pedestrian safety and crossing accommodations.
  - South Township Road east of Sequoia Parkway has higher travel speeds (40 mph); therefore, the need for crossing treatments should be evaluated if future development of nearby pedestrian generators is proposed.
  - OR 99E between Ivy Street and Pine Street (approximately one-half mile) does not have any pedestrian crossings. One or two crossings should be examined, especially on the west end of this section of roadway where there is development on both sides of the highway.

- OR 99E between Sequoia Parkway and the eastern edge of the Canby UGB (approximately one mile) has only one pedestrian crossing (i.e., at the signalized intersection with Territorial Road). The possible signalization of an improved Otto Road intersection would add a second pedestrian crossing. One or two additional crossings should be examined, but may not be feasible given the current 45 mph speed limit on this section of OR 99E.
- South Mulino Road has higher travel speeds (speed limit not posted, so the 55 mph basic rule applies); therefore, the need for crossing treatments should be evaluated if future development of nearby pedestrian generators is proposed. Adjacent land uses consist primarily of farmland, but the comprehensive plan provides for future industrial development.
- South Haines Road has higher travel speeds (speed limit not posted, so the 55 mph basic rule applies); therefore, the need for crossing treatments should be evaluated if future development of nearby pedestrian generators is proposed. Adjacent land uses consist of existing residences with direct access to the road, and there is potential for future urban residential development.

Pedestrian Improvement Projects

Pedestrian improvements in Canby are aimed at closing the gaps in the pedestrian network along arterial and collector roadways and providing multi-modal connections to improve safety and livability. The pedestrian projects considered for this TSP include the deficient arterial or collector roadway segments (i.e., lacking sidewalks or with gaps in network) and railroad crossing locations (i.e., lacking crosswalks or with identified improvement needs). The deficient roadway segments and railroad crossing locations were evaluated in the Transportation Solutions Report (see Appendix K) and prioritized as high, medium, or low priority. This evaluation considered the following five criteria (which are explained in greater detail in the Transportation Solutions Report):

- High speed/high volume roadway that meets either the 25 mile per hour (mph) or 3,000 vehicles per day threshold (identified in "Chapter 4: Future Needs")
- Identified safety concern (as identified in "Chapter 3: Existing Conditions" and "Chapter 4: Future Needs")
- Prioritization based on proximity to key land uses that generate significant pedestrian activity
- Prioritization based on community survey responses
- Coordinated with an identified roadway improvement project (see "Chapter 7: Motor Vehicle Plan")

The highest priority projects are included in the Financially-Constrained Solutions Package. Therefore, it is expected that they can be funded using existing revenue streams through the year 2030. In addition, as development occurs, streets are rebuilt, and other funding opportunities arise (such as grant programs), the non-financially-constrained project list (particularly the list of high priority projects) provides a valuable resource for selecting additional pedestrian projects throughout Canby. Due to the variability of these unique funding sources, it is possible that some of these additional projects may be funded and constructed before projects included in the Financially-Constrained Solutions Package. The complete list of pedestrian projects considered in this TSP is included in the Transportation Solutions Report (see Appendix K).

The pedestrian projects included in the Financially-Constrained Solutions Package are listed in Table 5-1 and shown in Figure 5-1. The recommended pedestrian facility improvements include constructing new sidewalks, filling in gaps in the sidewalk network, upgrading intersections and railroad crossings for safer pedestrian crossings, expanding and improving the connectivity of the shared-use path network, and other programs to encourage walking. Table 5-1 also includes planning level cost estimates (except for projects where costs are accounted for in an associated motor vehicle or bicycle project on the same corridor). The planning level cost estimates are based on general unit costs for transportation improvements, but do not reflect the unique project elements that can significantly modify project costs. Each of these project costs will need further refinement to determine right-of-way requirements and costs associated with special design details as projects are pursued.

Table 5-1: Pedestrian Projects with Planning Level Costs (Financially-Constrained)

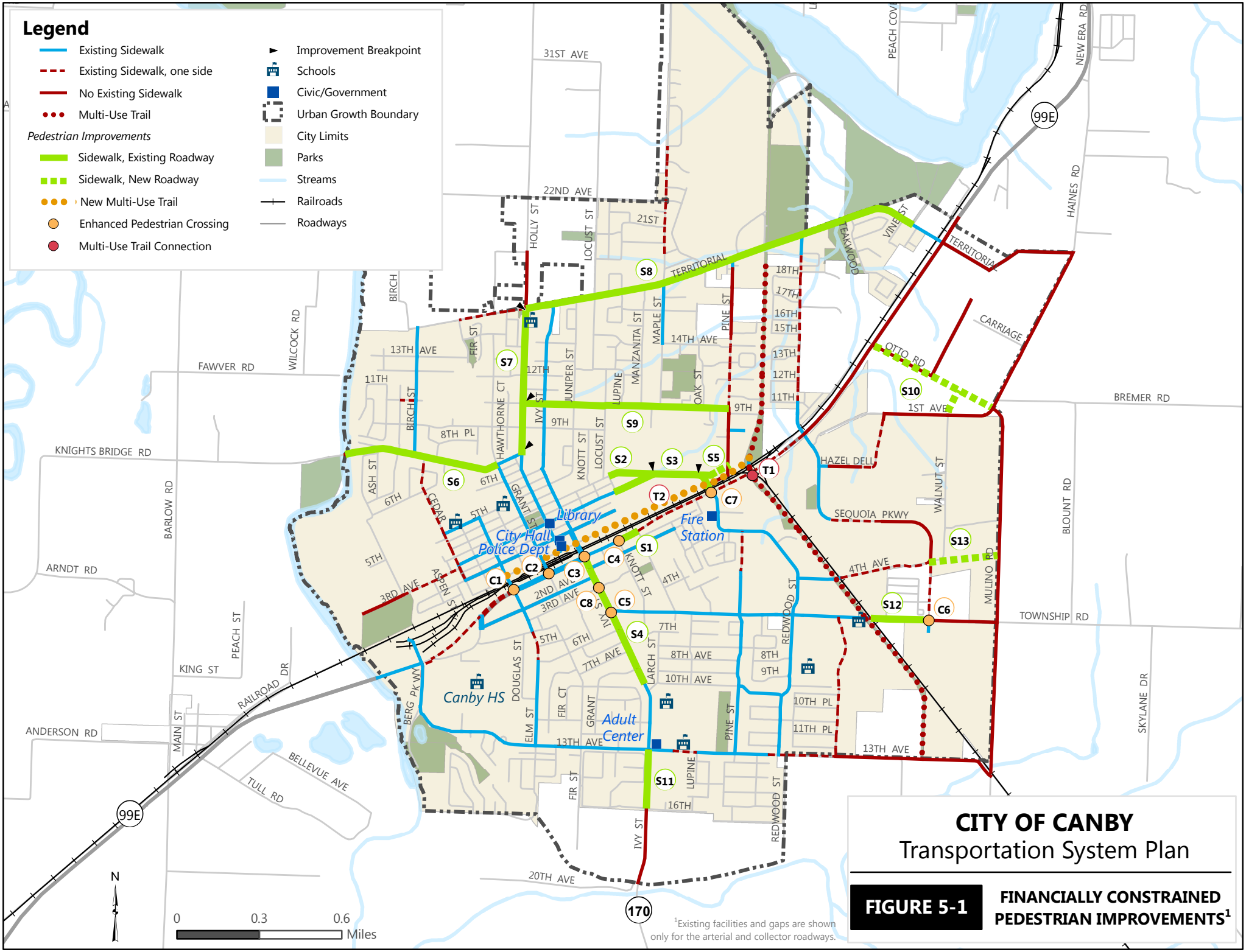
Location	Pedestrian Project		Planning Level Cost
Sidewalks			
OR 99E (north side, Knott St to Locust St)	**S1**	Install sidewalks (north side)	$0[a]
NE 3rd Ave (Locust St to NE 4th Ave) and NE 4th Ave (Locust St to NE 3rd Ave)	**S2**	Install sidewalks (provide sufficient space for bike lane and sidewalks by converting roadways to one-way travel)	$220,000
NE 4th Ave (NE 3rd Ave to Fairgrounds)	**S3**	Install sidewalks	$150,000
S Ivy St (OR 99E to Lee Elementary)	**S4**	Fill in sidewalk gaps	$490,000
Pine St (OR 99E to NE 4th Ave)	**S5**	Install sidewalks	$0[a]
Knights Bridge Rd (west UGB to Grant St)	**S6**	Fill in sidewalk gaps	$220,000[b]
N Holly St (Knights Bridge Rd to NW Territorial Rd)	**S7**	Fill in sidewalk gaps	$550,000
Territorial Rd (Holly St to OR 99E)	**S8**	Fill in sidewalk gaps	$1,230,000
NE 10th Ave (Holly St to Pine St)	**S9**	Install sidewalks	$830,000
Otto Rd (OR 99E to Mulino Road)	**S10**	Install sidewalks, crosswalks, ramps	$0[a]

Table 5-1 continued on next page.

(Continued) Table 5-1: Pedestrian Projects with Planning Level Costs (Financially-Constrained)

Location	Pedestrian Project		Planning Level Cost
Sidewalks (Cont.)			
S Ivy St (S 13th Ave to S 16th Ave)	**S11**	Fill in sidewalk gaps	$100,000
S Township Rd (OP RR to Sequoia Pkwy)	**S12**	Install sidewalks	$200,000
SE 4th Ave (Sequoia Pkwy to Mulino Rd)	**S13**	Install sidewalks	$0[a]
Enhanced Pedestrian Crossing			
OR 99E and UPRR (at Elm St)	**C1**	Improve crosswalk and ramps	$40,000
OR 99E and UPRR (at Grant St)	**C2**	Improve crosswalk and ramps, install pedestrian refuge island	$30,000
OR 99E and UPRR (at Ivy St)	**C3**	Improve crosswalk and ramps, install pedestrian refuge island	$30,000
OR 99E (between Ivy St and Locust St)	**C4**	Install pedestrian refuge island	$0[a]
S Ivy St (north leg at Township Rd)	**C5**	Install crosswalk and ramps	$0[a]
Township Rd (at Sequoia Pkwy)	**C6**	Provide crosswalk	$0[a]
OR 99E and UPRR (at Pine St)	**C7**	Improve crosswalk and ramps	$0[a]
S Ivy St (south leg at SW 3rd Ave)	**C8**	Install crosswalk, ramps, and pedestrian refuge island (remove crosswalk striping on north leg)	$0[a]
Multi-Use Trail			
OR 99E and Molalla Forest Rd Trail	**T1**	Connect multi-use trail to sidewalks on south side of OR 99E	$360,000
Parallel Route to OR 99E (between Elm St and Molalla Forest Rd Trail)	**T2**	Construct multi-use trail along rail corridor	$0[c]
Program Strategy			
Safe Routes to School (yearly funding)	**P1**	Prepare initial plan and provide yearly funding ($50,000 per year)	$1,050,000
ADA Improvements (yearly funding)	**P2**	Prepare initial plan and provide yearly funding ($50,000 per year)	$1,050,000
		TOTAL	**$6,550,000**

[a] Cost accounted for with an associated motor vehicle project.
[b] The eastern portion of the project is already underway and its funding is already accounted for. This cost accounts for the remaining portion of the project.
[c] Projects identified in both pedestrian and bicycle improvement lists, but costs provided in bicycle list.
[d] Project S10 consists of sidewalks on either NW 6th Ave or the Knights Bridge Road Extension, depending on which roadway is chosen for Motor Vehicle Project L1.


Legend
Existing Sidewalk
Existing Sidewalk, one side
No Existing Sidewalk
Multi-Use Trail
Pedestrian Improvements
Sidewalk, Existing Roadway
Sidewalk, New Roadway
New Multi-Use Trail
Enhanced Pedestrian Crossing
Multi-Use Trail Connection
Improvement Breakpoint
Schools
Civic/Government
Urban Growth Boundary
City Limits
Parks
Streams
Railroads
Roadways
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
T1
T2
C1
C2
C3
C4
C5
C6
C7
C8
Library
City Hall
Police Dept
Fire Station
Canby HS
Adult Center
99E
170
31ST AVE
22ND AVE
21ST
14TH AVE
13TH AVE
12TH
11TH
10TH AVE
10TH PL
11TH PL
9TH
8TH AVE
8TH PL
7TH AVE
7TH
6TH
5TH
4TH AVE
3RD AVE
2ND AVE
16TH
18TH
17TH
15TH
13TH
20TH AVE
TERRITORIAL
FAWVER RD
KNIGHTS BRIDGE RD
ARNDT RD
KING ST
ANDERSON RD
BREMER RD
TOWNSHIP RD
SEQUOIA PKWY
HAZEL DELL
OTTO RD
CARRIAGE
TULL RD
BELLEVUE AVE
RAILROAD DR
BERG PKWY
HOLLY ST
LOCUST ST
BIRCH
WILCOCK RD
FIR ST
IVY ST
JUNIPER ST
LUPINE
MANZANITA ST
MAPLE ST
PINE ST
OAK ST
HAWTHORNE CT
KNOTT ST
ASH ST
CEDAR
GRANT ST
ALDEN ST
BARLOW RD
PEACH ST
MAIN ST
ELM ST
DOUGLAS ST
FIR CT
LARCH ST
REDWOOD ST
WALNUT ST
MULINO RD
BLOUNT RD
SKYLANE DR
HAINES RD
NEW ERA RD
PEACH COVE
TEAKWOOD
VINE ST
N
0
0.3
0.6
Miles
[1]Existing facilities and gaps are shown only for the arterial and collector roadways.
CITY OF CANBY
Transportation System Plan
FIGURE 5-1
FINANCIALLY CONSTRAINED PEDESTRIAN IMPROVEMENTS[1]

Complementary Pedestrian Policies

To fully implement and utilize the pedestrian network identified in this Pedestrian Plan, supporting policies and standards are needed. In addition to the road cross-sections (discussed in Chapter 7) and code policies (discussed in Chapter 10), the following sections describe recommendations for ADA accessibility, sidewalk design standards, and a pedestrian crossing enhancement toolbox.

ADA Accessibility

Americans with Disabilities Act (ADA) accessibility was a pedestrian need that was identified, including the need to provide ADA accessible curb cuts for all downtown streets and destinations (e.g. schools, hospital, and shopping). A citywide ADA audit within Canby is needed to provide a comprehensive evaluation of areas that do not currently meet ADA standards. After an audit is completed, an ADA improvement program can be developed. The priority locations will be determined after the inventory has been conducted. A phased construction plan, with specific priority given to key downtown locations, would be included as part of the program. The list may be updated over time depending on current funding availability, but will provide a starting point for project selection. The funding for this effort is included in the Financially-Constrained Solutions Package, as listed in Table 5-1.

Sidewalk Design Standards

Sidewalks shall be built to the City's current design standards and in compliance with the Americans with Disabilities Act (at least four feet of unobstructed sidewalk).[31] Wider sidewalks may be constructed in commercial districts or on arterial streets. On OR 99E, the minimum sidewalk width allowed must be at least as wide as ODOT's design standards require.

Sidewalks shall also be sized to meet the specific needs of the adjacent land uses. Guidance to assess capacity needs for pedestrians can be found in the *Highway Capacity Manual*.[32] Typically, the base sidewalk sizing for local streets should be six feet (clear of obstruction). The critical element is the effective width of the walkway. Because of street utilities and amenities (i.e. benches), a six-foot walkway can be reduced to three feet of effective walking area. Obstructions are the greatest capacity constraint to pedestrian flow.

As functional classification of roadways change, so should the design of the pedestrian facilities. Specific sidewalk width ranges are included as part of the roadway cross-section standards provided in "Chapter 7: Motor Vehicle Plan." Wider sidewalks may be necessary depending upon urban design needs and pedestrian flows (e.g. adjacent to storefront retail).

[31] *Americans with Disabilities Act*, Uniform Building Code.

[32] *Highway Capacity Manual*, Transportation Research Board, 2000; Chapter 18.

Pedestrian Crossing Enhancement Toolbox

Multiple recommended pedestrian projects involved the installation of a pedestrian crossing enhancement (see Projects C1 through C7 in Table 5-1). Table 5-2 summarizes several potential crossing enhancements that can be applied for these projects within the City of Canby. Each crossing location should be reviewed to determine the appropriate combination of improvements. For example, curb extensions are effective for reducing crosswalk lengths and exposure to conflicting vehicles, but these are only reasonable where on-street parking is provided because the curb extension 'shadows' the parked cars. Another example includes pedestrian countdown timers, which can only be applied at existing or new traffic signal controlled crossings. The examples shown in Table 5-2 represent a toolbox of solutions for pedestrian enhancements.

Table 5-2: Potential Crossing Enhancement Tools

Improvement	Description	Illustration	Cost Range
Marked Crosswalk	White, thermoplastic markings at street corner. Alternative material could include non-white color or textured surfaces.		$500 to $1,000 each crossing
Raised Crosswalk	Crosswalks that are level with the adjacent sidewalks, making pedestrians more visible to approaching traffic.		$4,000
New Corner Sidewalk Ramp	Construct ADA compliant wheelchair ramps consistent with city standards		$3,000 to $5,000 each corner
Median Refuge	Construct new raised median refuge area. Minimum width 6 feet, and minimum length of 30 feet. Curb can be mountable to allow emergency vehicles to cross, if required.		$3,000 to $10,000 depending on overall length and amenities.

Table 5-2 continued on next page.

(Continued) Table 5-2: Potential Crossing Enhancement Tools

Improvement	Description	Illustration	Cost Range
Pedestrian Count Down Timer Signal	Install supplemental pedestrian signal controls to indicate the time remaining before crossing vehicles get 'green' signal indication.		$500 each signal head
Curb Extensions	Construct curb extension on road segments with on-street parking. Reduces pedestrian crossing area, and exposure to vehicle conflicts.		$5,000 to $8,000 depending on design amenities and aesthetic treatments.
Mid-Block Pedestrian Signal and Crossing	Construct new pedestrian signal that is synchronized with major street traffic progression to reduce interruption of through traffic. Appropriate near high pedestrian generators.		$100,000 to $150,000
Mid-Block Rectangular Rapid Flashing Beacon (RRFB) and Crossing	Construct new pedestrian crossing with pedestrian activated flashing beacons. Appropriate near medium pedestrian generators and important crossing locations.		$20,000 to $60,000 depending if median refuge island and associated RRFB assemblies are installed

Chapter 6. Bicycle Plan

Introduction

Bicycle facilities play an important role in helping Canby provide multi-modal transportation alternatives, meet transportation performance standards, and serve future growth. The Canby Bicycle Plan presented in this chapter aims to provide safe, continuous, and accessible bicycle facilities throughout Canby. This plan includes the recommended improvement projects and complementary policies that the City should implement to improve Canby's bicycle network.

Prior to presenting the improvement projects and complementary policies, this chapter provides background discussion regarding typical bicycle use, a summary of existing bicycle facilities and issues within Canby, and projected future bicycle needs for Canby.

Background of Typical Bicycle Use

Bicycle trips are different from pedestrian and motor vehicle trips. Common bicycle trips are longer than walking trips and generally shorter than motor vehicle trips. Where walking trips are attractive at lengths of a quarter mile (generally not more than a mile), bicycle trips are attractive up to three miles. System continuity, system connectivity, and safety are key issues for bicyclists. The lack of safe facilities and gaps in the system often cause the most significant problems for bicyclists traveling within a city.

There are many purposes for bicycle trips, but they can generally grouped into three categories:

- Commuter trips – home to work
- Activity based trips – home-to-school, home-to-park, home-to-neighborhood commercial or home-to-home
- Recreational based trips – home to park, cycling trips

Commuter trips are typically home/work/home (sometimes linking to transit) and are made on direct, major connecting roadways and/or local streets. Bicycle lanes provide good accommodations for these trips. Activity based trips are typically are made on local streets with some connections to arterials and collectors. Their needs are for lower volume/speed traffic streets, safety, and connectivity. Recreational trips share many of the needs of both the commuter and activity-based trips, but create greater needs for off-street routes, connections to rural routes and safety. Typically, recreational bike trips will exceed the normal bike trip length.

Each of these categories were considered when determining needs within Canby and recommended improvement projects, as described in the following sections.

Existing Bicycle Facilities and Issues

Existing bicycle facilities and issues in Canby are documented in detail in "Chapter 3: Existing Conditions." Based on the existing bicycle facilities inventory, the following issues were identified:

- Bike lanes are absent on many arterial and collector streets throughout Canby.
- Key locations lacking bike lanes are along OR 99E, through town, and in the northwest portion of the city.
- The main gap in bike lanes along North Ivy Street (which provides north/south travel for bicyclists in the center of the city) is in the vicinity of OR 99E and the Union Pacific Railroad.
- On OR 99E between Elm Street and Berg Parkway there is a wide shoulder on only one side of the street.
- Neighborhood routes are designated as bike routes with shared travel lanes, but speeding by motorists can create safety concerns for bicyclists, especially in locations where on-street parking forces a narrower travel way.
- There are potential safety concerns for bicyclists at the following railroad crossings due to gaps adjacent to rails or uneven crossing surfaces:
    - North Elm Street crossing of Union Pacific Railroad has gaps adjacent to the rail, asphalt fill is breaking away, and the surface is rough.
    - North Grant Street crossing of Union Pacific Railroad has gaps adjacent to the rail.
    - North Pine Street crossing of Union Pacific Railroad has gaps adjacent to the rail.
    - South Township Road crossing of Oregon Pacific Railroad has gaps adjacent to the rail.

Projected Future Bicycle Issues

Based on the future growth projections and corresponding system needs discussed in "Chapter 4: Future Needs", the following future bicycle issues were identified:

- As bike lanes are planned for arterial and collector roadways, the following locations should be considered higher priority given their projected motor vehicle volume and speed:
    - OR 99E
    - Ivy Street (between North 1st Avenue and South 2nd Avenue)

- North Holly Street
- Knights Bridge Road
- North Redwood Street
- Elm Street (between NW 3rd Avenue and SW 4th Avenue)
- SE Territorial Road
- South Haines Road
- SE 1st Avenue
- Otto Road
- South Mulino Road
- South Township Road (east of Sequoia Parkway)
- NE 4th Avenue (adjacent to the Clackamas County Fairgrounds)
- NE 3rd Avenue (east of North Locust Street)

- In addition, these non-arterial/collector locations should be evaluated to determine if bicycle enhancements are needed:
  - South Walnut Street
  - Old Pacific Highway (near Canby High School)
  - North Birch Street (between Knights Bridge Road and NW Territorial Road)
  - NW Territorial Road (between North Birch Street and North Holly Street)

Bicycle Improvement Projects

Bicycle improvements in Canby are aimed at closing the gaps in the bicycle network along arterial and collector roadways and providing multi-modal links to improve livability. The recommended bicycle network includes various types of bicycling facilities connecting key destinations throughout Canby. Facility improvements include constructing and/or striping bike lanes, improving railroad crossings, expanding and improving the connectivity of the shared-use path network, and other programs to encourage bicycling (such as the recommendation to develop of a Safe Routes to School Program). More detailed explanations of bicycle facility types are provided in the "Bicycles" section of "Chapter 3: Existing Conditions."

The bicycle projects considered for this TSP include the deficient arterial or collector roadway segments (i.e., lacking bike lanes or shoulders) and railroad crossing locations. Typically, local streets do not require delineated bicycle lanes as traffic volumes and

speeds are low enough that bicycles and motor vehicles can reasonably share the same travel area.

The deficient roadway segments and railroad crossing locations were evaluated in the Transportation Solutions Report (see Appendix K) and prioritized as high, medium, or low priority. This evaluation considered the following five criteria (which are explained in greater detail in the Transportation Solutions Report):

- High speed/high volume roadway that meets either the 25 mile per hour (mph) or 3,000 vehicles per day threshold (as identified in "Chapter 4: Future Needs")
- Identified safety concern (as identified in "Chapter 3: Existing Conditions" and "Chapter 4: Future Needs")
- Prioritization based on proximity to key land uses that generate significant bicycle activity
- Prioritization based on community survey responses
- Coordinated with an identified roadway improvement project (see "Chapter 7: Motor Vehicle Plan")

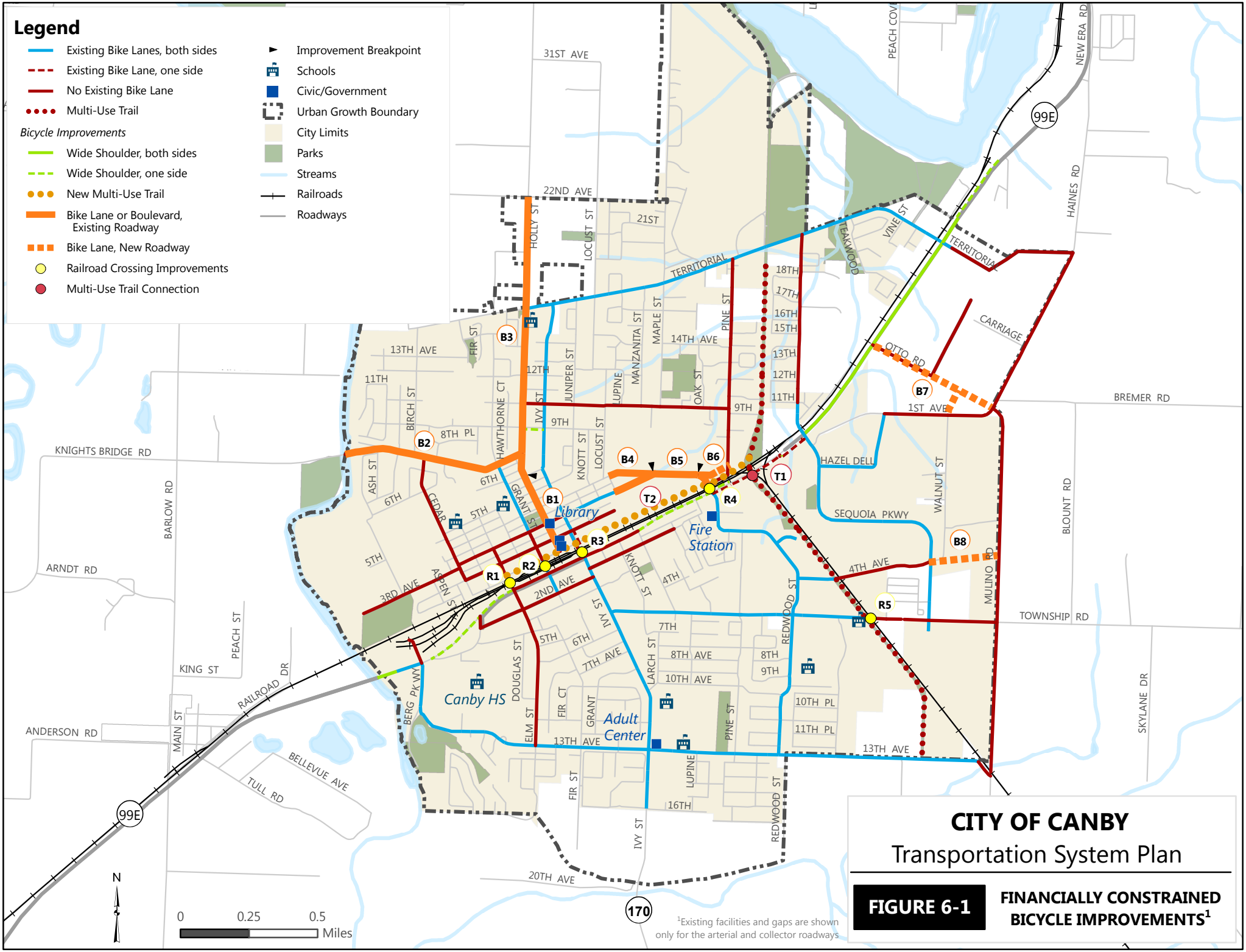
The highest priority projects are included in the Financially-Constrained Solutions Package. Therefore, it is expected that they can be funded using existing revenue streams through the year 2030. In addition, as development occurs, streets are rebuilt, and other funding opportunities arise (such as grant programs), the non-financially-constrained project list (particularly the list of high priority projects) provides a valuable resource for selecting additional bicycle projects throughout Canby. Due to the variability of these unique funding sources, it is possible that some of these additional projects may be funded and constructed before projects included in the Financially-Constrained Solutions Package. The complete list of bicycle projects considered for the TSP is included in the Transportation Solutions Report (see Appendix K).

