Draft Report for the

City of West Linn Transportation System Plan

Prepared by

DKS Associates
TRANSPORTATION SOLUTIONS

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Production of this report has been the collective effort of the following people:

City of West Linn
Dennis Wright, Engineering Manager
Gene Green, Public Works Director
Pat Rich, Public Works
Bryan Brown, Planning Director
Chris Kerr, Senior Planner

DKS Associates
Carl Springer, PTP, PTOE, Project Manager
Colette Snuffin, PE, Project Engineer
Garth Appanaitis, EIT, Transportation Engineering Staff

Angelo Planning Group
DJ Heffernan, Project Manager
Darci Rudzinski

ODOT, Region 1
Gail Curtis, Senior Planner
Marty Jensvold, Traffic Management Engineer

Metro
John Mermin, Transportation Planner

Transportation Advisory Board
David Newell
Erik Gakstatter
Joyce Jackson
Susan Hopkins
Thomas Frank
Tim Collins
William Bennett

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Executive Summary

Introduction

In 2000, the City of West Linn adopted their first Transportation System Plan (TSP). Since that time, there has been significant growth in West Linn and its surrounding communities, and a few key changes to state highway facility plans in the area. The primary purpose of this update is to address these changes, with focus on:

- Addressing how regional traffic diversion on Interstate 205 affects city street circulation and related access to the Willamette neighborhood area.
- Incorporating Highway 43 Concept Design Plan to serve long-term transportation needs for all travel modes.
- Confirm that the plan is consist with latest Statewide Plans and Policies.
- Ensuring that the high priority system improvements can be funded through existing transportation programs.

This plan fulfills the Transportation Planning Rule (TPR) requirements for comprehensive transportation planning in the cities of Oregon, and presents the investments and priorities for the Pedestrian, Bicycle, Transit, and Motor Vehicle systems along with new transportation programs to correct existing shortfalls and enhance critical services.

For each travel mode, a **Master Plan** project map and list are identified to support the City's transportation goals and policies. Projects that can be funded over the next 20 years are referred to as **Action Plans**.

The TSP provides specific information regarding transportation needs to guide future transportation investment in the City and determine how land use and transportation decisions can be brought together beneficially for the City and is based on needs required to meet transportation demand based on 2030 future needs. This executive summary provides the goals and policies, modal plans and financing summaries. For a more detailed analysis, refer to the remaining chapters for more in-depth information.

Plan Process and Committees

The West Linn TSP update was developed in close coordination with city staff and key representatives from the surrounding communities. Three formal committees participated in the plan development:

- Technical Advisory Committee (TAC) – Agency staff from Oregon Department of Transportation, Metro, TriMet and the City of West Linn participated in reviewing the technical methods and findings of the study. The focus of this group was on consistency with the plans and past decisions in adjoining jurisdictions, and consensus on new recommendations.
- Transportation Advisory Board (TAB) – Residents of West Linn that serve on the Board reviewed preliminary findings and provided input for draft chapters of the document during monthly meetings.
- Tenth Street Task Force – The City Council appointed a citizen member committee to focus on circulation and travel safety issues along the 10th Street exit of I-205. A series of meetings were held with the Task Force to report interim study findings and any outstanding policy issues that required their direction. The meetings were open to participation by the general public.

The committees met regularly through the plan development process to review interim work products, assist in developing and ranking transportation solutions, and to refine master plan elements to ensure consistency with community goals.

The West Linn Transportation System Plan process included the following steps:

- Update Goals and Policies
- Inventory/Data Collection to a year 2007 baseline
- Evaluate Existing Conditions and Future Travel Needs Through Forecasting
- Update Needs by Travel Mode and Consider Alternatives
- Refine Improvement Lists to Mitigate Deficiencies by Mode For 2030 Conditions
- Update Planning and Cost Estimates of Improvements
- Identify Financing Sources
- Draft TSP

As with the 2000 TSP, this TSP's planning objective was to optimize each of these modes of transportation within West Linn with the 2030 forecasted travel demand. The following sections summarize the findings of the Transportation System Plan studies.

Public Involvement

Two public open house events will be held to present findings, and to gather feedback from the community. The first meeting was held on September 20, 2007 to discuss the overall project process, and to present how safe and effective the system operates today. A final Public Open House will be held October 15, 2008, which will review the findings and conclusions of the Transportation System Plan update.

Goals and Policies

The City's Comprehensive Plan lays out a general policy framework regarding transportation services, as well as policies for streets, bicycles, pedestrians, transit, water, freight, and transportation demand management. The goals and policies of this TSP include recommended updates to the Comprehensive Plan, as presented in Chapter 2. These goals and policies were applied in the development of this Transportation System Plan to formulate strategies and implementing measures for each of the travel modes applied in the City of West Linn. The intent of the updated policies was to simplify and/or clarify statements from the 2000 TSP and Comprehensive Plan and to respond to more recent policies that were adopted by the State of Oregon and ODOT.

The overview transportation goals in the Comprehensive Plan are:

1. Provide a transportation system for the City of West Linn that:

   a) Provides for maximum mobility while encouraging modes of transportation other than the automobile.

   b) Provides for connectivity within and between neighborhoods and community centers, using new and existing transportation services that are consistent with Metro's street and walkway spacing standards.

   c) Is convenient, safe, and efficient.

   d) Maintains the cohesiveness of the City's neighborhoods.

   e) Is built with consideration for community priorities and affordability.

   f) Respects and preserves the natural environment on both a neighborhood and City-wide basis.

2. Provide a cost-effective balanced transportation system, incorporating all modes of transportation (including motor vehicle, bicycle, pedestrian, transit, and other modes).

3. Develop transportation facilities that are accessible to all members of the community and minimize out-of-direction travel.

Some specific areas that new or updated policies are recommended include:

General Policies

- Development impacts — Language is proposed that would support developments mitigating their traffic impacts, making frontage improvements, contributing towards onsite and offsite improvements, and preparing traffic impact analyses as needed

Street Policies

- Street design — Clarified to be related not only to the intended use but also the functional class
- Improvement priorities — Areas for specific priority would include improvements for pedestrian and transit riders, high accident locations, street maintenance, neighborhood traffic calming, bicyclists, and travel lane widths.

Pedestrian Policies

- Spacing of routes — Language is proposed that would seek to eliminate gaps in the existing network and use a preferred spacing of no more than 330 feet between pedestrian

network elements. Clarified to be related not only to the intended use but also the functional class

Funding sources — Language is proposed that supports coordination with other agencies to obtain funding for pedestrian improvements.

Pedestrian safety – Language is proposed that ensures that pedestrian improvements meet agency standards and that existing locations are retrofitted with ramps.

Walkway standard review – The policy would be expanded to periodically review that local standards are consistent with regional, state and federal standards.

Transit Policies

Coordination — Language is proposed that supports coordination with TriMet to support transit amenities and increasing ridership, as well as providing support to special needs riders.

Accessibility – Language is proposed that would increase accessibility of the transit system to potential riders through a variety of means.

Transportation Demand Management (TDM)

Employer TDM measures – Clarification is recommended that would not only encourage employers to implement TDM measures as a means of reducing commuter traffic, but also in order to meet regional air quality and vehicle miles traveled (vmt) reductions.

Transportation Plans

The existing system network for each mode (pedestrian, bicycle, motor vehicle, truck and other modes) was updated from the 2000 TSP to reflect completed projects since the original plan was completed. A Master Plan (long term project goals that meet planning requirements) and an Action Plan (projects that are reasonably expected to be funded) were compiled for each transportation mode. These plans are designed to comply with relevant State and adjoining jurisdictions planning documents. The overall findings and conclusions for each travel mode are summarized in the following sections. For full descriptions of the analysis, process, and projects, please refer to individual mode chapters: Chapter 5 – Pedestrian, Chapter 6 – Bicycle, Chapter 7 – Transit, and Chapter 8 – Motor Vehicles.

Pedestrians

An inventory was conducted on collector and arterial streets in West Linn to identify where new or in-fill pedestrian facilities would be most valuable. While sidewalks generally exist along the major corridors (Highway 43, Salamo Road and Rosemont Road), gaps in the system exist. Key issues included an incomplete arterial/collector sidewalk system, reviewing crossing spacing to determine where additional locations are needed, and identifying walkway/crossing needs in conjunction with routes to major transit stops.

The Pedestrian Master Plan was created that cost $19.7 million to add facilities to meet all these needs. The project locations are illustrated in Figure 5-1, which is duplicated following this section. Of these, several projects were determined to be high priority, based on input received during the public involvement process. The highest valued pedestrian improvements were determined to be located along Highway 43 (as included with the Highway 43 Concept Plan) and were selected for the Action Plan as listed in Table 1-1. Refer to Table 5-2 for a complete list of the Pedestrian Master Plan projects.

Table 1-1: Pedestrian Action Plan (Costs included in Highway 43 Concept Plan)

#	Priority	Location	Sidewalk In Fill Extent	From	To	Cost(s) $1,000s
2	High	Willamette Drive*	One side of street.	Bolton Street	Failing Street	$0**
3	High	Willamette Drive*	One side of street.	Failing Street	Davenport Street	$0**
4	High	Willamette Drive*	One side of street.	Davenport Street	Caufield Street	$0**
5	High	Willamette Drive*	One side of street.	Caufield Street	Barlow Street	$0**
6	High	Willamette Drive*	One side of street.	Barlow Street	Dillow Drive	$0**
7	High	Willamette Drive*	One side of street.	Dillow Drive	Pimlico Drive	$0**
8	High	Willamette Drive*	One side of street.	Mark Lane	Mapleton Drive	$0**
9	High	Willamette Drive*	One side of street.	Mapleton Drive	100' south of Cedaroak Drive	$0**
10	High	Willamette Drive*	Both sides of street.	Cedaroak Drive	Walling Circle (north)	$0**
11	High	Willamette Drive	Both sides of street.	Fairview Way	Marylhurst Drive	$0**
12	High	Willamette Drive*	Both sides of street.	Walling Circle (north)	Fairview Way	$0**
13	High	Willamette Drive*	Both sides of street.	Marylhurst Drive	Shady Hollow Way	$0**
14	High	Willamette Drive*	Both sides of street.	Shady Hollow Way	North city limits	$0**

**Included in Highway 43 Concept Plan Cost Estimates

West Linn Transportation System Plan

PEDESTRIAN PLAN

LEGEND

Pedestrian Projects

- Sidewalk - One Side
- Sidewalk - Both Sides
- Proposed Off-Street Path
- Proposed Crossing
- Off-Street Path
- City Hall
- Schools
- Library
- Parks
- Community Center
- Freeway
- Major Roads
- Streets
- Railroad
- Water
- City Limits

NOTE: Trail locations are conceptual as based on the previously adopted Parks Master Plan.

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Bicycles

The arterial roadway system in West Linn has basic bike lanes on a few major facilities, but most of the arterial streets have no designated bike facilities. Nearly all collector streets have no bike facilities at all. The only streets in the city with significant bike facilities are Willamette Drive (Highway 43), West A Avenue, and intermittent segments along Summit Street, Parker Road, and Willamette Falls Drive. In many cases, the slope of the roadway limits the feasibility or need for bike lanes on major arterials. Examples include Hidden Springs Road, and the south end of Salamo Road. Issues to address include the overall connectivity of the bicycle system and the lack of a dedicated bicycle system on collector streets (only shared roadways exists).

A Bicycle Master Plan was created that cost $8.5 million to implement in today's dollars. The Master Plan is shown in Figure 6-1, which is duplicated on the next page. Several strategies were identified to address bicycle system needs and to guide project prioritization. This prioritization process helps to focus community investment on those projects that are most effective at meeting important needs, while deferring other projects of lesser need. The highest priority bicycle projects totaled about $1.8 million. These Action Plan projects (Table 1-2) include adding bicycle lanes to existing streets. Refer to Table 6-2 for a complete list of Bicycle Master Plan projects, including expected implementation phasing over the life of the plan.

Table 1-2: Bicycle Action Plan and Cost Estimates

#	Location	Improvement	From	To	Cost $1,000s
1	Rosemont Road*	On-street Bike Lanes	Carriage Way	Summit Street	$1,425
2	Salamo Road*	On-street Bike Lanes	10th Street	Barrington Drive	$390
				Total Cost	**$1,815**

West Linn Transportation System Plan

BICYCLE PLAN

LEGEND

Bicycle Projects

- Bicycle Lane - Raised
- Bicycle Lane - Standard
- Shoulder Bikeway
- Bicycle Boulevard Treatment
- Proposed Off-Street Path

Note: includes lanes under construction at the time of inventory.

- Project Number
- Off-Street Paths
- Existing Bicycle Facility
- City Hall
- Schools
- Library
- Parks
- Community Center
- Freeway
- Major Roads
- Streets
- Water
- City Limits

NOTE: Trail locations are conceptual as based on the previously adopted Parks Master Plan.

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Transit

TriMet currently provides transit service to West Linn and operates two routes in the City. Existing service and amenities such as park and ride locations (only one) and bus shelters are limited. None of the existing stops currently meet TriMet's general ridership threshold (35) for daily boardings and it is likely that the City of West Linn would need to fund future transportation improvements. A recent survey of residents was conducted to determine general opinions and levels of transit use by residents. Key transit needs that were identified include limited accessibility and transit amenities, and difficult connections to regional employment centers.

Four improvement strategies were developed to meet transit needs in West Linn:

1) Provide express routes to regional employment centers
2) Provide bus shelters/improved user amenities
3) Provide additional park and ride lots
4) Provide access to activity and service centers

A $1.3 million transit action plan project list (Table 1-3) was created to identify projects to be funded by the year 2030. A major share of those costs serve as a placeholder for improving local service, pending the outcome of a follow-up transit survey that provides neighborhood data and could be used to determine areas within the City that would benefit from specific improvements.

Table 1-3: Transit Action Plan

Priority	Project	Agency Responsible	Description	Cost ($1,000s)
High	Improve Service Coordination for Route 154	West Linn/TriMet	Coordinate with TriMet to modify the schedule, stop locations, or add a layover to improve connections and service for Route 154	-
High	Transit Expansion Study and Survey	West Linn	Explore the feasibility of local fixed-route transit service including surveys of residents and potential users.	$75
High	Provide Transit Amenities at Major Transit Stops	West Linn/TriMet	Provide shelters, information kiosks, etc along key transit routes in West Linn with land use development. Specific locations (5) to be determined through transit study and survey.	$50
High	Improve Pedestrian Connections to Transit Facilities	West Linn/TriMet	Construct sidewalks, crosswalks, etc. adjacent to transit routes and facilities.	$0*
Med	Decrease Headways	TriMet	Provide more frequent transit service during peak commute periods.	-
Med / Low	Provide More Local Service	West Linn/TriMet	Expand coverage by providing local service to connect to existing transit lines. Enhance/expand local pick up services. Specific locations/actions to be determined through transit study and survey. This project is a placeholder for funds pending the outcome of the study.	$50/yr
			Transit Project Total (for 23 years)	**$1,275**

NOTE: * Specific projects and costs included in Pedestrian Plan of this TSP

Motor Vehicle

A broad set of measures were reviewed to best serve growth in the City of West Linn over the next 20 years. Future travel forecasts showed that current planned improvements will not be sufficient to serve long-range growth to 2030, so other measures are required. Reliable and efficient travel on major city and state facilities within the city will require significant investments in Transportation System Management (TSM), Travel Demand Management (TDM), and roadway improvements. A variety of roadway and highway improvement alternatives were analyzed for meeting these needs. The following sections summarize the recommended motor vehicle system plans that meet the demands of future growth and comply with local and state planning requirements.

Street System Design

The functional street classification system for West Linn includes arterials, collectors, neighborhood routes, and local streets. No changes were proposed to the existing functional classification, shown in Figure 8-1 and duplicated on the next page.

Transportation System Management (TSM)

Transportation System Management (TSM) focuses on low cost strategies to enhance operational performance of the transportation system by seeking solutions to immediate transportation problems, finding ways to better manage transportation, maximizing urban mobility, and treating all modes of travel as a coordinated system. TSM measures focus primarily on region-wide improvements, however several measures that could benefit West Linn include:

Intelligent Transportation Systems (ITS): ITS focuses on increasing the efficiency of existing transportation infrastructure, which enhances the overall system performance and reduces the need to add capacity (e.g. travel lanes). Efficiency is achieved by providing services and information to travelers so they can (and will) make better travel decisions and to transportation system operators so they can better manage the system and improve system reliability.

Clackamas County has prepared an ITS plan for the urbanized area of the County. The plan identifies opportunities for regional coordination and funding and calls for Clackamas County to dedicate funding sources for projects. The Clackamas County ITS Plan[1] identifies ITS projects in West Linn located along I-205 and Highway 43. Projects located in West Linn along each of these facilities (and planned implementation schedules) are:

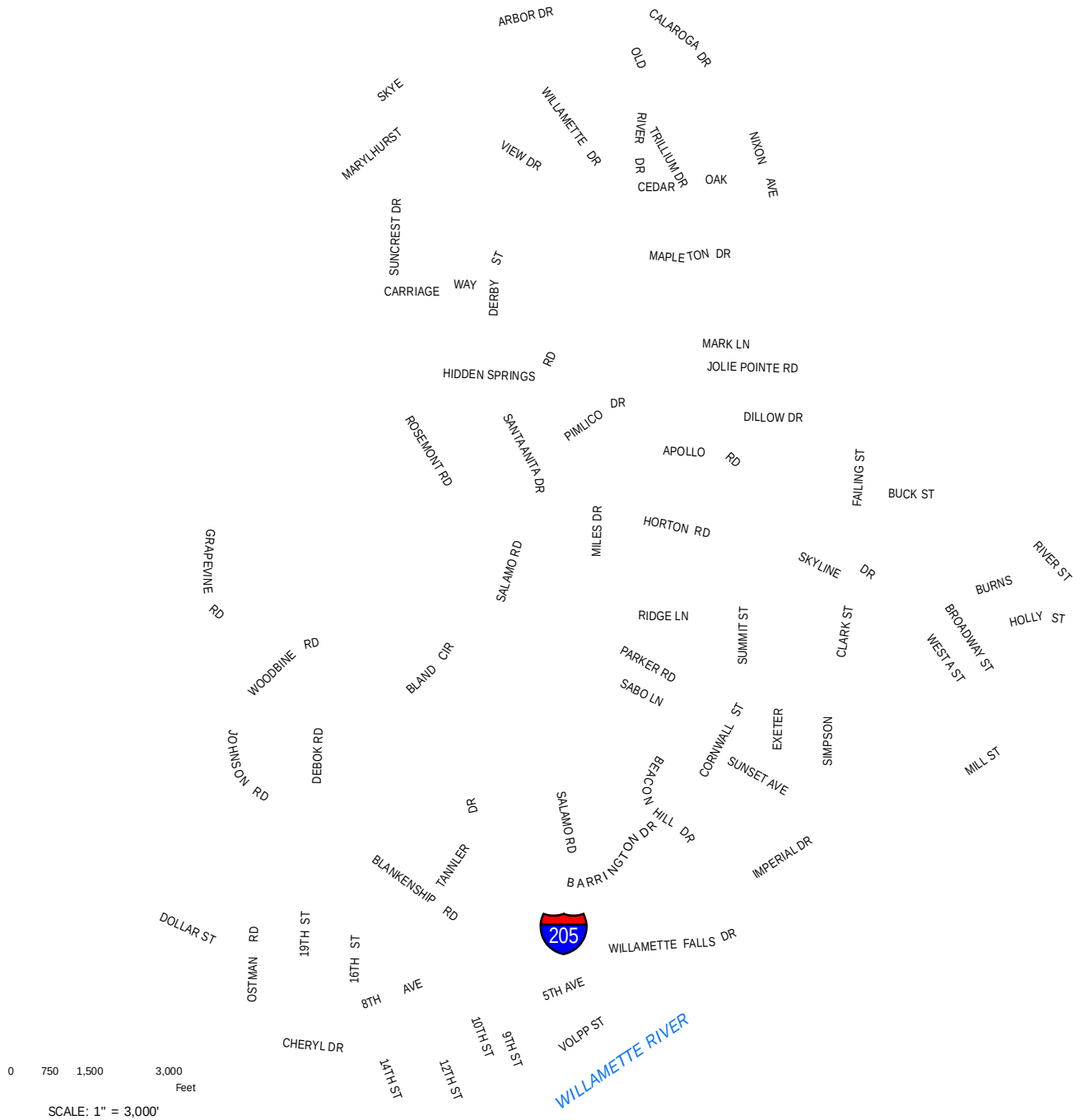
Highway 43

- CCTV cameras at three locations [Planned 11-20 years]
- Detector station [Planned 11-20 years]
- Incident management corridor [Planned 11-20 years]
- Transit priority corridor (and information display) [Planned 6-10 years]
- Fiber optic cable [Planned 11-20 years]

Interstate 205

- CCTV cameras at four locations [*completed*]
- Fiber optic cable [*completed*]

[1] Clackamas County ITS Plan, DKS Associates, Inc. and Zenn Associates, February 2003.



West Linn Transportation System Plan

EXISTING/FUTURE FUNCTIONAL CLASS

LEGEND

- Freeway
- Principal Arterial
- Arterial
- Collector
- Neighborhood Route
- Local Street

- Railroad
- Water
- City Limits

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Neighborhood Traffic Management (NTM): The City has an established traffic safety committee which meets on a monthly basis that oversees NTM issues among their other responsibilities. The committee has a set procedure for NTM implementation that starts with the identification of a perceived problem by concerned citizens, after which the committee conducts a speed/volume survey to identify if the problem exists. Once the problem has been identified and classified, the committee discusses the various approaches to solving the problem. There are many different NTM options available to the committee, which are described in the technical appendix. Typically, the committee starts with lower cost solutions, such as education and enforcement and if it is deemed that either of these solutions are not having the desired effect, an engineering solution is selected by the committee. The implementation of the selected NTM solution may be funded by the city and/or the concerned citizens. Often the city pays for the logistics of the NTM implementation and the citizens pay for the material costs.

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 should guarantee reduced congestion, reduced accident rates, less need for highway widening, conservation of energy, and reduced air pollution.

The following recommendations are made for access management:

- Develop formalized access management plans for specific major and minor arterial streets in the City of West Linn to provide a detailed assessment of current conditions, and document specific measures to maximize the capacity of each existing facilities and protect their functional integrity.
- Work with land use development applications to consolidate driveways where feasible.
- Provide left turn lanes where warranted for access onto cross streets.
- Construct raised medians to provide for right-in/right-out driveways as appropriate.

Table Error! No text of specified style in document.**-4: Access Spacing Standards for City Street Facilities**

Roadway Functional Classification	Area	Traffic Signals (miles)	Public Intersections (feet)	Private Driveways (feet)	Median Opening (feet)
Arterial	Urban	½	600	300	600
	Opportunity	¼	NA	NA	NA
Collector	All	¼	200	150	NA
Neighborhood Route	All	¼	150	100	NA
Local Residential Street	All	NA	100	50	NA
Local Commercial Street	All	NA	100	50	NA

"Urban" refers to intersections inside the West Linn urban growth boundary and outside the central business district or designated town centers.
"Opportunity" refers to the designated opportunity areas located in the Robinwood, Bolton, and Willamette neighborhoods.

Roadway Extensions to Improve Circulation

The City of West Linn's many cul-de-sacs, steep topography, and major facilities such as Highway 43 and I-205 limit intercity connectivity. Therefore, many intercity trips are forced to travel along the few through streets that do connect across these barriers. 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. Additionally, public safety response time can also be reduced.

Some of the congestion on roads such as Rosemont Road, Salamo Road, or Hidden Springs Road could be improved through improved neighborhood connectivity. Improved connectivity in the area east of Highway 43 and in the Tanner Basin area can provide circulation to existing or future traffic signals that will result in less delay and better safety for access onto the highway. Several short roadway connections will be needed within neighborhood areas to connect disjointed local streets and to reduce out-of-direction travel for vehicles, pedestrians and bicyclists.