The bicycle projects included in the Financially-Constrained Solutions Package are listed in Table 6-1 and shown in Figure 6-1. The project list in Table 6-1 also includes planning level cost estimates for these projects. For some projects, cost estimates are accounted for in an associated motor vehicle or pedestrian project. The planning level cost estimates that are provided are based on general unit costs for transportation improvements, but do not reflect the unique project elements that can significantly modify individual project costs. Each of these project costs will need further refinement to determine unique right-of-way requirements and costs associated with special design details as projects are pursued.

Table 6-1: Bicycle Projects with Planning Level Costs (Financially-Constrained)

Location	Bicycle Project		Planning Level Cost
Railroad Crossing Improvements			
UPRR (at Elm St)	**R1**	Improve rail crossing (fill in gaps adjacent to rails)	$100,000
UPRR (at Grant St)	**R2**	Improve rail crossing (fill in gaps adjacent to rails)	$100,000
UPRR (at Ivy St)	**R3**	Improve rail crossing (fill in gaps adjacent to rails)	$100,000
UPRR (at Pine St-NE 4th Ave)	**R4**	Provide rail crossing	$0[a]
OPRR (at Township Rd)	**R5**	Move guardrail and improve rail crossing (fill in gaps adjacent to rails)	$100,000
Bike Lanes or Boulevards			
N Holly St (NW 6th Ave to Multi-Use Trail[d])	**B1**	Install enhancements to create a bicycle boulevard	$30,000
Knights Bridge Rd (west edge of UGB to Holly St)	**B2**	Stripe bike lanes	$41,000
N Holly St (NW 22nd Ave to NW 6th Ave)	**B3**	Stripe bike lanes (widen as needed)	$663,000
NE 3rd Ave (Locust St to NE 4th Ave) and NE 4th Ave (Locust St to NE 3rd Ave)	**B4**	Stripe bike lane (provide sufficient space for bike lane and sidewalks by converting roadways to one-way travel)	$16,000
NE 4th Ave (NE 3rd Ave to Fairgrounds Entrance)	**B5**	Install bike lanes	$105,000
Pine St (OR 99E to NE 4th Ave)	**B6**	Install bike lanes	$0[a]
Otto Rd (OR 99E to Mulino Road)	**B7**	Install bike lanes	$0[a]
SE 4th Ave (Sequoia Pkwy to Mulino Rd)	**B8**	Install bike lanes	$0[a]
Multi-Use Trail			
OR 99E and Molalla Forest Rd Trail	**T1**	Connect multi-use trail to sidewalks on south side of OR 99E	$0[b]
Parallel Route to OR 99E (between Elm St and Molalla Forest Rd Trail)	**T2**	Construct 12'-wide multi-use trail along rail corridor	$3,435,000[c]
		TOTAL	**$4,690,000**

[a] Cost accounted for with an associated motor vehicle project.
[b] Projects identified in both pedestrian and bicycle improvement lists, but costs provided in pedestrian list.
[c] Projects identified in both pedestrian and bicycle improvement lists, but costs provided in bicycle list.
[d] The multi-use trail (see Project T1) is a planned project located between NW 1st Avenue and the railroad tracks.



CITY OF CANBY

Transportation System Plan

FIGURE 6-1 **FINANCIALLY CONSTRAINED BICYCLE IMPROVEMENTS[1]**

[1]Existing facilities and gaps are shown only for the arterial and collector roadways

Complementary Bicycle Policies

To fully implement and utilize the bicycle network identified in this Bicycle Plan, supporting policies are needed. In addition to the road cross-sections (discussed in Chapter 7) and code policies (discussed in Chapter 10), the following sections describe recommendations for bicycle parking and land development contribution.

Bicycle Parking

The availability of bicycle parking is an important consideration when choosing whether to make a trip by bicycle. Lack of proper storage facilities discourages potential riders from traveling by bicycle. To accommodate bicyclists, including those who are commuting to work or running errands, the City of Canby includes bicycle parking requirements for new development in its City Zoning Code.

The City should also consider providing additional bicycle parking at locations that are significant activity generators. The adequacy of existing bicycle racks should be assessed in downtown and at schools, parks, the fairgrounds, and retail areas. The attractiveness of bike parking may also be improved by providing covered parking or secured facilities where bicycles may be locked away. To the extent possible, bike parking should be visible, inviting, and integrated with building, street front, and landscape design.

Land Development Contribution

The effectiveness of Canby's bicycle network will be limited unless convenient connections to desired destinations are also provided. Therefore, it is important for developers to provide connections or accessways to link their sites to the existing bicycle and pedestrian facilities in as direct a manner as is reasonable. In addition, if a development fronts a street where the City intends to provide a bike lane or sidewalk, the developer shall be responsible for providing the bikeway or walkway facility as part of any half-street improvement required for project mitigation.

Chapter 7. Motor Vehicle Plan

Introduction

Multi-modal roadways form the backbone of Canby's transportation system. The Canby Motor Vehicle Plan presented in this chapter aims to provide safe, connected, and accessible roadway facilities throughout Canby that meet desired traffic operation levels and accommodate users of other modes. This plan includes the recommended improvement projects and complementary policies that the City should implement to improve Canby's roadway network and maintain consistency with other jurisdictional plans, including the Clackamas County Transportation System Plan and ODOT's *Oregon Highway Plan*. The recommended improvements projects have been selected to balance the traveling needs of the residents, business owners, and visitors of Canby, while also providing services for regional auto and freight traffic.

Prior to presenting the motor vehicle improvement projects and complementary policies, this chapter provides background discussion regarding existing motor vehicle facilities and issues within Canby, projected future motor vehicle needs for Canby, and recommended improvement strategies.

Existing Motor Vehicle Facilities and Issues

Existing motor facilities and issues in Canby are documented in detail in "Chapter 3: Existing Conditions." Based on the existing motor vehicle facilities inventory, the following issues were identified:

- Two intersections (i.e., OR 99E/Barlow Road and OR 99E/Haines Road) do not meet *Oregon Highway Plan* mobility standards.
- There is poor safety performance at the OR 99E/Ivy Street and OR 99E/Pine Street intersections. These intersections had the greatest number of collisions between 2003 and 2007 and were identified as top five percent and top 15 percent Safety Priority Index System (SPIS) sites, respectively.
- Along most of OR 99E through Canby, there are between four to ten times more driveways than *OHP* minimum access spacing standards. The significant number of nonconforming accesses increases the number of potential conflicts along the highway and reduces traffic flow due to slow moving vehicles entering and exiting the highway.
- Knights Bridge Road on the west edge of town has an abrupt change in speed limit. Many drivers enter the city traveling at higher-than-posted speeds on the 25 mph neighborhood street.

- Truck routes transect residential neighborhoods, specifically near the industrial pocket in the northwest part of town and along 13th Avenue in the southern part of town.

Future Motor Vehicle Issues

Based on future traffic volume projections, in "Chapter 4: Future Needs" the following future issues were identified:

- Three key corridors should be examined for corridor-wide improvements:
  - OR 99E would exceed standards at most study intersections, with particular concerns at Otto Road, Haines Road, Ivy Street, and Barlow Road.
  - South Township Road would exceed standards at all study intersections.
  - Sequoia Parkway would exceed standards at the northernmost study intersections in proximity to OR 99E
- Other locations of concern:
  - There would be a bottleneck on OR 99E between Sequoia Parkway and Pine Street, where parallel connections are limited due to the railroad. This highway section would also reach the limits of a 5-lane roadway.
  - North Birch Street (classified as a neighborhood route) would continue to be used as a cut-through route (instead of Holly Street) between Knights Bridge Road and NE Territorial Road (especially in the eastbound direction).
  - South Haines Road is expected to be used as a main connection between the Canby Pioneer Industrial Area and OR 99E to the northeast. If it is intended to serve industrial area traffic, South Haines Road and applicable intersection movements should be improved to accommodate increased traffic, including trucks. Otherwise, improved connectivity to OR 99E from the Canby Pioneer Industrial Area should be provided at a more convenient location.
  - Northbound traffic would divert away from South Ivy Street and cut through the adjacent neighborhood in order to use South Elm Street to access OR 99E. This would likely be due to congestion at the OR 99E/Ivy Street intersection.

Recommended Improvement Strategies

To meet performance standards and manage the forecasted travel demand for all modes, the transportation system within the City of Canby needs significant multi-modal improvements. The transportation improvements will be more sustainable and the associated financial investments will yield greater returns by following a variety of management and capital improvement strategies, including:

- Apply classifications and designations to the roadway network, including:
  - Functional Classification
  - Special Transportation Area (STA) Designation
  - Truck Routes
- Adopt roadway standards, including:
  - Roadway Cross-Sections
  - Access Management
  - Traffic Signal Spacing
- Implement other plans or programs, including:
  - Local Street Connectivity
  - Neighborhood Traffic Management
  - Transportation Demand Management (TDM)
- Construct roadway improvement projects that provide necessary capacity and connectivity; two solutions packages have been identified:
  - Preferred Solutions Package
  - Financially-Constrained Solutions Package

The roadway classifications and designations; roadway standards; other plans and programs; and roadway improvement projects are discussed in the following sections.

Roadway Classifications and Designations

This section discusses the various roadway classifications that are important to managing the transportation system. These classifications include the following:

- Street Functional Classification
- Special Transportation Area (STA) Designation
- Truck Routes

Street Functional Classification

Street functional classification is an important tool for managing public facilities pragmatically and cost effectively. It is based on a hierarchal system of roads that designates the level of access versus mobility that different roads should provide. In this way, it helps traffic move smoothly through the system and protects neighborhoods.

Functional classification also supports future construction and planning efforts by providing design and connectivity guidance. For example, roadway cross-section standards are provided based on functional classification. In addition, system connectivity is best structured with incremental steps in classifications so that there is a smooth transition from high access/low mobility roads to low access/high mobility roads.

The functional classes, recommended classification changes, and criteria for future classification changes for Canby roadways are explained in the following sections.

Functional Classes

The three main functional classes are arterial, collector, and local street, but some cities further divide these classifications into major/minor or add other classifications such as highway, parkway, neighborhood route/collector, etc.). Previously, Canby had five functional classes: highway, arterial, collector, neighborhood route, and local street. It is recommended that Canby maintain similar functional classes, with the exception that a standalone highway functional class should no longer be provided. Updated functional class explanations are provided below.

Arterials

Arterial streets serve to provide major connections within and through Canby and include OR 99E. These streets link major commercial, residential, industrial and institutional areas. Arterial streets are typically spaced about one mile apart to assure accessibility and reduce the incidence of traffic using collectors or local streets for through traffic in lieu of a well placed arterial street. Access control is a key feature of an arterial route. Arterials are typically multiple miles in length.

Collectors

Collector streets provide both access and circulation within and between residential and commercial/industrial areas. Collectors differ from arterials in that they provide more of a localized circulation function, do not require as extensive control of access (compared to arterials), and penetrate residential neighborhoods to funnel trips from the neighborhood and local streets onto the arterial street system. The maximum interval for collector roadways should be 1,500 feet. Collectors are typically greater than 0.5 to 1.0 miles in length.

Neighborhood Routes

Neighborhood routes are usually long relative to local streets and provide connectivity to collectors or arterials. Because neighborhood routes have greater connectivity, they generally have more traffic than local streets and are used by residents in the area to get into and out of the neighborhood, but do not serve citywide/large area circulation. They are typically about a quarter to a half-mile in total length. Traffic from cul-de-sacs and other local streets may drain onto neighborhood routes to gain access to collectors or arterials. Because traffic needs are greater than a local street, they will likely be larger than typical residential streets. However, certain measures should be considered to retain the neighborhood character and livability of these routes. Neighborhood traffic management measures are often appropriate (including devices such as speed humps, traffic circles and other devices). However, it should **not** be construed that neighborhood routes automatically get speed humps or any other measures. While these routes have special needs, neighborhood traffic management is only one means of retaining neighborhood character and vitality.

Local Streets

Local streets have the sole function of providing immediate access to adjacent land. Service to through traffic movements on local streets is deliberately discouraged by design. All other city streets in the City of Canby that are not designated as arterial streets, collector streets, or neighborhood routes are considered to be local streets.

Recommended Functional Classification Changes

Updated functional classifications of City of Canby roadways will provide a framework for improving network design, circulation, and mobility. The key changes include (1) updating the arterial roadway network to be consistent with the recommended transportation improvements, (2) maintaining and updating the collector system to reflect recent and expected land use development, and (3) providing neighborhood routes that serve clear connections between neighborhoods and the collector and arterial network. The recommended street functional classifications for City of Canby roadways are shown in Figure 7-1. Any street not designated as an arterial, collector, or neighborhood route is considered a local street. Many of these classifications are the same as they were previously, but the revised classifications are listed in Table 7-1. In this table, the prior classifications (as indicated in the prior TSP) are also listed.

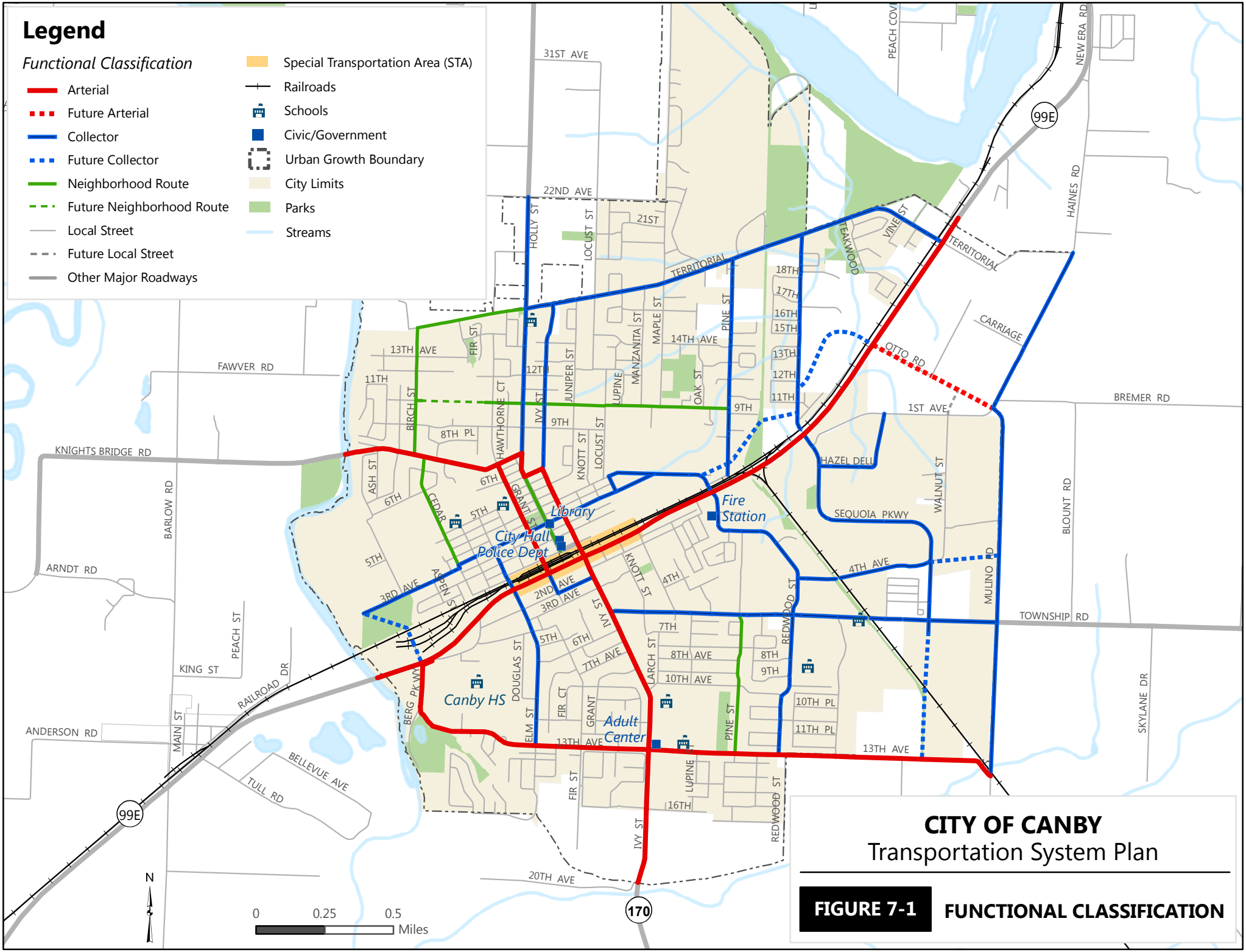

Legend
Functional Classification
Arterial
Future Arterial
Collector
Future Collector
Neighborhood Route
Future Neighborhood Route
Local Street
Future Local Street
Other Major Roadways
Special Transportation Area (STA)
Railroads
Schools
Civic/Government
Urban Growth Boundary
City Limits
Parks
Streams
Library
City Hall
Police Dept
Fire Station
Canby HS
Adult Center
99E
170
31ST AVE
22ND AVE
21ST
13TH AVE
14TH AVE
12TH
11TH
9TH
8TH PL
7TH AVE
6TH
5TH
4TH AVE
3RD AVE
2ND AVE
1ST AVE
10TH AVE
8TH AVE
7TH
16TH
20TH AVE
10TH PL
11TH PL
18TH
17TH
15TH
13TH
TERRITORIAL
OTTO RD
CARRIAGE
HAINES RD
NEW ERA RD
PEACH COVE
BREMER RD
BLOUNT RD
SKYLANE DR
MULINO RD
TOWNSHIP RD
SEQUOIA PKWY
HAZEL DELL
WALNUT ST
TEAKWOOD
VINE ST
HOLLY ST
LOCUST ST
MAPLE ST
PINE ST
OAK ST
MANZANITA ST
LUPINE
JUNIPER ST
IVY ST
KNOTT ST
HAWTHORNE CT
FIR ST
BIRCH ST
ASH ST
CEDAR
GRANT ST
ALDEN ST
DOUGLAS ST
ELM ST
FIR CT
LARCH ST
REDWOOD ST
FAWVER RD
KNIGHTS BRIDGE RD
BARLOW RD
ARNDT RD
PEACH ST
KING ST
RAILROAD DR
BERG PKWY
MAIN ST
ANDERSON RD
BELLEVUE AVE
TULL RD
N
0
0.25
0.5
Miles
CITY OF CANBY
Transportation System Plan
FIGURE 7-1
FUNCTIONAL CLASSIFICATION

Table 7-1: Roadway Classification Changes

Roadway	From	To	Change from Prior Classification
Arterials			
OR 99E	West City Limits	East City Limits	Was separate "Highway" classification
North Grant Street	OR 99E	Knights Bridge Road	Upgrade from collector
North Holly Street	NW 6th Avenue	Knights Bridge Road	Upgrade from collector
NW 6th Avenue	North Holly Street	North Ivy Street	Upgrade from local street
Otto Road Extension	OR 99E	Mulino Road	New roadway (Financially-Constrained Package)
Collectors			
North Ivy Street	North 6th Avenue	North Territorial Road	Downgrade from arterial
South Grant Street	SW 2nd Avenue	OR 99E	Upgrade from local
NW Territorial Road	North Holly Street	North Ivy Street	Downgrade from arterial
NE Territorial Road	North Ivy Street	OR 99E	Downgrade from arterial
North Holly Street	NW Territorial Road	NW 22nd Avenue	Downgrade from arterial
New frontage road	North Pine Street	OR 99E	New roadway (Preferred Package)
South Elm Street	SE 13th Avenue	OR 99E	Downgrade from arterial
SE 4th Avenue	Sequoia Parkway	South Mulino Road	New roadway (Financially-Constrained Package)
Sequoia Parkway	SE Township Road	SE 13th Avenue	New roadway (Preferred Package)
South Berg Parkway	OR 99E	SW 13th Avenue	Downgrade from arterial
North Berg Parkway	OR 99E	NW 3rd Avenue	New roadway (Preferred Package)
Neighborhood Routes			
North Cedar Street	NW 3rd Avenue	Knights Bridge Road	Downgrade from collector
North Holly Street	NW 1st Avenue	NW 6th Avenue	Downgrade from collector
NW 10th Avenue	North Holly Street	North Ivy Street	Downgrade from collector
NW 10th Avenue	North Ivy Street	North Pine Street	Downgrade from collector
NW 10th Avenue	North Birch Street	North Grant Street	New roadway
Local Streets			
NW 1st Avenue	North Douglas Street	North Ivy Street	Downgrade from collector
NW 2nd Avenue	North Cedar Street	North Ivy Street	Downgrade from collector
SE 2nd Avenue	South Ivy Street	End of Roadway	Downgrade from collector

Table 7-1 continued on next page.

(Continued) Table 7-1: Roadway Classification Changes

Roadway	From	To	Change from Prior Classification
Local Streets (Continued)			
NE 2nd Avenue	North Ivy Street	End of Roadway	Downgrade from collector
SW 2nd Avenue	South Birch Street	South Grant Street	Downgrade from collector
North Birch Street	NW Territorial Road	North City Limits	Downgrade from neighborhood connector
North Maple Street	NE 10th Avenue	North City Limits	Downgrade from neighborhood connector
North Cedar Street	NW 2nd Avenue	NW 3rd Avenue	Downgrade from collector
North Elm Street	NW 3rd Avenue	NW 5th Avenue	Downgrade from neighborhood connector
NW 5th Avenue	North Cedar Street	North Elm Street	Downgrade from neighborhood connector
SE Territorial Road	OR 99E	Haines Road	Downgrade from arterial
South Pine Street	SE Township Road	SE 3rd Avenue	Downgrade from neighborhood connector
SE 10th Avenue	South Pine Street	South Redwood Street	Downgrade from neighborhood connector
South Teakwood Street	SE 13th Avenue	SE Township Road	Downgrade from neighborhood connector
SW 6th Avenue	South Elm Street	South Ivy Street	Downgrade from neighborhood connector

Criteria for Future Functional Classification Changes

The criteria used to assess functional classification have two components: the extent of connectivity and the frequency of the facility type. Maps can be used to determine regional, city/district, and neighborhood connections. The frequency or need for facilities of certain classifications is not routine or easy to package into a single criterion. While planning textbooks call for arterial spacing of a mile, collector spacing of a quarter to a half-mile, and neighborhood connections at an eighth to a sixteenth of a mile, this does not form the only basis for defining functional classification.

Changes in land use, environmental issues or barriers, topographic constraints, and demand for facilities can change the frequency for routes of certain functional classifications. While spacing standards can be a guide, they must consider other features and potential long term uses in the area (some areas would not experience significant changes in demand, where others will). It is acceptable for the city to re-classify street functional designations to have different naming conventions, however, the general intent and purpose of the facility, whatever the name, should be consistent with regional, state, and federal guidelines.

By planning an effective functional classification of Canby streets, the City can manage public facilities pragmatically and cost effectively. These classifications do not mean that because a route is an arterial it is large and has lots of traffic. Nor do the definitions dictate that a local street should only be small with little traffic. Identification of connectivity does not dictate land use or demand for facilities. The demand for streets is directly related to the land use. The highest level connected streets have the greatest potential for higher traffic volumes, but do not necessarily have to have high volumes as an outcome, depending upon land uses in the area. Typically, a significant reason for high traffic volumes on surface streets at any point can be related to the level of land use intensity within a mile or two. Many arterials with the highest level of connectivity have only 35 to 65 percent "through traffic". Without the connectivity provided by arterials and collectors, the impact of traffic intruding into neighborhoods and local streets goes up substantially.

Special Transportation Area (STA) Designation

The City of Canby and ODOT coordinated efforts to obtain an Oregon Transportation Commission (OTC) approval of an amendment to the *Oregon Highway Plan* to designate a *Special Transportation Area (STA)* for the portion of OR 99E through Canby's downtown (i.e., Elm Street to Locust Street). To assist in this effort, an STA suitability evaluation was performed and is provided in Appendix H. A summary of the findings of STA suitability evaluation are provided below.

The STA designation is appropriate for OR 99E through Canby's downtown (i.e., Elm Street to Locust Street) because the existing and planned environment surrounding the highway meets the criteria specified in the 1999 Oregon Highway Plan (OHP).[33] Specifically, an STA designation recognizes that local mobility and access needs in Canby's downtown are a priority and are as important as the highway's role to move through-traffic. Designation of an STA also allows for the application of context-sensitive highway design features as well as a slightly higher level of traffic congestion downtown, consistent with the greater access needs.

Significant multi-modal improvements should be provided along this section of OR 99E for it to better accommodate pedestrian, bicycle, and transit movement along and across the highway consistent with the desired characteristics of an STA. To this end, the Motor Vehicle Master Plan includes an STA implementation project as a priority project. This project (and the identified cost estimate) would include pedestrian, bicycle, transit, and on-street parking improvement projects along the STA designated section of OR 99E.

The City has also expressed interested in working with ODOT to develop a "downtown streetscape" plan for OR 99E in the STA (as well as for the remainder of the OR 99E corridor in Canby). Such a plan would help ensure coordinated efforts between ODOT and the City and also provide guidance to future development along the corridor.

[33] *1999 Oregon Highway Plan*; Policy Element, pages 49-51.

There is also precedence supporting an STA designation for the desired section of OR 99E through Canby. In 2004, the OTC adopted an STA designation on McLoughlin Boulevard (OR 99E) approximately nine miles north in Oregon City. This roadway section is a similar length (i.e., half mile), has approximately equal average daily traffic (ADT) levels (i.e., just over 20,000 daily vehicles),[34] has the same cross-section (i.e., four to five lanes with limited on-street parking), and a 30 mph speed limit. An enhancement plan was also adopted in 2005 for McLoughlin Boulevard that indicated that this roadway section was to be converted to a more pedestrian friendly roadway with narrower travel lanes, reduced vehicle speeds, a raised landscape median, wider sidewalks, pockets of on-street parking, and pedestrian refuges.[35] Similar improvements are intended for OR 99E in Canby.