The proposed Local Connectivity Plan for the City of West Linn is shown in Figure 8-6. In most cases, the improvements would involve the changing of a streets functional classification from local street to neighborhood route. In limited cases, a short length of new road would be necessary for improved connectivity. The arrows on Figure 8-6 represent recommended connections and the general direction for the placement of the connection in existing configurations. In each case, the specific alignments and design may be modified dependent upon future development review.

The criteria for providing local connections are based on the Metro RTP requirements for new residential or mixed-use developments.

- Every 330 feet, a grid for pedestrians and bicycles (may include paved roadway or trails)
- Every 530 feet, a grid for automobiles (local street or higher classification)

West Linn

Transportation System Plan Update

LEGEND

- ⟷ - Local Street Connection
- ⟺ - Pedestrian/Bike Connection (No Autos)

NOTE: General connection route indicated. Precise alignments to be determined

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NO SCALE

Figure 8-6

FUTURE LOCAL STREET CONNECTIVITY IMPROVEMENTS

Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is the general term used to describe any action that removes single occupant vehicle(SOV) trips from the roadway network during peak travel demand periods. As growth in the City of West Linn occurs, the number of vehicle trips and travel demand in the area will also increase. The ability to change a user's travel behavior and provide alternative mode choices will help accommodate this potential growth in trips.

The City of West Linn, Clackamas County, and TriMet should coordinate to implement the pedestrian, bicycle, and transit system improvements, which offer alternative modes of travel. The recommended TDM action plan includes:

- Support continued efforts by TriMet, Metro, ODOT, and Clackamas County to develop productive TDM measures that reduce commuter vehicle miles and peak hour trips.
- Update the City of West Linn Goals and Policies to adopt the 2040 Regional Non-SOV Modal Targets.
- Encourage the development of high-speed communication in all part of the city (fiber optic, digital cable, DSL, etc). The objective would be to allow employers and residents the maximum opportunity to rely upon other systems for conducting business and activities than the transportation system during peak periods.
- Encourage developments that effectively mix land uses to reduce vehicle trip generation. These plans may include development linkages (particularly non-auto) that support greater use of alternative modes.
- Continued implementation of motor vehicle parking ratios (minimum and maximum2) for new development.
- Continued implementation of building orientation and transit planning requirements for new development.
- Continued implementation of street connectivity requirements.
- Require new employment development to install bicycle racks.
- Implementation of bicycle, pedestrian, motor vehicle and transit system action plans as presented in this TSP.

Roadway Improvements

At the existing level of land development, the transportation system generally operates without significant deficiencies in the study area. However, both regional and local traffic volumes are projected to increase on many of the streets within the city by 2030. Notable roadways with traffic volume increases are Highway 43, 10th Street on both sides of I-205, and Rosemont Road. Two-way traffic volumes on these streets are projected to increase during the PM peak hour by approximately 1,000 vehicles per hour (vph) on Highway 43, 1,100 vph on 10th Street, and 700 vph on Rosemont Road. Many of the study intersections would fail to meet performance standards either (as applicable) for the City of West Linn or for the Oregon Department of Transportation (ODOT) as a result of the increases in volume.

In order to address future growth and projected deficiencies of the transportation system, various improvement alternatives were considered, with study intersections combined into three general groups:

[2] Minimum parking ratios allow vehicular storage when travelers do not have the flexibility to choose transit. Maximum parking ratios assist TDM goals by capping the number of stalls available for vehicles.

- Highway 43,
- 10th Street/I-205 interchange area, and
- Other West Linn intersections (generally located along Rosemont Road or other areas not associated with the first two groups).

The *West Linn OR 43 Conceptual Design Plan*[3] (included as an Appendix to this TSP) analyzed intersections along the Highway 43 corridor and addressed multi-modal circulation concepts to guide future design. The plan maintains the current cross-section of one travel lane in each direction in order to keep the local character and meet community concerns, while not impacting existing right of way. Improvements such as adding left turn lanes to the median and traffic control would be made in some locations to increase capacity. However, due to the stated constraints, performance standards would still not be met at several locations, and design exceptions would need to be pursued from ODOT. Additional locations could meet performance standards by widening Highway 43 to a 5-lane section, however significant right of way impacts would be required to provide such an improvement. Recommended improvements are consistent with the Highway 43 Concept Plan configurations.

The *10th Street Area Plan*[4] includes analysis of intersections along and in proximity to the 10th Street corridor. Through coordination with the 10th Street Traffic Task Force, the following three groups of improvement alternatives were developed and evaluated:

- Group A: 10th Street Capacity Enhancements
- Group B: Willamette Falls Drive Enhancements and Management Tools
- Group C: Major System Improvements.

Details regarding the configuration and performance of each group of improvements are located in the Plan. Recommendations were made following the analysis of each group of alternatives. These recommendations included dropping or advancing the consideration for improvements based on their performance and other evaluation criteria. Several recommendations for additional project consideration or further analysis in the TSP were included. Both a split diamond and single point urban interchange (SPUI) design were considered for the 10th Street interchange area.

Improvements for intersections that were not included in the two other groups (Highway 43 corridor or 10th Street Interchange Area) were analyzed independently. All remaining intersections are under the jurisdiction of City of West Linn and would meet performance standards with improvements to lane configuration or traffic control.

Based on the needs of the motor vehicle capacity analysis, a Motor Vehicle Master Plan was created that includes $20.9 million for improvements on city roadways and intersections, and up to another $50.9 million on state highways (depending on ultimate interchange configuration selected for 10th Street). These projects were developed in support of the City's transportation goals and policies, but due to funding constraints may not be included in the Action Plan – the subset of the Master Plan that is reasonably likely to be funded.

City street projects summarized in Table 1-5 include all the motor vehicle master plan projects within their jurisdiction. Projects that were also included in the Action Plan are noted as such.

[3] West Linn OR 43 Conceptual Design Plan – Final Report, June 29, 2007.
[4] *City of West Linn TSP Update - 10th Street Area Plan*, prepared by DKS Associates, November 2, 2007.

Table 1-5: Motor Vehicle Master Plan and Action Plan Projects – City of West Linn Facilities

No.	Location	Description	Plan	Cost ($1,000)
1	Salamo Road / Rosemont Road	Add a traffic signal when warranted	Action	$250
2	Willamette Falls Drive / Sunset Avenue	Add a traffic signal when warranted	Action	$250
3	Rosemont Road / Carriage Way	Add a center median on Rosemont Road to allow two-stage left turn from Carriage Way	Action	$1,420
4	Rosemont Way / Hidden Springs Road	Add a traffic signal when warranted and northbound/southbound left turn lanes on Rosemont Road	Action	$750
5	Willamette Falls Drive / Ostman Road	Widen Willamette Falls Drive with center median 500' on each side of intersection to allow for two-stage left turn from Ostman Rd	Action	$1,285
6	Willamette Falls Drive / Dollar Street (east)	Widen Willamette Falls Drive with center median 500' on each side of intersection for two-stage left turn from Dollar St	Action	$1,420
7	10th Street (I-205 SB Ramps to 8th Court)	Widen to 5-lane section with center turn lane and 2 travel lanes each direction	Action	$1,625
8	10th Street (8th Ave to Willamette Falls Drive)	Add through lanes on 10th Street for a total of 2 lanes in each direction. Prohibit northbound left turn movement and replace left turn lane with ped island.	Action	$480
9	Blankenship Road / 10th Street	Add 2nd eastbound right turn lane and restripe westbound approach to have exclusive left turn and shared left-thru lane	Action	$500
10	10th Street / Willamette Falls Drive	Change/upgrade traffic control to either signal or roundabout	Action	$800
11	10th Street / 8th Avenue	Add right-in right-out access at the time of 8th Court extension.	Action	$20
12	10th Street / I-205 NB Ramps	Add turn lanes (northbound right turn lane, stripe southbound approach to have dual left turn lanes and one thru lane, add exclusive NB Off-ramp left turn lane, and widen NB On-ramp to have two receiving lanes to support dual SB left turn movement)	Action	$1,000
13	8th Court	Extend 8th Ct to Willamette Falls Dr. to provide additional access to 8th Court retail. (Concurrently make 10th Street/ 8th Avenue right-in right-out access.)	Action	$2,000
14	Willamette Falls Drive /12th Street	All way stop control/ traffic signal when warrants are met	Action	$250
15	Willamette Falls Drive /14th Street	All way stop control when warrants are met	Action	$10
16	Willamette Falls Drive /19th Street	All way stop control when warrants are met	Action	$10
17	8th Avenue	Modify Dollar St connection to reconnect to 8th Avenue, and provide alternative route for local trips.	Action	$1,000
18	19th Street / Blankenship Road	Upgrade to current City standards from Blankenship Rd/Debok Road to Willamette Falls Drive	Action	$5,895
19	8th Avenue	Upgrade from 10th Street to Dollar Street	Master	$1,695
20	Salamo Road / Parker Road	Add a traffic signal when warranted	Action	$250
			Master Plan Total	**$20,910**
			Action Plan Total	**$15,015**

Major master plan street projects on ODOT facilities are listed in Table 1-6. These projects primarily include implementation of the Highway 43 Concept Plan as well as long-term improvements to the I-205/10th Street interchange. Most of the projects are reasonably expected to be funded as part of the Action Plan, as noted in the table. While these projects are located on facilities that are not under the jurisdiction of City of West Linn, funding a portion of the projects would increase the likelihood that they are constructed and serve the transportation needs of West Linn residents.

Table 1-6: Motor Vehicle Master Plan and Action Plan Projects – ODOT Facilities

No.	Location	Description	Plan	Cost ($1,000)
21	Highway 43 / Willamette Falls Drive	Add a traffic signal that is coordinated with adjacent signal at I-205 NB Off Ramps	Action	$250
22	I 205/10th Street Interchange	Construct a long-term interchange improvement (SPUI or Split Diamond)	Master	$15,000-$30,000*
		(Highway 43 Concept Plan Improvements		
23	Highway 43 / Arbor Drive	Add left turn lanes on Highway 43 (cost included in Highway 43 segment cost, listed below)	Action	$0
24	Highway 43 / Cedar Oak Drive	Realign shopping center driveway located to the southeast with intersection	Action	$500
25	Highway 43 / Holmes Street	Modify circulation to allow exit only traffic from Holmes Street	Action	$10
26	Highway 43 / Lewis Street	Modify circulation to prohibit left turns out from Lewis Street	Action	$10
27	Highway 43 / Pimlico Drive	Add a traffic signal when warranted	Action	$250
28	Highway 43 / Hood Street /McKillican Street	Modify traffic signal timing to have protected/permitted phasing on Hood and McKillican	Action	$50
29	North City Limit to Marylhurst	Highway 43 Improvements**	Action	$2,920
30	Marylhurst to Hidden Springs	Highway 43 Improvements**	Action	$4,195
31	Hidden Springs to Pimlico	Highway 43 Improvements**	Action	$5,385
32	Pimlico to Buck	Highway 43 Improvements**	Action	$3,335
33	West A Street to Webb	Highway 43 Improvements**	Action	$2,065
34	Webb to Hood-McKillican	Highway 43 Improvements**	Action	$1,910
			Master Plan Total	$35,880-$50,880
			Action Plan Total	$20,880

Notes:
**Cost of SPUI would be approximately $15,000,000 while the split diamond configuration would cost approximately $30,000,000*
*** Refer to Highway 43 Concept Plan for details*

Motor vehicle Action Plan components are summarized in Table 1-7. For illustration purposes, a local match of 15 percent of construction costs was assumed for ODOT projects, however this does not represent a commitment by the city for this amount. There may be other opportunities or means to support state project on the Action Plan list.

The Action Plan map is illustrated in Figure 8-9, which is duplicated on the next page. Project numbers shown on the map correspond with value listed in the foregoing tables.

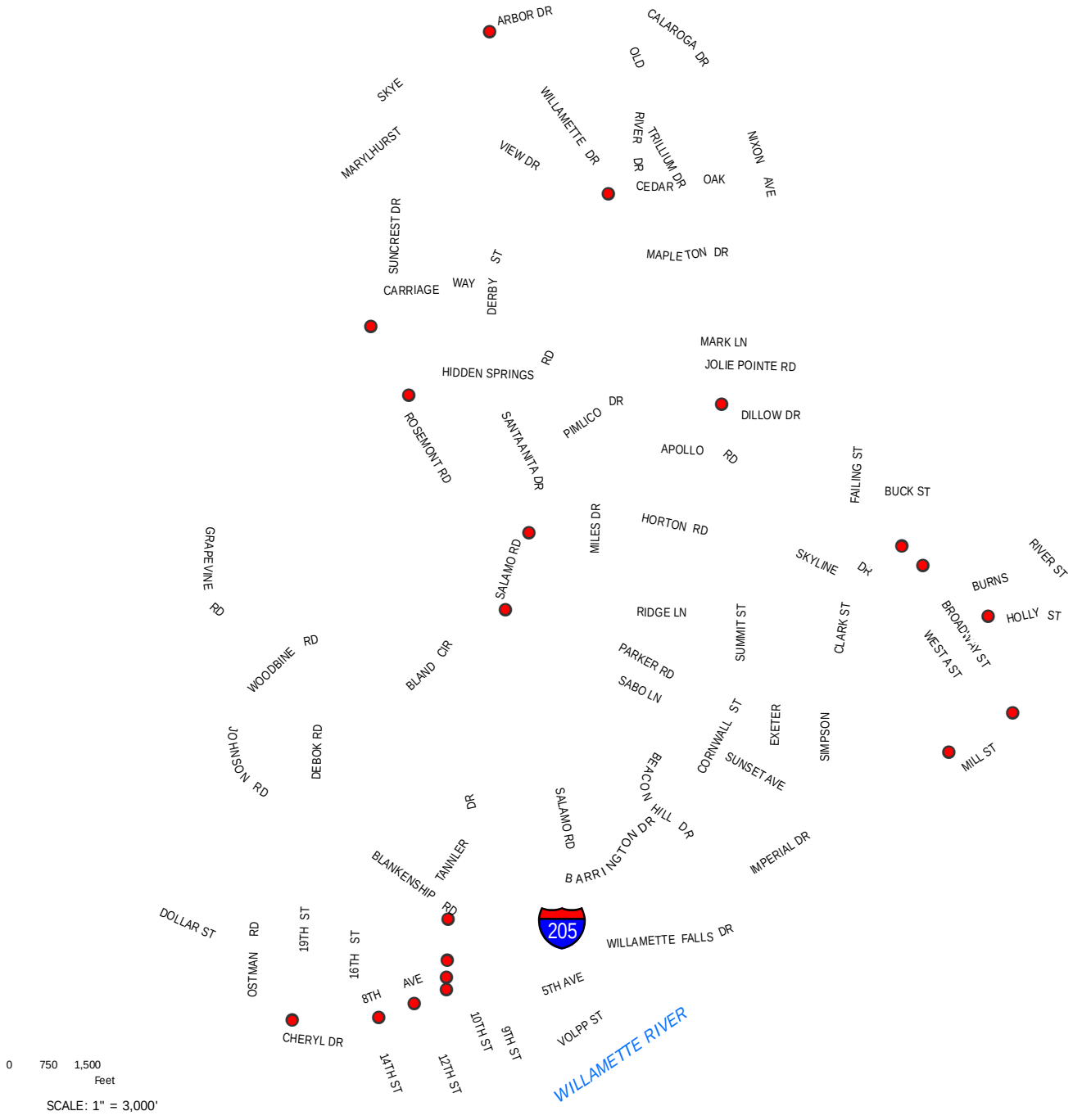
Table 1-7: Motor Vehicle Action Plan Cost Summary

Project Type	Cost
City of West Linn Facility Improvements	$15,015,000
ODOT Facility Improvements - Local Match	$3,132,000
Total Motor Vehicle Action Plan Cost	**$18,147,000**

West Linn

Transportation System Plan

MOTOR VEHICLE MASTER PLAN PROJECT LOCATIONS



LEGEND

- Facility Improvement
- Intersection Improvement
- Project Number
- Railroad
- Water
- City Limits

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Other Modes

Future needs and recommended improvements for other modes of transportation such as rail, interstate bus, air, water, freight, and pipeline are identified and summarized below.

Rail

No rail services are currently provided to the City of West Linn. Oregon City is provided service by the Southern Pacific Railroad, which runs parallel to Highway 99E. Given West Linn's current density and the urban form of the Portland metropolitan area, it is unlikely that passenger rail transportation will come directly to the City of West Linn. It is recommended that residents continue to use the services and facilities in the Portland area. Potential improvements in service exist with the expansion of regional systems currently being discussed. West Linn should continue to support and promote regional improvements to the transit system, and be actively involved in the coordination of these services and possible connecting services to best serve its residents. As the details of these systems and potential connecting points are not yet known, it is not possible to incorporate them into existing plans and facility improvements. West Linn should advocate for good connections from the city to future passenger rail stations.

Interstate Bus Transportation

Interstate bus service is available from downtown Portland at the Greyhound station. West Linn residents can reach this station either by private automobile or by the Route 35 Tri-Met line. Greyhound does not currently operate any suburban bus stations near West Linn.

If market conditions warrant, Greyhound or another interstate bus service would serve West Linn residents better with a suburban station south of Portland. Oregon City used to have an interstate bus station, and West Linn would recommend re-activating this facility. However, a decision to provide such a station would be market-oriented since inter-city bus service providers are private corporations.

Air Transportation

West Linn residents are encouraged to continue to use the services and facilities available at the Portland Metropolitan Airport and at the General Aviation Airport in Aurora. As air will continue to grow as a popular and efficient form of transportation, it is important that West Linn residents have a convenient and reliable method for getting to the airports. Although I-205 provides direct access to the Portland Airport, increasing traffic makes its reliability questionable. The City of West Linn needs to petition and support ODOT in their efforts to improve flow on this important link with capital improvements, and with traffic management efforts.

Water Transportation

West Linn lies along the west side of the Willamette River. The Willamette Falls Locks, operated by the U.S. Army Corps of Engineers, are a part of the water-borne transportation system through West Linn. As the City recognizes the river and locks as an efficient mode of transportation for commercial traffic, land use decisions and policy development concerning the locks and riverfront should promote the continued use of these facilities.

Use of the river to transport people, either by river taxi or a ferry is a concept West Linn residents have suggested and are open to. The provision of such services is market-driven and will not be provided by a private company until it becomes economically viable. As the implementation of this type of service would require an immense capital undertaking, it would not be fiscally responsible for the City to

undertake such a project. However, because river taxis and ferries offer potential transportation alternatives, future policy and land use decisions should protect and promote their use in the future by allowing for landing and docking sites.

Freight and Goods Movement

The two routes within West Linn most used for freight movement by truck are I-205 and Highway 43, both under the jurisdiction of the Oregon Department of Transportation. It is recommended that the state monitor the traffic and accident patterns along I-205, especially in the vicinity of the Highway 43 interchange.

Pipeline

There are no pipelines transporting commodities in West Linn except those used in the West Linn Paper Company industrial complex, and pipelines from the Smurfit Paper Mill in Oregon City to settling ponds along the Willamette River in West Linn.. A sewage force main that is part of the Tri-City Sewerage District facility crosses the Willamette River. Several Northwest Natural Gas mains run through West Linn. Also, the South Fork Water Board has a potable water pipeline across the Willamette River serving West Linn.

Financing

Transportation funding is commonly viewed as a user fee system where the users of the system pay for infrastructure through motor vehicle fees (such as gas tax and registration fees) or transit fares. However, a great share of motor vehicle user fees goes to road maintenance, operation and preservation of the system rather than construction of new system capacity. Much of what the public views as new construction is commonly funded (partially or fully) through property tax levies, traffic impact fees and fronting improvements to land development. The City of West Linn utilizes several mechanisms to fund construction of its transportation infrastructure, including:

- Fuel Tax and Vehicle License Fee
- System Development Charge
- Exactions (Developer Required Improvements)
- Street Maintenance Fee

Under the above funding programs, the City of West Linn will collect approximately $1.7 million for street construction and repair each year. Over the 23-year life of this planning period, that is equivalent to $39.2 million in today's dollars.

The costs outlined in the Transportation System Plan to implement the Action Plans for Streets, Transit, Bicycles, and Pedestrians total $21.2 million, and several other recommended transportation operations and maintenance programs would add $23.3 million for a total cost over 23 years of $44.6 million. This total exceeds the expected 23-year revenue estimate of $39.2million by approximately $5.4 million. However, the relative gap between available revenue and total expenditures of projects included in the plan (approximately 10%) indicates that projects included in the Action Plan are reasonably likely to be funded

Table 1-8: Transportation Action Plans Costs over 23 years (2007 Dollars)

Transportation Element	Approximate Cost ($1,000)
System Improvement Projects (Action Plans projects to be funded by City)	
Motor Vehicle – City of West Linn Facilities	$15,015
Motor Vehicle – State Facilities (15% contribution)	$3,132
Bicycle	$1,815
Transit	$1,275
Pedestrian	$0*
Total Capital Projects	**$21,237**
Operations, Maintenance and Other Programs and Services	
Roadway Maintenance ($714,000 per year)	$15,708
Street Lighting ($331,000 per year)	$7,613
Total Operations and Maintenance Programs	**$23,321**
23 YEAR TOTAL COST	**$44,558**
23 YEAR TOTAL FUNDING	**$39,197**
23 YEAR ADDITIONAL NEED	***$5,361***

* Pedestrian projects and funding are included in the Highway 43 Concept Plan

While the Action Plan is reasonably expected to be funded, additional projects included in the Master Plan are not expected to be funded. The projects costs for the remaining projects noted in the modal Master Plans require additional funding, and they are expected to be built beyond the 23-year horizon or completed with development exactions or other unanticipated funding sources. Table 10-3 summarizes the additional Master Plan projects for each mode that are not included in the reasonably fundable Action Plan.

Table 1-9: Master Plan Projects not in Action Plan – Costs over 23 years (2007 Dollars)

Transportation Element	Approximate Cost ($1,000)
System Improvement Projects (Not funded by City in Action Plan)	
Motor Vehicle	$5,895
Bicycle	$6,720
Transit	$0
Pedestrian	$19,700
23 YEAR TOTAL in 2007 Dollars	**$32,315**

Goals and Policies

The City's Comprehensive Plan presents a general policy framework regarding transportation services, as well as policies for streets, bicycles, pedestrians, transit, water, freight, and transportation demand management. This chapter of the West Linn Transportation System Plan (TSP) summarizes the proposed Comprehensive Plan amendments for Goal 12 – Transportation that were developed in conjunction with the TSP update process. The updated goals and policies were applied in the development of this TSP to formulate strategies and implementing measures for each of the travel modes applied in the City of West Linn. The intent of the updated policies was to simplify and/or clarify statements from the 2000 TSP and Comprehensive Plan and to respond to more recent policies that were adopted by the State of Oregon and ODOT.

Some specific areas that new or updated goals and policies are recommended include:

Overview Goals

- **Transportation system connectivity** – Language is proposed that would seek consistency with Metro street and walkway spacing standards

General Policies

- **Development impacts** – Language is proposed that would support developments mitigating their traffic impacts, making frontage improvements, contributing towards onsite and offsite improvements, and preparing traffic impact analyses as needed.

Street Policies

- **Street design** – Clarified to be related not only to the intended use but also the functional class.
- **Improvement priorities** – Areas for specific priority would include improvements for pedestrian and transit riders, high accident locations, street maintenance, neighborhood traffic calming, bicyclists, and travel lane widths.

Pedestrian Policies

- **Spacing of routes** – Language is proposed that would seek to eliminate gaps in the existing network and use a preferred spacing of no more than 330 feet between pedestrian network elements. Clarified to be related not only to the intended use but also the functional class
- **Funding sources** – Language is proposed that supports coordination with other agencies to obtain funding for pedestrian improvements.
- **Pedestrian safety** – Language is proposed that ensures that pedestrian improvements meet agency standards and that existing locations are retrofitted with ramps.
- **Walkway standard review** – The policy would be expanded to periodically review that local standards are consistent with regional, state and federal standards.

Transit Policies

- **Coordination** – Language is proposed that supports coordination with TriMet to support transit amenities and increasing ridership, as well as providing support to special needs riders.
- **Accessibility** – Language is proposed that would increase accessibility of the transit system to potential riders through a variety of means.

Transportation Demand Management (TDM) Policies

- **Employer TDM measures** – Clarification is recommended that would not only encourage employers to implement TDM measures as a means of reducing commuter traffic, but also in order to meet regional air quality and vehicle miles traveled (vmt) reductions.

Existing Conditions

As part of the City of West Linn Transportation System Plan (TSP) Update, an analysis of how the transportation system performs today was made to establish a baseline for evaluations. This information is compared to identified performance or design standards, as appropriate, and any elements that are found to be deficient are identified. This information also serves as a basis of comparison for the future year 2030 evaluations discussed in later chapters. The system review and performance analysis was based upon the transportation system inventory compiled during the fall of 2006, and historical records available regarding system usage.

Thirty-four intersections within West Linn were selected for focused operations analysis. The study intersections are identified in Figure 3-1. At each location, traffic data was gathered and analyzed to evaluate current conditions and performance for all modes of travel. Additional data was collected for other aspects of the transportation system including reported vehicle crashes, built facilities as described by city and Metro GIS data, and reported traffic volumes on state and county facilities.

The following sections describe the characteristics, usage, and performance of the existing transportation system in the City of West Linn.

West Linn

Transportation System Plan Update

LEGEND

00 - Study Intersection & Number

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NO SCALE

Figure 3-1
STUDY AREA

Pedestrian

To assess the adequacy of pedestrian facilities in West Linn, GIS data provided by the city was utilized to create an overview of crosswalks and off-street trails. A field inventory of sidewalks along the city's arterial and collector streets was conducted. The location of existing activity centers such as parks, schools, the library, City Hall, transit stops and the downtown central business district were identified to determine possible pedestrian trip generators. Figure 3-2 shows existing pedestrian facilities in West Linn as well as the location of major activity centers.

Sidewalk connectivity is generally adequate in the downtown area and near most schools. It is desirable to provide at least one continuous sidewalk connection between activity centers and arterial and collector roadways to provide safe and attractive non-motorized travel options. There are locations where sidewalk coverage could be more complete and provide greater connectivity throughout the city. The identified pedestrian issues are summarized below.

Facility Connectivity

The existing sidewalk inventory showed that a basic system of walking facilities is provided along most of the major street within the city; however, there are significant gaps in sidewalks or walkways within the older neighborhoods. These older neighborhoods were developed when street standards did not require sidewalks on higher-class roads, or where topography constrained the ability to design an adequate sidewalk facility. For example, the Willamette district generally has sidewalks on at least one side of the road along collectors and arterials (such as Dollar Street) but there are key gaps along Willamette Falls Drive. The Robinwood neighborhood has no collector streets with sidewalks. An illustration of grade challenges is along Hidden Springs Road, where sidewalks are provided in the uphill direction only in its steepest sections. For many of these cases, it may be not feasible or desirable to construct sidewalks to fill in these gaps.

Given the above, it is recommended that the public involvement process through this plan update should engage neighborhood representatives to identify elements of their area that are the best candidates for filling in facilities, either as sidewalks or more improved walkways. As needed, provisions should be made in the development code to allow for re-development with an appropriate choice of pedestrian facility types for a given neighborhood street.

It is recommended that the focus of filling gaps in the sidewalk occur along arterial streets where physical terrain allows. Examples would include Rosemont Road, Willamette Drive (Highway 43), West A Street, Salamo Road, and portions of Willamette Falls Drive.

Pedestrian Activity Levels

Pedestrian crossing volumes at the study intersections were counted between 3:30 to 6:30 pm during the PM peak hour. The peak hour pedestrian volumes indicate the relative differences in pedestrian demand at study intersections. Although the study area vehicular evening peak hour typically occurs from 4:00 to 5:00 PM, intersections located near schools and other

activity centers may experience higher pedestrian volumes earlier in the day. This is likely at Rosemont Road / Salamo Road and Highway 43 / Cedaroak Drive intersections. Pedestrian volumes at each study intersection are shown in Table 3-1. Locations where 30 or more pedestrians were observed during the three-hour count period are highlighted in gray.

Table 3-1: PM Peak Hour Pedestrian Crossing Volumes at Study Intersections

Intersection	North/South Pedestrian Volume	East/West Pedestrian Volume
Highway 43 / Arbor Drive	2	0
Highway 43 / Marylhurst Drive-Lazy River Way	7	3
Highway 43 / Walling Way	3	0
Highway 43 / Cedaroak Drive	2	14
Highway 43 / Hidden Springs Drive	2	0
Highway 43 / Jolie Pointe Drive	1	0
Highway 43 / Pimlico Drive	1	1
Highway 43 / West "A" Street	1	3
Highway 43 / Holmes Street	2	1
Highway 43 / Lewis Street-Webb Street	0	1
Highway 43 / Burns Street	0	0
Highway 43 / Hood Street-McKillican Street	0	1
Highway 43 / I-205 SB Ramps	4	1
Highway 43 / I-205 NB Ramps	0	0
Highway 43 / Willamette Falls Drive	1	0
Willamette Falls Drive / Sunset Avenue	0	4
Rosemont Road / Carriage Way	0	0
Rosemont Road / Hidden Springs Road	2	1
Rosemont Road / Salamo Road	17	18
Rosemont Road / Summit Street	0	0
Sunset Avenue / Cornwall Street	0	2
Salamo Road / Bland Circle	0	0
Salamo Road / Barrington Drive	0	0
Salamo Road / Parker Road	6	0
Blankenship Road / Tannler Drive	0	0
10th Street / Blankenship Road	4	1
10th Street / I-205 SB Ramp	3	2
10th Street / I-205 NB Ramp	2	0
10th Street / 8th Avenue	4	6
10th Street / Willamette Falls Drive	3	2
Willamette Falls Drive / 12th Street	0	4
Willamette Falls Drive / Dollar Street E	2	1
Willamette Falls Drive / 19th Street	0	0
Willamette Falls Drive / Ostman Road	7	2
Willamette Falls Drive / Dollar Street W	1	0

Source: Traffic Counts conducted November 2006

Typically, the highest pedestrian movements occur at intersections located near retail, recreational and educational land uses. This trend is present in West Linn, as the table shows more significant pedestrian volumes near businesses and schools.

Issues to be Addressed through Plan Update Process

Deficiencies and issues to be carried through the plan update process include:

- Sidewalks throughout the City should be ADA compliant.
- Sidewalk widths for state-owned facilities[1] shall meet ODOT standards or where there are adopted local street plans; sidewalk widths shall follow those plans.
- Provide basic walkway services in all neighborhoods, and identify which facilities should be upgraded to sidewalks.
- Revise the current TSP and SDC projects that show sidewalks in locations that are not feasible or desirable, based on discussions with neighborhood representatives.
- Review spacing and safety of pedestrian crossings for arterials and highways within the city to identify locations where enhancements are required. These typically focus around commercial areas, such as 10th Street, the Bolton Shopping Center, the library, and higher intensity retail uses on Highway 43.
- Identification of walkway / crossing needs should be done in conjunction with routes to major transit stops.

[1] ODOT facilities where sidewalks are required include Highway 43. Sidewalk widths for portions of Highway 43 are specified by the West Linn OR 43 Conceptual Design Plan, adopted December 10, 2007.

West Linn

Transportation System Plan

SIDEWALK INVENTORY

LEGEND

Sidewalks

- 1 ft. - 6 ft. Width
- No Sidewalk

- Off-Street Paths
- City Hall
- Schools
- Library
- Parks
- Community Center
- Freeway
- Major Roads
- Streets
- Railroad
- Water
- City Limits

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Bicycle

To assess the adequacy of bicycle facilities in West Linn, a field inventory of designated bike lanes and shoulder bikeways was conducted. The locations of identified shared roadways and off-street trails were obtained from city-supplied GIS data. The location of existing activity centers such as parks, schools, the library, City Hall, transit stops and the downtown central business district were identified to determine possible bicycle trip generators. Figure 3-3 shows the existing bicycle facility inventory in West Linn as well as the location of major activity centers.

The arterial roadway system in West Linn has basic bike lanes on a few major facilities, but most of the arterial streets have no designated bike facilities. Nearly all collector streets have no bike facilities at all. The only streets in the city with significant bike facilities are Willamette Drive (Highway 43), West A Avenue, and intermittent segments along Summit Street, Parker Road, and Willamette Falls Drive. In many cases, the slope of the roadway limits the feasibility or need for bike lanes on major arterials. Examples include Hidden Springs Road, and the south end of Salamo Road.

Roads with no bike lanes or intermittent bike lanes force bicyclists to share the travel lane with motor vehicles or use the shoulder if available. In many cases, this is not a desirable option for bicyclists due to narrow widths or uneven pavement conditions. Adequate bicycle facilities connections should be provided to allow for safe travel between neighborhoods and activity centers.

Local streets generally are not required to provide bike facilities, since streets with low vehicle volumes (under 3,000 average daily traffic) and slow speeds (25 miles per hour or less) do not require designated bike lanes. In these cases, the traveled way can be shared between motor vehicles and bicyclists. Bicycle issues are summarized at the end of this section.

Bicycle Activity Levels

Bicycle counts were conducted during weekday three-hour periods (3:30 PM to 6:30 PM) at the study intersections in West Linn. The PM Peak hour bicycle volumes at each study intersection are shown in Table 3-2. These volumes indicate extremely low bicycle activity at the study intersections. The only study intersection where more than three bicycles were observed during the three-hour count period was Rosemont Road / Salamo Road with a total of seven. Some bike lanes and sidewalks are present at this intersection.

Table 3-2: Bicycle Crossing Volumes at Study Intersections

Intersection	North/South Bicycle Volume	East/West Bicycle Volume
Highway 43 / Arbor Drive	0	2
Highway 43 / Marylhurst Drive-Lazy River Way	0	0
Highway 43 / Walling Way	1	0
Highway 43 / Cedaroak Drive	0	1
Highway 43 / Hidden Springs Drive	0	0

Intersection	North/South Bicycle Volume	East/West Bicycle Volume
Highway 43 / Jolie Pointe Drive	0	0
Highway 43 / Pimlico Drive	1	0
Highway 43 / West “A” Street	0	0
Highway 43 / Holmes Street	0	0
Highway 43 / Lewis Street-Webb Street	0	1
Highway 43 / Burns Street	0	0
Highway 43 / Hood Street-McKillican Street	1	0
Highway 43 / I-205 SB Ramps	0	0
Highway 43 / I-205 NB Ramps	0	0
Highway 43 / Willamette Falls Drive	0	1
Willamette Falls Drive / Sunset Avenue	2	0
Rosemont Road / Carriage Way	0	0
Rosemont Road / Hidden Springs Road	0	0
Rosemont Road / Salamo Road	1	1
Rosemont Road / Summit Street	1	1
Sunset Avenue / Cornwall Street	0	0
Salamo Road / Bland Circle	0	0
Salamo Road / Barrington Drive	0	0
Salamo Road / Parker Road	2	1
Blankenship Road / Tannler Drive	0	0
10th Street / Blankenship Road	2	0
10th Street / I-205 SB Ramp	0	0
10th Street / I-205 NB Ramp	0	0
10th Street / 8th Avenue	0	2
10th Street / Willamette Falls Drive	1	0
Willamette Falls Drive / 12th Street	0	0
Willamette Falls Drive / Dollar Street E	0	1
Willamette Falls Drive / 19th Street	0	1
Willamette Falls Drive / Ostman Road	0	0
Willamette Falls Drive / Dollar Street W	0	0

Source: Traffic Counts conducted November 2006

Issues to be Addressed through Plan Update Process

Deficiencies and issues to be carried through the plan update process include:

- The overall system of bike lanes provides very limited connectivity between different areas of the city.
- There is no bikeway system on collector streets, other than sharing the roadway with motor vehicles.
- A basic bike route system should be developed along or parallel to all arterial routes in the city, where feasible by topographic and other design constraints. Considerations should include Rosemont Road, and portions of Willamette Falls Drive.

West Linn

Transportation System Plan

BICYCLE FACILITY INVENTORY

LEGEND

Bicycle Lanes

- No Bicycle Facilities
- Shared Lane
- Bicycle Lane

Note: includes lanes under construction at the time of inventory.

- Off-Street Paths
- City Hall
- Schools
- Library
- Parks
- Community Center
- Freeway
- Major Roads
- Streets
- Railroad
- Water
- City Limits

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Transit

Transit service is provided in West Linn by the Tri County Metropolitan Transportation District of Oregon (TriMet), which provides transit service for the Portland Metro area including the counties of Clackamas, Multnomah and Washington. TriMet Route 35 travels through West Linn along Highway 43, connecting the Oregon City Transit Center and downtown Portland. TriMet Route 154 travels between the Oregon City Transit Center and the southwest area of West Linn. There is one park-and-ride in West Linn located at Highway 43 / Cedaroak Drive for commuters wishing to travel north on Route 35. TriMet service to the City of West Linn is summarized in Table 3-3.

Table 3-3: Transit Service Route Weekday Peak Period Level of Service

Transit Route	Average Headways (Minutes)			Level of Service Based on Time between Buses		
	AM	Midday	PM	AM	Midday	PM
#35 Inbound	13	30	27	B	E	D
#35 Outbound	30	30	18	E	E	C
#154 Inbound	41	60	36	E	E	E
#154 Outbound	41	60	36	E	E	E

Note: AM Period = 06:00-08:30, Midday Period = 08:30-16:00, PM Period = 16:00-18:00
Level of Service for transit service based on headway: less than 10 minutes = LOS A;
10-14 minutes = LOS B; 14-19 minutes = LOS C; 20-29 minutes = LOS D; 30-60 minutes = LOS E;
And greater than 60 minutes = LOS F.

The existing transit routes, shelters and amenities are illustrated on Figure 3-4. There are only two stops with bus shelters, near the Bolton Area shopping center and near the intersection of Willamette Falls Drive and Highway 43. There is essentially no transit service available with convenient walking distance for most of the city west of Highway 43. This includes the shopping center on Salamo Road, and several of the school sites.

Issues to be Addressed through Plan Update Process

- Marketing and awareness should be improved to attract higher ridership.
- Consider additional locations for park and ride lot facilities.
- Identify locations along Highway 43 where transit shelter enhancements would be most effective.
- Consider how to connect to potential street car extension to Lake Oswego.

West Linn Transportation System Plan

EXISTING TRANSIT FACILITIES

LEGEND

35	Bus Route w/ Route No. < 30 Min. Headway
154	Bus Route w/ Route No. > 30 Min. Headway

Transit Facilities

- Stop
- Shelter
- Transit Center
- Park and Ride

- Freeway
- Major Roads
- Streets
- Railroad
- Water
- City Limits

Note: bus routes outside West Linn not shown

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TRANSPORTATION SOLUTIONS

Motor Vehicle

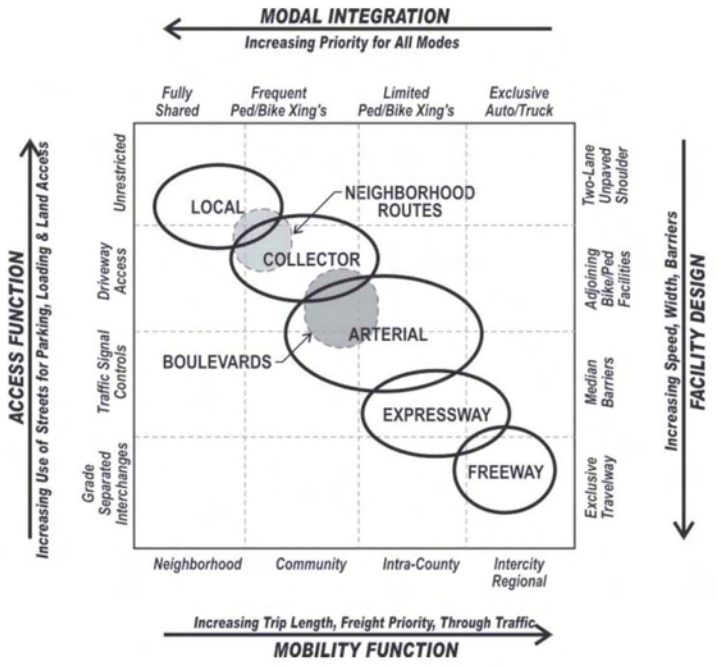
The motor vehicle system within the City of West Linn includes city streets, state highways, and an interstate freeway. This section is divided into a description of how the system has developed to date, then a more detailed review of how it is used and operated.

Functional Classification

The functional classification system is designed to serve transport needs within the community. The schematic diagram below is useful for understanding how worthwhile objectives can have opposing effects by illustrating the competing functional nature of roadway facilities as it relates to access, mobility, multi-modal transport, and facility design. For example, as mobility is increased (bottom axis), the provision for non-motor vehicle modes (top axis) is decreased accordingly. Similarly, as access increases (left axis), the facility design (right axis) dictates slower speeds, narrower travel ways, and non-exclusive facilities. The goal of selecting functional classes for particular roadways is to provide a suitable balance of these four competing objectives.

The diagram shows that as street classes progress from local to collector to arterial to freeway (top left corner to bottom right corner) the following occurs:

- *Mobility Increases* – Longer trips between destinations, greater proportion of freight traffic movement, and a higher proportion of through traffic.
- *Integration of Pedestrian and Bicycle Modes Decreases* – Provisions for adjoining sidewalks and bike facilities are required up through the arterial class, however, the frequency of intersection or mid-block crossings for non-motorized vehicles steadily decreases with higher functional classes. The expressway and freeway facilities typically do not allow pedestrian and bike facilities adjacent to the roadway and any crossings are grade-separated to enhance mobility and safety.
- *Access Decreases* – The shared uses for parking, loading, and direct land access is reduced. This occurs through parking regulation, access control and spacing standards (see opposite axis).



- *Facility Design Standards Increase* – Roadway design standards require increasingly wider, faster facilities leading to exclusive travelways for autos and trucks only. The opposite end of the scale is the most basic two-lane roadway with unpaved shoulders.

Two additional areas are noted on the diagram for Neighborhood Routes and Boulevards that span two conventional street classes.

The current West Linn functional class system[2] for roadway facilities is depicted in Figure 3-5. The existing arterial route from Parker Road to Sunset Avenue is a circuitous route from Parker Road to Lancaster Street to Cornwall Street to Sunset Avenue. The functional classification map published by ODOT for West Linn shows a more direct arterial route with Parker Road bypassing Lancaster Street and connecting directly to Sunset Avenue. However, the existing land use and road conditions support the route as shown in the West Linn TSP. This pattern will continue until development provides the needed arterial standard street improvements. The West Linn functional classification hierarchy is described in Table 3-4.

Table 3-4: West Linn Street Functional Classification Description

Classification	Description
Principal Arterial	Typically state highways that provide the high level roadway capacity to local land uses. These routes connect over the longest distance (sometimes miles long) and are less frequent than other arterial or collectors. These highways generally span several jurisdictions and many times have statewide importance (as defined in the ODOT State Highway Classification).
Arterial	Arterials serve to interconnect and support the principal arterial highway system. 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 in lieu of a well placed arterial street. Many of these routes connect to cities surrounding West Linn.
Collector	Collectors provide both access and circulation within residential and commercial/industrial areas. Collectors differ from arterials in that they provide more of a citywide circulation function, do not require as extensive control of access and penetrate residential neighborhoods, distributing trips from the neighborhood and local street system.
Neighborhood Route	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, 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 to be referred to in a later section in this chapter). 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	Local streets have the sole function of providing access to immediate adjacent land. Service to "through traffic movement" on local streets is deliberately discouraged by design

Source: West Linn Transportation System Plan.

[2] City of West Linn Transportation System Plan, 1998. Street Element adopted in 2000.

West Linn

Transportation System Plan

EXISTING FUNCTIONAL CLASS

LEGEND

- Freeway
- Principal Arterial
- Arterial
- Collector
- Neighborhood Route
- Local Street
- Railroad
- Water
- City Limits

N

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The Oregon Highway Plan identifies the Oswego Highway as a Statewide Highway for the majority of its length in West Linn and as a District Highway approximately between I-205 and Highway 99E. Statewide Highways often function as connectors to larger urban areas, provide safe and efficient, high-speed, continuous flow operations, and serve as inter-urban and inter-regional connectors. District Highways often function as county and city arterials or collectors and provide connections between small urbanized areas, rural centers and urban hubs, while also serving local access and traffic. The management objective for District Highways is to provide for safe and efficient, moderate to high-speed continuous-flow operation in rural areas and moderate to low-speed operation for traffic flow and pedestrian/bicycle movements in urban areas.

Roadway facilities with differing City, County, and State functional classifications are listed in Table 3-5.

Table 3-5: Conflicting Functional Classifications

Corridor	City Classification	County Classification	ODOT Classification
Highway 43 (Willamette Dr)	Major arterial / Principal route	Major arterial	Urban Principal Arterial / Urban Minor Arterial
I-205	Major arterial / Principal route	Freeway / Expressway	Urban Principal Arterial
McKillican Street	Collector	Local	N/A

Sources: 1998 West Linn TSP, Clackamas County Comprehensive Plan (updated August 2005), Oregon Highway Plan (updated January 2006)

Roadway Jurisdiction

Roadway jurisdiction (ownership and maintenance responsibilities) of the various roads in the City of West Linn is identified in Figure 3-6. The Oswego Highway (OR43) and I-205 along with its entrance and exit ramps are state facilities managed by ODOT. Arterial and collector roadways outside of the West Linn city limits are owned and operated by Clackamas County or other cities, while the city is responsible for all other roads within city limits.

Roadway Connectivity

Interstate 205 (I-205), located in the southern section of West Linn, serves as a regional facility and the major route to the East Portland metropolitan area. The Oswego Highway (OR 43 or Highway 43 or Willamette Drive) functions as the major north-south arterial through West Linn and includes turn lanes at several intersections. Access to I-205 from Highway 43 is provided at their interchange on the east edge of West Linn. Access to I-205 in West Linn is also provided farther west at 10th Street.

Roadway Characteristics

Field inventories were conducted to determine characteristics of major roadways in the TSP study area. Data collected included posted speed limits, roadway lanes, geometry and lane configurations, and intersection controls. These characteristics define roadway capacity and operating speeds through the street system, which affects travel path choices for drivers in West Linn. The results are listed in Table 3-6.

Table 3-6 also includes a focused inventory of the posted speeds in West Linn. The majority of roadways in West Linn are posted at 25 mph. Arterial roadways such as Willamette Falls Drive, Salamo Road and Rosemont Road, as well as Highway 43 are posted at higher speeds ranging from 25 to 45 mph.

Intersection control types at study intersections are shown on Figure 3-7. Five of the ten traffic signals in West Linn are located in I-205 interchange areas and the remaining five are located along Highway 43. The intersection of Highway 43/Holmes Street has a pedestrian signal for Highway 43 traffic but is stop-controlled on the side street. All-way stop controlled intersections are located at four arterial intersections and the rest of the study intersections are two-way stop controlled.