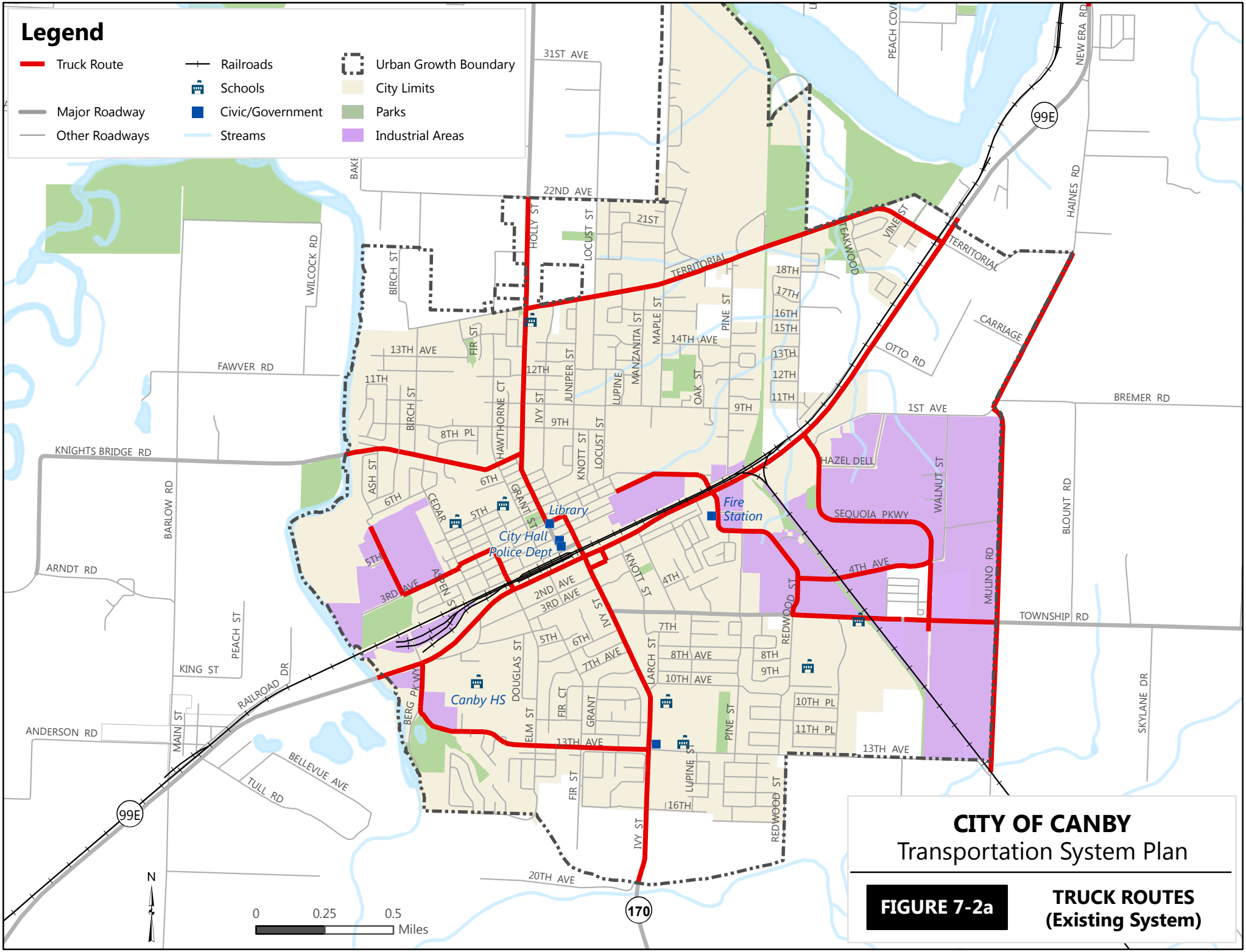
Truck Routes

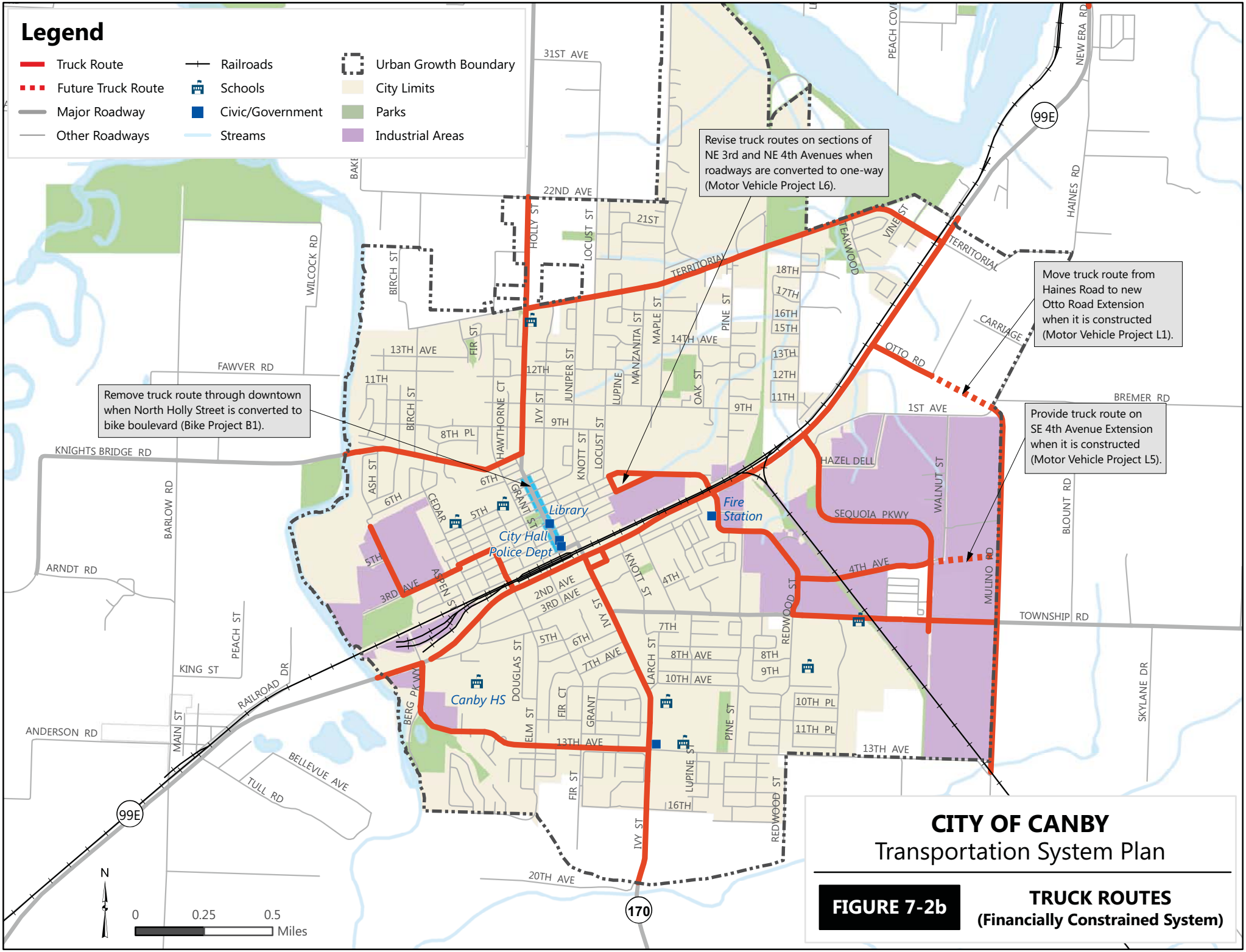
Efficient truck movement within and through Canby plays a vital role in maintaining and developing Canby's economic base due to the significance of the city's industrial areas and the use of OR 99E as a key freight corridor for the region. Well planned truck routes in Canby are important to protect residential neighborhoods while also accommodating the efficient movement of raw materials and finished products. Trucks moving from industrial areas to OR 99E or traveling through Canby are different than trucks making local deliveries. The transportation system should be planned to accommodate Canby's unique needs. The establishment of through truck routes provides for this efficient movement while at the same time maintaining neighborhood livability and public safety and minimizing maintenance costs of the roadway system.

The proposed truck routes within Canby are shown in Figure 7-2a/b/c for the existing transportation system, financially-constrained system, and preferred system respectively. Notes are provided on the figures indicating when the respective truck route changes should occur. These truck routes are aimed at addressing the through movement of trucks, not local deliveries. These truck routes should be designed to be "truck friendly" by having wider travel lanes (i.e., at least 12-foot lanes where possible), longer access spacing, 35 foot (or larger) curb returns, and pavement design that accommodates a larger share of trucks. Signage should also be used to direct trucks to these routes.

[34] 2008 ODOT Transportation Volume Tables, obtained from ODOT website.

[35] *McLoughlin Boulevard Enhancement Plan*, November 1, 2005; Adopted May 18, 2005.

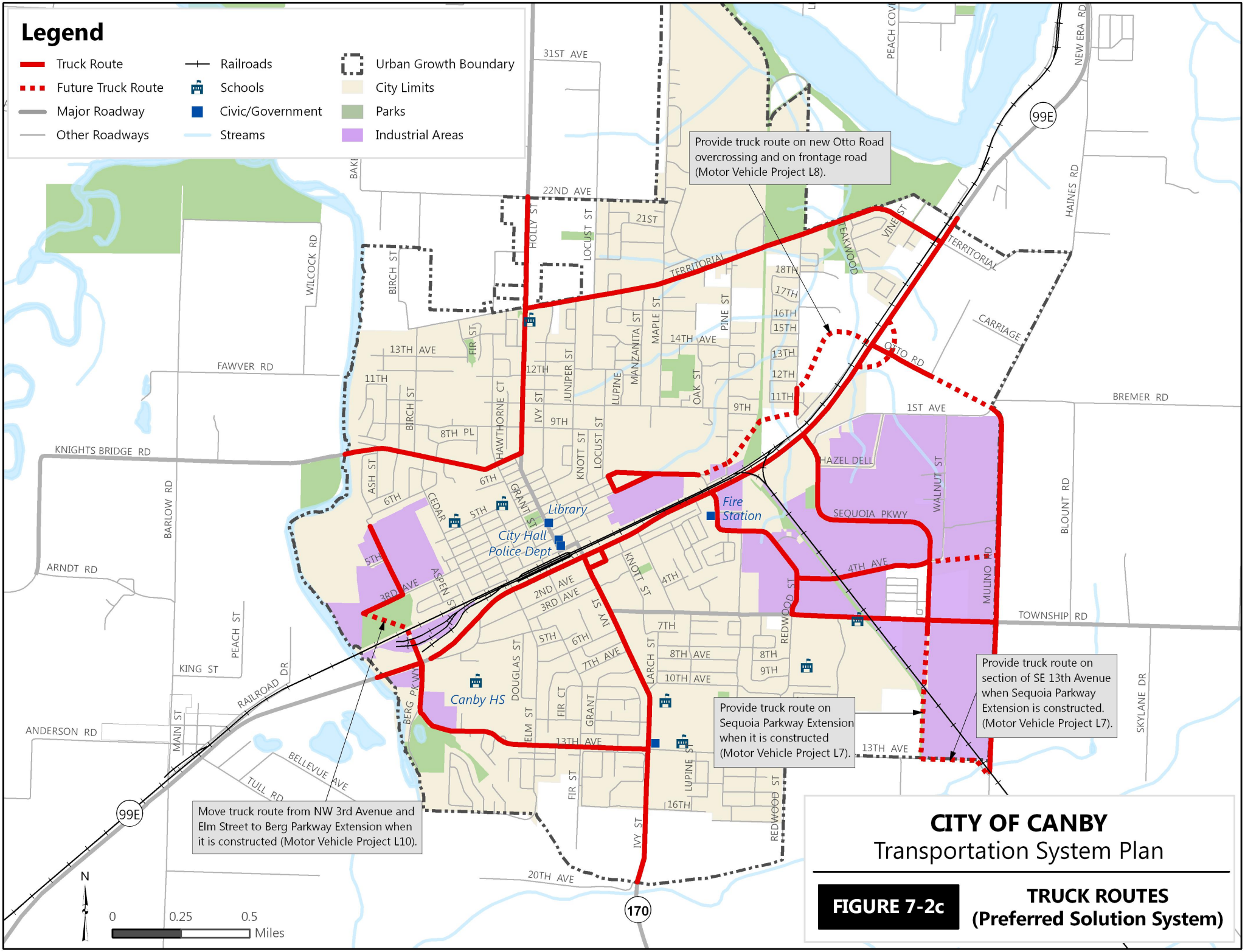

Legend
Truck Route
Major Roadway
Other Roadways
Railroads
Schools
Civic/Government
Streams
Urban Growth Boundary
City Limits
Parks
Industrial Areas
Library
City Hall
Police Dept
Fire Station
Canby HS
99E
170
N
0
0.25
0.5
Miles
CITY OF CANBY
Transportation System Plan
FIGURE 7-2a
TRUCK ROUTES
(Existing System)



CITY OF CANBY
Transportation System Plan

FIGURE 7-2b

TRUCK ROUTES
(Financially Constrained System)



CITY OF CANBY
Transportation System Plan

FIGURE 7-2c

TRUCK ROUTES (Preferred Solution System)

Roadway Standards

This section discusses the various roadway standards that are important to managing the transportation system. These standards include the following:

- Roadway Cross-Sections
- Industrial Area Roadway Cross-Sections
- Access Management
- Traffic Signal Spacing

Roadway Cross-Section Standards

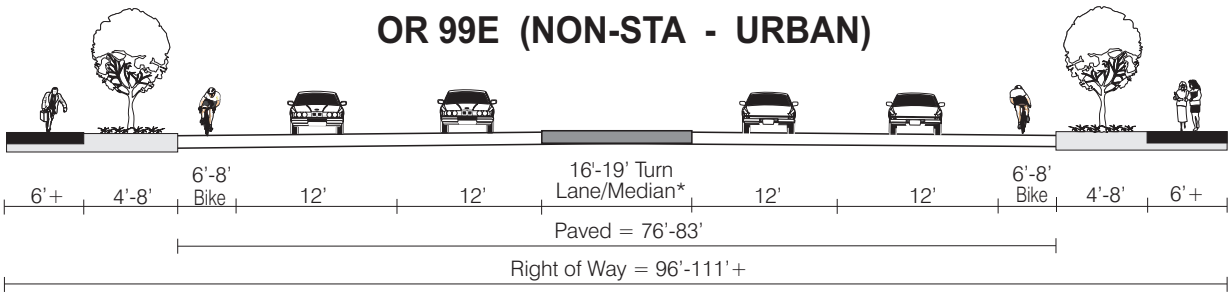
Street cross-section standards consist of minimum, maximum, and/or typical cross-sections that are required for City roadways based on their functional classification. The purposes of the cross-section standards are to ensure that the City roadways can meet the multi-modal function and demand associated with their functional classification and to provide consistency throughout the City.

Because the actual design of a roadway can vary from segment to segment due to adjacent land uses and other factors (e.g., truck routes, bike routes, pedestrian corridors, etc.), flexibility has been built in to the standards; this is why ranges of required components are provided for each functional class. In addition, because physical limitations exist for some roadways due to prior construction, "low impact" standards were also developed and may be used at the City's discretion when an existing roadway with physical limitations is being improved. Specific right-of-way needs will also need to be monitored continuously through the development review process to reflect current needs and conditions; specifically, more specific details may become evident during development review, thereby requiring improvements other than these outlined in this TSP.

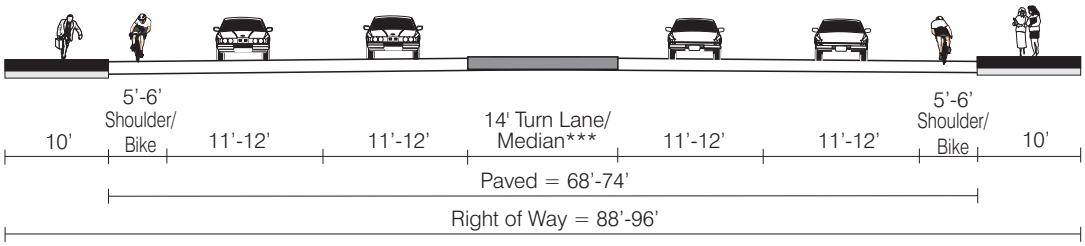
Additional design considerations are required for OR 99E. The state highway design considerations are defined in the *Oregon Highway Plan (OHP)* and in the *Highway Design Manual (HDM)*. Any deviation from these standards requires approval of a design exception. Design and future improvements to OR 99E must also address ORS 366.215 (Reduction in Vehicle Carrying Capacity) on this national freight network facility. The City also intends to conduct a future OR 99E corridor plan that will refine the cross-sections, roadway features, and cost estimates for highway improvements in Canby.

The cross-section standards are provided in Figure 7-3 for OR 99E, Figure 7-4 for arterial streets, Figure 7-5 for collector streets, and Figure 7-6 for neighborhood routes and local streets. To ensure suitability for roadway improvements, final cross-section designs must be coordinated with City of Canby staff and are subject to City Staff approval; cross-sections of state highways are also subject to ODOT approval.

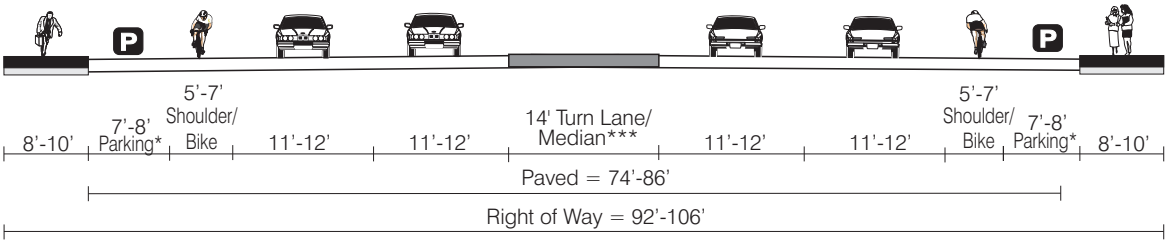
OR 99E (NON-STA - URBAN)



OR 99E (STA - TYPICAL)



OR 99E (STA - WITH ON-STREET PARKING)



Notes:

* On-Street Parking may be provided on one or both sides

** Turn lane/median is to be provided except under Molalla Forest Road Multi-Use bridge and at adjacent Oregon Pacific Railroad crossing

*** Turn Lane/Median section may consist of one of the following:

A. 14' Left-Turn Lane or Two-Way Left-Turn Lane with No Raised Median
B. 12' Raised, Landscaped Median with 1' Shy Distance on Either Side
C. 12' Pedestrian Refuge (Level with Roadway) with 1' Shy Distance on Either Side

The OR 99E Cross-Sections are shown to be consistent with ODOT Standards. Specific roadway designs will be developed through a refinement plan or project development process. Design and future improvements to OR 99E must also address ORS 366.215 (Reduction in Vehicle Carrying Capacity) on this national freight network facility.

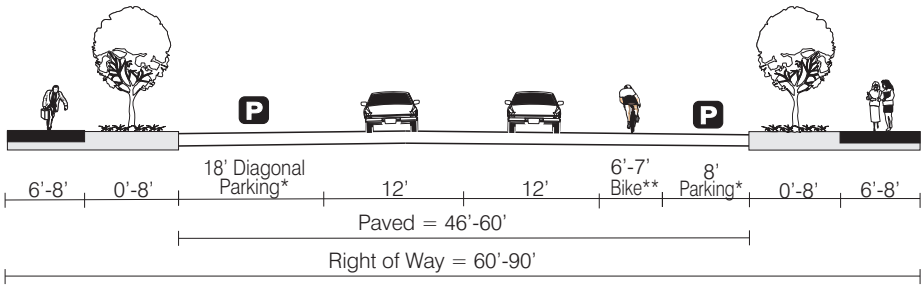
LEGEND

P - On-street Parking Lane (except at intersections)

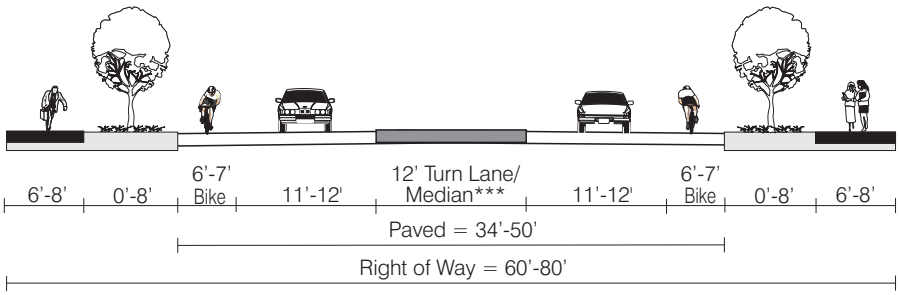
Figure 7-3

OR 99E: STANDARD CROSS-SECTIONS

ARTERIAL (ONE-WAY TRAFFIC)



ARTERIAL (TWO-WAY TRAFFIC)



Notes:

* On-Street Parking is only allowed on arterial roadways within downtown commercial district. Diagonal or parallel parking may be provided on one or both sides interchangeably.

** When on-street parking is provided, bike lanes should only be provided adjacent to parallel parking (not head-in diagonal parking). If diagonal parking is provided on both sides and speeds are 25 miles per hour or less, then bike lanes are not required.

*** Turn Lane/Median section is optional and may consist of one of the following:

A. 12' Left-Turn Lane or Two-Way Left-Turn Lane with No Raised Median
B. 10' Raised, Landscaped Median with 1' Shy Distance on Either Side
C. 10' Pedestrian Refuge (Level with Roadway) with 1' Shy Distance on Either Side

Low Impact Street Design Characteristics

Characteristic	*Arterials (One-Way)*	*Arterials (Two-Way)*
Vehicle Lane Widths	*11 ft.*	*11 ft.*
On-Street Parking	*8 ft.- Only in downtown*	*8 ft.- Only in downtown*
Bicycle Lanes (minimum)	*5-6 ft. - Right side or road*	*5-6 ft.*
Sidewalks (minimum)	*6-8 ft.*	*6 ft.*
Buffer/Planter Strip	*0-8 ft*	*0-8 ft*
Turn Lane/Median	*12 ft.- Optional*	*12 ft. - Optional*
Neighborhood Traffic Management (NTM)	*Under Special Conditions*	*Under Special Conditions*
Transit	*As appropriate*	*As appropriate*
Turn Lanes	*When Warranted*	*When Warranted*

"Low Impact" standards require demonstration of hardship or other exceptional circumstances resulting from conditions of the adjacent properties and must be approved by City Staff.

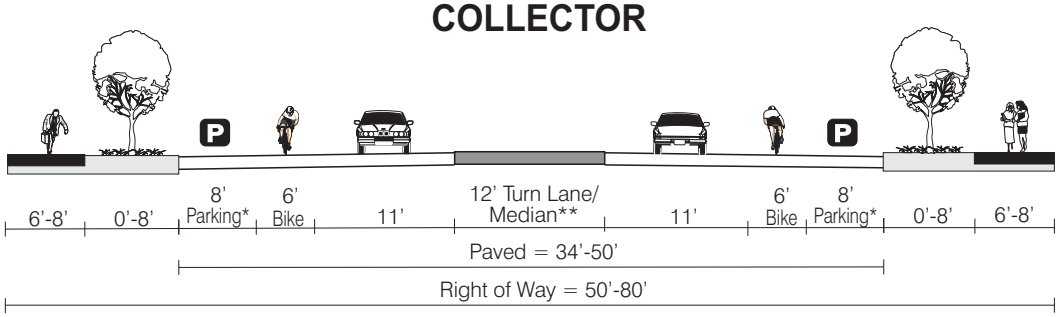
LEGEND

P - On-street Parking Lane (except at intersections)

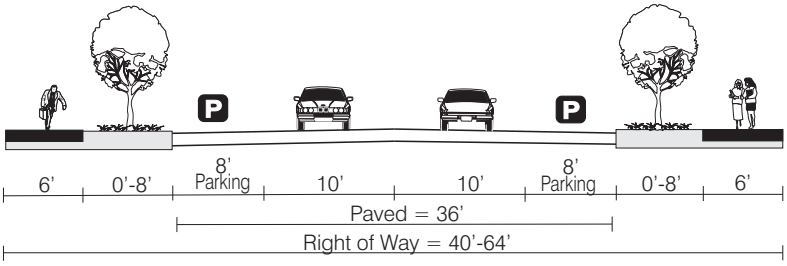
Figure 7-4

ARTERIAL: STANDARD CROSS-SECTIONS

COLLECTOR



NEIGHBORHOOD ROUTE



Notes:

* On-Street Parking may be provided on neither, one, or both sides. Where turn lanes are provided, on-street parking should not be allowed.

** Turn Lane/Median section is optional and may consist of one of the following:

A. 12' Left-Turn Lane or Two-Way Left-Turn Lane with No Raised Median
B. 10' Raised, Landscaped Median with 1' Shy Distance on Either Side
C. 10' Pedestrian Refuge (Level with Roadway) with 1' Shy Distance on Either Side

Low Impact Street Design Characteristics

Characteristic	*Collectors*	*Neighborhood Routes*
Vehicle Lane Widths	*10-11 ft.*	*10 ft.*
On-Street Parking	*8 ft.-Optional*	*8 ft.- At least one side*
Bicycle Lanes (minimum)	*5-6 ft.*	*None*
Sidewalks (minimum)	*6-8 ft.*	*6 ft.*
Buffer/Planter Strip	*0-8 ft*	*0-8 ft*
Turn Lane/Median	*12 ft.-Optional*	*None*
Neighborhood Traffic Management (NTM)	*Under Special Conditions*	*Under Special Conditions*
Transit	*As appropriate*	*As appropriate*
Turn Lanes	*When Warranted*	*When Warranted*

"Low Impact" standards require demonstration of hardship or other exceptional circumstances resulting from conditions of the adjacent properties and must be approved by City Staff.

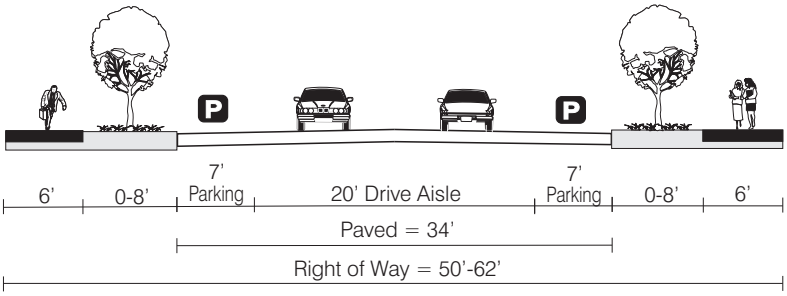
LEGEND

P - On-street Parking Lane (except at intersections)

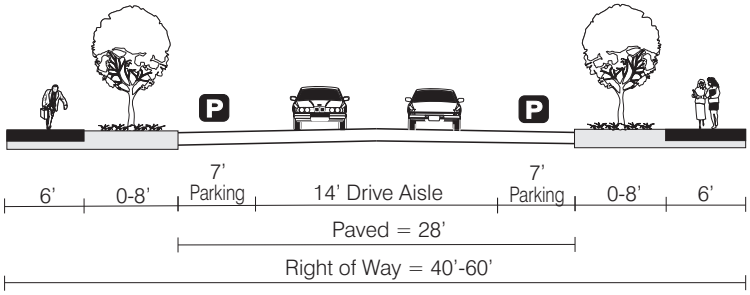
Figure 7-5

COLLECTOR/NEIGHBORHOOD ROUTE: STANDARD CROSS-SECTIONS

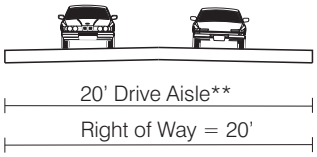
STANDARD LOCAL STREET



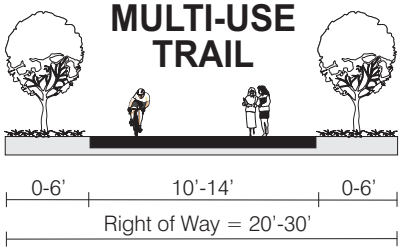
LOW-VOLUME LOCAL STREET (<500 Vehicles Per Day)



ALLEY



MULTI-USE TRAIL



Notes:

** On-Street Parking prohibited.

Low Impact Street Design Characteristics

Characteristic	*Local*
Drive Aisle	*14 ft.*
On-Street Parking	*7 ft.- Both sides required*
Bicycle Lanes (minimum)	*None*
Sidewalks (minimum)	*6 ft.*
Buffer/Planter Strip	*0-8 ft*
Turn Lane/Median	*None*
Neighborhood Traffic Management (NTM)	*Under Special Conditions*
Transit	*Should not be used*
Turn Lanes	*None*

"Low Impact" standards require demonstration of hardship, other exceptional circumstances resulting from conditions of the adjacent properties and must be approved by City Staff.

LEGEND

P - On-street Parking Lane (except at intersections)

Figure 7-6

LOCAL STREET/ALLEY: STANDARD CROSS-SECTIONS

Industrial Area Roadway Cross-Sections

In Canby, industrial uses currently play an important economic role and are expected to play an even greater role as development occurs in the Canby Pioneer Industrial Area. Having industrial area roadway cross-section standards will help the City ensure that new and improved roadways in the industrial areas are built to accommodate efficient freight movement.

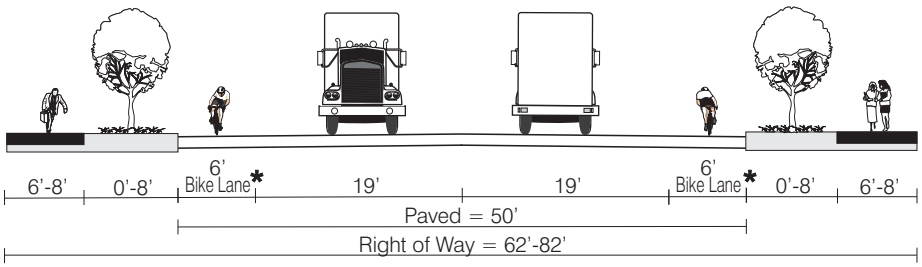
The industrial area roadway cross-section standards for Canby are shown in Figure 7-7 and were determined from geometric analysis documented in the Industrial Area Cross-Section Analysis Memorandum included as Appendix I. The identified cross-sections will allow two trucks to simultaneously make opposing turn maneuvers through intersections and not have overlapping paths. This objective for large trucks is often not applied to the general road system because a balance is desired between accommodations for all transportation modes (particularly pedestrians). However, in major industrial areas, truck movements become a higher priority and wider streets and intersections are more important.