Table 3-6: Existing Study Area Roadway Characteristics by Functional Classification

Corridor	Posted Speed	Street Width [ft]	ROW Width [ft]	Number of Lanes	Lane Width [ft]
Principal Arterial					
Highway 43 (Willamette Drive)	35	27-80	60	2-4	12
Arterial					
Hidden Springs Road	25	30-53	60	2	11
West A Street	25	37-42	60	2	11
Willamette Falls Drive	25-45	32-41	120	2	11-12
Rosemont Road	25-40	23-40	60	2	10
Santa Anita Drive	25	33-54*	50-84	2	12-15
Salamo Road	25-40	32-55*	30	2	12
Summit Street *(also Collector)*	25	24-45	60-70	2	10-11
Skyline Drive	25	28-36	50	2	12
Parker Road	25-35	20-50*	60	2	10-12
Cornwall Street	25	26-33	60	2	10-11
Sunset Avenue	25	26-29	60	2	10-11
10th Street	25	15-24	50	2-4	11
12th Street	25	52-58	80	2	11
Tualatin Avenue	25	25	60	2	11
Collector					
Marylhurst Drive	25	27	50	2	10
Hillcrest Drive	25	17-23	50	2	10
Suncrest Drive	25	25-38	50	2	10
Carriage Way	25	28-38	50	2	18
Cedaroak Drive *(also Neighborhood Route)*	25	27-35	50	2	11
Old River Road	25	20-25	60	2	11
Elmran Avenue	25	20	50	2	10
Nixon Avenue	25	18-25	40-50	2	10
Mapleton Drive		18-20	50	2	11

Corridor	Posted Speed	Street Width [ft]	ROW Width [ft]	Number of Lanes	Lane Width [ft]
Jolie Pointe Road	25	18-37	60	2	9
Larson Avenue		22-30	50	2	14
Failing Street		24	60	2	12-14
Pimlico Drive	25	31-40	60	2	14-16
Clark Street		42-43		2	10
Long Street		23-44		2	12-14
Simpson Street		23-44	50	2	10-11
Bland Circle	25	30-34	60	2	10-16
Tannler Drive		32-44	40-50	2	12
Blankenship Road		25-46	60	2	10-14
Debok Road	25	32-48	60	2	12-14
Johnson Road	25-40	22-42	60	2	10-12
Dollar Street	25	28-34		2	11
Ostman Road	25	21-35		2	11-12
Burns Street	25	20-23	50	2	14
Hood Street	25	23-31	40	2	11
McKillican Street	25	40-42	60	2	12
Neighborhood Route					
Dillow Road	25	20-25	30-60	2	8-11
Broadway Street		20-43		2	10-12
Horton Road		37-44*	50-55	2	16
Exeter Street	25	18-32	60	2	10-11
Oxford Street	25	35	60	2	10-14
Barrington Drive		34-44		2	12
Beacon Hill Drive		18-35		2	12
Imperial Drive		37-45		2	10-12
County Roads					
Grapevine Road	25	18-33		2	9
Woodbine Road		18-32	40-150	2	8-15
Pete's Mt Road		22-25	60	2	10

*Street width includes traffic island.

Table 3-6 lists the existing number of lanes on each roadway in West Linn. The majority of roadways in West Linn are two lanes, although additional turn lanes are provided at I-205 interchange areas and many arterial intersections along Highway 43, Salamo Road, and Blankenship Road. Local streets in the City of West Linn are two lane roadways.

The key roadways in West Linn were measured at various locations to determine typical cross-section widths. Some streets within the study area have new sections intermixed with older sections resulting in ranges of roadway widths depending on location.

West Linn

Transportation System Plan

ROADWAY OWNERSHIP/ JURISDICTION

LEGEND

Ownership

State of Oregon

Clackamas County

Note: All other roads within West Linn are under the authority of the City.

Freeway

Major Roads

Streets

Railroad

Water

City Limits

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West Linn

Transportation System Plan

EXISTING INTERSECTION CONTROL

LEGEND

Intersection Control

- Signalized
- Stop
- All-Way Stop

- Freeway
- Major Roads
- Streets
- Railroad
- Water
- City Limits

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TRANSPORTATION SOLUTIONS

Pavement Conditions

The following section is an excerpt from the recent pavement conditions report[3] that was prepared for the City of West Linn.

Engineering Information Services, INC. of Salem, Oregon was contracted by the City of West Linn to Provide Pavement Management Technical Services to 1) Conduct a visual pavement assessment of each City street and, 2) Determine the impacts of funding levels on the network pavement condition. The Metropolitan Transportation Commission, MTC, Pavement Management Program (PMP) was used for this evaluation. This system strives to develop a maintenance strategy that will improve the overall condition of the street network to an optimal Pavement Condition Index, PCI, in the low to mid 80's and maintain it at that level.

A detailed visual inspection of the City of West Linn streets resulted in a calculated average PCI of 68. Using a 0-100 PCI scale, with 100 being most favorable, a rating of 68 places the City's street network in the upper range of the satisfactory condition category. In order to determine GASB 34 Statement asset valuation and funding levels to maintain current infrastructure, the City's street network replacement value is estimated at $97.5 million. Using this estimate and the MTC program, an unrestricted funding level of $15.1 million over the next six-year period is needed to achieve a PCI in the low to mid 80's. Of this total, approximately $6.4 million is needed in the first year alone, primarily to repair streets in the 'fair' to 'poor' range, those streets with a PCI of 0-49, which is about 17 percent of West Linn's total network. The total budget needs amount of $15.1 million exceeds West Linn's current funding level by $13.6 million, thus creating a backlog in deferred maintenance.

In order to sustain the current PCI of 68 over a six-year period, an annual investment level of $550,000 would need to be allocated over the next six years. Using this budget amount, the cost of deferred maintenance backlog is 2012 would be approximately 14.8 million. Utilizing the same analysis period of six years with West Linn's current maintenance and rehabilitation funding of $1.5 million over six-years shows the PCI decreasing to 64 in 2012-with deferred maintenance being just over $16.2 million. Current funding allocation of $1.5 million is not sufficient to address all of the City of West Linn's future street maintenance needs.

Additionally, planning at an investment level totaling $4.5 million over a six (6) year period shows that the PCI will gradually increase reaching 70 over the analysis period. This allows for 77.8% of the street network to be in the 'good' condition category with deferred maintenance in excess of $13.5 million in the year 2015.

Although the Pavement Condition Index currently in the high 60's, the PCI is not the only critical indicator of the overall health of the paved street network. Based on the current funding levels the deferred maintenance backlog will continue to increase, which will place additional financial burden and funding requirements to maintain the street system in future years. A surface management plan should be developed that will address the projected deferred maintenance back-log to avoid future exponential cost increase in providing an acceptable service level of the City's paved street system.

[3] Executive Summary from City of West Linn Public Works Department Pavement Management Program Budget Options Report, Prepared by Engineering Information Services, June 2007.

Designated Street Parking

An inventory of existing designated on-street parking was conducted for the arterial and collector roadways within the study area. On-street parking is not generally provided on arterials or collectors in West Linn with the exception of angled and parallel parking accessed by frontage roads along Willamette Falls Drive between 10th Street and Dollar Street (East).

Access Management

Proper roadway access spacing is important to maintain operating characteristics and safety. Typically, each parcel is allowed access to the adjacent roadway. However, when roadway access points are located too frequently along a roadway, action may need to be taken. Access management practices can include closure, consolidation or relocation of accesses.

The ODOT access management standards, as defined in OAR 734-051, call for minimum distances between access points on the same side of the highway. The standards vary depending on the highway classification and the posted speed on the roadway, as shown in Table 3-7. The ODOT spacing standards apply to the Oswego Highway (OR 43) and the I-205 interchange areas.

Most segments of the Oswego Highway (OR 43) do not meet ODOT access spacing standards as a result of frequent roadway intersections or driveways located along the highway as it passes through residential areas.

Table 3-7: ODOT Access Management Standards (feet)

	Posted Speed (MPH)				
Facility	**55 or greater**	**50**	**40,45**	**30,35**	**25 or less**
Statewide Highway (ft)	1,320	1,100	990	770	550
District Highway (ft)	700	550	500	400	400

Source: Oregon Highway Plan, Table 15, ODOT (1999)

The Clackamas County standards for county road access spacing are listed in Table 3-8. Like ODOT standards, the minimum spacing varies depending on posted speed on the roadway.

Table 3-8: Clackamas County Approach Spacing Standards (feet)

	Access Requirements		
Facility	**Signal Spacing**	**Street**	**Driveway**
Major Arterial	1000	400	400*
Minor Arterial	600	300	300*
Collector			150**
Local			25 distance from right of way lines to nearest intersection

Source: Clackamas County Comprehensive Plan, Chapter 5 – Transportation, TableV-5
* Single family residential should not access major or minor arterial,
Access management targets shall be implemented when appropriate
** Single family residential driveways should not access a collector, but when they are allowed spacing of 100 ft is minimum

Access spacing standards identified in the 1998 West Linn TSP are summarized in Table 3-9.

Table 3-9: West Linn Spacing Standards (feet)

	Access Requirements		
Facility	**Signal Spacing**	**Street**	**Driveway**
Arterial			
(Urban Area)	2,650	600	300
(Opportunity Area)	1,320	NA	NA
Collector	1,320	200	150
Local Residential Street	NA	100	50
Local Commercial Street	NA	100	50

Source: West Linn Transportation System Plan, Table 3-25.

Motor Vehicle Volumes

An inventory of peak hour traffic conditions was performed in the fall of 2006 as part of the West Linn TSP Update. Thirty-four study intersections where selected for focused analysis in coordination with the City of West Linn and ODOT staff in order to address areas of concern along major roadways. PM peak hour turn movement counts between 3:30 to 6:30 PM were conducted at the study intersections for establishing current traffic performance.

Figures 3-8 and 3-9 show the average daily two-way existing traffic volumes on roadways in the West Linn area. These two-way traffic volumes can vary from day to day and month to month based on weather, surrounding roadway conditions (such as construction), and holidays.

The figure indicates that the highest vehicle volumes (not including I-205) in West Linn occur along the principal arterial, Highway 43. Vehicle volumes on this roadway are over 20,700 vehicles per day.

Traffic count data was used as a basis for evaluating traffic performance at the study intersections during PM peak hour conditions. To analyze operating conditions it is necessary to determine peak hour volumes for each turning movement, lane configurations, and traffic signal timings at signalized intersections. The existing PM peak hour traffic volumes at study intersections are illustrated in Figures 3-10a through 3-10c.

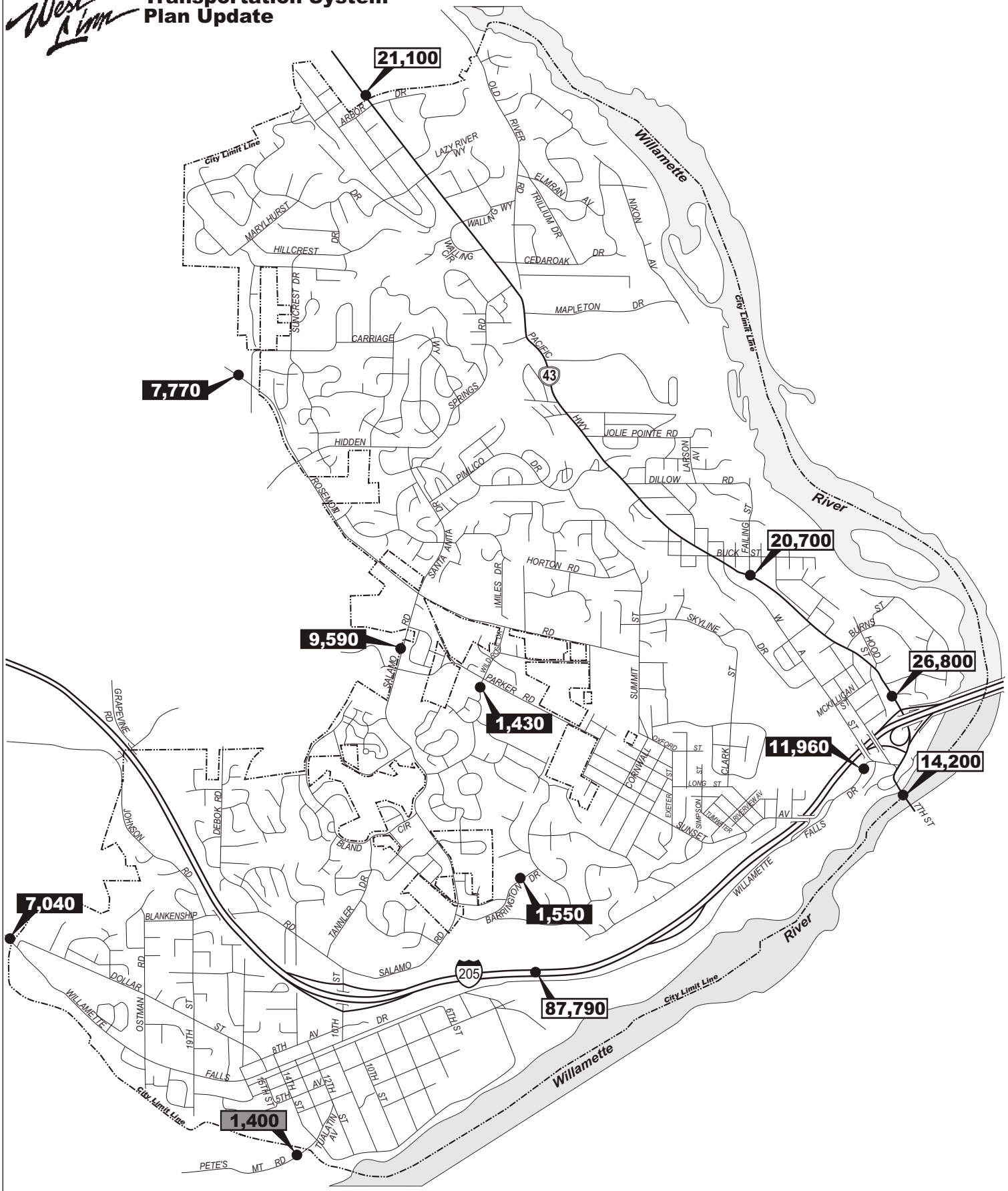
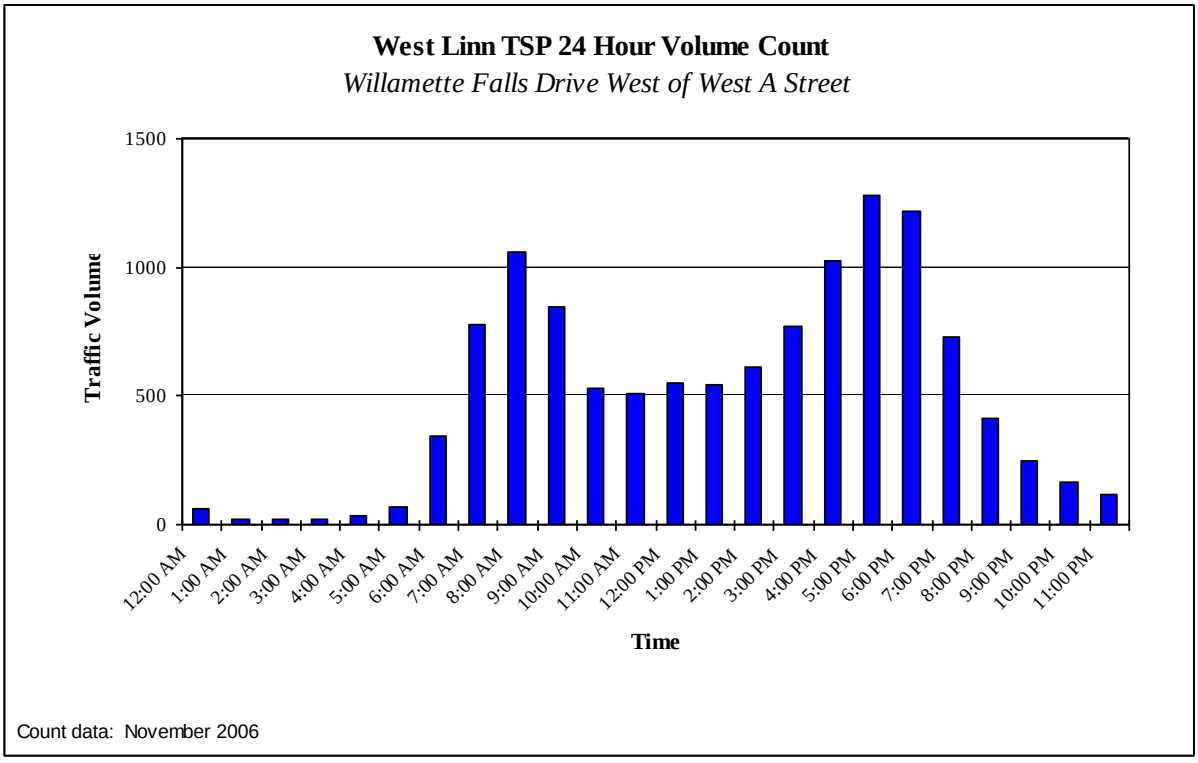
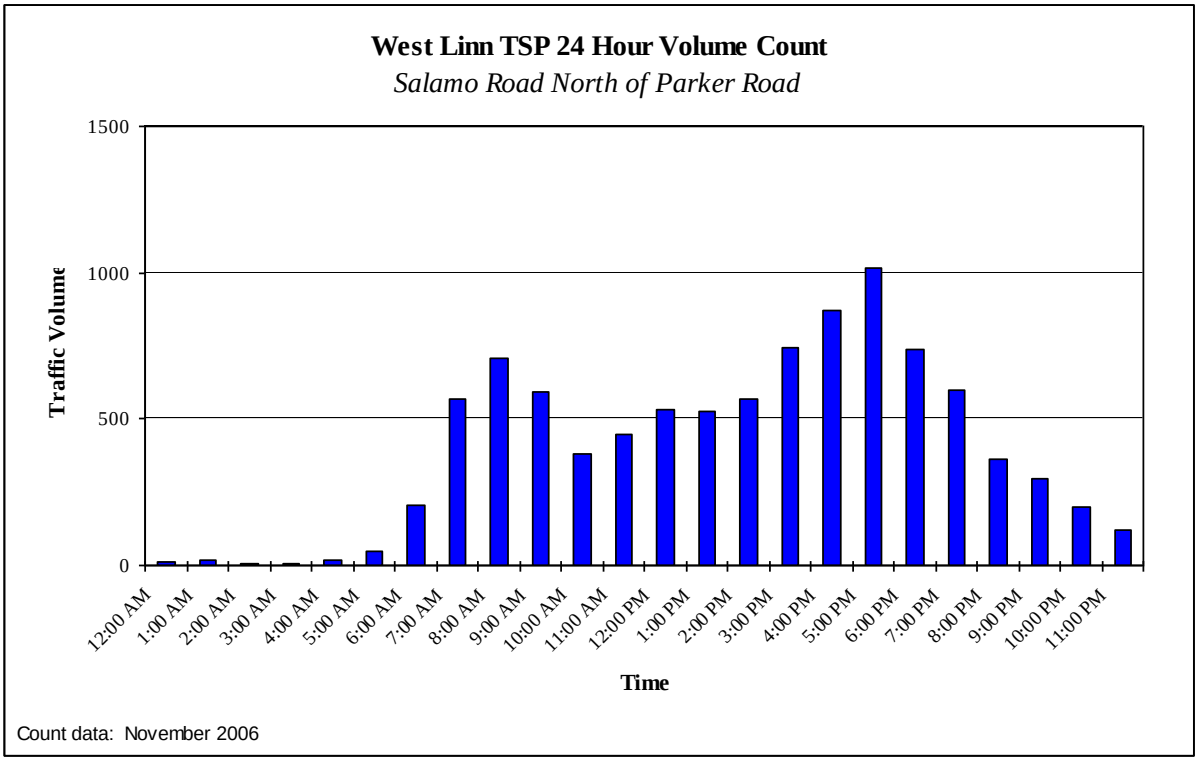
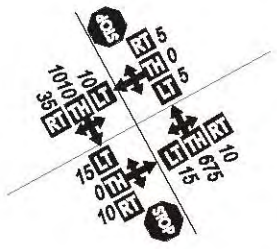

Transportation System Plan Update
West Linn
21,100
7,770
9,590
1,430
20,700
26,800
11,960
14,200
1,550
87,790
7,040
1,400
Willamette River
City Limit Line
ARBOR DR
LAZY RIVER WY
OLD RIVER RD
MARYLHURST DR
HILLCREST DR
WALLING WY
WALLING CIR
TRILLIUM DR
ELMRAN AV
NIXON AV
CEDAROAK DR
MAPLETON DR
SUNCREST DR
CARRIAGE WAY
SPRINGS
PACIFIC HWY 43
JOLIE POINTE RD
LARSON AV
DILLOW RD
HIDDEN
ROSEMONT
PIMLICO DR
SANTA ANITA DR
HORTON RD
MILES DR
SALAMO RD
WILLAMETTE DR
PARKER RD
SUMMIT ST
SKYLINE DR
W A BURNS ST
HOOD ST
FAILING ST
BUCK ST
MCKILLICAN ST
OXFORD ST
CORNWALL ST
EXETER ST
CLARK ST
LONG ST
SIMPSON ST
TUMWATER DR
BLUEVIEW AV
SUNSET AV
17TH ST
FALLS DR
GRAPEVINE RD
JOHNSON RD
DEBOK RD
BLAND CIR
TANNLER DR
BARRINGTON DR
BLANKENSHIP RD
DOLLAR ST
OSTMAN RD
19TH ST
8TH AV
10TH DR
6TH ST
14TH ST
15TH ST
12TH AV
10TH ST
5TH ST
TUALITIN ST
PETE'S MT RD
205
LEGEND
● - Count Location
000 - 24 Hour Count Volume (Collected in Nov. 2006)
000 - 2005 Average Annual Daily Traffic Volume (From ODOT Data)
000 - 2005 Average Annual Daily Traffic Volume (From Clackamas County Data)
DKS Associates
TRANSPORTATION SOLUTIONS
NO SCALE
Figure 3-8
24 HOUR VOLUMES