A key component considered in the cross-section standards is the balance of street width with the required curb return radii to facilitate truck movements. Narrower roadways require larger curb returns, while wider roadways mean that smaller curb returns are needed. For Canby, narrower roadways were sought compared to smaller curb return radii to minimize the overall right-of-way and impervious area footprint of the roadways. This strategy can be compatible with the pedestrian environment by separating the sidewalks from the roadway by landscaping/swale areas, which would minimize issues with curb ramp design.

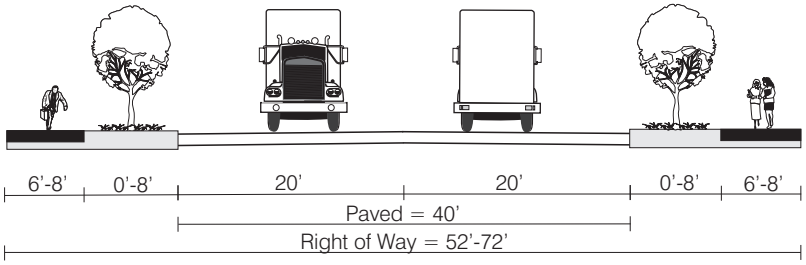
As shown in Figure 7-7, bike lanes are to be provided on collector roadways. It is expected that trucks may use the portion of the bicycle lanes adjacent to intersections when making turn maneuvers. Therefore, to make it clear to truck drivers and cyclists that there are likely to be conflicts in the turning area, bike lane stripes should be dotted instead of solid within the turning maneuver area of the trucks.

The analysis to determine street widths was focused on collector and local streets. This can be translated to required private access curb-cuts in the industrial area by applying the local street design.

COLLECTOR



LOCAL



Note:

*Adjacent to intersections, bike lane stripes should be dotted instead of solid within the turning maneuver area of the trucks.

Low Impact Street Design Characteristics

Characteristic	*Collector*	*Local*
Paved Width	*46 ft.*	*32 ft.*
On-Street Parking	*None*	*None*
Bicycle Lane	*5 ft.*	*None*
Sidewalks	*6 ft.*	*6 ft.*
Buffer/Planter Strip	*0-8 ft*	*0-8 ft*
Turn Lane/Median	*12 ft.*	*None*
Neighborhood Traffic Management (NTM)	*None*	*None*

"Low Impact" standards require demonstration of hardship or other exceptional circumstances resulting from conditions of the adjacent properties and must be approved by City Staff.

Figure 7-7

INDUSTRIAL AREA ROADWAY: STANDARD CROSS-SECTIONS

Access Management

Access Management is a broad set of techniques that balance the need to provide efficient, safe and timely travel with the ability to allow access to the individual destination. Proper implementation of access management techniques will promote reduced congestion, reduced accident rates, less need for highway widening, conservation of energy, and reduced air pollution.

Access management involves the control or limiting of access on arterial and collector facilities to maximize their capacity and preserve their functional integrity. Numerous driveways erode the capacity of arterial and collector roadways and introduce a series of conflict points that present the potential for crashes and interfere with traffic flow. Preservation of capacity is particularly important on higher volume roadways for maintaining traffic flow and mobility. Whereas local and neighborhood streets primarily function to provide direct access, collector and arterial streets serve greater traffic volume with the objective of facilitating through travel. Canby, as with every city, needs a balance of streets that provide access with streets that serve mobility. A balance can be achieved by implementing various access management strategies, such as those listed below:

- Work with land use development applications to consolidate driveways, provide crossover easements, and take access from lower class roads where feasible. Existing, non-conforming accesses would only be subject to review and revision upon site improvement or a land use application.
- Implement access spacing standards for new developments and construction, including the prohibition of private access onto arterial roadways and the prohibition of new single-family residential access onto collectors unless no other access options are available. Parcels shall not be landlocked by access spacing policies.
- Establish City access spacing standards to prohibit the construction of access points within the influence area of intersections. The influence area is that area where queues of traffic commonly form on the approach to an intersection (typically within 150 feet). In a case where a project has less than 150 feet of frontage, the site would need to explore potential shared access, or if that were not practical, place driveways as far from the intersection as the frontage would allow (permitting for 5 feet from the property line). However, full access might not be permitted in these conditions (e.g., restriction to right-in/right-out access).
- Implement City access spacing standards for new construction on County facilities within the urban growth boundary.
- Address *Oregon Highway Plan* access management standards through the City development review and State access management permitting process when developing improvements on OR 99E and for properties adjacent to the highway.
- Establish maximum access spacing standards for City streets to promote connectivity.

- Establish a street connectivity and block formation requirement to implement a street grid throughout Canby. In order to promote efficient vehicular and pedestrian circulation throughout the City, land divisions and large site developments should produce complete blocks bounded by a connecting network of public and/or private streets, in accordance with the following standards:
    - Block Length and Perimeter. The maximum block length shall not exceed 600 feet or 1,000 feet along an arterial.
    - Street Connectivity. Public and private streets connectivity shall conform to the functional classification map (Figure 7-1) and the local street connectivity plan (Figure 7-8)
    - Exception. Exceptions to the above standards may be granted when blocks are divided by one or more pathway(s). Pathways shall be located to minimize out-of-direction travel by pedestrians and may be designed to accommodate bicycles.

Many communities have historically struggled with the issue of limiting residential access to collector roadways. This is due to the desire to maintain the roadway as a public place that creates a friendly pedestrian and bicycle environment, as opposed to backing properties with fences that wall-off and isolate the roadway. To address this concern and implement the recommended access restrictions, the following measures shall be required:

- Provide a local street grid with 150-foot to 250-foot spacing that allows back-to-back lots along local streets with side yards to the collector roadway while discouraging the creation of double-frontage lots. In addition, prohibit the use of fences along lot lines that front the collector roadway, or
- Require lots with frontage along the collector roadway to orient the front of the home to the collector, but provide rear-alley or driveway motor vehicle access.

New development and roadway projects involving City street facilities should meet the access spacing standards summarized in Table 7-2. In cases where physical constraints or unique site characteristics limit the ability for the access spacing standards shown in Table 7-2 to be met, the City of Canby should retain the right to grant an access spacing variance. All requests for an access spacing variance shall be required to complete an access management plan for review and approval by the Public Works Director or City Engineer, which should include at a minimum the following items:

- Review of the existing access conditions within the study area (defined the property frontage plus the distance of the minimum access spacing requirement). This should include a review of the last three years of crash data, as well as collection of traffic volume information and intersection operations analysis.
- Short term analysis of the study area safety and operations with the proposed access configuration, as well as with a configuration that would meet access spacing standards.

- Long term analysis of the study area safety and operations with the proposed access configuration. This scenario should also include consideration of the long-term redevelopment potential of the area and discussion of how access spacing standards may be achieved.

Parcels shall not be landlocked by access spacing policies. Opportunities should be explored to provide future access through neighboring parcels and an interim access may be granted. Non-conforming access (defined per Table 7-2) should work to achieve a condition as close to standard as possible. For example, a private access may be permitted to an arterial roadway if no other option (e.g. access to a side street) exists; however, the private access would then be required to meet the minimum driveway spacing of 330 feet listed in Table 7-2.

Table 7-2: Access Spacing Standards for City Street Facilities[a]

Street Facility	Maximum spacing[b] of roadways	Minimum spacing[b] of roadways	Minimum spacing[b] of roadway to driveway[c]	Minimum Spacing[b] driveway to driveway[c]
Arterial	1,000 feet	660 feet	330 feet	330 feet or combine
Collector	600 feet	250 feet	100 feet	100 feet or combine
Neighborhood/Local	600 feet	150 feet	50 feet	10 feet

[a] Exceptions may be made in the downtown commercial district, if approved by the City Engineering or Public Works Department, where alleys and historic street grids do not conform to access spacing standards.
[b] Measured centerline to centerline
[c] Private access to arterial roadways shall only be granted through a requested variance of access spacing policies when access to a lower classification facility is not feasible (which shall include an access management plan evaluation)

In addition to implementing access spacing standards, the City of Canby should require an access report for new access points, proposed to serve commercial and industrial developments, stating that the driveway/roadway is safe as designed and meets adequate stacking, sight distance and deceleration requirements as set by ODOT, Clackamas County and American Association of State Highway and Transportation Officials (AASHTO). Generally, the need for an access report is triggered by land use actions, design reviews, or land divisions.

Any proposed accesses to State facilities must be approved by ODOT. The 1999 Oregon Highway Plan identifies access management objectives for all classifications of roadways under State jurisdiction. OR 99E is classified as a Regional Highway by ODOT, which maintains a management objective that balances the needs of through traffic movement with direct property access. Based on these objectives, ODOT has established access spacing standards for all highway classifications that vary with proximity to urbanized areas and changes in posted speeds. These standards are also provided in the 1999 Oregon Highway Plan. Table 7-3 identifies the ODOT access spacing standards that are applicable within the Canby Urban Growth Boundary (UGB). Note that the spacing standards in Table 7-3 are only to be applied to accesses on the same side of the highway.

Table 7-3: Applicable ODOT Minimum Access Management Standards

Highway Category[a]	Approach Spacing Standards[b] (by Posted Speed)			
	≥55 mph	*40,45 mph*	*30,35 mph*	*≤25 mph*
Regional Highway (rural)	990 feet	750 feet	600 feet	450 feet
Regional Highway (urban)	990 feet	750 feet	425 feet	350 feet

[a] OR 99E is classified by ODOT as a Regional Highway.
[b] Measurement of the approach road spacing is from center to center on the same side of the roadway.

Source: 1999 Oregon Highway Plan, Appendix C, Table 14

The following additional guidance is also provided in the *Oregon Highway Plan* regarding STAs on Regional Highways: "Minimum access management spacing for public road approaches is the existing city block spacing or the city block spacing as identified in the local comprehensive plan. Public road connections are preferred over private driveways and in STA's driveways are discouraged. However, where driveways are allowed and where land use patterns permit, the minimum access management spacing for driveways is 175 feet or mid-block if the current city block is less than 350 feet."[36]

Traffic Signal Spacing

Traffic signals that are spaced too closely on a corridor can result in poor operating conditions and safety issues due to the lack of adequate storage for vehicle queues. A minimum traffic signal spacing of 600 feet (preferably 1,000 feet) should be required for arterial and collector facilities outside of the Special Transportation Area (STA). Different signal spacing standards may be applied to lower classifications of roadways. ODOT identifies one-half mile as the desirable spacing of signalized intersections on regional highways but recognizes that shorter signal spacing may be appropriate due to a number of factors including existing road layout and land use patterns.

Other Plans and Programs

This section discusses other plans and programs that are important to managing the transportation system. These plans and programs include the following:

- Local Street Connectivity
- Transportation Demand Management (TDM)
- Neighborhood Traffic Management (NTM)
- Traffic Control Plan

[36] *1999 Oregon Highway Plan*, Table 15 Access Management Spacing Standards, footnote on access management for the STA which is in the in the OHP

Local Street Connectivity

The Local Street Connectivity Plan specifies the general location where new local streets should be installed as nearby areas are developed. The purpose of the plan is to ensure that new developments accommodate future local circulation between adjacent neighborhoods to improve connectivity for all modes of transportation.

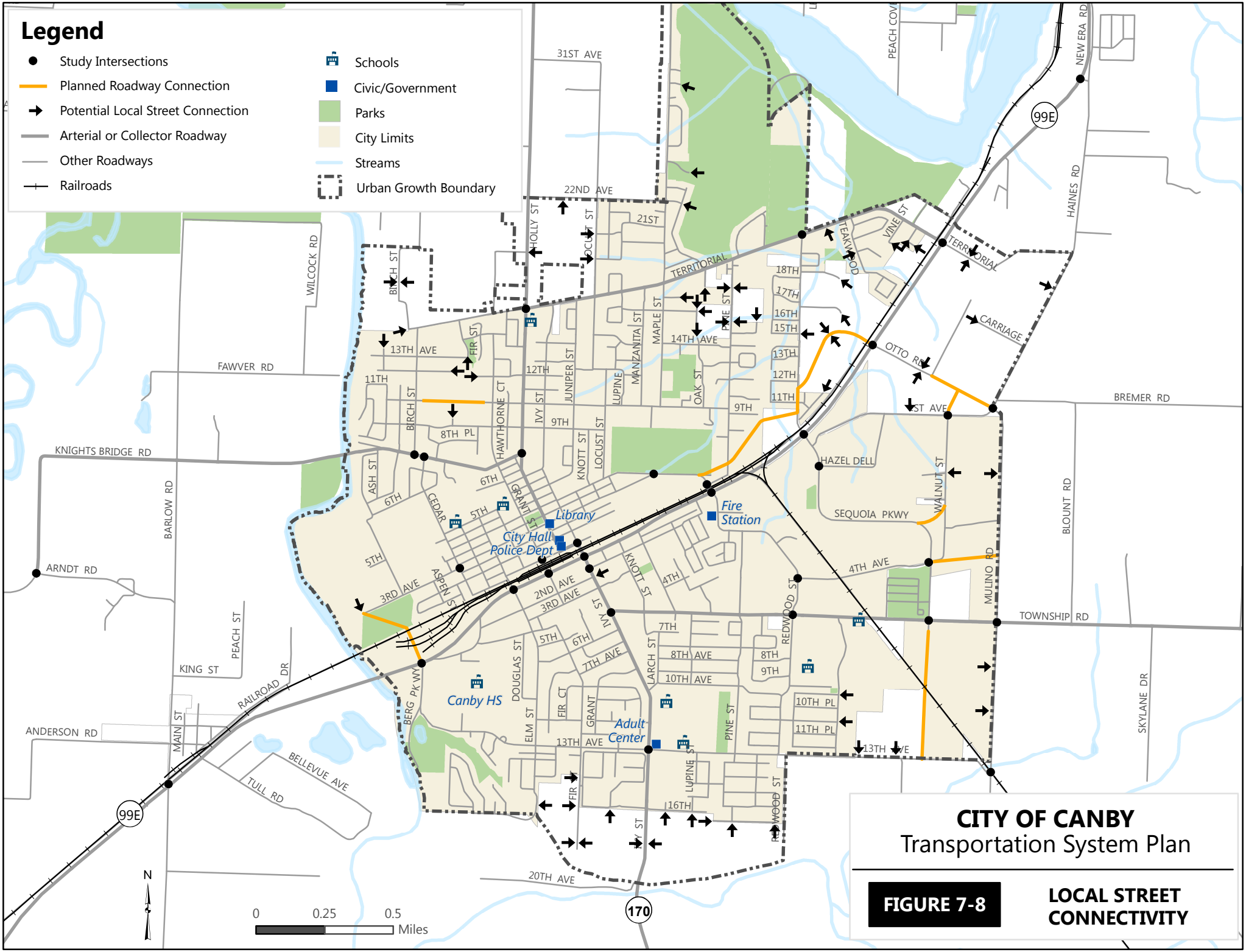
New developments are often developed with limited opportunities for movement into and out of the developments. In fact, some neighborhoods funnel all pedestrian, bicycle, and vehicular traffic onto a single street. This type of street network results in out-of-direction travel and contributes to increased congestion and decreased pedestrian/bicycle accessibility. This can result in the need for investments in wider roads, traffic signals, and turn lanes that could otherwise be avoided. By providing connectivity between neighborhoods, out-of-direction travel and vehicle miles traveled (VMT) can be reduced, accessibility between various travel modes can be enhanced, and traffic levels can be balanced out between various streets. In this way, some of these local connections can help mitigate network capacity deficiencies by improving traffic circulation. Additionally, public safety response time is reduced.

In Canby, several roadway connections will be needed within developable areas to reduce out of direction travel for vehicles, pedestrians, and bicyclists. This is most important in the areas where a significant amount of new development is possible. Figure 7-8 shows the Local Street Connectivity Plan for Canby. In most cases, the connector alignments are not specific and are aimed at reducing potential neighborhood traffic impacts by better balancing traffic flows on neighborhood routes. The arrows shown in the figure represent *potential* connections and the general direction for the placement of the connection[37]. In each case, the specific alignments and design should be determined as part of development review. The criteria used for providing connections are as follows:

- Pedestrian and bicycle connections should be provided every 330 feet
- Vehicle connections should be provided every 600 feet centerline to centerline

To protect existing neighborhoods from the potential traffic impacts caused by extending stub end streets, connector roadways should also incorporate neighborhood traffic management into their design and construction. In addition, when a development constructs stub streets, they should install signs indicating the potential for future connectivity to increase the awareness of residents.

[37] Other local street connections may be required as the City conducts development review.


Legend
Study Intersections
Planned Roadway Connection
Potential Local Street Connection
Arterial or Collector Roadway
Other Roadways
Railroads
Schools
Civic/Government
Parks
City Limits
Streams
Urban Growth Boundary
Library
City Hall
Police Dept
Fire Station
Canby HS
Adult Center
31ST AVE
22ND AVE
21ST
TERRITORIAL
FAWVER RD
KNIGHTS BRIDGE RD
ARNDT RD
KING ST
ANDERSON RD
TULL RD
BELLEVUE AVE
RAILROAD DR
PEACH ST
BARLOW RD
WILCOCK RD
HOLLY ST
BIRCH ST
FIR ST
IVY ST
JUNIPER ST
HAWTHORNE CT
MAPLE ST
MANZANITA ST
LUPINE
OAK ST
PINE ST
KNOTT ST
LOCUST ST
ASH ST
CEDAR
GRANT ST
ASPEN ST
BERG PKWY
DOUGLAS ST
ELM ST
MAIN ST
LARCH ST
REDWOOD ST
TEAKWOOD
VINE ST
CARRIAGE
OTTO RD
BREMER RD
HAZEL DELL
SEQUOIA PKWY
WALNUT ST
MULINO RD
BLOUNT RD
TOWNSHIP RD
4TH AVE
SKYLANE DR
HAINES RD
NEW ERA RD
PEACH COVE
20TH AVE
99E
170
N
0
0.25
0.5
Miles
CITY OF CANBY
Transportation System Plan
FIGURE 7-8
LOCAL STREET CONNECTIVITY

In order to ensure that new developments meet the objectives of the local street plan, developments should be required to provide a proposed street map as part of the development approval process. The street map should be reviewed to ensure the development does the following:

- Provides full street connections with spacing of no more than 500 feet between connections, except where prevented by barriers
- Provides bike and pedestrian access ways with spacing of no more than 300 feet, except where prevented by barriers (bike and pedestrian access ways should be considered at the end of cul-de-sacs)
- Limits use of cul-de-sacs and other closed-end street systems to situations where barriers prevent full street connections or to locations where pedestrian/bike accesses are to be provided (approximately halfway between vehicular accesses)
- Includes no close-end street longer than 150 feet or having no more than 30 dwelling units
- Includes street cross-sections demonstrating dimensions of ROW improvements, with streets designed for posted or expected speed limits

Topography, railroads, and environmental conditions (such as the Molalla River and other wetland areas) limit the level of connectivity in Canby. Some stub end streets in the city's road network may become cul-de-sacs, extended cul-de-sacs, or provide local connections. Pedestrian connections from the end of any stub end street that results in a cul-de-sac will be mandatory as future development occurs (with the exception of locations where topography, railroads, and environmental conditions make such connections infeasible). The goal is to improve city connectivity for all modes of transportation as feasible.

Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is the general term used to describe any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods. Generally, TDM focuses on reducing vehicle miles traveled and promoting alternative modes of travel, with focus typically being placed on large employers. However, there are a wide variety of TDM actions that can be specifically tailored to the individual needs of an area. As growth in the Canby area occurs, the number of vehicle trips and travel demand in the area will also increase. This growth can be better accommodated if alternative mode choices for new and existing users are encouraged.

Various TDM solutions were evaluated for Canby and documentation is provided in the Transportation Solutions Report (included as Appendix K). Due primarily to the potential growth in the Canby Pioneer Industrial Area, it was determined that implementation of employer-based TDM strategies for new employment development with more than 50 employees is recommended as the first step for Canby towards managing trips. Table 7-4 provides a list of several strategies that may be applied as appropriate within Canby city limits.

Table 7-4: Potential Transportation Demand Management Strategies

Strategy	Description	Potential Trip Reduction
Telecommuting	Employees perform regular work duties at home or at a work center closer to home, rather than commuting from home to work. This can be full time or on selected workdays. This can require computer equipment to be most effective.	82-91% (Full Time) 14-36% (1-2 day/wk)
Compressed Work Week	Schedule where employees work their regular scheduled number of hours in fewer days per week.	7-9% (9 day/80 hr) 16-18% (4 day/40 hr) 32-36% (3 day/36 hr)
Transit Pass Subsidy	For employees that commute to work by bus or other public transportation methods, employers pay a portion of the cost of a monthly transit pass.	19-32% (full subsidy of cost, high transit service) 4-6% (full subsidy of cost, medium transit service) 0.5-1% (full subsidy of cost, low transit service) 10-16% (half subsidy of cost, high transit service) 2-3% (half subsidy of cost, medium transit service) 0-0.5% (half subsidy of cost, low transit service)
Cash Out Employee Parking	An employer that has been subsidizing parking discontinues the subsidy and instead provides each employee an equivalent monetary amount. Employees can then use the money to take an alternative travel mode or to pay the full price for parking (at no net change in travel cost).	8-20% (high transit service) 5-9% (medium transit service) 2-4% (low transit service)
Eliminate Parking Subsidies	The portion of the cost of parking that is paid for by the employer is eliminated, and the employee pays an increased cost for parking.	8-20% (high transit service) 5-9% (medium transit service) 2-4% (low transit service)
Reduced Cost Parking for HOVs	Parking costs charged to employees are reduced for carpools and vanpools.	1-3%
Alternative Mode Subsidy	For employees that commute to work by modes other than driving alone, the employer provides a monetary bonus to the employee.	21-34% (full subsidy of cost, high alternative modes) 2-4% (half subsidy of cost, medium alternative modes)
On-Site Services	Provide services at the work site that are frequently used by the employees (and that the employee would typically need to drive to use). Examples include cafes/restaurants, dry cleaners, day care centers, and bank machines.	1-2%

Table 7-4 continued on next page.

(Continued) Table 7-4: Potential Transportation Demand Management Strategies

Strategy	Description	Potential Trip Reduction
Bicycle Program	Provides support services to those employees that bicycle to work. Examples include: safe/secure bicycle storage, shower facilities and subsidy of commute bicycle purchase.	0-10%
On-site Rideshare Matching for HOVs	Employees who are interested in carpooling or vanpooling provide information to a transportation coordinator on staff regarding their work hours, availability of a vehicle and place of residence. The coordinator then matches employees who can reasonably rideshare together.	1-2%
Provide Vanpools	Employees that live near each other are organized by their employer into a vanpool for their trip to work. The employer may subsidize the cost of operation and maintaining the van. Existing programs in the Canby area that could be utilized include Valley VanPool (for Salem destinations) and Metro VanPool (for Portland destinations)	15-25% (company provided van with fee) 30-40% (company subsidized van)
Gift/Awards for Alternative Mode Use	Employees are offered the opportunity to receive a gift or an award for using modes other than driving alone.	0-3%
Provide Buspools	Arrange a commuter bus service specifically to transport employees to work.	3-11%
Walking Program	Provide support services for those who walk to work. This could include buying walking shoes or providing lockers and showers.	0-3%
Time off with Pay for Alternative Mode Use	Employees are offered time off with pay as an incentive to use alternative modes.	1-2%
Company Cars for Business Travel	Employees are allowed to use company cars for business-related travel during the day	0-1%
Guaranteed Ride Home Program	A company owned or leased vehicle is provided in the case of an emergency for employees that use alternative modes.	1-3%

Sources:

Guidance for Estimating Trip Reductions from Commute Options, Oregon Department of Environmental Quality, August 1996

Employee Commute Options (ECO) Sample Trip Reduction Plan, Oregon Department of Environmental Quality, October 2006

Neighborhood Traffic Management

Neighborhood Traffic Management (NTM) is a term that has been used to describe traffic control devices typically used in residential neighborhoods to slow traffic or possibly reduce the volume of traffic. NTM is descriptively called traffic calming due to its ability to improve neighborhood livability.

The City of Canby currently has limited neighborhood traffic management elements, mainly the use of narrow road widths that manage vehicle speed. As traffic congestion increases in the future, protecting the livability of neighborhoods may become an increasing need that requires the ability to mitigate impact.

To address neighborhood impacts, Canby should require that in addition to assessing impacts to the entire transportation network, traffic studies for new developments should also assess impacts to residential streets and identify mitigation for developments that are anticipated to add significant traffic volumes or increase vehicle speeds on nearby residential streets. The threshold used to determine if this additional analysis is needed is if the proposed project is expected to increase volumes on a residential street (classified as either local or neighborhood route) by more than 30 vehicles in a peak hour or 300 vehicles per day. Once the analysis is performed, thresholds used to determine if residential streets are impacted should be:

- Local residential street volumes should not increase above 1,200 average daily trips
- Local residential street speeds should not exceed 28 miles per hour (85^{th} percentile speed)

Mitigation measures for neighborhood traffic impact must balance the need to manage vehicle speeds and volumes with the need to maintain mobility, circulation, and function for service providers (e.g. emergency response). Table 7-5 lists common NTM applications and suggests which devices may be supported by the Canby Fire District. Any NTM project should include coordination with emergency agency staff to ensure public safety is not compromised.

Neighborhood traffic management (NTM) may also be considered for OR 99E but it would be required to meet ODOT standards, including any ODOT approved design exceptions. For example, pavement textures, chokers, and traffic circles are generally prohibited on state highways.

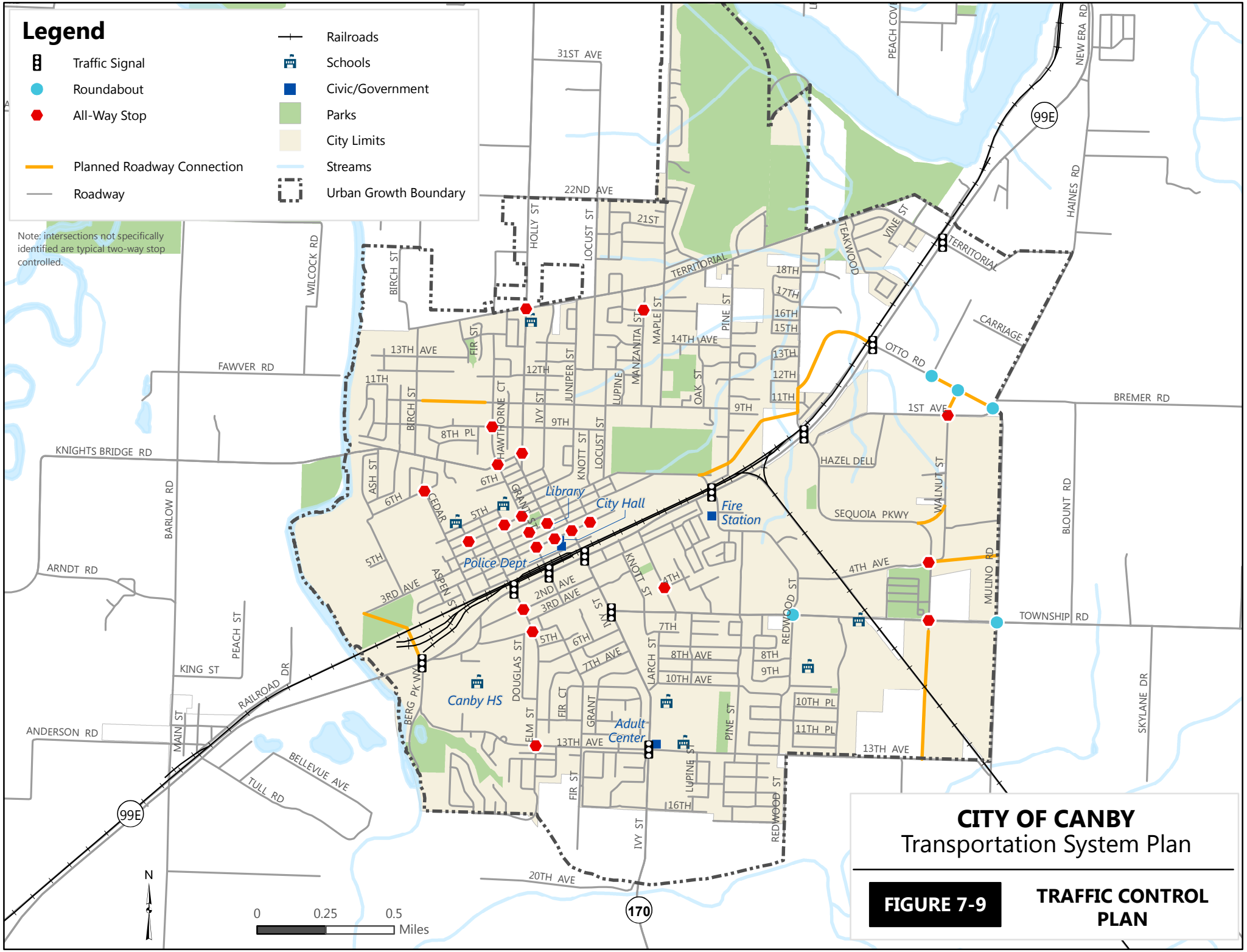
Table 7-5: Allowed Traffic Calming Measures by Roadway Functional Classification

Traffic Calming Measure	Is Measure Supported? (per Roadway Classification)[a]		
	Arterial	*Collector*	*Neighborhood Route/ Local Street*
Curb Extensions	Supported	Supported	Calming measures are supported on roads that have connectivity (more than two accesses) and are accepted and field tested by the Canby Fire District.
Roundabouts	Supported	Supported	
Medians and Pedestrian Islands	Supported	Supported	
Pavement Texture	Supported	Supported	
Speed Hump	Not Supported	Not Supported	
Raised Crosswalk	Not Supported	Not Supported	
Speed Cushion (provides emergency pass-through with no vertical deflection)	Not Supported	Not Supported	
Choker	Not Supported	Not Supported	
Traffic Circle	Not Supported	Not Supported	
Diverter (with emergency vehicle pass through)	Not Supported	Supported	
Chicanes	Not Supported	Not Supported	

[a] Traffic calming measures are supported with the qualification that they meet Canby Fire District guidelines including minimum street width, emergency vehicle turning radius, and accessibility/connectivity.

Traffic Control Plan

A traffic control plan was prepared for Canby and is provided in Figure 7-9. This plan documents the location of roundabouts, traffic signals, and all-way stop controlled intersections for the Financially-Constrained Solutions Package.


Legend
Traffic Signal
Roundabout
All-Way Stop
Planned Roadway Connection
Roadway
Railroads
Schools
Civic/Government
Parks
City Limits
Streams
Urban Growth Boundary
Note: intersections not specifically identified are typical two-way stop controlled.
CITY OF CANBY
Transportation System Plan
FIGURE 7-9
TRAFFIC CONTROL PLAN
N
0
0.25
0.5
Miles
Library
City Hall
Fire Station
Police Dept
Canby HS
Adult Center
99E
170
31ST AVE
22ND AVE
21ST
TERRITORIAL
FAWVER RD
KNIGHTS BRIDGE RD
ARNDT RD
KING ST
ANDERSON RD
TULL RD
BELLEVUE AVE
RAILROAD DR
PEACH ST
MAIN ST
BARLOW RD
WILCOCK RD
BIRCH ST
HOLLY ST
LOCUST ST
FIR ST
JUNIPER ST
LUPINE
MANZANITA ST
MAPLE ST
PINE ST
OAK ST
IVY ST
KNOTT ST
HAWTHORNE CT
ASH ST
CEDAR
GRANT ST
ASPEN ST
BERG PKWY
DOUGLAS ST
ELM ST
FIR CT
GRANT
LARCH ST
REDWOOD ST
OTTO RD
CARRIAGE
BREMER RD
1ST AVE
HAZEL DELL
SEQUOIA PKWY
WALNUT ST
BLOUNT RD
MULINO RD
4TH AVE
TOWNSHIP RD
SKYLANE DR
HAINES RD
NEW ERA RD
PEACH COVE
VINE ST
TEAKWOOD
18TH
17TH
16TH
15TH
14TH AVE
13TH
12TH
11TH
9TH
8TH PL
6TH
5TH
3RD AVE
2ND AVE
7TH
8TH AVE
10TH AVE
10TH PL
11TH PL
13TH AVE
16TH
20TH AVE

Roadway Improvement Projects

This section discusses roadway improvement projects that are important to improving the capacity and connectivity of the transportation system. The inclusion of proposed projects and actions in this plan does not obligate or imply obligations of funds by any jurisdiction for project-level planning or construction. Instead, the inclusion of proposed projects and actions serves as an opportunity for the, to be included, if appropriate, in the State Transportation Improvement Program (STIP) and the City of Canby Capital Improvement Program. Such inclusion is not automatic, but it is incumbent on the State, City of Canby, Clackamas County, and the general public to take action to encourage and support inclusion of projects in the STIP or the CIP at the appropriate time. Because a project must have identified funding to be included in the STIP or CIP, the ultimate number of projects that can be included in these documents is constrained by available funding.

In addition, all projects will need to go through a refinement and design process with the appropriate agencies (i.e., the City of Canby, Clackamas County, or ODOT) prior to implementation. For implementation of all projects on OR 99E, ODOT approval will be required. Engineering studies, signal warrant and traffic analysis, and conformance with applicable standards should be evaluated as projects are developed.

The following two solutions packages, which are comprised of multiple projects, have been identified:

- Financially-Constrained Solutions Package
- Preferred Solutions Package

The development of these two solutions packages is documented in detail in the Transportation Solutions Report (included as Appendix K), and the main findings are discussed below.

Financially-Constrained Solutions Package

The motor vehicle projects included in the Financially-Constrained Solutions Package are shown in Figure 7-10. The recommended improvements include non-capacity projects, large-scale capacity improvements, roundabout improvements, and isolated intersection capacity improvements.

In addition to being shown in Figure 7-10, the motor vehicle projects included in the Financially-Constrained Solutions Package are listed in Table 7-6. This table provides brief project descriptions (see Transportation Solutions Report in Appendix K for additional details) and planning level cost estimates. The estimates include roadway improvements, construction of sidewalks and bike lanes on new roadways, provision of curbs and crosswalks at new or upgraded intersections, and repaving costs on improved ODOT roadways. Because these costs are based on general unit costs for transportation improvements and do not reflect unique project elements that can significantly modify project costs, each of these project costs will need further refinement to determine right-of-way requirements and costs associated with special design details as projects are pursued.

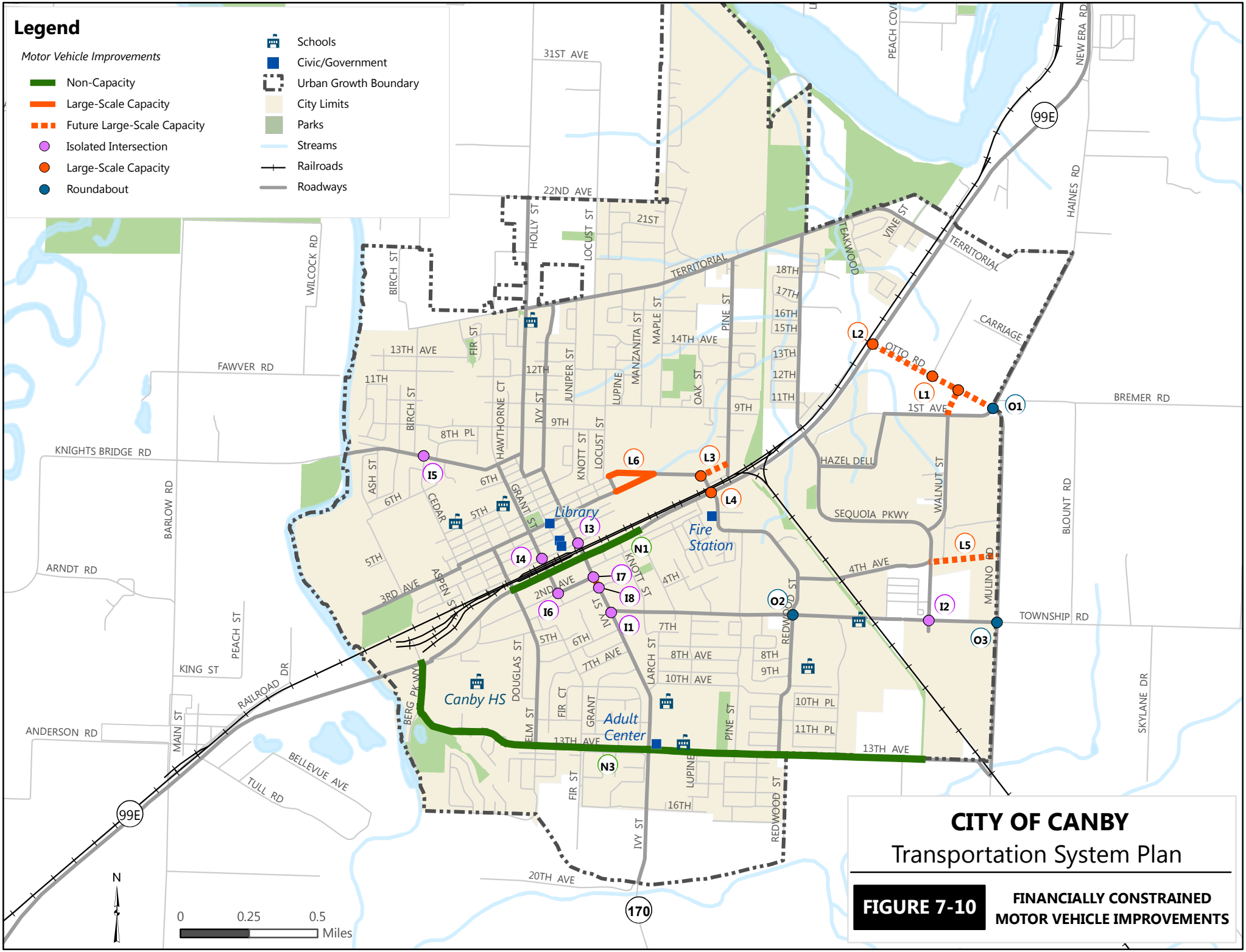

Legend
Motor Vehicle Improvements
Non-Capacity
Large-Scale Capacity
Future Large-Scale Capacity
Isolated Intersection
Large-Scale Capacity
Roundabout
Schools
Civic/Government
Urban Growth Boundary
City Limits
Parks
Streams
Railroads
Roadways
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FIGURE 7-10
FINANCIALLY CONSTRAINED MOTOR VEHICLE IMPROVEMENTS
Canby HS
Library
Fire Station
Adult Center
99E
170
L1
L2
L3
L4
L5
L6
O1
O2
O3
I1
I2
I3
I4
I5
I6
I7
I8
N1
N3
0
0.25
0.5
Miles
N

Table 7-6: Motor Vehicle Projects with Planning Level Costs (Financially-Constrained)

Location	Motor Vehicle Project		Planning Level Cost
Non-Capacity Improvements			
OR 99E (Elm Street to Locust Street)[a]	**N1**	Construct multi-modal improvements (associated with STA designation) and repave highway (includes Pedestrian Projects S1 and C4)	$3,770,000
All traffic signals on OR 99E within Canby city limits[a]	**N2**	Convert to adaptive signal system	$400,000
SE/SW 13th Avenue (Berg Parkway to Sequoia Parkway Extension)	**N3**	Perform safety study and construct traffic calming and other safety improvements prior to constructing Sequoia Parkway Extension to SE 13th Avenue	$750,000
Large-Scale Capacity Improvements			
Otto Road Extension (OR 99E to Mulino Road)	**L1**	Construct new road (includes two roundabouts and Pedestrian Project S10 and Bicycle Project B7)	$8,915,000
OR 99E/Otto Road[a]	**L2**	Install traffic signal (associated with Otto Road Extension)	$300,000
NE 4th Avenue/Pine Street	**L3**	Relocate intersection farther from Union Pacific Railroad track and construct so roadway runs east-west with south leg teeing into intersection (with the northbound approach allowed a free movement); this alignment accommodates potential future frontage road to the east (includes Pedestrian Project S5 and Bicycle Project B6)	$1,255,000
OR 99E/Pine Street and Adjacent Union Pacific Railroad Crossing[a]	**L4**	Install westbound right-turn lane, convert southbound approach to two left turn lanes and a shared through-right lane (requires additional lane across railroad tracks), relocate southbound approach stop bar behind railroad tracks, and adjust signal timing to run with split phases for northbound and southbound approaches (includes Pedestrian Project C7 and Bicycle Project R4)	$2,000,000
SE 4th Avenue Extension (Sequoia Parkway to Mulino Road)	**L5**	Install two-lane collector roadway (includes Pedestrian Project S13 and Bicycle Project B8)	$3,140,000
NE 3rd Avenue (Locust Street to NE 4th Avenue) and NE 4th Avenue (Locust Street to NE 3rd Avenue)	**L6**	Convert roadways to one-way travel (to provide sufficient space for bike lane and sidewalks)	$0[b]

Table 7-6 continued on next page.

(Continued) Table 7-6: Motor Vehicle Projects with Planning Level Costs (Financially-Constrained)

Location	Motor Vehicle Project		Planning Level Cost
Roundabout Improvements			
SE 1st Avenue/Haines Road/Mulino Road/Bremer Road	**O1**	Install roundabout	$2,000,000
Township Road/Redwood Street	**O2**	Install roundabout	$1,000,000
Township Road/Mulino Road	**O3**	Install roundabout	$1,000,000
Isolated Intersection Capacity Improvements			
Township Road/South Ivy Street	**I1**	Install traffic signal (includes Pedestrian Project C5)	$300,000
Township Road/Sequoia Parkway	**I2**	Convert to all-way stop and install eastbound and westbound left-turn lanes (includes Pedestrian Project C6)	$510,000
North Ivy Street/North 1st Avenue	**I3**	Remove southbound stop sign, restrict east leg to right-in/right-out, and install diverter on west leg to only allow southbound right turns	$10,000
North Grant Street/NW 1st Avenue	**I4**	Remove southbound stop sign	$10,000
Knights Bridge Road/Cedar Street	**I5**	Restripe northbound approach to include a right-turn lane	$5,000
South Grant Street/SW 2nd Avenue	**I6**[c]	Install westbound right-turn lane	$100,000
South Ivy Street/SW 2nd Avenue	**I7**[c]	Install eastbound right-turn lane	$100,000
South Ivy Street/SW 3rd Avenue	**I8**[c]	Install partial diverter on west leg to close westbound receiving lane (includes Pedestrian Project C8)	$40,000
		TOTAL	**$25,605,000**

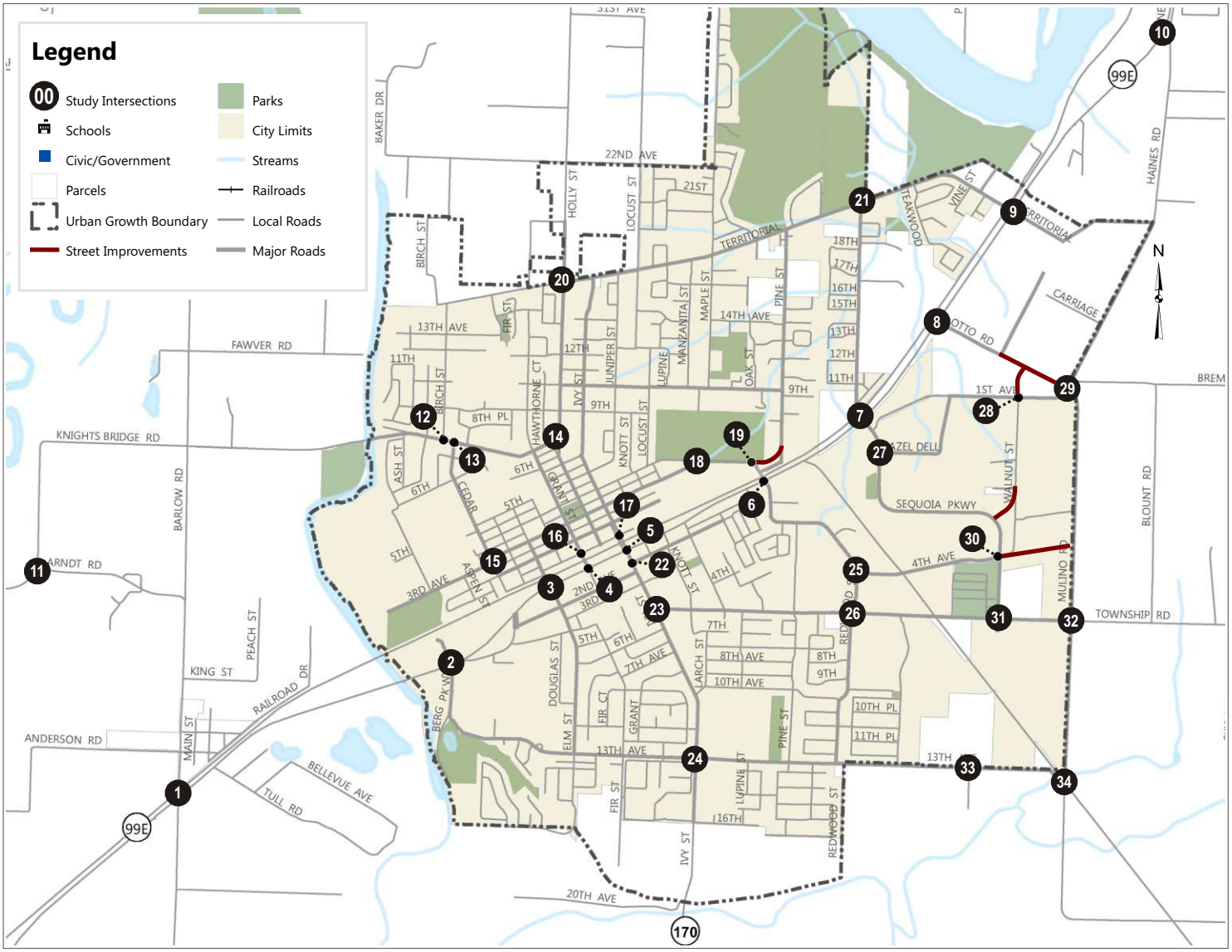
[a] ODOT approval required for implementation of all portions of projects on OR 99E. Engineering studies, signal warrant and traffic analysis, and conformance with ODOT standards will be evaluated as projects are developed.

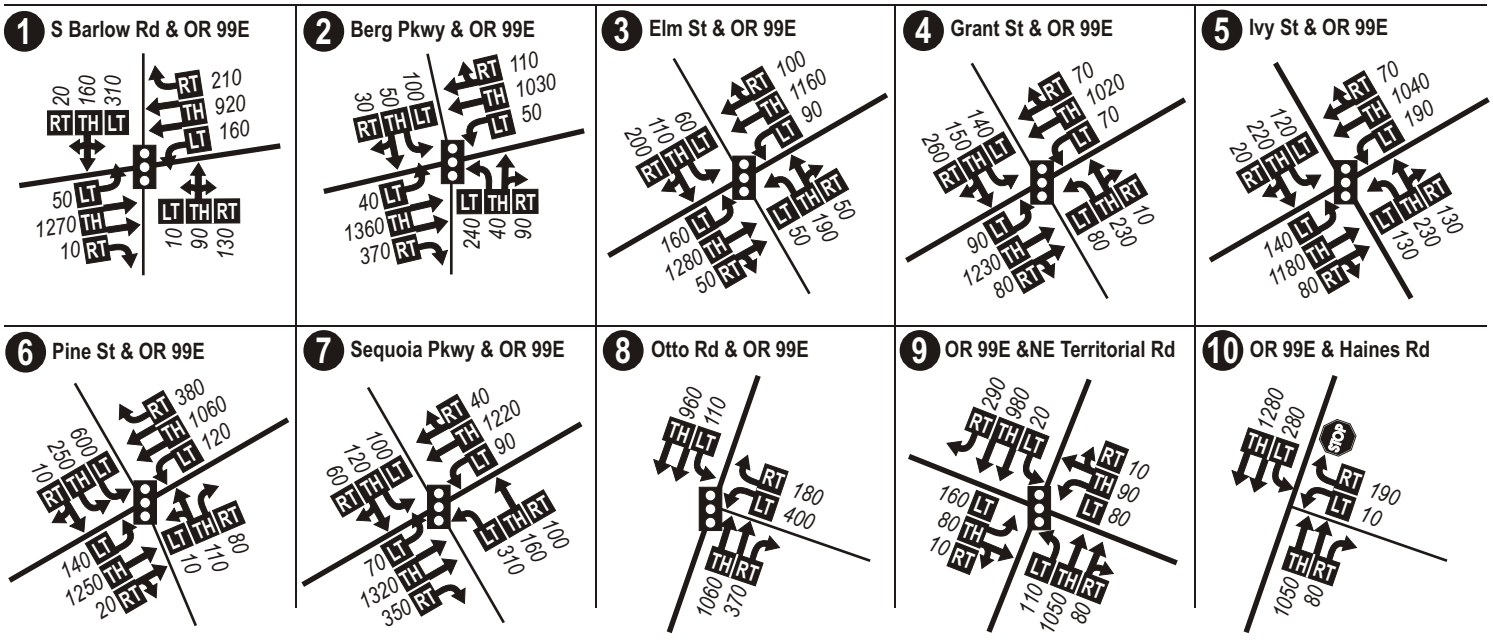
[b] Project L6 is identified in both pedestrian and bicycle improvement lists, with corresponding portions of total cost provided in each list (i.e., sidewalk costs in pedestrian list and bike lane costs in bicycle list).

[c] Projects I6, I7, and I8 are intended to divert traffic from SW 3rd Avenue to SW 2nd Avenue and should be constructed together.

Traffic Volumes and Operations (Financially-Constrained Package)

Because the entire city transportation network must work together as a whole, traffic analysis was performed assuming the entire Financially-Constrained Solutions Package was implemented. The analysis was based on future 30th highest hour traffic volumes that were forecasted for the year 2030 at the TSP study intersections using the same methodology discussed in "Chapter 4: Future Needs." The future 30th highest hour traffic volumes for the Financially-Constrained Solutions Package are provided in Figure 7-11a/b.





Intersection Detail Legend

- *00* - 30th Highest Hour Traffic Volume*
- LT TH RT (Left•Thru•Right) - Volume Turn Movement
- ← - Lane Configuration
- Traffic Signal
- STOP - Stop Sign
- Roundabout

*See note on Figure 7-11b

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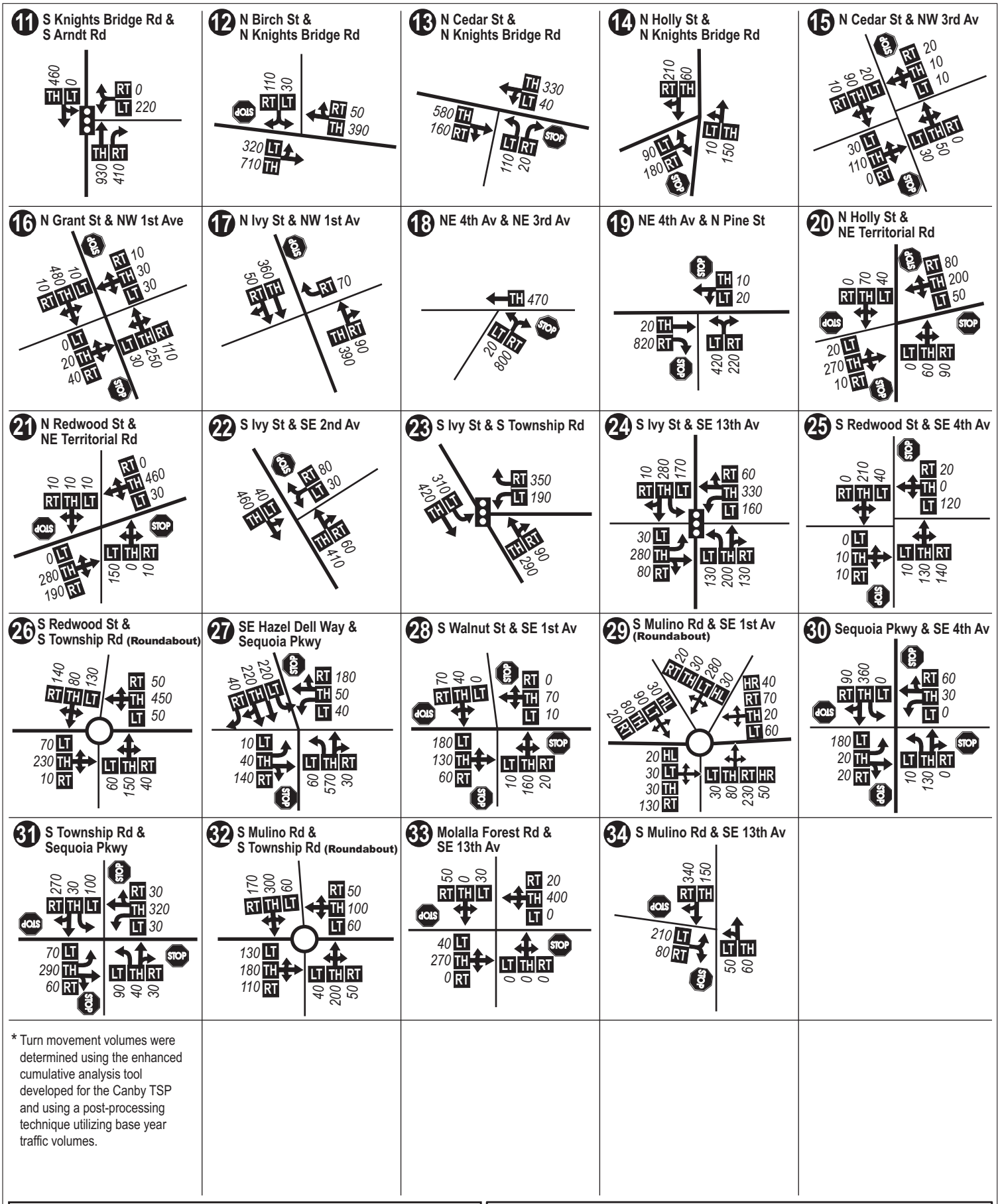
FIGURE 7-11a ***2030 FINANCIALLY-CONSTRAINED VOLUMES (Sheet 1 of 2)***



* Turn movement volumes were determined using the enhanced cumulative analysis tool developed for the Canby TSP and using a post-processing technique utilizing base year traffic volumes.

Intersection Detail Legend

- *00* - 30th Highest Hour Traffic Volume*
- LT TH RT (Left • Thru • Right) - Volume Turn Movement
- HL HR (Hard Left • Hard Right) - Additional Volume Turn Movements
- ← - Lane Configuration
- Traffic Signal
- STOP - Stop Sign
- Roundabout

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FIGURE 7-11b *2030 FINANCIALLY-CONSTRAINED VOLUMES (Sheet 2 of 2)*

Based on the projected volumes, the signalized, two-way stop controlled, and all-way stop controlled intersection operations were determined using the *2000 Highway Capacity Manual* methodology,[38] while roundabout operations were determined using methodology prepared by the National Cooperative Highway Research Program (NCHRP).[39] This methodology is currently being implemented by ODOT and will be utilized in the new *2010 Highway Capacity Manual (HCM)*, which has not yet been released.