Figure 3-9: 24-Hour Tube Count Data on Willamette Falls Drive and Salamo Road

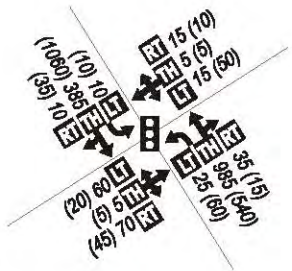




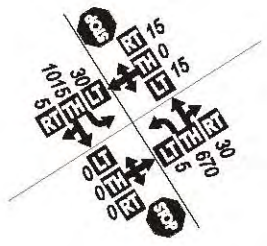
1 Hwy 43 @ Arbor Dr



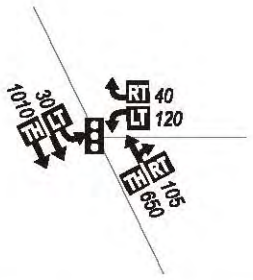
2 Hwy 43 @ Marylhurst Dr-Lazy River Wy



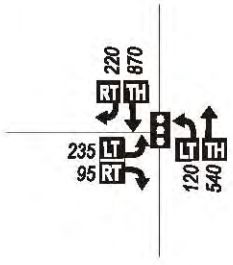
3 Hwy 43 @ Walling Wy



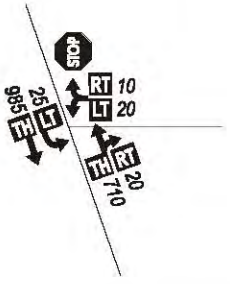
4 Hwy 43 @ Cedaroak Dr



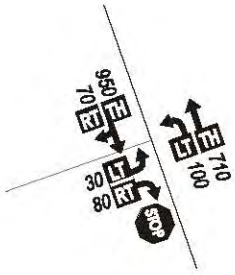
5 Hwy 43 @ Hidden Springs Rd



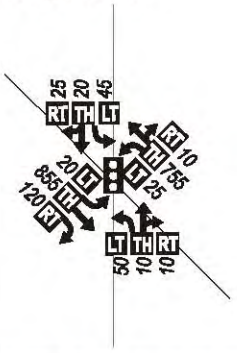
6 Hwy 43 @ Jolie Pointe Rd



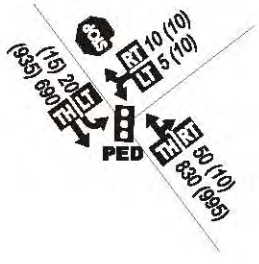
7 Hwy 43 @ Pimlico Dr



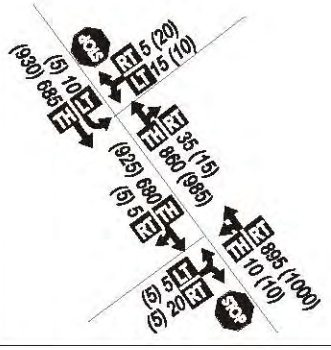
8 Hwy 43 @ West A St



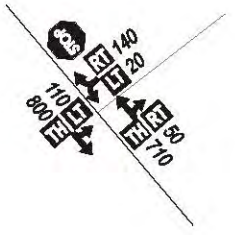
9 Hwy 43 @ Holmes St



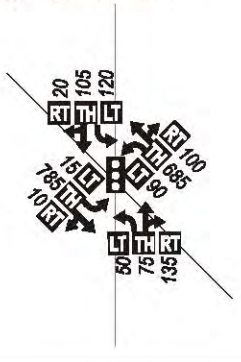
10 Hwy 43 @ Lewis St-Webb St



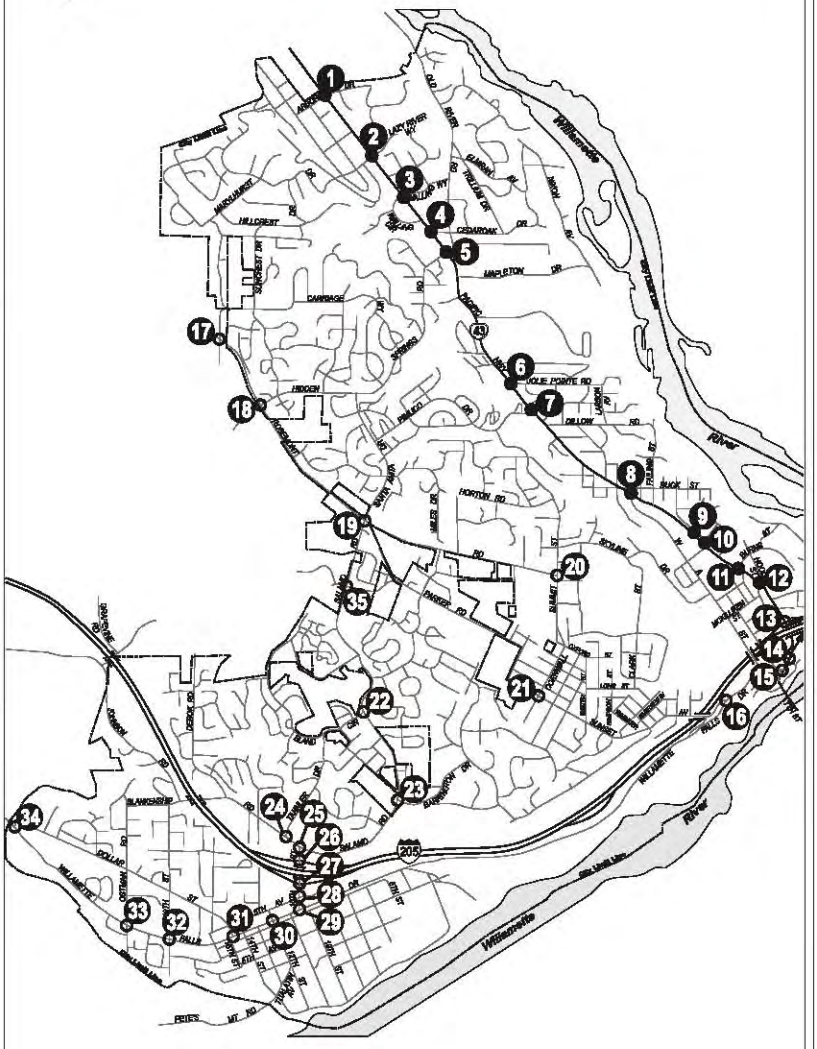
11 Hwy 43 @ Burns St



12 Hwy 43 @ McKillican St



West Linn Transportation System Plan Update



LEGEND

- Study Intersection & Number (This Sheet)
- Study Intersection & Number (Not This Sheet)
- Lane Configuration
- STOP - Stop Sign
- Traffic Signal
- *00* - PM Peak Hour Traffic Volume
- LT TH RT - Volume Turn Movement (Left-Thru-Right)

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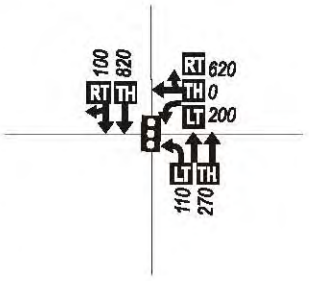
NO SCALE

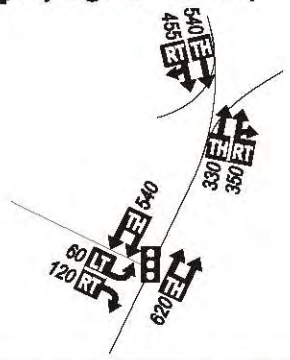
Figure 10a

EXISTING CONDITIONS

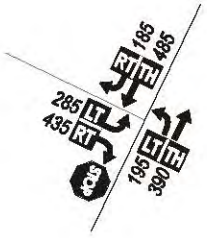
13 Hwy 43 @ I-205 SB On/Off Ramps



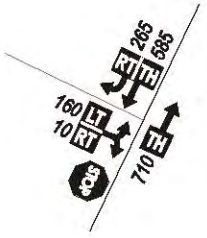
14 Hwy 43 @ I-205 NB Off-Ramp



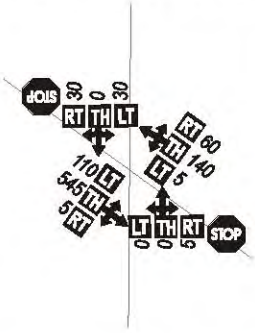
15 Hwy 43 @ Willamette Falls Dr



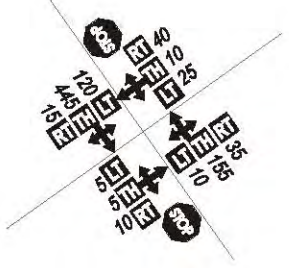
16 Willamette Falls Dr @ Sunset Av



17 Rosemont Rd @ Carriage Wy



18 Rosemont Rd @ Hidden Springs Rd



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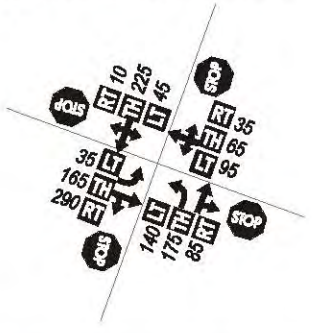
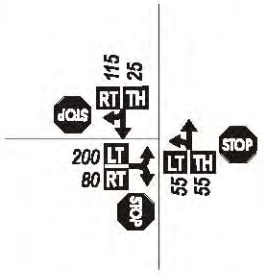
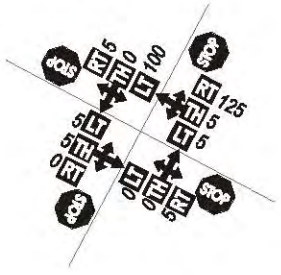


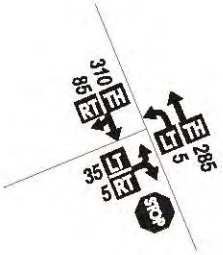
20 Rosemont Rd @ Summit St



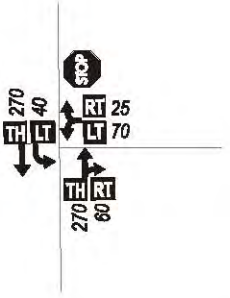
21 Sunset Av @ Cornwall St



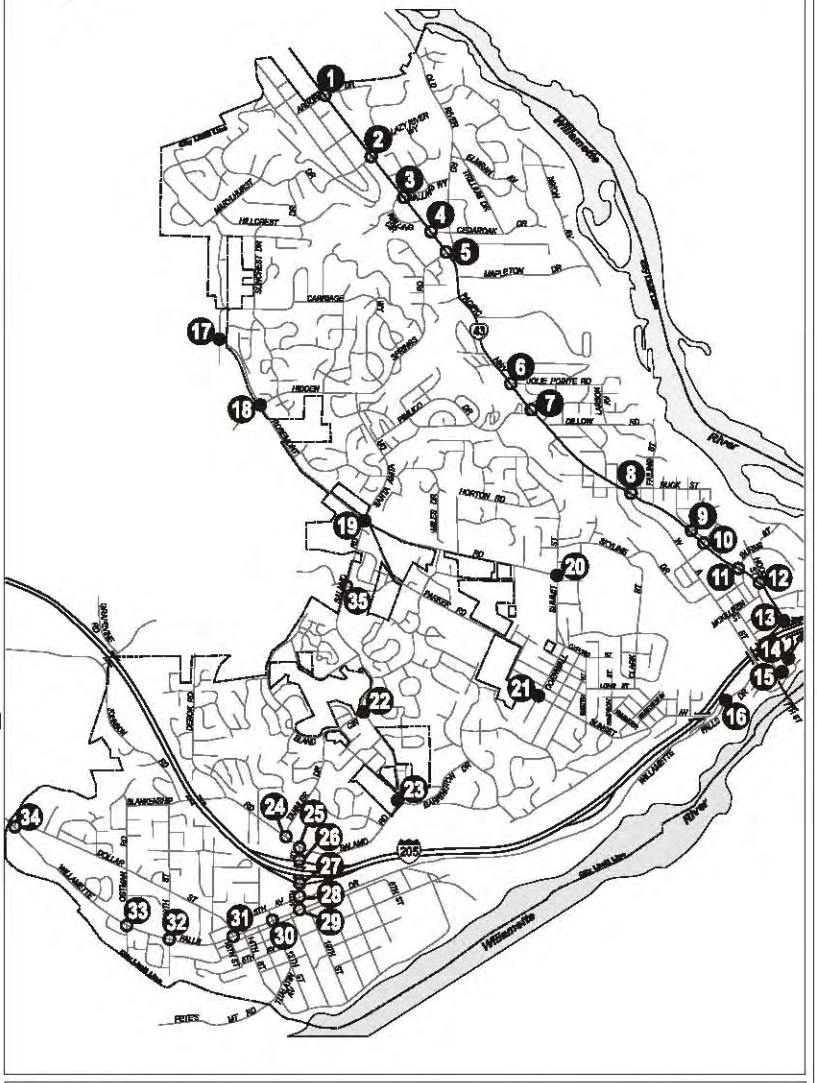
22 Salamo Rd @ Bland Cir



23 Salamo Rd @ Barrington Dr



West Linn Transportation System Plan Update



LEGEND

- Study Intersection & Number (This Sheet)
- Study Intersection & Number (Not This Sheet)
- Lane Configuration
- Stop Sign
- Traffic Signal
- 00 - PM Peak Hour Traffic Volume
- LT TH RT - Volume Turn Movement (Left-Thru-Right)

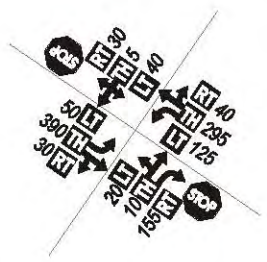
DKS Associates
TRANSPORTATION SOLUTIONS

NO SCALE

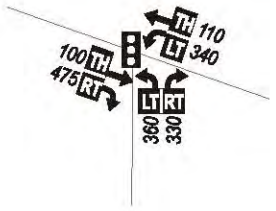
Figure 10b

EXISTING CONDITIONS

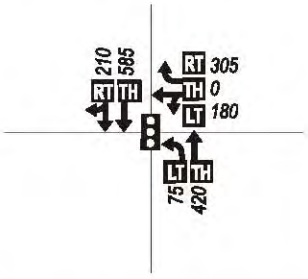
24 Blankenship Rd @ Tannler Dr



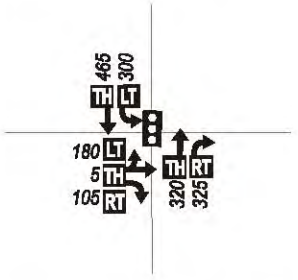
25 10th St @ Blankenship Rd



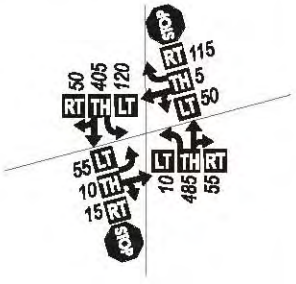
26 10th St @ I-205 SB Ramps



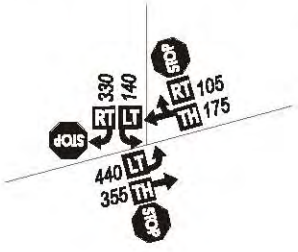
27 10th St @ I-205 NB Ramps



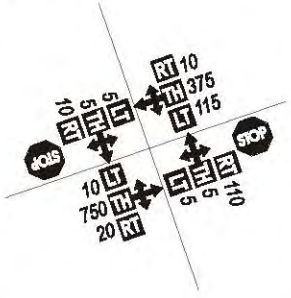
28 10th St @ 8th Av



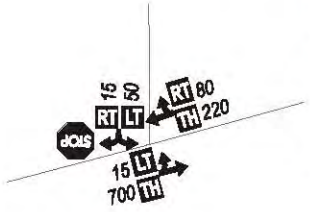
29 10th St @ Willamette Falls Dr



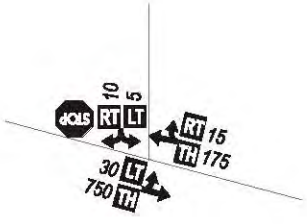
30 Willamette Falls Dr @ 12th St



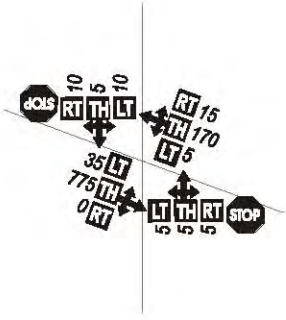
31 Willamette Falls Dr @ Dollar St E



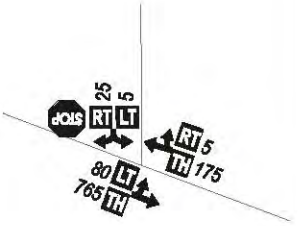
32 Willamette Falls Dr @ 19th St



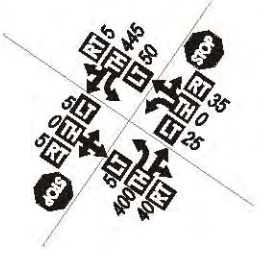
33 Willamette Falls Dr @ Ostman Rd



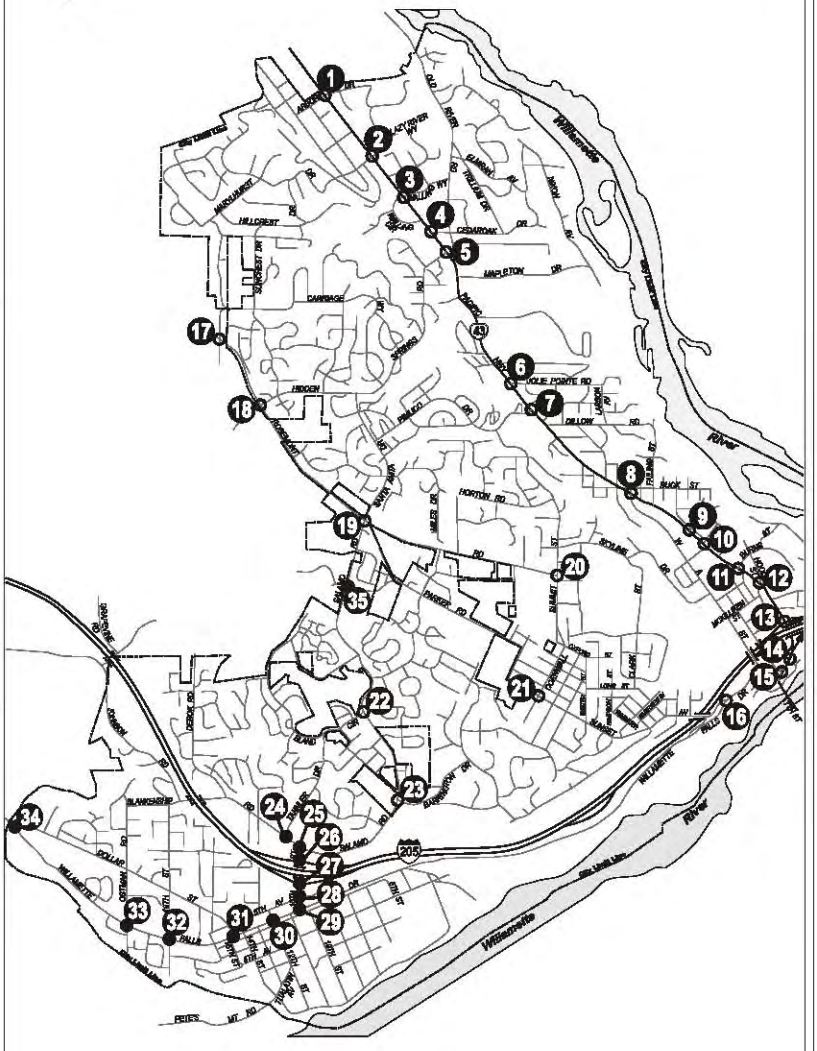
34 Willamette Falls Dr @ Dollar St W



35 Salamo Rd @ Parker Rd



West Linn Transportation System Plan Update



LEGEND

- Study Intersection & Number (This Sheet)
- Study Intersection & Number (Not This Sheet)
- Lane Configuration
- Stop Sign
- Traffic Signal

00 - PM Peak Hour Traffic Volume

LT TH RT - Volume Turn Movement
Left-Thru-Right

DKS Associates
TRANSPORTATION SOLUTIONS

NO SCALE

Figure 10c

EXISTING CONDITIONS

Existing Operation Conditions

Level of Service (LOS) and volume to capacity (v/c) ratios are both used as measures of effectiveness for intersection operation. LOS is similar to a "report card" rating based upon 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 peak hour operating conditions. Level of Service F represents conditions where average vehicle delay exceeds 80 seconds per vehicle entering a signalized intersection and demand has exceeded capacity. This condition is typically evident in long queues and delays. Unsignalized intersections provide levels of service for major and minor street turning movements. For this reason, LOS E and even LOS F can occur for a specific turning movement; however, the majority of traffic may not be delayed (in cases where major street traffic is not required to stop). LOS E or F conditions at unsignalized intersections generally provide a basis to study intersections further to determine availability of acceptable gaps, safety and traffic signal warrants.

A volume to capacity ratio (v/c) is the peak hour traffic volume at an intersection divided by the maximum volume that intersection can handle. For example, when a v/c is 0.80, peak hour traffic is using 80 percent of the intersection capacity. If traffic volumes exceed capacity, queues will form and will lengthen until demand subsides below the available capacity. When the v/c approaches 1.0, intersection operation becomes unstable and small disruptions can cause traffic flow to break down.

Level of service, delay and volume to capacity ratios are used as measures of effectiveness for study intersection performance. The minimum operational standard specified in the City of West Linn Comprehensive Plan (April 2006) is LOS D for all facilities except principal arterials (Highway 43) where the minimum is LOS E. The ODOT operating performance standards[4] require intersections inside an Urban Growth Boundary and within the Portland Metropolitan Region to operate below the maximum volume to capacity ratios shown in Table 3-10.

Table 3-10: ODOT Operating Standards

ODOT Highway Category	Location	Volume to Capacity Ratio (v/c)
District/Local Interest Roads	Unsignalized approaches to Highway 43	0.90
Corridors	Highway 43 from City Limit to Highway 99E except West A Street through McKillican Street	0.99
Town Center	West A Street through McKillican Street	1.1 first hour 0.99 second hour
Ramp Terminals for Freeway Interchange Ramps	I-205 ramp intersections	0.85

[4] *1999 Oregon Highway Plan*, Oregon Department of Transportation, August 2006, Policy 1F.

The PM peak hour intersection volumes were used to determine the existing study intersection operating conditions based on the *2000 Highway Capacity Manual* methodology for signalized and unsignalized intersections[5]. Traffic volumes and level of service calculation sheets can be found in the appendix.

Table 3-11 summarizes the existing weekday PM peak hour intersection operation at study intersections. Intersections controlled by traffic signals operate within accepted standards along Highway 43, and at some locations on 10th Street. However, the intersection of 10th Street / Salamo Road-Blankenship Drive operates at capacity today, because of the close spacing with the freeway off-ramps and coordinated signal controls between those two adjacent intersections. Queues on Salamo Road approach have been observed to extend over a quarter-mile uphill during peak periods, and require several traffic cycles to clear.

The locations controlled by all-way stops generally operate within acceptable standards, as do those with stop sign controls on the minor street approach only. There are several exceptions along Highway 43 where the estimated delay for vehicles turning left onto the highway from the minor street is very significant, with an LOS F rating. These locations will be reviewed to determine if volumes and spacing are sufficient to justify installation of traffic signals or other higher capacity controls.

Table 3-11: Weekday PM Peak Hour Intersection Level of Service

Intersection	LOS	Average Delay (Sec)	Volume/ Capacity (v/c)	Measure of Effectiveness		MOE Met ?
				Agency	Maximum	
Signalized Intersections						
Highway 43 / Marylhurst Dr-Lazy River Way	B	16.3	0.80	ODOT	v/c 0.99	Yes
Highway 43 / Cedaroak Dr	B	10.4	0.65	ODOT	v/c 0.99	Yes
Highway 43 / Hidden Springs Rd	C	25.0	0.83	ODOT	v/c 0.99	Yes
Highway 43 / West A St	B	12.5	0.74	ODOT	v/c 1.1	Yes
Highway 43 / Hood St-McKillican St	C	23.6	0.76	ODOT	v/c 1.1	Yes
Highway 43 / I-205 SB	C	26.5	0.85	ODOT	v/c 0.85	Yes
Highway 43 / I-205 NB	A	8.0	0.30	ODOT	v/c 0.85	Yes
10th St / Blankenship Dr	D	55.0	0.63	ODOT	v/c 0.85	Yes
10th St / I-205 SB	C	34.4	0.61	ODOT	v/c 0.85	Yes
10th St / I-205 NB	B	16.1	0.65	ODOT	v/c 0.85	Yes
All-Way Stop Intersections						
Salamo Rd / Rosemont Rd	E	38.3	**>1**	City	LOS D	**No**
Rosemont Rd / Summit St	A	9.2	0.37	City	LOS D	Yes
Sunset Ave / Cornwall St	A	7.6	0.15	City	LOS D	Yes
Willamette Falls Dr / 10th St	C	23.8	0.87	City	LOS D	Yes
Unsignalized Intersections						
Highway 43 / Arbor Dr	B/**F**	1.5	0.03 / 0.37	ODOT	v/c 0.99/0.90	Yes
Highway 43 / Walling Way	B/E	0.9	0.04 / 0.21	ODOT	v/c 0.99/0.90	Yes

[5] *2000 Highway Capacity Manual*, Transportation Research Board, 2000.

Intersection	LOS	Average Delay (Sec)	Volume/ Capacity (v/c)	Measure of Effectiveness		MOE Met ?
				Agency	Maximum	
Highway 43 / Jolie Pointe Rd	A/E	0.8	0.03 / 0.22	ODOT	v/c 0.99/0.90	Yes
Highway 43 / Pimlico Dr	B/**F**	7.9	0.16 / **>1**	ODOT	v/c 0.99/0.90	**No**
Highway 43 / Holmes St	B/**F**	2.7	0.02 / 0.65	ODOT	v/c 0.99/0.90	Yes
Highway 43 / Lewis St	B/E	0.6	0.01 / 0.15	ODOT	v/c 0.99/0.90	Yes
Highway 43 / Burns St	B/**F**	39.6	0.23 / **>1**	ODOT	v/c 1.1/0.90	**No**
Highway 43 / Willamette Falls Dr	A/**F**	73.5	0.21 / **>1**	ODOT	v/c 0.99/0.90	**No**
Willamette Falls Dr / Sunset Ave	B/**F**	98.2	0.22 / **>1**	City	LOS D	**No**
Rosemont Rd / Carriage Way	A/C	2.4	0.09 / 0.21	City	LOS D	Yes
Rosemont Rd / Hidden Springs Rd	A/C	3.1	0.10 / 0.14	City	LOS D	Yes
Salamo Rd / Bland Circle	A/B	0.8	0.00 / 0.09	City	LOS D	Yes
Salamo Rd / Barrington Dr	A/C	2.5	0.04 / 0.20	City	LOS D	Yes
Salamo Rd / Parker Rd	A/C	1.6	0.05 / 0.13	City	LOS D	Yes
Blankenship Road / Tannler Dr	A/**F**	8.0	0.13 / 0.52	City	LOS D	**No**
10th St / 8th Ave	A/**F**	10.1	0.13 / 0.73	City	LOS D	**No**
Willamette Falls Dr / 12th St	A/C	3.7	0.17 / 0.23	City	LOS D	**No**
Willamette Falls Dr / Dollar St (East)	A/C	1.3	0.01 / 0.21	City	LOS D	Yes
Willamette Falls Dr / 19th St	A/**F**	42.6	0.01 / 0.95	City	LOS D	**No**
Willamette Falls Dr / Ostman Rd	A/C	0.8	0.03 / 0.06	City	LOS D	Yes
Willamette Falls Dr / Dollar St (West)	A/B	1.0	0.03 / 0.07	City	LOS D	Yes

Notes: *LOS = Level of Service*
Delay = Average vehicle delay in the peak hour for entire intersection in seconds.
MOE = Measure of Effectiveness

Unsignalized Intersection Operations:
A/A = Major street turn LOS / Minor street turn LOS
#/# = Major street turn v/c / Minor street turn v/c

Traffic Safety

The last two and a half years (2003 through 2006) of available collision data were obtained from ODOT to identify any areas of traffic safety concern within West Linn.

Table 3-12 summarizes the collisions experienced at study intersections and the resulting collision rate calculates the number of collisions per million vehicles entering the intersection. Collision rates of 1.0 or greater are generally used as indicators that specific intersections should be investigated further for potential safety enhancements. As shown, all study intersections maintain collision rates well below 1.0.

Table 3-12: Collision Rates

Intersection	Total Collisions (Year 2003-2006)	Collision Rate
Highway 43 / Arbor Drive	1	0.07
Highway 43 / Walling Way	1	0.07
Highway 43 / Cedaroak Drive	5*	0.33
Highway 43 / Hidden Springs Drive	6	0.38
Highway 43 / Jolie Pointe Drive	1	0.07
Highway 43 / Pimlico Drive	0	0.00
Highway 43 / West "A" Street	2	0.13
Highway 43 / Holmes Street	2	0.13
Highway 43 / Lewis Street	3	0.20
Highway 43 / Burns Street	0	0.00
Highway 43 / Hood Street-McKillican Street	0	0.00
Highway 43 / I-205 SB Ramps	13	0.80
Highway 43 / I-205 NB Ramps	9	0.63
Highway 43 / Willamette Falls Drive	7	0.47
Rosemont Road / Carriage Way	0	0.00
Rosemont Road / Hidden Springs Road	3	0.45
Rosemont Road / Salamo Road	2	0.19
Rosemont Road / Summit Street	0	0.00
Salamo Road / Bland Circle	0	0.00
Salamo Road / Barrington Drive	1	0.18
Willamette Falls Drive / Sunset Ave	4	0.30
Willamette Falls Drive / Dollar Street (West)	1	0.12
Willamette Falls Drive / Ostman Road	3	0.38
10th Street / I-205 SB Ramp	3	0.22
10th Street / I-205 NB Ramp	6	0.46
10th Street / 8th Avenue	4	0.38
Blankenship Road / Tannler Drive	3	0.33
Summit Street(Cornwall) / Sunset Avenue	0	0.00
Willamette Falls Drive / 12th Street	1	0.09
Willamette Falls Drive / 19th Street	1	0.11
Ponderray Drive west of Parker Road	1	0.09
Willamette Falls Drive / Dollar Street (East)	1	0.07

Source: ODOT – Transportation Data Section – Crash Analysis and Reporting Unit, Continuous System Crash Listing, City of West Linn, 2003-2006.
* One crash at this intersection involved one pedestrian. Crash Rate = (Crashes*1000000) / (Years*ADT*340)

Truck Freight

Efficient truck movement plays a vital role in the economical movement of raw materials and finished products. The designation of through truck routes provides for this efficient movement while at the same time maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. The only state-designated truck route in West Linn is I-205. Clackamas County and the City of West Linn identify Highway 43 and I-205 as freight routes within the West Linn UGB.

Truck (heavy vehicle) volumes were collected as part of the intersection turn movement counts and were used in motor vehicle operations calculations. Truck use at study intersections is listed in Table 3-13. Freight routes and volumes are shown on Figure 3-11.

Table 3-13: PM Peak Hour Truck Volumes at Study Intersections

Intersection	Intersection Truck Volume	Truck % of All Vehicular Traffic
Highway 43 / Arbor Drive	26	1%
Highway 43 / Walling Way	23	1%
Highway 43 / Cedaroak Drive	31	2%
Highway 43 / Hidden Springs Drive	23	1%
Highway 43 / Jolie Pointe Drive	52	3%
Highway 43 / Pimlico Drive	54	3%
Highway 43 / West "A" Street	60	3%
Highway 43 / Burns Street	39	2%
Highway 43 / Hood Street-McKillican Street	42	2%
Highway 43 / I-205 SB Ramps	75	4%
Highway 43 / I-205 NB Ramps	86	5%
Highway 43 / Willamette Falls Drive	49	2%
Rosemont Road / Carriage Way	5	1%
Rosemont Road / Hidden Springs Road	5	1%
Rosemont Road / Salamo Road	30	2%
Rosemont Road / Summit Street	1	0%
Salamo Road / Bland Circle	24	3%
Salamo Road / Barrington Drive	34	5%
Salamo Road / Parker Road	7	1%
Sunset Ave / Cornwall St	0	0%
Blankenship Rd / Tannler Dr	27	2%
10th St / Blankenship Road	43	3%
10th St / I-205 SB Ramp	88	5%
10th St / I-205 NB Ramp	90	5%
10th St / 8th Ave	30	2%
10th St / Willamette Falls Dr	27	2%
Willamette Falls Drive / Sunset Ave	38	2%
Willamette Falls Drive / Dollar Street E	16	1%
Willamette Falls Drive / 12th Street	24	2%
Willamette Falls Drive / 19th Street	24	2%
Willamette Falls Drive / Ostman Road	27	3%
Willamette Falls Drive / Dollar Street W	22	2%

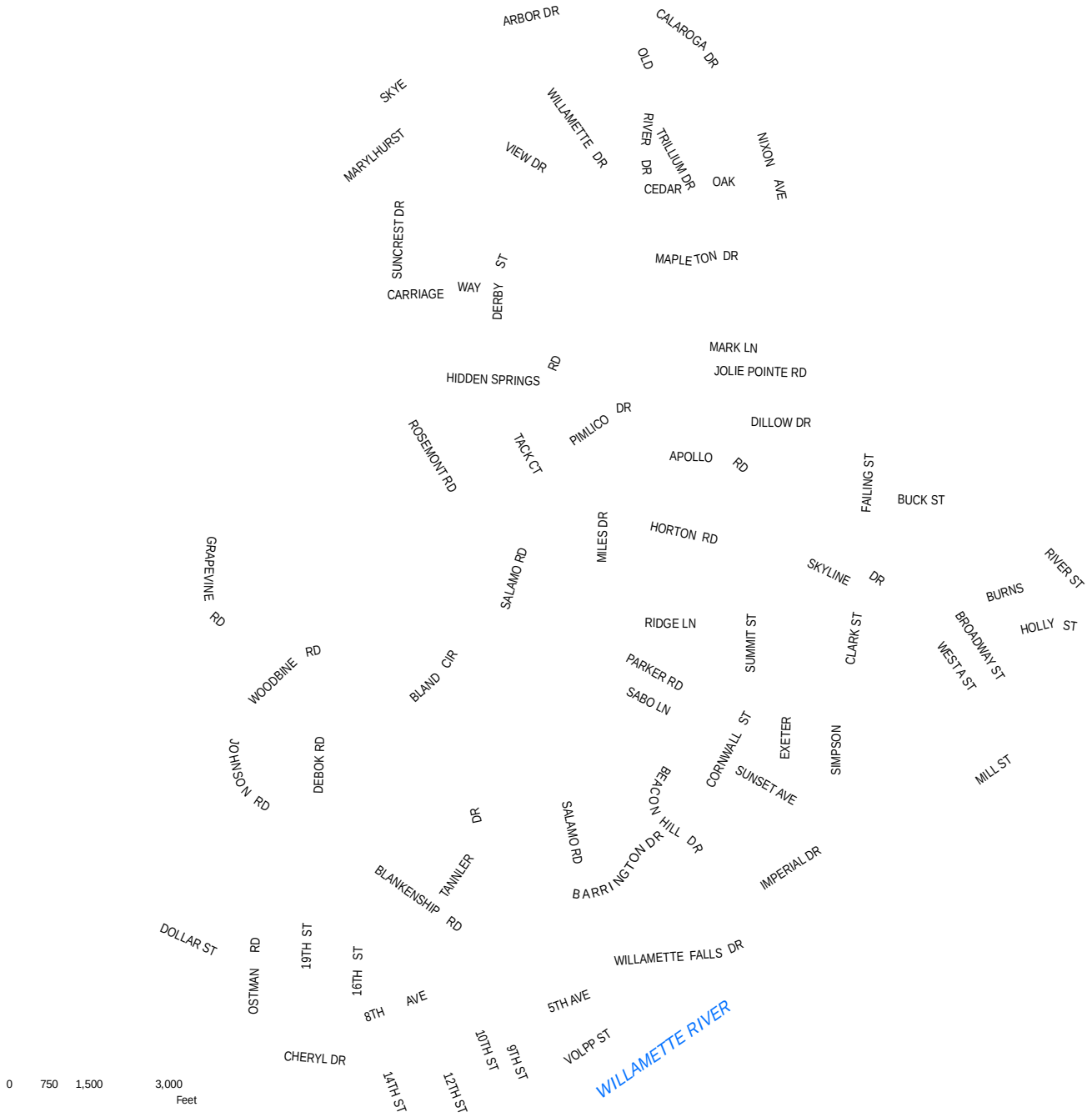
Source: Traffic Counts conducted November 2006

Railroad Crossings

There is no railroad within the city limits of West Linn.

Other Travel Modes

There are no other modes of transportation to be included in the TSP Update. A major natural gas pipeline and a rail line are located south of West Linn in Oregon City.



West Linn

Transportation System Plan

TRUCK FREIGHT ROUTES

LEGEND

Freight Volumes

0 - 25 HV/hr

26 - 50 HV/hr

>50 HV/hr

Freight Routes

Clackamas County Freight Route

State Freight Route/ Federally Designated Freight Route

Freeway

Major Roads

Streets

Railroad

Water

City Limits

N

DKS Associates
TRANSPORTATION SOLUTIONS

Future Conditions

The West Linn Transportation System Plan addresses existing system needs and additional facilities that are required to serve future growth. The existing system must be properly managed to ensure that growth does not degrade roadway operations below acceptable standards. Metro's urban area transportation forecast model was used to determine future traffic volumes in West Linn. This forecast model translates assumed land uses into personal travel, selects modes, and assigns motor vehicles to the roadway network. These traffic volume projections form the basis for identifying potential roadway deficiencies and for evaluating alternative circulation improvements. This section describes the forecasting process including key assumptions and the land use scenario developed from the existing Comprehensive Plan designations and allowed densities.

Projected Land Uses

Land use is a key factor in developing a functional transportation system. The amount of land that is planned to be developed, the type of land uses, and how the land uses are mixed together have a direct relationship to expected demands on the transportation system. Understanding the amount and type of land use is critical to taking actions to maintain or enhance transportation system operation.

Projected land uses were developed for areas within the urban growth boundary and reflect the Comprehensive Plan and Metro's land use assumptions for the year 2030. Complete land use data sets were developed for the following conditions:

- Existing Conditions (2005 - most current base travel forecast for the Metro region)
- Future Conditions (2030 forecasts)

The base year travel model is updated periodically and for this study effort, the available base model provided by Metro was for 2005. Land uses were inventoried throughout West Linn by Clackamas County and Metro. This land use database includes the number of dwelling units, the number of retail employees, and the number of other employees. Table 1 summarizes the

land uses for existing conditions and the future scenario within the West Linn TSP study area. While these summaries only outline land use in West Linn for the purposes of this study, the travel demand forecasts that have been evaluated reflect the regional land use growth throughout the Portland metropolitan area (the four county area). A detailed summary of the uses for each Transportation Analysis Zone (TAZ) within the West Linn study area is provided in the Appendix.

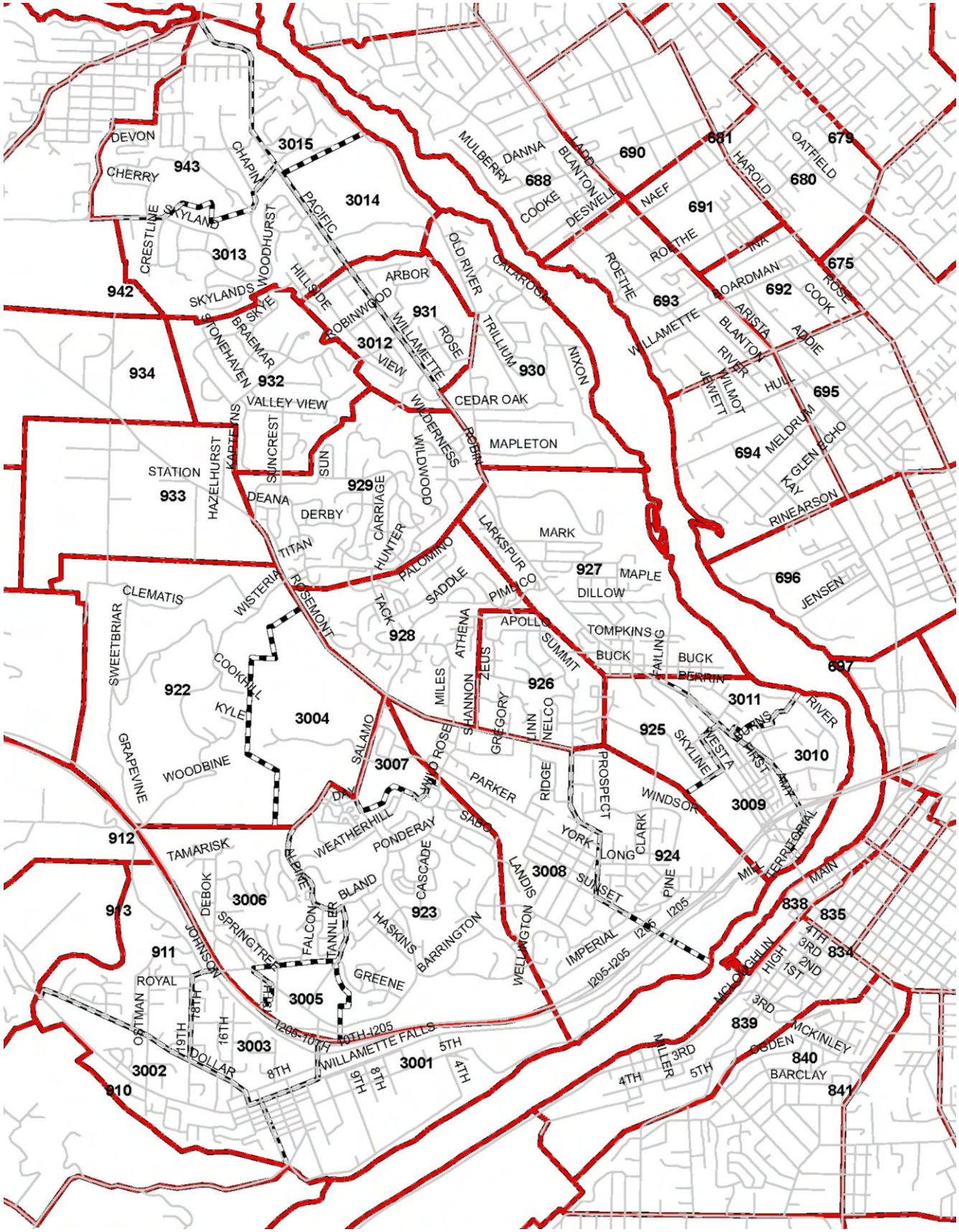
Table 1: West Linn Land Use Summary

Land Use	2005	2030	Increase	Percent Increase
Households (HH)	9,132	11,389	2,257	25%
Retail Employees (RET)	907	1,675	768	85%
Other(Non-Retail) Employees (OTH)	3,021	4,709	1,688	56%

At the existing level of land development, the transportation system generally operates without significant deficiencies in the study area. As land uses are changed in proportion to each other (i.e. there is a significant increase in employment relative to household growth), there will be a shift in the overall operation of the transportation system. Retail land uses generate higher amounts of trips per acre of land than do households and other land uses. The location and design of retail land uses in a community can greatly affect transportation system operation. Additionally, if a community is homogeneous in land use character (i.e. all employment or residential), the transportation system must support significant trips coming to or from the community rather than within the community. Typically, there should be a mix of residential, commercial, and employment type land uses so that some residents may work and shop locally, reducing the need for residents to travel long distances.

Table 1 indicates that significant growth is expected in West Linn in the coming decades. The transportation system in West Linn should be monitored to make sure that land uses in the plan are balanced with transportation system capacity. This TSP balances needs with the forecasted 2030 land uses.

For transportation forecasting, the land use data is stratified into geographical areas called transportation analysis zones (TAZs), which represent the sources of vehicle trip generation. There are approximately 10 Metro TAZs within the West Linn TSP study area. These 10 TAZs were subdivided, as part of this plan, into 40 TAZs to more specifically represent land use in West Linn. The disaggregated model zone boundaries are shown in Figure 4-1.



LEGEND

- TAZ Boundary
- 000 - TAZ Number

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Figure 4-1

TRAFFIC ANALYSIS ZONES (TAZ)

Metro Area Transportation Model

A determination of future traffic system needs in West Linn requires the ability to accurately forecast travel demand resulting from estimates of future population and employment for the City. The objective of the transportation planning process is to provide the information necessary for making decisions on when and where improvements should be made to the transportation system to meet travel demand as developed in an urban area travel demand model as part of the Regional Transportation Plan update process. Metro uses VISUM, a computer based program for transportation planning, to process the large amounts of data for the Portland Metropolitan area. For the West Linn TSP, the Clackamas County focused area model was used to forecast 2030 travel with substantially more detail added into the West Linn area.

Traffic forecasting can be divided into several distinct but integrated components that represent the logical sequence of travel behavior (Figure 4-2). These components and their general order in the traffic forecasting process are as follows:

- Trip Generation
- Trip Distribution
- Mode Choice
- Traffic Assignment

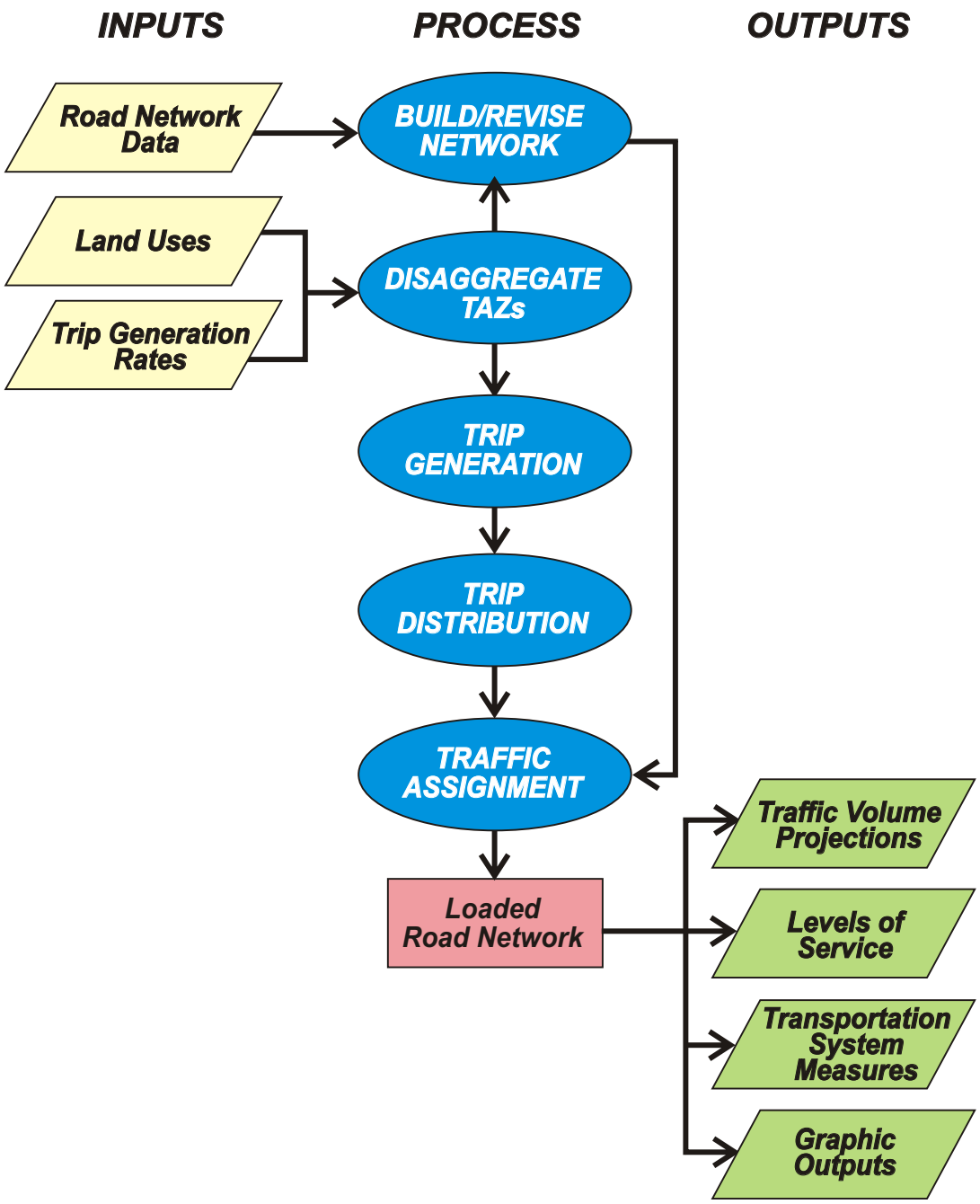

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Figure 4-2

MODEL PROCESS

Trip Generation

The trip generation process translates land use quantities (number of dwelling units, retail, and other employment) into vehicle trip ends (number of vehicles entering or leaving a TAZ or sub-TAZ) using trip generation rates established during the model verification process. The Metro trip generation process is elaborate, entailing detailed trip characteristics for various types of housing, retail employment, non-retail employment, and special activities. Typically, most traffic impact studies rely on the Institute of Transportation Engineers (ITE) research for analysis[1]. The model process is tailored to variations in travel characteristics and activities in the region. For reference, Table 2 provides a summary of the approximate average evening peak hour trip rates used in the Metro model. These are averaged over a broad area and thus, are different than driveway counts represented by ITE. This data provides a reference for the trip generation process used in the model.

Table 2: Approximate Average PM Peak Hour Trip Rates Used in Metro Travel Demand Model

	Average Trip Rate/Unit		
Unit	In	Out	Total
Household (HH)	0.43	0.19	0.62
Retail Employee (RET)	0.78	0.69	1.47
Other Employee (OTH)	0.07	0.29	0.36

Source: DKS/Metro

Table 3 illustrates the estimated growth in vehicle trips generated within the greater West Linn area during the PM peak period (2-hr peak) between 2005 and 2030. It indicates that vehicle trips in West Linn would grow by approximately 40 percent between 2005 and 2030 if the land develops according to Clackamas County and Metro's 2030 land use assumptions. The great majority of the expected growth lies outside of the current city limits. Refer to appendix for details about the trip growth for each TAZ. Assuming a 20-year horizon to the 2030 scenario, this represents an annualized growth rate of between 1 and 2 percent per year.

Table 3: Existing and Future Projected Vehicle Trips (PM Peak 2-Hour Period)

Trip Type	2005 Trips	2030 Trips	Growth
Single Occupancy Vehicles	6,615	9,106	2,491
High Occupancy Vehicles	2,361	3,530	1,170
Medium Trucks	19	31	12
Heavy Trucks	24	40	15

[1] *Trip Generation Manual*, 7th Edition, Institute of Transportation Engineers, 2001.