The intersection operations resulting from the Financially-Constrained Solutions Package are listed in Table 7-7. As shown, most of the study intersections would meet applicable operating standards in 2030. The key operational-related findings associated with the Financially-Constrained Solutions Package include the following:

- None of the study intersections on OR 99E between Locust Street and Grant Street would have met operating standards if this section of OR 99E had not obtained an STA designation. Even with the STA designation, the intersection of OR 99E/Ivy Street would still not meet operating standards.
- Of the four signalized intersections that do not meet standards, one is outside of the City's jurisdiction (OR 99E/S Barlow Road) and the others (OR 99E/Ivy Street, OR 99E/Pine Street, and OR 99E/Sequoia Parkway) still provide sufficient capacity to meet demand (i.e., v/c's are less than 1.0).
- Of the five two-way stop controlled intersections that do not meet standards, one is outside of the City's jurisdiction (OR 99E/Haines Road) and the others experience high side street delays. However, this is not considered critical when the intersection's worst movement has a v/c ratio less than 0.90.

Table 7-7: 2030 Operating Conditions (Financially-Constrained Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized					
OR 99E/S Barlow Rd	ODOT	≤ 0.75	69.0	E	**1.13**
OR 99E/Berg Pkwy	ODOT	≤ 0.85	18.8	B	0.79
OR 99E/Elm St	ODOT	≤ 0.95	39.6	D	0.84
OR 99E/Grant St	ODOT	≤ 0.95	33.6	C	0.86
OR 99E/Ivy St	ODOT	≤ 0.95	58.7	E	**0.96**
OR 99E/Pine St	ODOT	≤ 0.85	50.1	D	**0.94**
OR 99E/Sequoia Pkwy	ODOT	≤ 0.75	37.8	D	**0.81**
OR 99E/Otto Rd	ODOT	≤ 0.75	43.1	D	0.75
OR 99E/Territorial Rd	ODOT	≤ 0.75	19.3	B	0.67

Table 7-7 continued on next page.

[38] *2000 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000.

[39] See NCHRP Report 572.

(Cont.) Table 7-7: 2030 Operating Conditions (Financially-Constrained Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized (Continued)					
Knights Bridge Rd/S Arndt Rd	Clackamas Co.	LOS D	11.9	B	0.80
S Township Rd/S Ivy St	Clackamas Co.	LOS D	12.3	B	0.65
SE 13th Ave/S Ivy St	Clackamas Co.	LOS D	16.3	B	0.69
All-way Stop Controlled					
SE 13th Ave/S Mulino Rd	Clackamas Co.	LOS D	16.5	C	0.73
NE Territorial Rd/N Holly St	City of Canby	LOS D	12.7	B	0.52
S Township Rd/Sequoia Pkwy	City of Canby	LOS D	20.0	C	0.73
SE 4th Ave/Sequoia Pkwy	City of Canby	LOS D	18.3	C	0.78
SE 1st Ave/S Walnut St	City of Canby	LOS D	12.8	B	0.60
Knights Bridge Rd/N Holly St	City of Canby	LOS D	10.1	B	0.38
Roundabout					
S Township Rd/S Mulino Rd	Clackamas Co.	LOS D	16.8	C	0.71
SE 1st Ave/S Mulino Rd/Otto Rd	Clackamas Co.	LOS D	10.4	B	0.55
S Township Rd/S Redwood St	City of Canby	LOS D	15.8	C	0.74
Two-way Stop Controlled					
OR 99E/Haines Rd	ODOT	≤ 0.70	>50	C/F	**1.00**
SE 2nd Ave/S Ivy St	Clackamas Co.	LOS D	17.5	A/C	0.30
NW 1st Ave/N Grant St	City of Canby	LOS E	30.0	A/D	0.35
NW 1st Ave/N Ivy St	City of Canby	LOS E	11.8	A/B	0.30
Knights Bridge Rd/N Birch St	City of Canby	LOS E	>50	**A/F**	0.85
Knights Bridge Rd/N Cedar St	City of Canby	LOS E	32.2	A/D	0.50
NW 3rd Ave/N Cedar St	City of Canby	LOS E	13.0	A/B	0.25
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	20.3	A/C	0.81
NE 4th Ave/N Pine St	City of Canby	LOS E	>50	**A/F**	0.77
NE Territorial Rd/N Redwood St	City of Canby	LOS E	>50	**A/F**	0.80
S Hazel Dell Way/Sequoia Pkwy	City of Canby	LOS E	>50	**A/F**	0.94
SE 4th Ave/S Redwood St	City of Canby	LOS E	17.5	A/C	0.35
SE 13th Ave/Molalla Forest Rd	City of Canby	LOS E	16.4	A/C	0.22

Signalized and All-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Intersection
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold values do not meet standards.

Two-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Worst Approach
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement (typically a major movement)
Bold values do not meet standards.

Traffic Simulation and Queuing (Financially-Constrained Package)

In addition to considering intersection operations, sketch-level traffic simulation and queuing analysis were performed for the Financially-Constrained transportation network with the purpose of gaining a general understanding of congestion issues in the downtown area as a result of the high v/c ratios at OR 99E intersections. The analysis was performed in SimTraffic™ utilizing volumes directly from the travel forecast tool (post-processing at study intersections). While specific queue lengths could not be obtained from this evaluation, the following general observations were made:

- Significant northbound queues are expected on South Ivy Street approaching OR 99E. Therefore, it is likely that northbound vehicles on South Ivy Street that intend to turn right onto OR 99E will use SE 2nd Avenue and Juniper Street to bypass the queues.
- Significant southbound queues are expected on both North Grant Street and North Ivy Street approaching the Union Pacific Railroad and OR 99E. These queues result from the bottleneck caused by having only two southbound lanes across the railroad track and the limited green time that the OR 99E/Grant Street and OR 99E/Ivy Street traffic signals can provide to their respective southbound approaches. Therefore, the higher volumes using the shared southbound through-right lanes are expected to queue back multiple city blocks into the downtown area.
- Significant eastbound queues are expected on NE 4th Avenue and NE 3rd Avenue approaching Pine Street due to heavy use of these roadways for exiting downtown and the high volume-to-capacity ratio of the OR 99E/Pine Street traffic signal.

Therefore, under the Financially-Constrained Solutions Package, the City of Canby can expect significant queuing in the downtown area in 2030. This is due to the high v/c ratios at the OR 99E/Grant Street, OR 99E/Ivy Street, and OR 99E/Pine Street traffic signals and the limitations on available southbound approach lanes to these intersection that are caused by the Union Pacific Railroad tracks.

Preferred Motor Vehicle Solutions Package

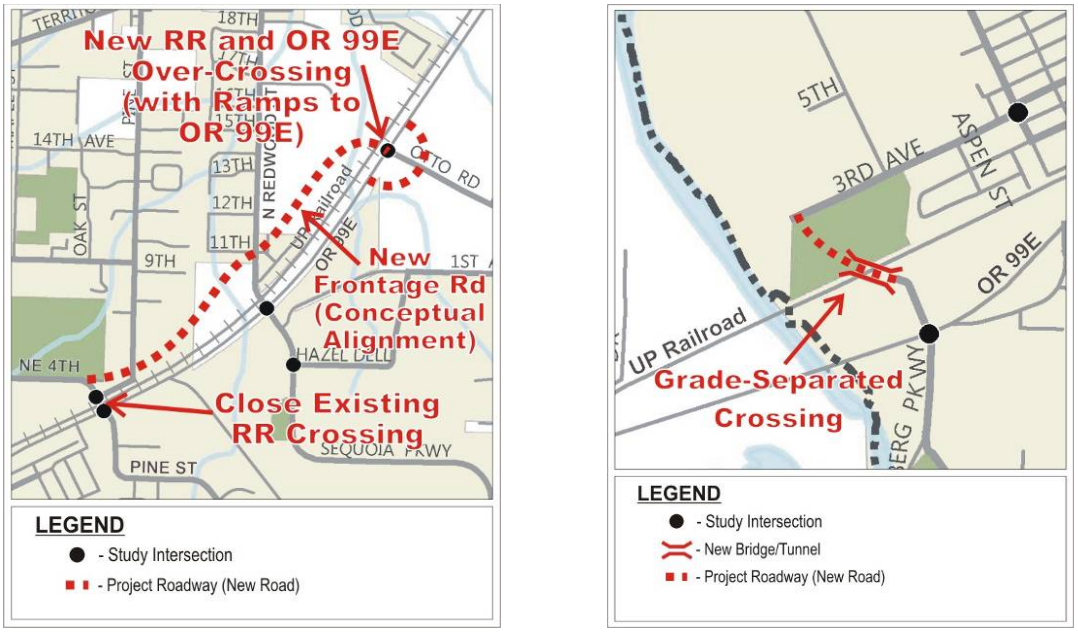
To address some of the congestion concerns associated with the Financially-Constrained Solutions Package and better meet operating standards through the year 2030, a Preferred Solutions Package was also developed for Canby. The Preferred Solutions Package includes most of the same motor vehicle projects identified previously for the Financially-Constrained Solutions Package, with the following key differences:

Additional Improvements Included in the Preferred Solutions Package

- Extend Sequoia Parkway from the existing roadway stub near Township Road south to SE 13th Avenue; this extension would require a grade-separated railroad crossing of the Oregon Pacific Railroad.
- Install an overcrossing of OR 99E and the Union Pacific Railroad at Otto Road with ramps and traffic signals providing access to OR 99E on the south side of the

overcrossing and a frontage road along the north side of OR 99E connecting the Otto Road overcrossing to Pine Street, as shown in Figure 7-12(a).

- Close the Pine Street-NE 4th Avenue crossing of the Union Pacific Railroad with a gate that only allows service to emergency vehicles, as shown in Figure 7-12(a).
- Extend Berg Parkway to NW 3rd Avenue via a grade-separated crossing of the Union Pacific Railroad, as shown in Figure 7-12(b); it has yet to be determined whether a bridge over the railroad tracks or a tunnel under the tracks is preferred.



(a) Otto Road Overcrossing and Pine Street At-Grade Rail Crossing Closure

(b) Berg Parkway Extension with Grade-Separated Railroad Crossing

Figure 7-12: Additional Improvements in Preferred Solutions Package

The Berg Parkway extension has the following benefits:

- It would serve truck traffic generated at the industrial area on North Baker Drive (instead of trucks routing through neighborhoods to access OR 99E at Elm Street).
- It would accommodate emergency service access across the railroad tracks, which would be particularly important when a train is blocking nearby at-grade crossings.
- It may serve as the first phase of a potential long-term solution to better connect Canby to I-5 via a bypass of Barlow that would extend Arndt Road over the Molalla River to NW 3rd Street. If Clackamas County were to pursue this option in the future, the Berg Parkway Extension should become part of the preferred motor vehicle projects for Canby.

In addition, there are two improvement projects included in the Financially-Constrained Solutions Package that would not be required if the Preferred Solutions Package was

implemented. However, these projects were conceived as possible early construction phases of the Preferred Solutions Package projects and may be implemented as interim solutions. In addition, there is also one alteration that would be needed to implement the Preferred Solutions Package. These three projects are listed below:

Financially-Constrained Improvements Not Included in Preferred Package

- All identified improvements to OR 99E/Pine Street intersection and adjacent Union Pacific Railroad crossing
- OR 99E/Otto Road traffic signal

Alteration to Financially-Constrained Improvement

- Provide the same roadway alignment for the relocated Pine Street/NE 4th Avenue intersection (i.e., roadway runs east-west with south leg teeing into intersection), but the east-west approaches should be allowed free movement and the northbound approach should be stop controlled

Table 7-8 provides planning level cost estimates for the additional improvements included in the Preferred Solutions Package.

Table 7-8: Preferred Package Motor Vehicle Projects with Planning Level Costs

Location	Motor Vehicle Project		Planning Level Cost
Additional Preferred Solutions Package Projects			
Sequoia Parkway Extension (Township Rd to SE 13th Avenue)	**L7**	Install two-lane collector roadway with grade-separated rail crossing (includes sidewalks and bike lanes)	$5,500,000[c]
OR 99E/Otto Road	**L8**	Install overcrossing of OR 99E and Union Pacific Railroad with ramps and traffic signals providing access to OR 99E on the south side of the overcrossing and a frontage road along the north side of OR 99E connecting Otto Road to Pine Street	$32,360,000
OR 99E/Pine Street and Adjacent Union Pacific Railroad Crossing	**L9**	Close Union Pacific Railroad crossing and install gate that only allows service to emergency vehicles	$250,000
Berg Parkway Extension	**L10**	Extend Berg Parkway to NW 3rd Avenue via a grade-separated crossing of the Union Pacific Railroad	$16,505,000
TOTAL ADDITIONAL COST FOR PREFERRED SOLUTIONS PACKAGE			**$54,615,000**

While the Preferred Solutions Package is the recommended ultimate solution for 2030, there are two alternative approaches that may be taken by the City:

- The City could pursue the Preferred Solutions Package as a stand-alone package.
- The City could pursue the Financially-Constrained Package as an interim step with the Preferred Solutions Package as the ultimate improvement package.

The total costs associated with the two alternative approaches for pursuing the Preferred Solutions Package are provided in Table 7-9. As shown, if the Financially-Constrained Package is included as an interim step, the total Preferred Solutions Package cost would be approximately $80.2 million. However, by pursuing the Preferred Solutions Package as a standalone package, the City could reduce overall costs to approximately $77.9 million because it could avoid constructing the two Financially-Constrained Solutions Package improvements that are not included in the Preferred Solutions Package (i.e., OR 99E/Pine Street and OR 99E/Otto Road traffic signal projects identified in Table 7-6).

Table 7-9: Total Preferred Package Costs (Two Alternatives)

Package Component	Planning Level Cost
Financially-Constrained Package as Interim Step	
Total Financially-Constrained Package Cost (see Table 7-6)	$25,605,000
Additional Preferred Solutions Package Projects Cost (see Table 7-8)	$54,615,000
TOTAL COST	**$80,220,000**
Preferred Solutions Package as Standalone	
Total Financially-Constrained Package Cost (see Table 7-6)	$25,605,000
Financially-Constrained Package Projects not Included in Preferred Package (sum of Projects L3 and L5, as shown in Table 7-6)	-$2,300,000
Additional Preferred Solutions Package Projects Cost (see Table 7-8)	$54,615,000
TOTAL COST	**$77,920,000**

Another important consideration is that because of the significant nature of an Otto Road overcrossing and frontage road—and the length of time it may take to plan and construct it—it may be worth incurring the additional costs in order to have the improved operations in the short-term to allow continued growth within the City.

Intersection Operations (Preferred Solutions Package)

Similar to the Financially-Constrained Solutions Package analysis, traffic analysis was performed for the Preferred Solutions Package assuming all associated transportation alternatives are implemented. The same operations analysis methodologies were also used.

The intersection operations resulting from the Preferred Solutions Package are listed in Table 7-10. As shown, nearly all study intersections would meet applicable operating standards in 2030 (given that an STA designation has been obtained for OR 99E between Locust Street and Elm Street). Only one signalized intersection would not meet the applicable standard, and this intersection is outside of the City's jurisdiction (OR 99E/S Barlow Road). One of the unsignalized intersections (OR 99E/Haines Road) that does not meet standards is also outside of the City's jurisdiction. The other unsignalized intersection that does not meet the existing standard (South Hazel Dell Way/Sequoia Parkway) experiences high side street delays, but this is not considered critical because the v/c ratio of its worst movement does not exceed 0.90.

Table 7-10: 2030 Operating Conditions (Preferred Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized					
OR 99E/S Barlow Rd	ODOT	≤ 0.75	64.7	E	**1.08**
OR 99E/Berg Pkwy	ODOT	≤ 0.85	22.1	C	0.87
OR 99E/Elm St	ODOT	≤ 0.95	40.8	D	0.83
OR 99E/Grant St	ODOT	≤ 0.95	61.6	E	0.91
OR 99E/Ivy St	ODOT	≤ 0.95	57.3	E	0.93
OR 99E/Pine St	ODOT	≤ 0.85	14.7	B	0.73
OR 99E/Sequoia Pkwy	ODOT	≤ 0.75	27.5	C	0.72
OR 99E/Otto Road (South)	ODOT	≤ 0.75	3.6	A	0.48
OR 99E/Otto Road (North)	ODOT	≤ 0.75	4.5	A	0.42
OR 99E/Territorial Rd	ODOT	≤ 0.75	21.4	C	0.62
Knights Bridge Rd/S Arndt Rd	Clackamas Co.	LOS D	15.1	B	0.85
S Township Rd/S Ivy St	Clackamas Co.	LOS D	10.7	B	0.62
SE 13th Ave/S Ivy St	Clackamas Co.	LOS D	16.0	B	0.68
All-way Stop Controlled					
SE 13th Ave/S Mulino Rd	Clackamas Co.	LOS D	14.8	B	0.68
NE Territorial Rd/N Holly St	City of Canby	LOS D	11.5	B	0.45
S Township Rd/Sequoia Pkwy	City of Canby	LOS D	15.4	C	0.65
SE 4th Ave/Sequoia Pkwy	City of Canby	LOS D	16.0	C	0.74
SE 1st Ave/S Walnut St	City of Canby	LOS D	14.3	B	0.64
Knights Bridge Rd/N Holly St	City of Canby	LOS D	10.9	B	0.50
Roundabout					
S Township Rd/S Mulino Rd	Clackamas Co.	LOS D	14.3	B	0.71
SE 1st Ave/S Mulino Rd/Otto Rd	Clackamas Co.	LOS D	22.9	C	0.79
S Township Rd/S Redwood St	City of Canby	LOS D	12.1	B	0.67
Two-way Stop Controlled					
OR 99E/Haines Rd	ODOT	≤ 0.70	>50	C/F	**1.73**
SE 2nd Ave/S Ivy St	Clackamas Co.	LOS D	14.6	A/B	0.30
NW 1st Ave/N Grant St	City of Canby	LOS E	28.4	A/D	0.36
NW 1st Ave/N Ivy St	City of Canby	LOS E	11.9	A/B	0.30
Knights Bridge Rd/N Birch St	City of Canby	LOS E	>50	A/F	0.46
Knights Bridge Rd/N Cedar St	City of Canby	LOS E	36.7	A/E	0.56
NW 3rd Ave/N Cedar St	City of Canby	LOS E	12.9	A/B	0.30

Table 7-10 continued on next page.

(Continued) Table 7-10: 2030 Operating Conditions (Preferred Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Two-way Stop Controlled (Continued)					
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	18.5	A/C	0.78
NE Territorial Rd/N Redwood St	City of Canby	LOS E	34.7	A/D	0.62
S Hazel Dell Way/Sequoia Pkwy	City of Canby	LOS E	>50	**A/F**	0.75
SE 4th Ave/S Redwood St	City of Canby	LOS E	13.8	A/B	0.35
SE 13th Ave/Molalla Forest Rd	City of Canby	LOS E	15.1	A/C	0.18

Signalized and All-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Intersection
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold values do not meet standards.

Two-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Worst Approach
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement (typically a major movement)
Bold values do not meet standards.

Traffic Simulation and Queuing (Preferred Solutions Package)

Traffic simulation and sketch-level queuing analysis was also performed for the Preferred Solutions Package in SimTraffic™. The observations from the analysis were very similar to the Financially-Constrained transportation network, with two key differences:

- No queuing issues occur on NE 4th Avenue and NE 3rd Avenue near Pine Street because of the closure of the Pine Street- NE 4th Avenue Union Pacific Railroad crossing.
- The closure of the Pine Street- NE 4th Avenue Union Pacific Railroad crossing also adjusts network travel patterns such that increased queuing is expected on the North Ivy Street southbound approach to OR 99E.

Therefore, while the Preferred Solutions Package improves v/c ratios of the study intersections in Canby, it does not fully address queuing concerns, particularly on North Ivy Street and North Grant Street in downtown.

Chapter 8. Other Modal Plans

Introduction

This chapter addresses transportation plans for the modes not covered in Chapters 5, 6, or 7. These modes are transit, rail, air, water, and pipeline.

Transit Master Plan

Canby Area Transit (CAT) is currently in the process of preparing a Transit Master Plan. This process is separate from the TSP update and was commenced in 2007 and 2008 through a series of public outreach events. The result of the process will be a stand-alone Transit Master Plan that is based on a 10-year outlook. The Transit Master Plan should be referred to for the latest information.

Though the Transit Master Plan is not yet complete, CAT has provided information regarding existing transit issues, the plan's goals and objectives, and a summary of key findings of the plan related to future route changes. These are discussed below.

Existing Transit Issues

Existing transit facilities and issues in Canby are documented in detail in "Chapter 3: Existing Conditions." Based on the existing transit facilities inventory, the following issues were identified:

- A new, larger site is needed for the Canby Transit Center.
- Bus stops with shelters, landing pads, and waiting areas are needed at the Canby Market Center and Canby Square transfer points.
- Bus stops along OR 99E require buses to stop traffic in the right travel lane and may affect highway operations.
- Additional facilities are needed at the following bus stops along OR 99E:
    - Northbound stop adjacent to Spinning Wheel restaurant needs a landing pad, sidewalk, or similar improvement
    - Northbound stop at Territorial Road needs a landing pad, sidewalk, or similar improvement
    - Northbound stop at Haines Road should be moved 50 feet south of existing location

  - Southbound stop at Territorial Road needs a landing pad, sidewalk, or similar improvement
  - Southbound stop at Sequoia Parkway should be moved 30 feet north of existing location
  - Southbound stop at Pine Street needs a landing pad, sidewalk, or similar improvement

- CAT no longer provides Saturday service.
- Canby does not have a park-and-ride lot.
- Canby is serviced by only one vanpool; however, additional vanpools can be organized by interested individuals, employers, or the City if there is sufficient demand.

Transit Master Plan Goals

The Transit Master Plan has one main goal and five objectives, which were developed in coordination with and approved by the advisory committee. The goal and objectives are identified below:

Goal 1: *Serve the transportation needs of residents, employees, and visitors with convenient, safe, affordable and efficient transit and alternative transportation services that offer a viable alternative to the automobile and provide key connections to other regional options.*

- **Objective 1:** Provide service that is coordinated, efficient and reliable.
- **Objective 2:** Enhance access to transit and other alternative transportation options.
- **Objective 3:** Accommodate the growing demand for transit and alternative transportation services in Canby.
- **Objective 4:** Promote land use patterns and local policies that support transit and alternative transportation use.
- **Objective 5:** Increase the awareness of and community involvement in transit and alternative transportation services.

Future Transit Route Changes

Canby Area Transit (CAT) has identified future route changes to address potential increases in transit demand. Two new routes are being proposed and are listed in Table 8-1. These routes connect Canby to nearby employment centers (i.e., Salem and Clackamas Town Center).

Table 8-1: Potential Future Canby Area Transit Routes

Transit Route	Service Area	Hours of Operation	Frequency
New CAT Line A	Between Canby and Salem Transit Mall	Weekdays from 5:00 a.m. to 10:00 a.m. and 2:30 p.m. to 7:00 p.m.	30 minutes
New CAT Line B	Between Canby and Clackamas Town Center (via I-205)	Weekdays from 6:30 am to 9:00 pm and Weekends 9:00 a.m. to 5:00 pm	1 hour

Source: Draft Canby Area Transit Master Plan

Changes to bus frequency and hours of operation are also proposed for existing routes, as shown in Table 8-2. The increased number of routes and bus frequency will require a larger transit center, as discussed in "Chapter 3: Existing Conditions." Additional stops for the CAT Orange Line have been identified along OR 99E outside of the Canby UGB.

Table 8-2: Potential Changes to Existing Routes

Transit Route	Characteristic	Existing	Proposed Change
CAT Green Line	Frequency	1 hour	30 minutes
	Hours of operation	Weekdays from 7:00 a.m. to 7:30 p.m.	Weekdays from 6:30 a.m. to 8:30 p.m.
CAT Blue Line	Frequency	1 hour	30 minutes
CAT Purple Line	Frequency	1 hour for a.m., midday, and p.m. peak periods; 2 hours in late a.m. and early p.m.	30 minutes for a.m. and p.m. peak periods; 1 hour during midday
CAT Orange Line	Frequency	Weekdays from 5:00 a.m. to 9:00 p.m.	Weekdays and weekends from 5:00 a.m. to 10:00 p.m.
SCTD Molalla to Canby	Frequency	1 to 2 hours	1 hour

Source: Draft Canby Area Transit Master Plan

Rail Plan

A rail plan was developed for Canby with emphasis on the public roadway crossings. This plan is comprised of the pedestrian, bicycle, and motor vehicle improvement projects that have been identified in conjunction with each of their respective modal plans (see Chapters 5, 6, and 7). Prior to listing the related improvement projects, this section provides a summary of existing rail facilities and issues within Canby (from "Chapter 3: Existing Conditions") and projected future rail issues for Canby (from "Chapter 4: Future Needs").

Existing Rail Facilities and Issues

There are two rail lines in Canby. The Union Pacific Railroad owns the north-south mainline (parallel to OR 99E) and attached sidings and spurs. The Oregon Pacific Railroad owns the southeasterly branch line. The two lines interchange near the pedestrian/bicycle bridge over OR 99E (i.e., the Molalla Forest Road Trail overcrossing located between the OR 99E/Sequoia Parkway and OR 99E/Pine Street intersections). Along these railroads

there are nine public and one private at-grade railroad crossings, as well as two grade separated crossings within the Canby UGB. The locations of the crossings and an inventory of crossing controls and characteristics are provided in "Chapter 3: Existing Conditions."

The following railroad related issues were identified in "Chapter 3: Existing Conditions:"

- The railroad is a major barrier to north/south travel across the city for other transportation modes.
- The majority of railroad crossings have nearby intersections within the Safe Stopping Distance.
- Significant noise levels are created by trains traveling through the city, though these may be attenuated by qualifying for a Quiet Zone (QZ) designation.

Future Rail Issues

The following railroad related issues were identified in "Chapter 4: Future Needs:"

- Passenger and freight rail frequency are likely to increase, but it has yet to be determined if the existing passenger rail line through Canby will be moved to a parallel corridor (i.e., no longer pass through Canby).
- The higher frequency of passenger and freight trains will likely necessitate the use of a second mainline track through Canby. This would require one of the following:
    A. A new mainline track to be constructed adjacent to the existing track
    B. The conversion of the existing auxiliary track to a mainline track and the construction of a new auxiliary track in another location
- Higher train speeds can be expected in the future. The potential plan is to increase passenger train speeds from 60 mph to 79 mph and freight train speeds from 50 mph to 60 mph. Due to the nearby New Era Hill, 80 mph is the highest speed likely to be achieved by trains through Canby at any time in the future.
- The increased train frequency will worsen the barrier effect of the rail corridor on the transportation network within Canby because it will result in more gate-down time. It is not clear what impact the increase in train speeds will have on the barrier affect because the higher speeds reduce the amount of gate-down time (trains pass through more quickly) but there may be safety implications from higher speed trains. The impact of more gate-down time and safety near rail crossings should be considered when evaluating future transportation improvements.
- As train service and speeds increase, there is a potential for the frequency and severity of crashes between vehicles, pedestrians, and cyclists with trains to also increase.

Rail Projects

Projects associated with the railroad (primarily at the crossings) were identified as part of the pedestrian, bicycle, and motor vehicle modal plans (see Chapters 5, 6, and 7). All of the pedestrian and bicycle improvements and the majority of the motor vehicle improvements associated with the railroad are included in the Financially-Constrained Solutions Package. There are also additional motor vehicle improvements affecting railroad crossings that are included in the Preferred Solutions Package. The railroad improvement projects included in each of the two solutions packages are discussed in the following sections.

Financially-Constrained Solutions Package

The railroad-related improvement projects included in the Financially-Constrained Solutions Package are listed in Table 8-3 (sorted by mode). For each project, the railroad-related component is identified. Various railroad crossings have multiple projects identified due to the separation of projects by mode. The crossings where improvements are identified include the Union Pacific Railroad crossings at Elm Street, Grant Street, Ivy Street, and Pine Street and the Oregon Pacific Railroad crossing at Township Road. There is also one project that is not related to a crossing but that runs along a rail corridor. This is the construction of the multi-use trail along the north side of the Union Pacific Railroad corridor between Elm Street and the Molalla Forest Road trail.