Trip Distribution

This step estimates how many trips travel from one zone in the model to any other zone. Distribution is based on the number of trip ends generated in each zone pair, and on factors that relate the likelihood of travel between any two zones to the travel time between zones. In projecting long-range future traffic volumes, it is important to consider potential changes in regional travel patterns. Although the locations and amounts of traffic generation in West Linn are essentially a function of future land use in the city, the distribution of trips is influenced by regional growth, particularly in neighboring areas such as Oregon City, Lake Oswego as unincorporated areas to the west of West Linn. External trips (trips that have either an origin and not a destination in West Linn or have a destination but not an origin in West Linn) and through trips (trips that pass through West Linn and have neither an origin nor a destination there) were projected using trip distribution patterns based upon census data and traffic counts performed at gateways into the Metro area Urban Growth Boundary (UGB) calibration.

Mode Choice

This is the step where it is determined how many trips will be by various modes (single-occupant vehicle, transit, truck, carpool, pedestrian, bicycle, etc.). The 2005 mode splits are incorporated into the base model and adjustments to that mode split may be made for the future scenario, depending on any expected changes in transit or carpool use. These considerations are built into the forecasts used for 2030.

Traffic Assignment

In this process, trips from one zone to another are assigned to specific travel routes in the network, and resulting trip volumes are accumulated on links of the network until all trips are assigned.

Network travel times are updated to reflect the congestion effects of the traffic assigned through an equilibrium process. Congested travel times are estimated using what are called “volume-delay functions” in EMME/2. There are different forms of volume/delay functions, all of which attempt to simulate the impact of congestion on travel times (greater delay) as traffic volume increases. The volume-delay functions take into account the specific characteristics of each roadway link, such as capacity, speed and facility type. This allows the model to reflect conditions somewhat similar to driver behavior.

Model Verification

The base 2005 modeled traffic volumes were compared against actual traffic volume counts across screenlines (an imaginary line where several parallel roadways would intersect), on key arterials, and at key intersections. Most arterial traffic volumes meet

screenline tolerances for forecast adequacy. Based on this performance, the model was used for future forecasting and assessment of circulation change.

Intersection turn movements were extracted from the model at key intersections for both the base year 2005 and forecast year 2030 scenarios. A "post processing" technique following NCHRP 255 Methodology[2] was utilized to refine model travel forecasts to the volume forecasts utilized for 2030 intersection analysis. Post processing is a methodology that uses existing count data, base year model data and future year model data to help determine future volumes by adding the increment of growth in volumes between the future and base year models to the existing count data. This methodology minimizes the effects of any model error by adding the increment of growth projected based on changes in land use to the base year counts.

Future (2030) System Assumptions

The Metro regional travel demand forecast model was used to determine future (2030) traffic volumes for the City of West Linn. The 2030 base model assumed RTP programmed improvements as a base case scenario. The improvements that are located within the City of West Linn and have an impact on motor vehicle roadway capacity are listed in Table 4. Other projects in the area (i.e. adjacent cities and counties) are included as listed in the RTP. These other projects could have impact on travel behavior within West Linn.

Table 4: RTP Projects Included in Future (2030) Travel Demand Modeling

RTP #	Project Name (Facility)	Project Location	Project Description	Est. Project Cost in 2003 dollars	RTP Program Years
5199	I-205 Auxiliary Lanes	I-5 to Stafford Road	Add auxiliary lanes as part of pavement preservation project	$8,000,000	2004-09
5013	I-205 Climbing Lanes	Willamette River to West Linn in Clackamas County	New SB Truck climbing lane at I-205 bridge (between Willamette River and 10th Street) - PE/ROW in financially constrained system	$46,200,000	2016-25

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

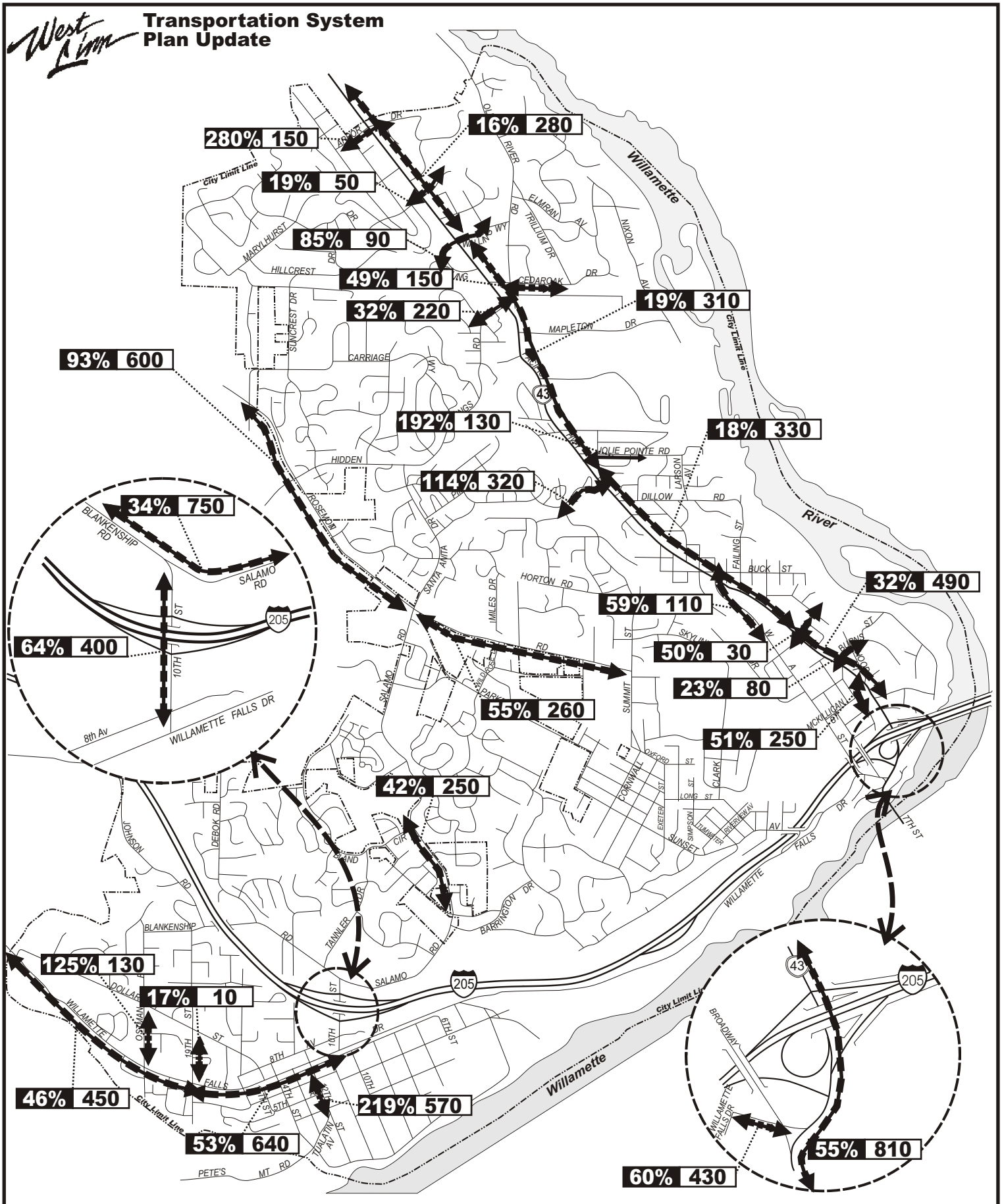
Future Facility Needs

This section identifies study area intersection deficiencies resulting from increases in vehicle volumes as forecasted by the 2030 financially constrained Metro RTP model for the 2030 base case scenario. Additionally, this section also identifies citywide circulation and safety improvement needs.

Both regional and local traffic volumes are projected to increase on many of the streets within the city. Figure 4-3 shows the percent increase in PM peak hour volume between 2006 and 2030. As illustrated in this figure, two-way traffic volumes are predicted to increase city wide by the year 2030. Notable roadways with traffic volume increases are Highway 43, 10th Street on both sides of I-205, and Rosemont Road. Two-way traffic volumes on these streets are projected to increase during the PM peak hour by as many as 995 vehicles per hour (vph) on Highway 43, 1085 vph on 10th Street, and 690 vph on Rosemont Road. Traffic volumes on the streets intersecting the above named streets are projected to increase greatly as well.

Many of the study intersections fail to meet performance standards either for the City of West Linn or for the Oregon Department of Transportation (ODOT) as a result of the increases in volume. Traffic operations for each study intersection was rated as good, adequate, or poor during the 2030 PM peak hour and shown in Figure 4-4. Many of the city and state intersections will experience poor operating conditions. The deterioration in operations is a direct result of both city and regional growth. The future operational analysis for each intersection is outlined in greater detail in the following sections.

The local street network in the City of West Linn is mostly built out and has connectivity restrictions between the downtown area and among some of the city's neighborhoods. Because of the city's developmental history and its geography, there are many winding, long blocks and cul-de-sacs outside of the downtown area. This type of street layout forces out-of-direction travel when traveling between and within neighborhoods, and greater use of local streets to compensate for lack of connectivity to more major facilities. Few direct routes exist in the central area of the city; most of the designated arterials zigzag through neighborhoods. In addition, I-205 bisects the City of West Linn, serving as a major barrier between neighborhoods to the south and the rest of the city. Many intercity trips concentrate along the few streets that do connect across I-205, such as 10th Street and Willamette Drive.



LEGEND

- 00% - Percentage Increase 2006 - 2030
- 00 - Volume Difference 2006 - 2030
- ←→ - Bi-Directional Volume

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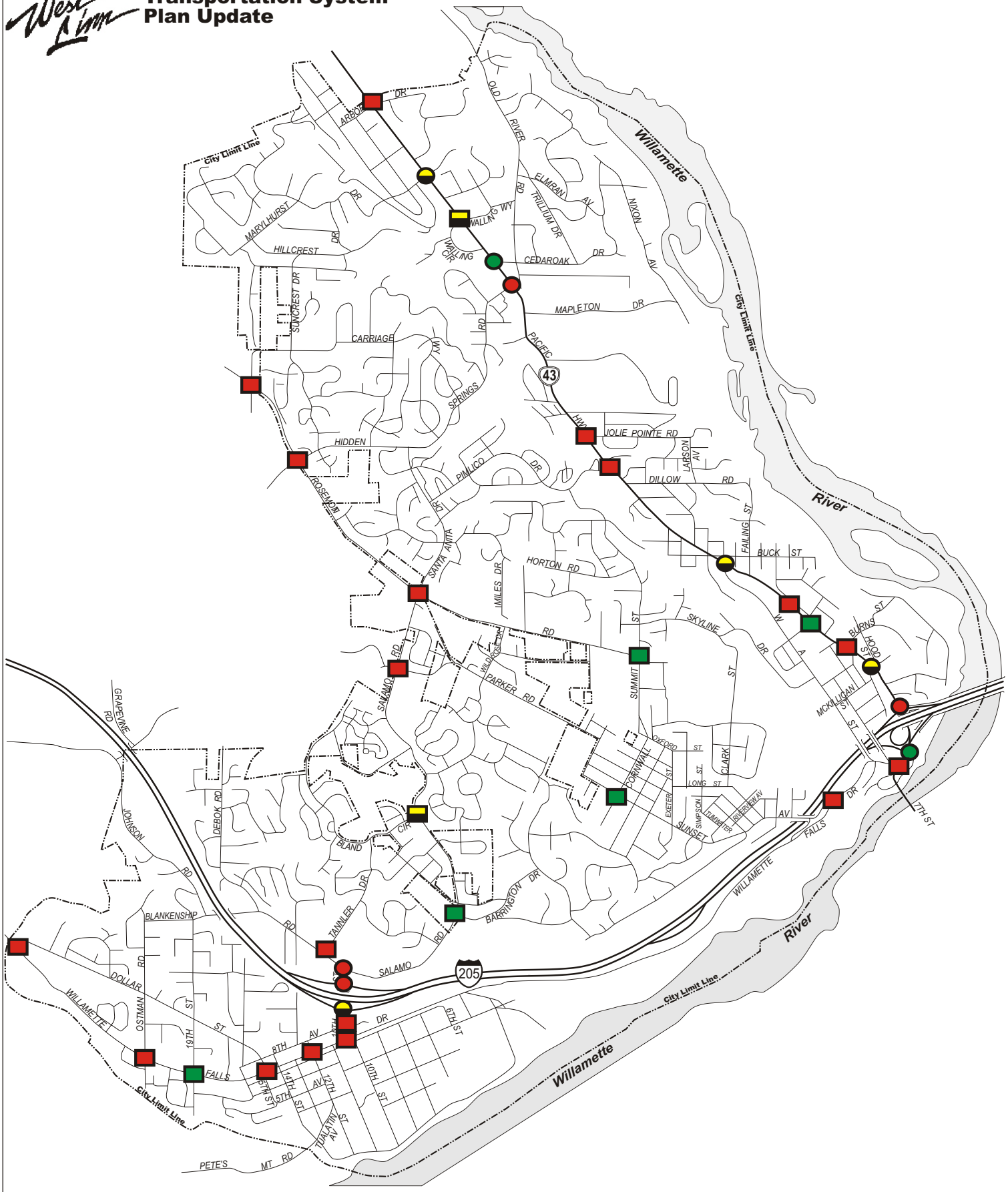
Figure 4-3

PERCENT INCREASE IN PM PEAK HOUR VOLUMES

West Linn

Transportation System Plan Update



LEGEND

- Good Operations
- Acceptable Operations
- Sub-Standard Operations
- Unsignalized Intersection
- Signalized Intersection

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Figure 4-4

FUTURE STUDY AREA INTERSECTION OPERATIONS

Future Intersection Capacity Analysis

The impact of growth on the local roadways was evaluated at the same 25 intersections examined for Existing Conditions. The 2030 operational analysis (summarized in Table 5) found many study intersections, both city streets and on State Highways, would reach or exceed capacity and experience high levels of congestion and delay without additional improvements to the existing transportation system.

These results are referred to as the 2030 base case scenario, since is assumes only those improvements that have already been identified for funding within the next 20 years. Subsequent chapters will develop circulation and operational alternatives to the 2030 base case and make recommendations about which are most efficient and cost effective in complying with the transportation goals and policies, as previously described in Chapter 2.

Table 3: Weekday PM Peak Hour Intersection Level of Service

		Existing (2006)			Future Base Case (2030)			Mobility Standard		
Intersection # on Map	Intersection	LOS	Average Delay (Sec)	Volume/ Capacity (v/c)	LOS	Average Delay (Sec)	Volume/ Capacity (v/c)	Agency	Minimum	Standard Met?
	Signalized Intersections									
2	Highway 43 / Marylhurst Dr-Lazy River Way	B	16.3	0.8	C	26.7	0.94	ODOT	v/c 0.99	Yes
4	Highway 43 / Cedaroak Dr	B	10.4	0.65	B	18.3	0.82	ODOT	v/c 0.99	Yes
5	Highway 43 / Hidden Springs Rd	C	25	0.83	D	42.8	**1**	ODOT	v/c 0.99	**No**
8	Highway 43 / West A St	B	12.5	0.74	C	31.1	0.97	ODOT	v/c 1.1	Yes
12	Highway 43 / Hood St-McKillican St	C	23.6	0.76	E	62.7	1.07	ODOT	v/c 1.1	Yes
13	Highway 43 / I-205 SB	C	26.5	0.85	E	69.1	**>1.0**	ODOT	v/c 0.85	**No**
14	Highway 43 / I-205 NB	A	8	0.3	B	10.2	0.41	ODOT	v/c 0.85	Yes
25	10th St / Blankenship Dr	D	55	0.63	**F**	>80.0	**>1.0**	ODOT	v/c 0.85	**No**
26	10th St / I-205 SB	C	34.4	0.61	**F**	>80.0	**>1.0**	ODOT	v/c 0.85	**No**
27	10th St / I-205 NB	B	16.1	0.65	E	64.3	>1.0	ODOT	v/c 0.85	Yes
	All-Way Stop Intersections									
19	Salamo Rd / Rosemont Rd	E	38.3	**>1.0**	**F**	>50.0	**>1.0**	City	LOS D	**No**
20	Rosemont Rd / Summit St	A	9.2	0.37	B	12.2	0.57	City	LOS D	Yes
21	Sunset Ave / Cornwall St	A	7.6	0.15	A	7.8	0.16	City	LOS D	Yes
29	Willamette Falls Dr / 10th St	C	23.8	0.87	**F**	>50.0	1.24	City	LOS D	**No**
	Unsignalized Intersections									
1	Highway 43 / Arbor Dr	B/**F**	>50.0	0.03 / 0.37	B/**F**	>50.0	0.04/**>1.0**	ODOT	v/c 0.99/0.90	**No**
3	Highway 43 / Walling Way	B/E	42.2	0.04 / 0.21	B/**F**	>50.0	0.00/0.92	ODOT	v/c 0.99/0.90	Yes
6	Highway 43 / Jolie Pointe Rd	A/E	47.3	0.03 / 0.22	B/**F**	>50.0	0.12/**>1.0**	ODOT	v/c 0.99/0.90	**No**
7	Highway 43 / Pimlico Dr	B/**F**	>50.0	0.16 / **>1.0**	C/**F**	>50.0	0.37/**>1.0**	ODOT	v/c 0.99/0.90	**No**
9	Highway 43 / Holmes St	B/**F**	>50.0	0.02 / 0.65	B/**F**	>50.0	0.03/**>1.0**	ODOT	v/c 0.99/0.90	**No**

Intersection # on Map	Intersection	Existing (2006) LOS	Existing (2006) Average Delay (Sec)	Existing (2006) Volume/ Capacity (v/c)	Future Base Case (2030) LOS	Future Base Case (2030) Average Delay (Sec)	Future Base Case (2030) Volume/ Capacity (v/c)	Mobility Standard Agency	Mobility Standard Minimum	Standard Met?
10	Highway 43 / Lewis St	B/E	40	0.01 / 0.15	B/**F**	>50.0	0.01/0.54	ODOT	v/c 0.99/0.90	Yes
11	Highway 43 / Burns St	B/**F**	>50.0	0.23 / **>1.0**	D/**F**	>50.0	0.49/**>1.0**	ODOT	v/c 1.1/0.90	**No**
15	Highway 43 / Willamette Falls Dr	A/**F**	>50.0	0.21 / **>1.0**	D/**F**	>50.0	0.77/**>1.0**	ODOT	v/c 0.99/0.90	**No**
16	Willamette Falls Dr / Sunset Ave	A/B	13.6	0.29 / 0.31	A/**E**	47.6	0.67/0.74	City	LOS D	**No**
17	Rosemont Rd / Carriage Way	A/C	21.9	0.09 / 0.21	A/**F**	>50.0	0.12/0.51	City	LOS D	**No**
18	Rosemont Rd / Hidden Springs Rd	A/C	18.6	0.10 / 0.14	B/**F**	>50.0	0.07/**>1.0**	City	LOS D	**No**
22	Salamo Rd / Bland Circle	A/B	38.3	0.00 / 0.09	A/D	34.6	0.02/0.60	City	LOS D	Yes
23	Salamo Rd / Barrington Dr	A/C	15.8	0.04 / 0.20	A/C	21.8	0.05/0.93	City	LOS D	Yes
35	Salamo Rd / Parker Rd	A/C	17.0	0.05 / 0.13	A/**F**	>50.0	0.13/0.79	City	LOS D	**No**
24	Blankenship Road / Tannler Dr	A/**F**	>50.0	0.13 / 0.52	B/**F**	>50.0	0.19/**>1.0**	City	LOS D	**No**
28	10th St / 8th Ave	A/**F**	>50.0	0.13 / 0.73	B/**F**	>50.0	0.18/**>1.0**	City	LOS D	**No**
30	Willamette Falls Dr / 12th St	A/C	22.7	0.17 / 0.23	B/**F**	>50.0	0.44/**>1.0**	City	LOS D	**No**
31	Willamette Falls Dr / Dollar St (East)	A/C	20.6	0.01 / 0.21	A/**F**	>50.0	0.15/0.74	City	LOS D	**No**
32	Willamette Falls Dr / 19th St	A/B	13.0	0.01 / 0.04	A/C	17.6	0.01/0.06	City	LOS D	Yes
33	Willamette Falls Dr / Ostman Rd	A/C	23.6	0.03 / 0.06	B/**F**	>50.0	0.01/0.23	City	LOS D	**No**
34	Willamette Falls Dr / Dollar St (West)	A/B	12.1	0.03 / 0.07	A/**F**	>50.0	0.13/0.71	City	LOS D	**No**

Notes: *LOS = Level of Service*
Delay = Average vehicle delay in the peak hour for entire intersection in seconds.
MOE = Measure of Effectiveness
Unsignalized Intersection Operations:
A/A = Major street turn LOS / Minor street turn LOS
Delay = Worst Case for Minor Street
#/# = Major street turn v/c / Minor street turn v/c

Traffic Signal Warrants

Traffic signal warrant 11 (Peak Hour Volume) from the *Manual on Uniform Traffic Control Devices* (MUTCD) was evaluated for the unsignalized study intersections that did not meet operational standards in the 2030 base case[3]. The intersections that would meet the traffic volume warrant for signalization by the year 2030 are listed in Table 6.

On arterial streets, signals should generally be spaced at least 1,000 feet apart for efficient operation, but signalizing some of the intersections that meet this warrant would result in shorter spacing. A detailed traffic engineering evaluation must be conducted to evaluate site conditions, signal spacing, and all MUTCD warrants before the installation of any traffic signal. ODOT signal design and signal phasing guidelines should be followed for all new traffic signal installations. ODOT typically requires an 8-hour warrant to be met. ODOT also requires other improvements, such as channelization to be considered prior to a signal.

Table 6: Traffic Signal Warrant Analysis for PM Peak Hour Volume

Intersection	Warrant Met for Existing (2006)?	Warrant Met for Future Base Case (2030)?
Highway 43/ Arbor Dr.	No	No
Highway 43/ Jolie Pointe Rd.	No	No
Highway 43/ Pimlico Dr.	No	**Yes**
Highway 43/ Holmes St.	No	No
Highway 43/ Burns St.	**Yes**	**Yes**
Highway 43/ Willamette Falls Dr.	**Yes**	**Yes**
Willamette Falls Dr./Sunset Ave./Chestnut St.	No	**Yes**
Rosemont Rd./Carriage Wy.	No	No
Rosemont Rd./Hidden Springs Rd.	No	**Yes**
Rosemont Rd./Salamo Rd	No	**Yes**
10th St / 8th Ave	No	**Yes**
Willamette Falls Dr / 10th St	**Yes**	**Yes**
Salamo Rd/Parker Rd	No	No
Blankenship Rd./Tannler Dr.	No	**Yes**
Willamette Falls Dr./12th St.	No	**Yes**
Willamette Falls Dr./Dollar St. East	No	No
Willamette Falls Dr./Ostman Rd.	No	No
Willamette Falls Dr./Dollar St. West	No	No

[3] *Manual on Uniform Traffic Control Devices for Streets and Highways*, Federal Highway Administration, 2003 Edition.

Pedestrian Network Plan

This chapter summarizes strategies to be used in evaluating the future needs and recommends improvements for the City of West Linn's pedestrian network. The Pedestrian Network Plan is intended to outline all pedestrian needs over the next 20 years and develop projects to address those needs, as well as identifying costs for those projects.

Needs

The City of West Linn's pedestrian facilities consist of sidewalks and off-street paths. Many of the City's newer streets have sidewalks on both sides. Off-street paths are primarily concentrated in parks and open spaces between neighborhoods. However, many streets in older sections of the city either have a sidewalk on one side or do not have sidewalks at all. Across the city there is limited pedestrian connectivity with significant gaps in the sidewalk network and overall, a limited number of total pedestrian facilities. This results in residential areas not being consistently connected to commercial centers, bus routes, schools, or other pedestrian destinations.

The most common overall need is to provide a safe and interconnected system that affords the opportunity to consider the walking mode of travel, especially for trips less than one-half mile in length for residential trips, and less than one-mile for recreational trips.