Table 8-3: Railroad-Related Improvement Projects (Financially-Constrained)

Location	Railroad-Related Project Component	
Pedestrian-Related Improvements (Enhanced Pedestrian Crossings)		
Elm Street Crossing of UPRR	**C1**	Improve section of crossing aligned with sidewalks
Grant Street Crossing of UPRR	**C2**	Improve section of crossing aligned with sidewalks
Ivy Street Crossing of UPRR	**C3**	Improve section of crossing aligned with sidewalks
Pine Street-NE 4th Ave Crossing of UPRR	**C7, S5**	Improve section of crossing aligned with sidewalks
Bicycle-Related Improvements (Railroad Crossing Improvements)		
Elm Street Crossing of UPRR	**R1**	Improve rail crossing (fill in gaps adjacent to rails)
Grant Street Crossing of UPRR	**R2**	Improve rail crossing (fill in gaps adjacent to rails)
Ivy Street Crossing of UPRR	**R3**	Improve rail crossing (fill in gaps adjacent to rails)
Pine Street Crossing of UPRR	**R4, B6**	Provide bicycle lanes over rail crossing
Township Road Crossing of OPRR	**R5**	Improve rail crossing (fill in gaps adjacent to rails) and widen if needed to accommodate bike lanes
Multi-Use Trail Improvements		
North side of UPRR corridor between Elm Street and Molalla Forest Road Trail	**T2**	Construct multi-use trail

Table 8-3 continued on next page.

(Continued) Table 8-3: Railroad-Related Improvement Projects (Financially-Constrained)

Location	Railroad-Related Project Component	
Motor Vehicle-Related Improvements (Large-Scale Capacity Improvements)		
Pine Street-NE 4th Avenue Crossing of UPRR and Adjacent OR 99E/Pine Street Intersection	**L5**	Widen Pine Street-NE 4th Avenue Crossing of UPRR from three travel lanes (two southbound, one northbound) to four travel lanes (three southbound, one northbound), relocate southbound approach stop bar so that is behind railroad tracks, adjust signal timing to run with split phases for northbound and southbound approaches, and prohibit southbound right-turn-on-red maneuvers

Preferred Solutions Package

The Preferred Solutions Package includes additional projects that affect railroad crossings. These projects are listed in Table 8-4.

Table 8-4: Railroad-Related Improvement Projects (Preferred Package)

Location	Railroad-Related Project Component
Motor Vehicle-Related Improvements (Large-Scale Capacity Improvements)	
Sequoia Parkway Extension (Township Rd to SE 13th Avenue)	Construct bridge over OPRR (includes sidewalks and bike lanes)
Otto Road Overcrossing of OR 99E and UPRR	Construct bridge over OR 99E and UPRR (includes sidewalks and bike lanes)
Pine Street-NE 4th Avenue Crossing of UPRR	Close the crossing with a gate that only allows service to emergency vehicles (would be performed in conjunction with the Otto Road Overcrossing)
Berg Parkway Extension between OR 99E and NW 3rd Avenue	Construct grade-separated crossing (either bridge or tunnel) of UPRR (includes sidewalks and bike lanes)

Air Plan

Regional and international air service for passengers and freight is provided at the Portland International Airport (PDX), which is located approximately 20 miles north of Canby and is accessible via OR 99E and Interstate-205. The Aurora State Airport and Mulino Airport are located less than ten miles from Canby and provide local commercial service and private aircraft use. No additional facilities are considered necessary for Canby within the planning horizon.

Water Plan

The Canby Ferry is operated by Clackamas County and provides motor vehicle, bicycle, and pedestrian service across the Willamette River. The ferry connects Canby to Pete's Mountain Road and West Linn to the north and operates seven days a week during the entire year whenever there is a vehicle to transport from 6:45 a.m. to 9:15 p.m. The ferry can carry up to six cars (two lanes of three cars) and charges a nominal fee, except for pedestrians or bicyclists, who travel free. Large trucks can also be accommodated by using multiple car stalls. Clackamas County tracks ferry use, and over 50 percent of use occurs in the afternoon between 12:00 p.m. and 6:00 p.m. with the peak being between 4:00 and 6:00 p.m. On average, there are between three and four vehicles per boat trip.

Historically, the Willamette River has been used for the shipment of raw timber and other bulk goods. Current use of the river as a transportation route is limited to barge shipment of sand and gravel as well as some floats of timber. Recreational boating on the Willamette River is popular year-round. No additional water transportation facilities are proposed in this TSP.

Pipeline Plan

Pipeline transportation in and through the Canby urban area includes transmission lines for electricity, cable television, and telephone services, and pipeline transport of water, sewer, and natural gas. All existing pipelines within and passing through Canby are outside of the maintenance responsibilities of the City. As such, no policies or recommendations in this area of transportation are provided for Canby.

Chapter 9. Financial Plan

Introduction

This chapter provides Canby with a financial plan for funding the transportation projects and programs identified in this Transportation System Plan (TSP). This chapter's outline is as follows:

- Summary of existing transportation-related revenue and expenditure streams
- Forecasts of future transportation-related revenues and expenditures through 2030 and available funds for transportation projects and programs identified in this TSP
- Summary of financial feasibility of Financially-Constrained and Preferred Solutions Packages
- Identification of potential new funding sources

Existing Revenue and Expenditure Streams

Transportation-related revenues and expenditures for the City of Canby over the last five years were provided by City staff. Averages are listed in Table 9-1 for City revenues and in Table 9-2 for City expenditures. The tables also list the revenues from two new sources that were recently enacted (i.e., local gas tax and street maintenance fee).

As listed in Table 9-1 and Table 9-2, in an average year in the recent past (when the two new revenue sources are included), the City has received $2,685,000 in revenue and spent $2,365,000 in expenditures, which corresponds to a $320,000 surplus. This does not necessarily indicate that future years will continue to have a surplus. In fact, for the 2008-2009 fiscal year (ending June 30, 2009), there was an unanticipated shortfall that resulted from the volatility of the economy over the last few months of the fiscal year.[40] This shortfall caused the Street Fund to expend some reserves. To prevent further use of reserves, the proposed budget for the 2009/2010 fiscal year includes reducing personnel costs by reassigning two city staff positions to other departments. It is unclear whether this will only reduce costs in the short-term. Also, Oregon state gas tax receipts have been declining; however, the Oregon legislature recently passed a 6 cent gas tax increase that will come into effect by the year 2011. Therefore, state gas tax revenues are expected to increase again.

[40] City of Canby Oregon Adopted Budget 2009-2010.

Table 9-1: Average Transportation-Related Revenue over Last Five Years

Transportation Revenue Source	Description	Average Annual Amount
State/Federal Funds		
State Highway Fund (gas taxes)	Dispersed annually to cities and counties throughout Oregon based on relative population and number of registered vehicles. Must be used for road-related expenses.	$655,000
Federal Fund Exchange	Federal money channeled through the State. Not intended for maintenance but can be used for any improvements in roadway right-of-way. Provided to City as a reimbursement following qualifying expenditures.	$170,000
Grants	One-time, project specific grants.	$210,000
City Funds		
Local Gas Tax	Tax collected on gasoline sales in City to be used for road-related expenses. Recently enacted (2009 was first year of revenue).	$235,000
Construction Excise Tax	Tax issued on construction permits.	$75,000
Erosion Control or Street Repair Fee's	Charges for services.	$15,000
Miscellaneous Revenue	Minor sources not accounted for elsewhere.	$15,000
Interest Revenue	Interest earned from Street Fund and Street Revenue Fund balance.	$10,000
Street Maintenance Fee	Reoccurring fee charged to all utility users based on expected traffic generation. Must be used for maintenance expenses. Recently enacted (2009 was first year of revenue).	$255,000
Urban Renewal (transportation related improvements)	Borrowed money for improvements (including transportation) in specified geographical area (see section on Urban Renewal Fund). Future taxes from properties in improved area will be used to repay loans (i.e., tax increment financing).	$565,000
Transportation System Development Charges (SDCs)	One-time fee charged to new developments based on land use and size. Must be used for roadway capacity improvements.	$480,000
	TOTAL AVERAGE ANNUAL TRANSPORTATION REVENUE	**$2,685,000**

Table 9-2: Average Transportation-Related Expenditures over Last Five Years

Transportation Expenditure	Description	Average Annual Amount
General Maintenance and Operations		
Personal Services	Contribution to staff wages and benefits.	$360,000
Material and Services	Office expenses, roadway maintenance and construction supplies, contractor work, and consulting engineer fees	$205,000
Capital Outlay Equipment	Cost of equipment used by City staff.	$20,000
Maintenance	General roadway maintenance and repair.	$75,000
Capital Improvements and Transfers		
Transportation System Development Charges (SDCs)	See description provided in Revenues table.	$345,000
Federal Fund Exchange	See description provided in Revenues table.	$170,000
Grants	See description provided in Revenues table.	$210,000
Other Capital Projects		$255,000
Urban Renewal (transportation related improvements)	See description provided in Revenues table.	$565,000
Operating Transfer to General Fund	Street Fund contributions to other City needs.	$65,000
Operating and Reserve Transfer To Fleet	Street Fund contributions to other City needs.	$90,000
Operating Transfer to Technical Services	Street Fund contributions to other City needs.	$5,000
TOTAL AVERAGE ANNUAL TRANSPORTATION EXPENDITURE		**$2,365,000**

Future Revenue and Expenditure Streams

Transportation related revenues and expenditures for the City of Canby were projected through the 2030 TSP horizon year and are shown in Table 9-3 and Table 9-4. These are primarily the same revenue and expenditure categories identified previously for the existing revenue and expenditure streams. However, the projected expenditures list provided in Table 9-4 does not include any spending on capital improvement projects so a determination can be made of available resources for implementing transportation programs identified in this TSP. In addition, two total revenue sums are shown in Table 9-3. The first sum includes all revenue sources, while the second sum does not include system development charge (SDC) funds due to their limited use for funding capacity-related improvements and not for projects focused on other needs or that target maintenance or city operations.

Table 9-3: Projected Future Transportation-Related Revenue through 2030

Transportation Revenue Source	Average Annual Amount	21-Year Total (through 2030)
State/Federal Funds		
State Highway Fund (gas taxes)	$655,000	$13,755,000
Federal Fund Exchange	$170,000	$3,570,000
City Funds		
Local Gas Tax	$250,000	$5,250,000
Construction Excise Tax	$75,000	$1,575,000
Erosion Control and Street Repair Fees	$15,000	$315,000
Miscellaneous Revenue	$15,000	$315,000
Interest Revenue	$10,000	$210,000
Street Maintenance Fee	$250,000	$5,250,000
Transportation System Development Charges (SDCs)	$1,120,000	$23,520,000
TOTAL REVENUE THROUGH 2030 (2008 DOLLARS)		**$53,760,000**
TOTAL NON-SDC REVENUE THROUGH 2030 (2008 DOLLARS)		**$30,240,000**

Table 9-4: Projected Future Transportation-Related Expenditures through 2030

Transportation Expenditure Source	Average Annual Amount	21-Year Total (through 2030)
General Maintenance and Operations		
Personal Services	$450,000	$8,400,000
Material and Services	$250,000	$4,305,000
Capital Outlay Equipment	$20,000	$420,000
Maintenance	$60,000	$1,260,000
Fund Transfers		
Operating Transfer to General Fund	$65,000	$1,365,000
Operating and Reserve Transfer To Fleet	$90,000	$1,890,000
Operating Transfer to Technical Services	$5,000	$105,000
TOTAL EXPENDITURES THROUGH 2030 (2008 DOLLARS)		**$17,745,000**

The excess revenue that is assumed to be available for new capital improvement projects and programs identified in this TSP is identified in Table 9-5. As shown, it is expected that approximately $23.5 million will be available from transportation SDCs for capacity-related improvements, and an additional $12.5 million will be available for discretionary spending (i.e., for other modal improvements and programs).

Table 9-5: Projected Available Capital Improvement and Program Funds through 2030

Available Funds through 2030	21-Year Total (through 2030)
Calculation of Discretionary Funds	
Total Non-SDC Revenue (see Table 9-3)	$30,240,000
- Total Expenditures (see Table 9-4)	- $17,745,000
= Total Discretionary Funds	**$12,495,000**
Calculation of Total Funds	
Total Discretionary Funds	$12,495,000
+ Transportation System Development Charges (SDCs) (see Table 9-3)	+ $23,520,000
= Total Available Funds	**$36,015,000**

Financial Feasibility of Solutions Packages

The Financially-Constrained and Preferred Solutions Packages include pedestrian, bicycle, and motor vehicle projects. The associated projects are discussed in Chapters 5, 6, and 7, as well as in the Transportation Solutions Report (see Appendix K), and the total project costs by mode and the financial outlook for the Financially-Constrained and Preferred Solutions Packages are discussed in the following sections.

Financially-Constrained Package Cost Feasibility

Project costs were previously provided in Chapters 5, 6, and 7 for the pedestrian, bicycle, and motor vehicle projects that are recommended for inclusion in the Financially-Constrained Solutions Package. The overall costs by mode are summarized in Table 9-6. As listed, the total cost is estimated to be approximately $36.8 million.[41] Because the total Financially-Constrained Solutions Package costs exceed the total available revenue of $36.0 million by approximately $0.8 million, the City would need to obtain additional revenue in order to fund the entire Financially-Constrained Solutions Package.

There is also insufficient funding expected for non-roadway improvements due in part to limitations in the City's current SDC methodology. Canby currently has transportation SDCs in the range of $2,500 per p.m. peak hour trip that can only be used for motor vehicle capacity projects. However, if the City amends its transportation SDC methodology so that funds can be used for all modes and slightly increases their SDC fee rates by approximately $80 per p.m. peak hour trip, then they can bring in approximately $0.8 million in additional funds. In addition, all SDC funds could be used for motor vehicle, pedestrian, and bicycle capacity improvement projects. This would allow the City to have approximately $36.8 million in total available funds, which equals the needed

[41] As applicable, these motor vehicle costs include the construction of sidewalks and bike lanes on new roadways, the provision of curbs and crosswalks at new or upgraded intersections, and repaving costs on improved ODOT roadways.

$36.8 million identified in Table 9-6. Therefore, the City would be able to fund all improvements included in the Financially-Constrained Solutions Package. Other optional additional funding sources besides increasing transportation SDCs include Urban Renewal Fund contributions, grants, or developer contributions. A combination of slightly increased SDCs and developer contributions is likely to fulfill the funding gap.

Table 9-6: Planning Level Costs for All Modes (Financially-Constrained Package)

Transportation Mode	Planning Level Cost
Non-Capacity Improvements	
Pedestrian	$6,550,000
Bicycle	$4,690,000
Motor Vehicle (Non-Capacity Improvements)	$4,920,000
Total	**$16,160,000**
Capacity Improvements	
Motor Vehicle (Capacity Improvements)	$20,685,000
TOTAL	**$36,845,000**

Preferred Solutions Package Cost Feasibility

Project costs were previously provided in Chapter 7 for the additional motor vehicle projects that are recommended for inclusion in the Preferred Solutions Package. Because the analysis in the Transportation Solutions Report (see Appendix K) regarding Berg Parkway indicates that the main benefits of this grade-separated railroad crossing are connectivity-related and that it does not have significant roadway capacity benefits, its estimated cost is included in the "non-capacity" section of Table 9-7. In addition, the Industrial Area Connectivity Memorandum (see Appendix J) indicates that the main benefits of the Sequoia Parkway Extension are also connectivity-related rather than capacity-related. Therefore, its estimated cost is also included in the "non-capacity" section of Table 9-7.

The same pedestrian and bicycle project costs that were identified for the Financially-Constrained Solutions Package are also recommended for inclusion in the Preferred Solutions Package. The overall Preferred Solutions Package costs by mode are summarized in Table 9-7. These costs assume the Financially-Constrained Package is an interim step, with the Preferred Solutions Package as the ultimate improvement package. As listed, the total cost for the Preferred Solutions Package is estimated to be approximately $91.5 million.[42]

[42] As applicable, these motor vehicle costs include the construction of sidewalks and bike lanes on new roadways, the provision of curbs and crosswalks at new or upgraded intersections, and repaving costs on improved ODOT roadways.

Table 9-7: Planning Level Costs for All Modes (Preferred Package with Financially-Constrained Package as Interim Step)

Transportation Mode	Planning Level Cost
Non-Capacity Improvements	
Pedestrian	$6,550,000
Bicycle	$4,690,000
Motor Vehicle (Non-Capacity Improvements)	$26,925,000
Total	**$38,165,000**
Capacity Improvements	
Motor Vehicle (Capacity Improvements)	$53,295,000
TOTAL	**$91,460,000**

Similar to the Financially-Constrained Solutions Package, there is insufficient funding available from existing revenue streams to fund the Preferred Solutions Package, and the City would need to obtain additional revenue. Some funding options include urban renewal funds, grants, developer contributions, and transportation SDCs. Transportation SDCs could fund the majority of the projects, with the main exceptions being the Sequoia Parkway and Berg Parkway Extensions, which would need to be funded using Urban Renewal funds, grants, developer contributions, or other sources.

One way in which Canby could fund the remaining projects (i.e., all projects with the exception of the Sequoia Parkway and Berg Parkway Extensions) would be to (1) amend their transportation SDC methodology so that funds can be used for all modes and (2) increase their SDC fee rates to approximately $6,100 per p.m. peak hour trip. This is more than double their existing rate of $2,500 per p.m. peak hour trip, but it is still comparable to nearby communities. By doing so, the City could bring in approximately $33.8 million in additional funds, which would bring their total available funds to approximately $69.8 million. When the Sequoia Parkway Extension ($5.5 million) and Berg Parkway Extension ($16.5 million) are not included in the project total, the remaining planning level project costs equal $69.5 million.

Increasing its SDC rates is only one option available to the City of Canby for increasing its funding streams. It is likely that the City would be able to obtain contributions from ODOT, Clackamas County, and the City's Urban Renewal District (URD), as described in the following section. These contributions would offset needed increases in City SDCs. Therefore, the Preferred Solutions Package could be feasibly funded given the potential for increased funding streams.

Potential New Funding Sources

New transportation-related funding sources are important for the City of Canby in order to construct all of the motor vehicle, pedestrian, and bicycle projects identified in the Financially-Constrained and/or Preferred Solutions Packages. In addition, if the City obtains new funding sources, then they will be able to construct other motor vehicle, pedestrian, and bicycle projects (such as the non-financially-constrained pedestrian and bicycle projects identified in the Transportation Solutions Report included as Appendix K).

Any potential funding source is constrained based on a variety of factors, including the willingness of local leadership and the electorate to burden citizens and businesses, the availability of local funds to be dedicated or diverted to transportation issues from other competing City programs, and the availability and competitiveness of state and federal funds. Nonetheless, it is important for the City to consider all of its options and understand where its power may exist to provide and enhance funding for its Transportation programs. In most communities where time is taken to build a consensus regarding a transportation plan, funding sources can be developed to meet the needs of the community.

In addition, the inclusion of proposed projects and actions in this plan does not obligate or imply obligations of funds by any jurisdiction for project-level planning or construction. Instead, the inclusion of proposed projects and actions serves as an opportunity for the, to be included, if appropriate, in the State Transportation Improvement Program (STIP) and the City of Canby Capital Improvement Program. Such inclusion is not automatic, but it is incumbent on the State, City of Canby, Clackamas County, and the general public to take action to encourage and support inclusion of projects in the STIP or the CIP at the appropriate time. Because a project must have identified funding to be included in the STIP or CIP, the ultimate number of projects that can be included in these documents is constrained by available funding.

This section describes several potential sources, including State and County contributions, City sources (i.e., residents, businesses, and/or developers), grants, and debt financing. Many of these sources have been used in the past by other agencies in Oregon, and in most cases, these funding sources, when used collectively, are sufficient to fund transportation improvements for a local community.

State and County Contributions

Within Canby there are multiple roadways that are not under City jurisdiction but instead are the responsibility of either ODOT or Clackamas County. The City should seek contributions (i.e., funding partnerships) from ODOT and Clackamas for projects located on their respective roadways. In addition, direct appropriations are another optional funding source.

ODOT Contributions

The Oregon Department of Transportation (ODOT) funds projects on state highways under three primary programs: modernization, preservation and maintenance, and grants (see

Grant Programs below). Programmed projects are included in the four-year State Transportation Improvement Program, which is updated every two years. ODOT maintenance districts (District 2B for Canby) also have available funds that may be used for small-scale projects such as in-fill sidewalks or culvert repair on a state highway.

The availability of City matching funds (contributed by the City and/or developers) better positions the City to obtain ODOT funding for projects on OR 99E. It is also more likely for ODOT funding to be obtained for locations that are identified as being in the top 5 percent of statewide Safety Priority Index System (SPIS) sites. In Canby, the OR 99E/Ivy Street intersection is identified as a top 5 percent SPIS site.

When considering proposed land use actions such as subdivisions or site development, the City should not assume that TSP projects on OR 99E will be in place to support the proposed development unless the project is programmed in the current Statewide Transportation Improvement Plan (STIP). For proposed comprehensive plan amendments, which must consider the long-term adequacy of the transportation system for TPR 660-10-060 compliance, ODOT must be consulted to determine whether a highway project was "reasonably likely to be funded" based on funding projections at that time.

Clackamas County Contributions

It is possible that Clackamas County would contribute funds to projects located on Clackamas County roadways. In particular, Clackamas County's 20-year Capital Improvement Plan (CIP) includes the following three projects that are similar to those included in the Financially-Constrained Solutions Package:

- **Project #273:** Install traffic signal at Township/Ivy Road intersection (this same project is included in the Financially-Constrained Solutions Package and has an estimated cost of $300,000)
- **Project #274:** Construct new OR Pacific railroad crossing on Township Road (a similar project to move the guardrails and improve this rail crossing to accommodate bikes and pedestrians is included in the Financially-Constrained Solutions Package and has an estimated cost of $100,000)
- **Project #270:** Install bike lanes on Territorial Road from Holly Street to Molalla Forest Road Trail and then on Holly Street from Territorial Road to the Canby Ferry (an overlapping project to install bike lanes on Holly Street from Knights Bridge Road to NW 22nd Avenue is in the Financially-Constrained Solutions Package and has a total estimated cost of $660,000; though the estimated cost for the overlapping section from Territorial Road to NW 22nd Avenue is only $625,000)

For proposed land use actions, projects on County roads should not be considered available to serve development unless they are programmed in the County's Five-Year CIP. When considering comprehensive plan amendments, the City should consult with the County

regarding the likelihood of County funding for projects contained in the TSP and/or 20-year CIP.

Direct Appropriations

The City can also seek direct appropriations from the State Legislature and/or the United States Congress for transportation capital improvements. There may be projects identified in the plan for which the City may want to pursue these special, one-time appropriations. In particular, projects that support economic development (e.g., the Otto Road extension) may gain support for direct appropriations.

City Sources

The City can also look to local residents, business owners, and developers to raise additional funds that can be designated for transportation-related uses. Some optional sources include developer exactions, Urban Renewal District (URD) fund increases, transportation SDC increases, local improvement district (LID) funds, General Fund revenue transfers, special assessments, and employment taxes.

Developer Exactions

Exactions are roadway and/or intersection improvements that are partially or fully funded by developers as conditions of development approval. Typically, all developers are required to improve the roadways along their frontage upon site redevelopment. In addition, when a site develops or redevelops, the developer may be required to provide off-site improvements depending upon the expected level of traffic generation and the resulting impacts to the transportation system.

Urban Renewal District (URD)

A URD is a tax-funded district within the city. The URD is funded with the incremental increases in property taxes that result from the construction of applicable improvements. As desired, the funds raised by a URD can be used for, but are not limited to, transportation projects. These projects must be located within the URD boundaries.

In 1999, the City created a URD for its downtown core and a portion of the Pioneer Industrial Area. The primary purpose in creating the URD was "to eliminate blighting influences found in the Renewal Area, to implement goals and objectives of the City of Canby Comprehensive Plan, and to implement development strategies and objectives for the Canby Urban Renewal Area."[43] The Canby Urban Renewal Plan indicates that the following projects are eligible for funding:

Project Activities to Treat Causes of Blight and Support Future Development

- Construct and improve streets, curbs and sidewalks in the project area
- Construct or improve pedestrian and bicycle circulation systems

[43] *Canby Urban Renewal Plan*, Adopted November 3, 1999.

- Acquisition and disposition of land for public improvements, rights-of-way, utility improvements, and private development

Street Construction and Circulation Improvements

- Construct and improve streets throughout the project area. Projects include but are not limited to the following:
    a. Landscaping
    b. Construction, reconstruction, repair, or replacement of:
        i. Streets
        ii. Sidewalks
        iii. Bike amenities
        iv. Pedestrian amenities
        v. Public transit facilities
    c. Acquisition of land, right of ways, easements and other land rights

The City may consider expanding the URD boundary to include additional transportation projects identified in this TSP, which would reduce the need for increasing the City's transportation SDC.

Transportation System Development Charges (SDCs)

SDCs are a funding source collected from new development that can be used to fund projects that increase the transportation system's capacity (not for projects that target maintenance or operations). While the methodologies for determining the SDC rate may vary, a commonly used method is to base the rate on the estimated p.m. peak hour vehicle trips generated by a proposed development. Because a single-family home generates approximately 1.0 p.m. peak hour vehicle trips, it is often considered the base unit.

The City of Canby has a current SDC rate of approximately $2,500 per p.m. peak hour trip. By comparison, the SDC rates for surrounding cities on the outskirts of the Portland Metropolitan Area average approximately $6,500 per p.m. peak hour trip. Based on the forecasted land use growth projected over the next 20 years, each $100 increase in the SDC rate would provide the City of Canby with additional funds of approximately $940,000 through 2030.

Local Improvement District (LID)

The City may set up Local Improvement Districts (LIDs) to fund specific capital improvement projects within defined geographic areas, or zones, of benefit. LIDs impose assessments on properties within its boundaries and may only be spent on capital projects within the geographic area. Because LIDs may not fund ongoing maintenance costs, they require separate accounting. Furthermore, because citizens representing 33 percent of the assessment can terminate a LID and overturn the planned projects, LID projects and costs must meet with broad approval of those within the LID boundaries.

General Fund Revenues

At the discretion of the City Council, the City can allocate General Fund revenues to pay for its Transportation program. General Fund revenues primarily include property taxes, use taxes, and any other miscellaneous taxes and fees imposed by the City. This allocation is completed as a part of the City's annual budget process, but the funding potential of this approach is constrained by competing community priorities set by the City Council. General Fund resources can fund any aspect of the program, from capital improvements to operations, maintenance, and administration. Additional revenues available from this source to fund new aspects of the Transportation program are only available to the extent that either General Fund revenues are increased or City Council directs and diverts funding from other City programs.

Special Assessments

A variety of special assessments are available in Oregon to defray costs of sidewalks, curbs, gutters, street lighting, parking, and central business district (CBD) or commercial zone transportation improvements. These assessments would likely fall within the Measure 50 limitations. One example is the 50/50 program. This is a match program for sidewalk infill projects where property owners pay half the cost of a sidewalk improvement and the City matches the investment to complete the project.

Employment Taxes

Employment taxes may be levied to raise additional funds. For example, in the Portland region, payroll and self employment taxes are used to generate approximately $145 million annually. The City of Portland has chosen to earmark these funds for TriMet transit operations.

Grants

The City of Canby should actively pursue State and Federal grants, in particular to complete desired pedestrian and bicycle projects. Grant opportunities include funding for pedestrian, bicycle, Intelligent Transportation System (ITS), and Safe Routes to School (SRTS) improvements. Current grant programs include:

Federal Funding Sources

- Highway Safety Improvement Program
- Transportation Enhancements
- Recreational Trails Program
- Safe Routes to School (SRTS)
- New Freedom Initiative
- Community Development Block Grants
- Land and Water Conservation Fund
- Transportation, Community and System Preservation Program

State Funding Sources

- Oregon Transportation Infrastructure Bank

- Oregon Special Transportation Fund
- Oregon Bicycle and Pedestrian Program Grants
- Oregon Pedestrian Safety Mini-Grant Program
- Oregon Business Energy Tax Credits (BETC)

Other Funding Sources

- American Greenways Program
- Bikes Belong Grant Program

One grant opportunity of particular importance is the Safe Routes to School (SRTS) Program. It is described below in more detail.

Safe Routes to School (SRTS)

The Oregon Safe Routes to School (SRTS) Program has money allocated for projects at schools serving grades K-8 and should be pursued in the City of Canby in conjunction with the development of a SRTS Program, which is included as a pedestrian project in the Financially-Constrained Solutions Package. The SRTS program administers funds received from the 2005 SAFETEA-LU transportation bill for Safe Routes to School Programs throughout the state. Potential grant funds are distributed as a reimbursement program through an open and competitive process. Funding is available through this program for pedestrian and bicycle infrastructure projects within two miles of schools. These funds should be pursued to implement any projects identified in conjunction with the development of the Canby SRTS Program, which may have some similar projects to those identified in this TSP and in the Transportation Solutions Report included as Appendix K.

Debt Financing

While not a direct funding source, debt financing is another funding method. Through debt financing, available funds can be leveraged and project costs can be spread over the projects' useful lives. Though interest costs are incurred, the use of debt financing can serve not only as a practical means of funding major improvements, but it is also viewed as an equitable funding source for larger projects because it spreads the burden of repayment over existing and future customers who will benefit from the projects. One caution in relying on debt service is that a funding source must still be identified to fulfill annual repayment obligations. Two methods of debt financing are voter-approved general obligation bonds and revenue bonds.

Voter-Approved General Obligation Bonds

Subject to voter approval, the City can issue General Obligation (GO) bonds to debt finance capital improvement projects. GO bonds are backed by the increased taxing authority of the City, and the annual principal and interest repayment is funded through a new, voter-approved assessment on property throughout the City (i.e., a property tax increase). Depending on the critical nature projects identified in the Transportation Plan and the willingness of the electorate to accept increased taxation for transportation

improvements, voter-approved GO bonds may be a feasible funding option for specific projects. Proceeds may not be used for ongoing maintenance.

Revenue Bonds

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

Chapter 10. Implementation Plan

Introduction

This chapter discusses the code updates recommended to implement the Canby TSP Update and ensure consistency with the Oregon Transportation Planning Rule (TPR). The code revisions to implement the TSP were prepared in conjunction with a code update process the City is currently undertaking. A full review of the existing Canby Code as it relates to TPR can be found in Appendix N, including discussion of TPR requirements identification of outstanding issues. The following sections identify code revisions recommended to meet specific TPR requirements, as well as additional code and policy that will help implement the TSP.

In both sections, revisions to existing code language are presented with deletions shown in ~~strikethrough~~ and additions or new code shown as underlined. To the extent possible, proposed text is organized using the numbering hierarchy provided by the Canby Code. When updating the City code, the City should carefully review the recommendations below to ensure that proposed language does not conflict with other existing code language. If conflicts are identified, additional areas of the adopted ordinance may need to be modified to ensure compliance with the TPR and consistency within the City's code.

Proposed Amendments for TPR Compliance

The discussion of recommended revisions is generally organized by reference to the applicable section(s) of the TPR that prompt a change in the city's implementing ordinances, followed by the recommended revisions.

Revisions to Address OAR Section 660-12-0045(1)(c)

16.88.180 Comprehensive Plan Amendments

C. Legislative Plan Amendment Standards and Criteria. In judging whether or not a legislative plan amendment shall be approved, the Planning Commission and City Council shall consider:

1. The remainder of the Comprehensive Plan of the city, and the plans and policies of the county, state, and local districts, in order to preserve functions and local aspects of land conservation and development;

2. A public need for the change;

3. Whether the proposed change will serve the public need better than any other change which might be expected to be made;

4. Whether the change will preserve and protect the health, safety and general welfare of the residents in the community;

5. Statewide planning goals.

D. Quasi-judicial Plan Amendment Standards and Criteria. In judging whether a quasi-judicial plan amendment shall be approved, the Planning Commission and City Council shall consider:

1. The remainder of the Comprehensive Plan of the city, as well as the plans and policies of the county, state, or any local school or service districts which may be affected by the amendments;

2. Whether all required public facilities and services exist, or will be provided concurrent with the anticipated development of the area. (Ord. 740 section 10.8.80, 1984; Ord. 981 section 16, 1997; Ord. 1080, 2001)

E. For proposed comprehensive plan amendments, which must consider the long-term adequacy of the transportation system for TPR 660-10-060 compliance, ODOT must be consulted to determine whether a highway project is "reasonably likely to be funded" based on funding projections at that time.

16.89.040 Type II procedure

C. Public notice.

1. Before making a Type II decision, the Planning Director shall mail notice meeting the requirements of state law to:

a. All owners of real property and, if the owner's address is different from the site address, all residents of property, within the distance prescribed in Table 16.89.020.

b. Any person who submits a written request to receive notice; and

c. Any governmental agency which is entitled to notice under an intergovernmental agreement entered into with the City. The City may notify other affected agencies, as appropriate, for review of the application.

d. Any application that involves access to OR 99E or that is expected to impact the state highway system must be provided to the Oregon Department of Transportation for their review and comment regarding conformance with state access management and mobility standards and requirements.

e. Any application that is expected to impact a road under the jurisdiction of Clackamas County must be provided to Clackamas County for review and comment regarding county standards.

2. Notice of any proposal that includes a new transportation facility or improvement, and where these facilities or improvements include or may impact a collector or arterial street, will be sent to the ODOT and Clackamas County or any special interest transportation groups as appropriate. Special interest transportation groups could include trucking organizations, bicycle and pedestrian interest groups, and interest groups for people with disabilities. Information that should be conveyed with the notice includes the following:

a. Project location
b. Proposed land use action
c. Location of project access point(s)

~~**2.**~~ **3.** The public notice shall allow a 10-day period for submitting written comments before a decision is made on the permit.

~~**3.**~~ **4.** The City shall prepare an affidavit of mailing for the public notice and make the affidavit part of the application file.

16.89.050 Type III Decision.

D. Public notice.[44]

1. At least 20 days prior to a public hearing on a Type III decision or a Type II appeal decision, the Planning Director shall mail notice meeting the requirements of state law to:

a. All owners of real property and, if the owner's address is different from the site address, all residents of property, within the distance prescribed in Table 16.89.020;
b. The appointed chair of any neighborhood association whose boundaries include the subject property;
c. Any person who submits a written request to receive notice; and
d. Any governmental agency which is entitled to notice under an intergovernmental agreement entered into with the City. The City may notify other affected agencies, as appropriate, for review of the application.
e. For appeals, the appellant and all persons who provided testimony.

2. Notice of any proposal that includes a new transportation facility or improvement, and where these facilities or improvements include or may impact a collector or arterial street, will be sent to the ODOT and Clackamas County or any special interest transportation groups as appropriate. Special interest transportation groups could include trucking organizations, bicycle and pedestrian interest groups, and interest groups for people with disabilities. Information that should be conveyed with the notice includes the following:

a. Project location
b. Proposed land use action
c. Location of project access point(s)

[44] Items in this section will need to be renumbered due to the addition of a new item #2.

~~7.~~ **8.** Any application that involves access to ~~the state highway system~~ OR 99E or that is expected to impact the state highway system ~~shall~~ must be provided to the Oregon Department of Transportation for their review and comment regarding conformance with state access management standards and requirements.

Revisions to Address OAR Section 660-12-0045(2)(a-b)

16.08.150 Traffic Impact Study (TIS).

A. Purpose. The purpose of this section of the code is to implement Section 660-012-0045(2)(b) of the State Transportation Planning Rule, which requires the city to adopt a process to apply conditions to development proposals in order to minimize adverse impacts to and protect transportation facilities. This section establishes the standards to determine when a proposal must be reviewed for potential traffic impacts; when a Traffic Impact Study must be submitted with a development application in order to determine whether conditions are needed to minimize impacts to and protect transportation facilities; what information must be included in a Traffic Impact Study; and who is qualified to prepare the Study.

B. Initial scoping. During the pre-application conference, the city will review existing transportation data to determine whether a proposed development will have impacts on the transportation system. It is the responsibility of the applicant to provide enough detailed information for the city to make a determination. If the city cannot properly evaluate a proposed development's impacts without a more detailed study, a transportation impact study (TIS) will be required to evaluate the adequacy of the transportation system to serve the proposed development and determine proportionate mitigation of impacts. If a TIS is required, the city will provide the applicant with a "scoping checklist" to be used when preparing the TIS.

C. Determination. Based on information provided by the applicant about the proposed development, the city will determine when a TIS is required and will consider the following when making that determination.

1. Changes in land use designation, zoning designation, or development standard.
2. Changes in use or intensity of use.
3. Projected increase in trip generation.
4. Potential impacts to residential areas and local streets.
5. Potential impacts to priority pedestrian and bicycle routes, including, but not limited to school routes and multimodal street improvements

identified in the TSP.

6. Potential impacts to intersection level of service (LOS).

D. TIS General Provisions

1. All transportation impact studies, including neighborhood through-trip and access studies, shall be prepared and certified by a registered Traffic or Civil Engineer in the State of Oregon.
2. Prior to TIS scope preparation and review, the applicant shall pay to the city the fees and deposits associated with TIS scope preparation and review in accordance with the adopted fee schedule. The city's costs associated with TIS scope preparation and review will be charged against the respective deposits. Additional funds may be required if actual costs exceed deposit amounts. Any unused deposit funds will be refunded to the applicant upon final billing.
3. For preparation of the TIS, the applicant may choose one of the following:
    1. The applicant may hire a registered Oregon Traffic or Civil Engineer to prepare the TIS for submittal to the city. The city Traffic Engineer will then review the TIS and the applicant will be required to pay to the city any fees associated with the TIS review; or
    2. The applicant may request that the city Traffic Engineer prepare the TIS. The applicant will pay to the city any fees associated with preparation of the TIS by the city Traffic Engineer.
4. The TIS shall be submitted with a concurrent land use application and associated application materials. The city will not accept a land use application for processing if it does not include the required TIS.
5. The city may require a TIS review conference with the applicant to discuss the information provided in the TIS once it is complete. This conference would be in addition to any required pre-application conference. If such a conference is required, the city will not accept the land use application for processing until the conference has taken place. The applicant shall pay the TIS review conference fee at the time of conference scheduling, in accordance with the adopted fee schedule.
6. A TIS determination is not a land use action and may not be appealed.

E. TIS Scope**.** The city shall determine the study area, study intersections, trip rates, traffic distribution, and required content of the TIS based on information provided by the applicant about the proposed development.

1. The study area will generally comprise an area within a ½-mile radius of the development site. If the city determines that development impacts may extend more than ½ mile from the development site, a larger study area may be required. Required study intersections will generally include (in addition to primary access points) collector/collector and above intersections with an anticipated peak hour traffic increase of five-percent from the proposed project.
2. If notice to ODOT or other agency is required pursuant to noticing requirements in Chapter 16.89, the city will coordinate with those agencies to provide a comprehensive TIS scope. ODOT may also require a TIS directly to support an OR 99E approach permit application.

F. TIS Content. A project-specific TIS checklist will be provided to the applicant by the city once the city has determined the TIS scope. A TIS shall include all of the following elements, unless waived by the city.

1. Introduction and Summary. This section shall include existing and projected trip generation including vehicular trips and mitigation of approved development not built to date; existing level and proposed level of service standard for city and county streets and volume to capacity for state roads; project build year and average growth in traffic between traffic count year and build year; summary of transportation operations; traffic queuing and delays at study area intersections; and proposed mitigation(s).
2. Existing Conditions. This section shall include a study area description, including information about existing study intersection level of service.
3. Impacts. This section should include the proposed site plan, evaluation of the proposed site plan, and a project-related trip analysis. A figure showing the assumed future year roadway network (number and type of lanes at each intersection) also shall be provided. For subdivision and other developments, the future analysis shall be for the year of proposed site build-out. For proposed comprehensive plan and/or zoning map amendments, the future analysis year shall be 20 years from the date of the City's adopted TSP, or 15 years, whichever is greater.
4. Mitigation. This section shall include proposed site and area-wide specific mitigation measures. Mitigation measures shall be roughly proportional to potential impacts. See Subsection K below for rough proportionality determination.
5. Appendix. This section shall include traffic counts, capacity calculations, warrant analysis, and any other information necessary to

convey a complete understanding of the technical adequacy of the TIS.

G. TIS Methodology. The City will include the required TIS methodology with the TIS scope.

H. Neighborhood Through-Trip Study. Any development projected to add more than 30 through-vehicles in a peak hour or 300 through-vehicle per day to an adjacent residential local street or neighborhood route will require assessment and mitigation of residential street impacts. Through-trips are defined as those to and from a proposed development that have neither an origin nor a destination in the neighborhood. The through-trip study may be required as a component of the TIS or may be a stand-alone study, depending on the level of study required in the scoping checklist. The through-trip study shall include all of the following:

1. Existing number of through-trips per day on adjacent residential local streets or neighborhood routes.
2. Projected number of through-trips per day on adjacent residential local streets or neighborhood routes that will be added by the proposed development.
3. Traffic management strategies to mitigate for the impacts of projected through-trips consistent.

If a residential street is significantly impacted, mitigation shall be required. Thresholds used to determine if residential streets are significantly impacted are:

1. Local residential street volumes should not increase above 1,200 average daily trips
2. Local residential street speeds should not exceed 28 miles per hour (85^{th} percentile speed)

I. Mitigation. Transportation impacts shall be mitigated at the time of development when the TIS identifies an increase in demand for vehicular, pedestrian, bicycle, or transit transportation facilities within the study area. Mitigation measures may be suggested by the applicant or recommended by ODOT or Clackamas County in circumstances where a state or county facility will be impacted by a proposed development. The city shall determine if the proposed mitigation measures are adequate and feasible. ODOT must be consulted to determine if improvements proposed for OR 99E comply with ODOT standards and are supported by ODOT. The following measures may be used to meet mitigation requirements:

1. On- and off-site improvements beyond required standard frontage

improvements.

1. Development of a transportation demand management program.
2. Payment of a fee in lieu of construction, if construction is not feasible.
3. Correction of off-site transportation deficiencies within the study area that are substantially exacerbated by development impacts.
4. Construction of on-site facilities or facilities located within the right-of-way adjoining the development site that exceed minimum required standards and that have a transportation benefit to the public.

J. Conditions of Approval. The city may deny, approve, or approve with appropriate conditions a development proposal in order to minimize impacts and protect transportation facilities.

1. Where the existing transportation system will be impacted by the proposed development, dedication of land for streets, transit facilities, sidewalks, bikeways, paths, or accessways may be required to ensure that the transportation system is adequate to handle the additional burden caused by the proposed use.
2. Where the existing transportation system is shown to be burdened by the proposed use, improvements such as paving, curbing, installation or contribution to traffic signals, traffic channelization, construction of sidewalks, bikeways, accessways, paths, or streets that serve the proposed use may be required.
3. The city may require the development to grant a cross-over access easement(s) to adjacent parcel(s) to address access spacing standards on arterials and collector roadways or site-specific safety concerns. Construction of shared access may be required at the time of development if feasible, given existing adjacent land use. The access easement must be established by deed.

K. Rough Proportionality Determination. Improvements to mitigate impacts identified in the TIS shall be provided in rough proportion to the transportation impacts of the proposed development.

1. The TIS shall include information regarding how the proportional share of improvements was calculated, using the ratio of development trips to growth trips and the anticipated cost of the full Canby Transportation System Plan. The calculation is provided below:

Proportionate Share Contribution = [Net New Trips/(Planning Period Trips–Existing Trips)] X Estimated Construction Cost

1. Net new trips means the estimated number of new trips that will be created by the

proposed development within the study area.

2. Planning period trips means the estimated number of total trips within the study area within the planning period identified in the TSP.
3. Existing trips means the estimated number of existing trips within the study area at the time of TIS preparation.
4. Estimated construction cost means the estimated total cost of construction of identified improvements in the TSP.

16.08.160 Safety and Functionality Standards.

The City will not issue any development permits unless the proposed development complies with the city's basic transportation safety and functionality standards, the purpose of which is to ensure that development does not occur in areas where the surrounding public facilities are inadequate. Upon submission of a development permit application, an applicant shall demonstrate that the development property has or will have all of the following:

A. Adequate street drainage, as determined by the city.
B. Safe access and clear vision at intersections, as determined by the city.
C. Adequate public utilities, as determined by the city.
D. Access onto a public street with the minimum paved widths as stated in Subsection E below.
E. Adequate frontage improvements as follows:
    1. For local streets and neighborhood connectors, a minimum paved width of 16 feet along the site's frontage.
    2. For collector and arterial streets, a minimum paved width of 20 feet along the site's frontage.
    3. For all streets, a minimum horizontal right-of-way clearance of 20 feet along the site's frontage.
F. Compliance with mobility standards identified in the TSP. If a mobility deficiency already exists, the development shall not create further deficiencies.

Chapter 16.46 Access Limitations on Project Density

16.46.080 State highway standards.

A. Refer to ~~Appendix G~~ the Motor Vehicle Chapter of the Transportation System Plan. ~~(Ord. 1043 section 3, 2000) O~~. ODOT regulates access to OR 99E. ODOT shall review and process applications for approaches to OR 99E consistent with *Oregon Highway Plan* standards and OAR 734.51 procedures. An ODOT permit to operate and maintain a State Highway Approach must be approved prior to site occupancy.

16.46.035 Restricted access.

~~The City may allow an access to a City street that does not meet the spacing requirements of Table 16.46.030 if the proposed access is restricted (prevents certain turning movements). The City may require an applicant to provide an engineered traffic study, access management plan, or other information as needed to~~

~~demonstrate that the roadway will operate within the acceptable standards with the restricted access in place. (Ord. 1237, 2007)~~

16.46.070 Exception standards ~~for City facilities.~~

A. An exception may be allowed from the access spacing standards ~~on City facilities~~ if the applicant can provide proof of unique or special conditions that make strict application of the provisions impractical. Applicants shall include proof that:

1. Indirect or restricted access cannot be obtained;

2. No engineering or construction solutions can be reasonably applied to mitigate the condition; and

3. No alternative access is available from a street with a lower functional classification than the primary roadway.

B. Access Management Plan Required. An applicant requesting an access exception must submit an access management plan. The access management plan shall explain the need for the modification and demonstrate that the modification maintains the classified function and integrity of the facility. An access management plan shall be prepared and certified by a traffic or civil engineer registered in the State of Oregon. An access management plan shall at minimum contain the following:

1. The minimum study area shall include the length of the site's frontage plus the distance of the applicable access spacing standard, measured from each property line or access point(s), whichever is greater. For example, a property with 500 feet of frontage on an arterial (required 660 foot access spacing standard) shall have a minimum study area which is 1,820 feet in length.

2. The potential safety and operational problems associated with the proposed access point. The access management plan shall review both existing and future access for all properties within the study area as defined above.

3. A comparison of all alternatives examined. At a minimum, the access management plan shall evaluate the proposed modification to the access spacing standard and the impacts of a plan utilizing the City standard for access spacing. Specifically, the access management plan shall identify any impacts on the operations and/or safety of the various alternatives.

4. A list of improvements and recommendations necessary to implement the proposed access modification, specifically addressing all safety and operational concerns identified.

5. References to standards or publications used to prepare the access management plan.

C. The granting of the exception shall be in harmony with the purpose and intent of these regulations and shall not be considered until every feasible option for meeting access standards is explored.

D. No exception shall be granted where such hardship is self-created.

E. Reasons for denying access spacing exception applications include, but are not limited to, traffic safety concerns, expected or planned traffic increases due to development or road construction, and emergency service provision issues. (Ord. 1043 section 3, 2000; Ord 1237, 2007)

Chapter 16.62 Subdivisions – Applications
16.62.020 Standards and criteria.
Applications for a subdivision shall be evaluated based upon the following standards and criteria:

E. A Traffic Impact Study (TIS) may be required in accordance with Section 16.08.150.

Chapter 16.76 PUD Requirements
16.76.020 General requirements.

K. A Traffic Impact Study (TIS) may be required in accordance with Section 16.08.150.

Chapter 16.86 Street Alignment Regulations
16.86.020 General provisions.

A. The ~~street circulation map of the Comprehensive Plan~~ Transportation System Plan shall be used to determine which streets are to be arterials, collectors, and neighborhood connectors. All new streets are required to comply with the roadway design standards provided in Chapter 7 of the TSP. ~~Based upon this, new arterial street rights-of-way shall be between sixty and eighty feet in width, depending upon the previously determined plan for each such street. New collector street rights-of-way shall have a minimum width of sixty feet. New neighborhood connectors shall have a minimum right-of-way width of sixty feet. All new streets shall comply with the roadway standards shown in Section 16.86.040.~~ The city may require right-of-way dedication and/or special setbacks as necessary to ensure adequate right-of-way is available to accommodate future road widening projects identified in the TSP.

Revisions to Address OAR Section 660-12-0045(3)(c)

16.49.050 Conditions placed on site and design review approvals.

2. The following types of conditions are specifically contemplated by subsection (1) of this section, and the listing below is intended to be illustrative only and not to be construed as a limitation of the authority granted by this section.

E. Off-Site Improvements. Improvements in public ~~utility~~ facilities, including public utilities, not located on the project site where necessary to assure adequate capacity and safety and where service demand will be created or increased by the proposed development. The costs of such improvements may be paid for in full while allowing for recovery of costs from users on other development sites, or they may be pro-rated to the proposed development in proportion to the service demand projected to be created on increases by the project. If determined appropriate by the city based on specific site conditions, off-site roadway improvements may be required to accommodate bicycle and pedestrian travel consistent with the TSP and applicable sections of this code.

Revisions to Address OAR Section 660-12-0060

16.88.190 Conformance with Transportation System Plan and Transportation Planning Rule

A. A proposed comprehensive plan amendment, zone change or land use regulation change, whether initiated by the city or by a private interest, shall be reviewed to determine whether it significantly affects a transportation facility, in accordance with the Transportation Planning Rule (OAR 660-012-0060). A plan or land use regulation amendment significantly affects a transportation facility if it:

1. Changes the functional classification of an existing or planned transportation facility;

2. Changes standards implementing a functional classification system;

3. As measured at the end of the planning period identified in the adopted plan:

a. Allows types or levels of land use that would result in levels of travel or access that are inconsistent with the functional classification of a transportation facility; or

b. Would reduce the performance ~~level of service~~ of the facility below the ~~that~~ minimum acceptable performance standard ~~level~~ identified in the Transportation System Plan;

c. Would worsen the performance of a facility that is otherwise projected to perform below the minimum acceptable performance standard identified in the Transportation System Plan.

~~**4.**~~

B. Amendments to the comprehensive plan and land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the function, capacity, and performance standards (e.g., level of service, volume to capacity ratio, etc.) of the facility identified in the Transportation System Plan. This shall be accomplished by one of the following:

~~**1.** Limiting allowed land uses to be consistent with the planned function of the transportation facility;~~

~~**2.** Amending the Transportation System Plan to ensure that existing, improved, or new transportation facilities are adequate to support the proposed land uses consistent with the requirement of the Transportation Planning Rule; or~~

~~**3.** Altering land use designations, densities, or design requirements to reduce demand for automobile travel and meet travel needs through other modes.~~

1. Adopting measures that demonstrate allowed land uses are consistent with the planned function, capacity, and performance standards of the transportation facility.

2. Amending the TSP or comprehensive plan to provide transportation facilities, improvements or services adequate to support the proposed land uses consistent with the requirements of Section -0060 of the TPR. Such amendments shall include a funding plan or other mechanism so that the facility, improvement or service will be provided by the end of the planning period.

3. Altering land use designations, densities, or design requirements to reduce demand for vehicle travel and meet travel needs through other modes of transportation.

4. Amending the TSP to modify the planned function, capacity or performance standards of the transportation facility.

5. Providing other measures as a condition of development, including transportation system management measures, demand management or minor transportation improvements.

C. A Traffic Impact Study may be required in accordance with Section 16.08.150 ~~by the City~~. (Ord. 1043, section 3, 2000; Ord 1237, 2007)

Additional Proposed Amendments & Code Assistance

These following code revisions are aimed at addressing a variety of goals, objectives or policies proposed to be adopted as part of the TSP and which will require new code provisions for implementation. Examples include requirements associated with multi-use pathways, barriers along rail lines and access to Highway 99E. This section also references transportation-related code amendments that are being proposed as part of a separate "Code Assistance" project aimed at implementing low impact development practices in Canby.

Revisions to Implement TSP

16.46.030 Access connection.

A. Spacing of accesses on City streets. The number and spacing of accesses on City streets shall be as specified in Table 16.46.030. Proposed developments or land use actions that do not comply with these standards will be required to obtain an access spacing exception and address the joint and cross access requirements of this Chapter. (Ord. 1043 section 3, 2000; Ord. 1076, 2001; Ord. 1237, 2007)

16.46.035 Restricted access.

The City may allow an access to a City street that does not meet the spacing requirements of Table 16.46.030 if the proposed access is restricted (prevents certain turning movements). The City may require an applicant to provide an engineered traffic study, access management plan, or other information as needed to demonstrate that the roadway will operate within the acceptable standards with the restricted access in place. (Ord. 1237, 2007). Access to OR 99E shall be regulated by ODOT through OAR 734.51.

TABLE 16.46.030
Access Management Guidelines for City Streets[a]

Street Facility	Maximum spacing[b] of roadways	Minimum spacing[b] of roadways	Minimum spacing[b] of roadway to driveway[c]	Minimum Spacing[b] driveway to driveway[c]
Arterial	1,000 feet	660 feet	330 feet	330 feet or combine
Collector	600 feet	250 feet	100 feet	100 feet or combine
Neighborhood/Local	600 feet	150 feet	50 feet	10 feet

[a] Exceptions may be made in the downtown commercial district, if approved by the City Engineering or Public Works Department, where alleys and historic street grids do not conform to access spacing standards.
[b] Measured centerline to centerline on both sides of the street
[c] Private access to arterial roadways shall only be granted through a requested variance of access spacing policies when access to a lower classification facility is not feasible (which shall include an access management plan evaluation)

Note: Spacing shall be measured between access points on both sides of the street.

Chapter 16.49 Site and Design Review
16.49.065 Bicycle and pedestrian facilities.
Developments coming under design review shall meet the following standards:

D. Developments that abut the Molalla Forest Road multi-use path shall provide a pedestrian/bicycle access to the path. The city may determine the development to be exempt from this standard if there is an existing or planned access to the path within 300 feet of the development.

Chapter 16.64 Subdivision Design Standards
16.64.030 Easements.

D. Developments that abut the Molalla Forest Road multi-use path shall provide a pedestrian/bicycle access to the path. The city may determine the development to be exempt from this standard if there is an existing or planned access to the path within 300 feet of the development.

~~**D.**~~ **E.** Solar Easements. Subdividers shall be encouraged to establish solar easements and utilize appropriate solar design in their development proposals. Solar easements shall be shown on the final plat and in the deed restrictions of the subdivision. The Planning Commission may require the recordation of special easements or other documents intended to protect solar access. (Ord. 740 section 10.4.40(C)(3), 1984; Ord. 1043 section 3, 2000; Ord 1237, 2007)

16.64.070 Improvements.
K. Other Improvements.

1. Curb cuts and driveway installation are not required of the subdivider but, if installed, shall be according to city standards.
2. Street tree planting is required of the subdivider and shall be according to city requirements. (Ord. 899 section 4, 1993)
3. The developer shall make necessary arrangements with utility companies or other persons or corporations affected, for the installation of underground lines and facilities. Electrical lines and other wires, including but not limited to communication, street lighting and cable television, shall be placed underground, unless overhead installation has been specifically approved by the commission because of unique circumstances at the site.
4. Developments along existing rail lines may be required to provide barrier fences or walls if necessary ensure safety for development occupants. City may also require noise mitigation such as sound walls or triple-pane windows in order to reduce the health impacts of train noises. Noise mitigation requirements shall be based on measured db levels when trains are in the vicinity and specific building construction features.

Chapter 16.86 Street Alignment Regulations
16.86.060 Street Connectivity.
When developing the street network in Canby, the emphasis should be upon a connected continuous grid pattern of local, collector, and arterial streets rather than discontinuous curvilinear streets and cul-de-sacs. Deviation from this pattern of connected streets shall only be permitted in cases of extreme topographical challenges including excessive slopes (35 percent plus), hazard areas, steep drainage-ways and wetlands. In such cases, deviations may be allowed but the connected continuous pattern must be reestablished once the topographic challenge is passed.