Limited Connectivity

An important need for pedestrians in the city is the availability and convenience for safe crossing locations on arterial streets and across large regional roadways. There are limited pedestrian crossing opportunities along both Highway 43 and I-205. There are currently seven crossing points across Highway 43 at signalized intersections that include pedestrian signals. I-205 can be traversed at six locations where there are either over- or under-crossings of the interstate. At the interchange of Highway 43/I-205 pedestrian crossing are not supplied for the NB on- or off-ramps. Any potential new crossing location would need to meet Oregon Department of Transportation (ODOT) crossing guidelines and be evaluated based on criteria ODOT uses for such facilities to ensure the crossing is warranted and safe. However, the existing pedestrian crossings could be upgraded or enhanced to promote safety.

Limited Facilities

Arterial and collector streets in the City of West Linn provide limited sidewalks (see Figure 3-2) leaving several areas throughout the City with no sidewalks on collectors or arterials. Neighborhoods such as Robinwood, Bolton, and Sunset are particularly lacking in sidewalks. There are not consistent sidewalks on Highway 43 between the northern city limits and Cedaroak Drive and sidewalks on only one side at several locations between Cedaroak Drive and Bolton Street.

Many projects identified in the City of West Linn's 1998 TSP have yet to be constructed and remain as gaps in the pedestrian network. The locations of these projects were carried forward in this TSP. Other deficiencies were also identified by residents and the City. The pedestrian deficiencies of a continuous network for arterials and collectors in the area are listed in Table 5-1.

TABLE 5-1: PEDESTRIAN DEFECIENCY LOCATIONS

Street Name	From	To
10th Street	Blankenship Road	8th Avenue
19th Street	Blankenship Road	Willamette Falls Drive
Bland Circle	North Limits	Salamo Road
Blankenship Road	Ostman Road	19th Street
Blankenship Road	Under I-205	
Blankenship Road	100' east of Virginia Lane	13th Street
Carriage Way	Rosemont Road	700' north of Rosemont Road
Cedaroak Drive	Old River Road	Elmran Avenue
Chestnut Street	Sunset Avenue	Willamette Falls Drive
Cornwall Street	Sunset Avenue	Oxford Street
Debok Road	100' north of Summerlinn Drive	Farvista Drive
Dillow Drive	Failing Street	Larson Avenue
Dillow Drive	Larson Avenue	Willamette Drive
Dollar Street	River Heights Circle	Willamette Falls Drive
Elmran Avenue	Nixon Avenue	Old River Road
Exeter Street	Oxford Street	Long Street
Failing Street	Willamette Drive	Dillow Drive
Hidden Springs Road	Carriage Way	400' south of Autumn View
Hidden Springs Road	Santa Anita Drive	300' east of Suncrest Drive
Hillcrest Drive	Marylhurst Drive (North)	Marylhurst Drive (South)
Johnson Road	Woodbine Road	Blankenship Road
Jolie Pointe Drive	Larson Avenue	Rainier Place
Larson Avenue	Dillow Drive	Jolie Pointe Drive
Mapleton Drive	Willamette Drive	Nixon Avenue
Marylhurst Drive	Willamette Drive	Hillcrest Court
Mckillican	West A Street	Willamette Falls Drive
Nixon Avenue	Mapleton Drive	Elmran Avenue
Old River Road	Willamette Drive	Cherokee Court
Ostman Road	Blankenship Road	Willamette Falls Drive
Oxford Street	Cornwall Street	Exeter Street
Parker Road	200' east of Wild Rose Drive	Sunset Avenue
Pimilco Drive	Willamette Drive	Palamino Way (East)
Pimilco Drive	Santa Anita Drive	Palamino Way (West)
Riverview Avenue	Turnwater Street	Sunset Avenue

Street Name	From	To
Rosemont Road	City Limits	Summit Street
Salamo Drive	10th Street	300' south of Bland Circle
Salamo Drive	Bland Circle	Weatherhill Road
Salamo Drive	S. Day Road	Parker Road
Santa Anita Drive	Pimlico Drive	Clubhouse Drive
Santa Anita Drive	Clubhouse Circle	Hidden Springs Road
Simpson Street	Long Street	Turnwater Street
Skyline Drive	Summit Drive	West A Street
Summit Street	Skyline Drive	Oxford Street
Suncrest Drive	Hillcrest Drive	Carriage Way
Sunset Avenue	Parker Road	Spring Rock Circle
Tannler Drive	Blankenship Road	Greene St
Tualatin Avenue	Volpp Street	12th Street
Turnwater Street	Simpson Street	Riverview Avenue
West A Street	Willamette Drive	Skyline Drive
Willamette Drive	Bolton Street	Pimlico Drive
Willamette Drive	Mark Lane	100' south of Cedaroak Drive
Willamette Drive	Cedaroak Drive	North City Limits
Willamette Falls Drive	West A Street	10th Street
Willamette Falls Drive	19th Street	Dollar Street (East)
Willamette Falls Drive	200' w of Ostman Road	Dollar Street (West)

In addition to the pedestrian facility deficiencies for arterial and collector streets noted in Table 5-1, other pedestrian facility projects are carried forward in this update to the 1998 TSP. These projects construct new accessways and short-cuts to provide key connections where deficiencies exist in the pedestrian network and are identified below.

Accessways and Short-Cuts

Connections between cul-de-sacs and adjacent roadways and other cul-de-sacs can significantly reduce travel distances for pedestrians, thereby encouraging more pedestrian trips. The identification of such connections in developed areas is required in Section 660-12-045(6) of the Transportation Planning Rule (TPR) as part of a locality's development of a bicycle and pedestrian circulation plan. Appropriate improvements should provide for more direct, convenient, and safe bicycle or pedestrian travel within and between residential areas and neighborhood activity centers. Although there are many locations in West Linn where cul-de-sac lengths are excessive and routes from local roads to collectors are not very direct, short-cuts are not always possible due to safety issues resulting from terrain or length of the necessary trail.

There are several locations identified in the city's 1998 TSP as possible locations for the construction of new pedestrian accessways or shortcuts. A number of these connections were not constructed, but remain feasible and would improve the overall sidewalk network:

Wisteria Road to Bland Circle

This connection would join two residential areas, creating a circular connection from Tannler Drive to Bland Circle, to Wisteria Road, and down to Blankenship Road. A road connection was shown in the Tannler Basin Master plan at this location, to be built when development occurs. Pedestrian and bicycle access should be part of that connection. This plan advocates that the completion of the connection wait until development occurs, as the length of the needed path makes it economically infeasible.

Sinclair Street to Holly Street
Sinclair Street dead ends in two locations. In order to walk west to Highway 43 one must walk east to River Road and then back to Highway 43. A connection at this location would be a mildly sloped trail, with right-of-way needed to be dedicated along lot lines. The construction of a trail at this location would be approximately 300 feet long.

Rosepark Drive to Rosemont Road
Rosepark Drive is a long cul-de-sac. A connection from the end of the cul-de-sac to Rosemont Road would provide shorter, more direct access for travel southeast on Rosemont Road. Right-of-way is not available for this connection and would have to be dedicated along lot lines.

Hillcrest Court to Marylhurst Drive
A connection from Hillcrest Court to Marylhurst Drive would reduce the walking distance to Highway 43 for residents of Hillcrest Court and other residents just west of Hillcrest. There is a significant slope at this location, and right-of way is not available.

Current Policy

Policy related to sidewalk infill is identified in the TSP Project Goals and Objectives. Pedestrian policy 4a states:

> *The City will ensure that walkways and related pedestrian improvements (e.g. crosswalks) are constructed on all identified walkway network roadways, either as separate projects or integrated with other roadway-related improvements. Walkway improvements will be implemented in accordance with current local, regional, State and Federal standards.*

The current policy for building and maintaining pedestrian infrastructure (such as sidewalks) allows the opportunity to fill in gaps for sidewalks directly adjacent to new development, as well as to fill in gaps in the pedestrian network even if the gap is not adjacent to a new development (or redevelopment). As defined in the Community Development Code, the land division provisions arrange for mitigation of impacts (including foot traffic) generated by development.

> *These impacts are to be mitigated at the developer's cost, by the provision of streets, sidewalks, bicycle and foot paths, and traffic control devices within, contiguous to, and nearby the development site.* [1]

This policy provides a potential funding strategy by collecting fees from new development to help fill in gaps in the pedestrian system (or improve pedestrian crossings at intersections) that may not be adjacent to the developing parcel.
However, as West Linn is a mature city, the potential for new development to fund infill sidewalk improvements is limited. As such, an annual allocation of revenues dedicated towards pedestrian projects would provide a means to not only fill gaps in the sidewalk network, but also provide new crosswalks and upgrade existing facilities (including installation of ADA compliant ramps.)

[1] Community Development Code 85.010, Chapter 85, Land Division – General, pg. 85-2, City of West Linn, May 2007.

Facilities

Sidewalks should be built to current design standards of the City of West Linn and in compliance with the Americans with Disabilities Act (at least four feet of unobstructed sidewalk). Wider sidewalks are desirable to promote pedestrian travel on all roadways. Additional pedestrian facilities may include accessways, pedestrian districts, pedestrian plazas and recreational trails.

- **Accessway** – A walkway that provides pedestrian and/or bicycle passage either between streets or from a street to a building or other destinations such as a school, park or transit stop.

- **Pedestrian District** – A plan designation or zoning classification that establishes a safe and convenient pedestrian environment in an area planned for a mix of uses likely to support a relatively high level of pedestrian activity.

- **Pedestrian Plaza** – A small, semi-enclosed area usually adjoining a sidewalk or a transit stop which provides a place for pedestrians to sit, stand or rest.

- **Recreational Trails –** A City-wide network to provide a linked system and a variety of trail experiences as recreation. The network would link parks and open spaces with neighborhoods, schools and other features and would consist primarily of off-street connections with on-street connections supplementing those areas where off-street connections are not possible.

Metro 2004 Regional Transportation Plan (RTP) identifies Highway 43 (Willamette Drive) as a transit/mixed use corridor under their pedestrian designation. The RTP defines transit/mixed-use corridors as priority areas for pedestrian travel that are served by good quality transit service and that will generate substantial pedestrian traffic near neighborhood-oriented retail development, schools, parks, and bus stops. These corridors should include such design features as wide sidewalks with buffering from traffic, pedestrian-scale lighting, benches, bus shelters, and street trees. A Conceptual Design Plan[2] for Highway 43 (Willamette Drive) identifies a number of projects along the corridor including new traffic signals, crosswalks, and a pedestrian refuge island.

Strategies

The existing conditions analysis identified pedestrian system issues within the City of West Linn that include an incomplete arterial/collector sidewalk system, a lack of local street connectivity, and arterial crossings with potential safety and connectivity issues. These needs correspond with those identified in the 1998 TSP.

Several strategies were identified in the 1998 TSP to address pedestrian system needs and to guide project prioritization. The focus identified in the 1998 TSP and carried forward to the current TSP is on providing pedestrian facilities along arterial and collectors. The prioritization process helps to further focus community investment on those projects that are most effective at meeting critical needs, while deferring other projects of lesser importance. An extensive public involvement process was enacted for this TSP to help identify and update needs, determine strategies and projects to address the needs, and a prioritization of those projects.

[2] West Linn OR 43 Conceptual Design Plan, Cogan Owens Cogan, SERA, DKS Associates, June 2007.

Identified strategies for pedestrian facilities include:

- Connect key pedestrian corridors to schools, parks, and activity centers;
- Pedestrian corridors that connect neighborhoods;
- Arterial crossing and safety enhancements;
- Pedestrian corridors that connect to transit;
- Fill in gaps in the network where some sidewalks exist; and
- Pedestrian corridors that connect to major recreational uses.

Pedestrian Master Plan

A list of potential pedestrian projects to meet the identified needs and achieve these strategies was developed into a Pedestrian Master Plan. The Master Plan shown in Figure 5-1 and summarized in Table 5-2 is an overall plan and summarizes the list of desired pedestrian related projects in West Linn.

Each bicycle project was ranked based on how well it met the improvement strategies that were identified. A high, medium, and low designation was given to each project to indicate a general priority for implementation. Each of these projects will need further refinement to detail right-of-way requirements and costs associated with special design details as projects are pursued.

Table 5-2: Pedestrian Master Plan Projects

#	Priority	Location	Sidewalk In Fill Extent	From	To	Cost(s) $1,000s
2	High	Willamette Drive*	One side of street.	Bolton Street	Failing Street	$0**
3	High	Willamette Drive*	One side of street.	Failing Street	Davenport Street	$0**
4	High	Willamette Drive*	One side of street.	Davenport Street	Caufield Street	$0**
5	High	Willamette Drive*	One side of street.	Caufield Street	Barlow Street	$0**
6	High	Willamette Drive*	One side of street.	Barlow Street	Dillow Drive	$0**
7	High	Willamette Drive*	One side of street.	Dillow Drive	Pimlico Drive	$0**
8	High	Willamette Drive*	One side of street.	Mark Lane	Mapleton Drive	$0**
9	High	Willamette Drive*	One side of street.	Mapleton Drive	100' south of Cedaroak Drive	$0**
10	High	Willamette Drive*	Both sides of street.	Cedaroak Drive	Walling Circle (north)	$0**
11	High	Willamette Drive	Both sides of street.	Fairview Way	Marylhurst Drive	$0**
12	High	Willamette Drive*	Both sides of street.	Walling Circle (north)	Fairview Way	$0**
13	High	Willamette Drive*	Both sides of street.	Marylhurst Drive	Shady Hollow Way	$0**
14	High	Willamette Drive*	Both sides of street.	Shady Hollow Way	North city limits	$0**
15	Med	10th Street	One side of street.	I-205	8th Street	$65
16	Med	10th Street*	One side of street.	Blankenship Road	I-205	$55
17	Med	Cedaroak Drive*	Both sides of street.	Old River Road	Elmran Avenue	$565
18	Med	Dillow Drive	Both sides of street.	Willamette Drive	Larson Avenue	$295
19	Med	Dillow Drive*	Both sides of street.	Larson Avenue	Failing Street	$210
20	Med	Elmran Avenue*	Both sides of street.	Nixon Avenue	Old River Road	$400
21	Med	Failing Street*	Both sides of street.	Willamette Drive	Dillow Drive	$380

#	Priority	Location	Sidewalk In Fill Extent	From	To	Cost(s) $1,000s
22	Med	Hillcrest Drive*	Both sides of street.	Marylhurst Drive (North)	Marylhurst Drive (South)	$630
23	Med	Jolie Pointe Drive*	Both sides of street.	Larson Avenue	Rainier Place	$220
25	Med	Larson Avenue*	Both sides of street.	Dillow Drive	Jolie Pointe Drive	$200
26	Med	Mapleton Drive*	Both sides of street.	Willamette Drive	Nixon Avenue	$620
27	Med	Marylhurst Drive*	Both sides of street.	Willamette Drive	Hillcrest Court	$915
28	Med	Mckillican*	One side of street.	West A Street	Willamette Falls Drive	$100
29	Med	Nixon Avenue*	Both sides of street.	Mapleton Drive	Elmran Avenue	$520
30	Med	Old River Road*	Both sides of street.	Willamette Drive	Cherokee Court	$840
31	Med	Ostman Road*	Both sides of street.	Blankenship Road	Willamette Falls Drive	$540
32	Med	Parker Road*	One side of street.	200' east of Wild Rose Drive	Sunset Avenue	$235
33	Med	Pimilco Drive*	Both sides of street.	Willamette Drive	Palamino Way (East)	$320
34	Med	Rosemont Road*	Both sides of street.	Summit Street	Ridge Lane	$280
35	Med	Rosemont Road*	One side of street.	Ridge Lane	Carriage Way	$850
38	Med	Salamo Drive*	Both sides of street.	10th Street	300' south of Bland Circle	$1,050
39	Med	Skyline Drive*	Both sides of street.	Summit Drive	West A Street	$880
40	Med	Sunset Avenue*	Both sides of street.	Parker Road	Spring Rock Circle	$515
41	Med	Tannler Drive*	Both sides of street.	Blankenship Road	Greene Street	$265
42	Med	Tualatin Avenue*	Both sides of street.	Volpp Street	12th Street	$165
88	Med	Willamette Drive / Burns Street	Crossing with Pedestrian Refuge	South Leg	-	$0**
84	Med	Willamette Drive / Chow Mein Lane	Crossing with Pedestrian Refuge	North Leg	-	$0**
83	Med	Willamette Drive / Fairview Way	Crossing with Pedestrian Refuge	South Leg	-	$0**
85	Med	Willamette Drive / Mary S. Young Pak	Crossing with Pedestrian Refuge	South Leg	-	$0**
86	Med	Willamette Drive / Pimlico Drive	Traffic Signal with Crosswalks		-	$0**
87	Med	Willamette Drive / White Tail Drive	Crossing with Pedestrian Refuge	North Leg	-	$0**
43	Med	Willamette Falls Drive*	Both sides of street.	6th Street	10th Street	$420
44	Med	Willamette Falls Drive*	Both sides of street.	19th Street	16th Street	$210
45	Low	19th Street	Both sides of street.	Dollar Street	Willamette Falls Drive	$0**
46	Low	19th Street*	Both sides of street.	Blankenship Road	Dollar Street	$405
47	Low	Bland Circle	Both sides of street.	North Limits	Salamo Road	$695
50	Low	Blankenship Road	One side of street.	100' east of Virginia Lane	13th Street	$40
51	Low	Blankenship Road*	One side of street.	Ostman Road	19th Street	$100
52	Low	Blankenship Road*	One side of street.	Under I-205		$60
53	Low	Carriage Way*	Both sides of street.	Rosemont Road	700' north of Rosemont Road	$145
54	Low	Chestnut Street	Both sides of street.	Sunset Avenue	Willamette Falls Drive	$135
55	Low	Cornwall Street*	Both sides of street.	Sunset Avenue	Oxford Street	$270
56	Low	Debok Road*	Both sides of street.	100' north of Summerlin Drive	Farvista Drive	$130

#	Priority	Location	Sidewalk In Fill Extent	From	To	Cost(s) $1,000s
57	Low	Dollar Street*	One side of street.	Ostman Road	Willamette Falls Drive	$565
58	Low	Dollar Street*	One side of street.	River Heights Circle	Ostman Road	$0**
59	Low	Exeter Street*	Both sides of street.	Oxford Street	Long Street	$135
60	Low	Hidden Springs Road	One side of street.	Carriage Drive	Wildwood Drive	$140
61	Low	Hidden Springs Road	One side of street.	Santa Anita Drive	300' east of Suncrest Drive	$130
62	Low	Hidden Springs Road*	One side of street.	Wildwood Drive	400' south of Autumn View	$65
63	Low	Johnson Road	Both sides of street.	Woodbine Road	Blankenship Road	$840
64	Low	New Off-Street Accessway*	Construct new bicycle / pedestrian connection.	Wisteria Road	Bland Circle	$0****
65	Low	New Off-Street Accessway*	Construct new bicycle / pedestrian connection.	Sinclair Street	Holly Street	$0****
66	Low	New Off-Street Accessway*	Construct new bicycle / pedestrian connection.	Rosepark Drive	Rosemont Road	$0****
67	Low	New Off-Street Accessway*	Construct new bicycle / pedestrian connection.	River Road	Perrin Street	$0****
68	Low	New Off-Street Accessway*	Construct new bicycle / pedestrian connection.	Hillcrest Court	Marylhurst Drive	$0****
69	Low	Oxford Street*	Both sides of street.	Cornwall Street	Exeter Street	$125
70	Low	Pimilco Drive	One side of street.	Santa Anita Drive	Palamino Way (West)	$115
71	Low	Riverview Avenue	Both sides of street.	Turnwater Street	Sunset Avenue	$75
72	Low	Salamo Drive	One side of street.	Bland Circle	Weathermill Road	$135
73	Low	Salamo Drive	One side of street.	S. Day Road	Parker Road	$95
74	Low	Santa Anita Drive*	One side of street.	Pimlico Drive	Clubhouse Drive	$50
75	Low	Santa Anita Drive*	One side of street.	Clubhouse Circle	Hidden Springs Road	$80
76	Low	Simpson Street	Both sides of street.	Long Street	Turnwater Street	$100
77	Low	Summit Drive*	One side of street.	Skyline Drive	Oxford Street	$235
78	Low	Suncrest Drive*	One side of street.	Hillcrest Drive	Carriage Way	$200
79	Low	Turnwater Street	Both sides of street.	Simpson Street	Riverview Avenue	$100
80	Low	Willamette Falls Drive	One side of street.	16th Street	Dollar Street (East)	$45
81	Low	Willamette Falls Drive	Both sides of street.	200' west of Ostman Road	Dollar Street (West)	$630
82	Low	Willamette Falls Drive*	Both sides of street.	West A Street	6th Street	$2,120
					Total	**$19,705**

*Included in previously adopted 1998 TSP.
**Included in Highway 43 Concept Plan Cost Estimates
***Included in Motor Vehicle Plan Cost Estimates
****Included in Bicycle Plan Cost Estimates

West Linn Transportation System Plan

PEDESTRIAN PLAN

LEGEND

Pedestrian Projects

- Sidewalk - One Side
- Sidewalk - Both Sides
- Proposed Off-Street Path
- Proposed Crossing
- Off-Street Path
- City Hall
- Schools
- Library
- Parks
- Community Center
- Freeway
- Major Roads
- Streets
- Railroad
- Water
- City Limits

NOTE: Trail locations are conceptual as based on the previously adopted Parks Master Plan.

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DKS Associates
TRANSPORTATION SOLUTIONS

Pedestrian Action Plan

A pedestrian action plan project list was created to identify projects that are reasonably expected to be funded by the year 2030, meeting the requirements of the updated Transportation Planning Rule[3]. Table 6-3 lists the full action plan (those projects listed as high priority in the Master Plan) identified in the TSP update analysis. Note that all pedestrian action plan projects are located in the vicinity of Highway 43 and the projects (and related costs) are included in the Highway 43 Concept Plan.

Table 6-3: Pedestrian Action Plan (Costs included in Highway 43 Concept Plan)

#	Priority	Location	Sidewalk In Fill Extent	From	To	Cost(s) $1,000s
2	High	Willamette Drive*	One side of street.	Bolton Street	Failing Street	$0**
3	High	Willamette Drive*	One side of street.	Failing Street	Davenport Street	$0**
4	High	Willamette Drive*	One side of street.	Davenport Street	Caufield Street	$0**
5	High	Willamette Drive*	One side of street.	Caufield Street	Barlow Street	$0**
6	High	Willamette Drive*	One side of street.	Barlow Street	Dillow Drive	$0**
7	High	Willamette Drive*	One side of street.	Dillow Drive	Pimlico Drive	$0**
8	High	Willamette Drive*	One side of street.	Mark Lane	Mapleton Drive	$0**
9	High	Willamette Drive*	One side of street.	Mapleton Drive	100' south of Cedaroak Drive	$0**
10	High	Willamette Drive*	Both sides of street.	Cedaroak Drive	Walling Circle (north)	$0**
11	High	Willamette Drive	Both sides of street.	Fairview Way	Marylhurst Drive	$0**
12	High	Willamette Drive*	Both sides of street.	Walling Circle (north)	Fairview Way	$0**
13	High	Willamette Drive*	Both sides of street.	Marylhurst Drive	Shady Hollow Way	$0**
14	High	Willamette Drive*	Both sides of street.	Shady Hollow Way	North city limits	$0**

**Included in Highway 43 Concept Plan Cost Estimates

[3] *OAR Chapter 660*, Department of Land Conservation and Development, Division 012, Transportation Planning, adopted on March 15, 2005, effective April 2005.

Bicycle Plan

This chapter summarizes strategies to be used in evaluating the future needs and recommends various improvements for the City of West Linn's bicycle system (policy, operations, and facilities). The Bicycle Plan is intended to outline all bicycle needs over the next 20 years and develop specific policy changes, operational enhancements and new capital projects to address those needs. The cost for the policy changes, enhanced operations, and new capital projects is tallied at the end of this chapter.

Needs

Bicycle trips are typically 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 third of a mile), bicycle trips are attractive up to three miles. Because of the length of the trip, bicycle lanes and multi-use paths both provide good accommodations for these trips. Many shorter bicycle trips can also be made on local streets without additional accommodations or via connections to arterials and collectors with bicycle facilities. The needs and deficiencies for the existing bicycle system can be categorized into two areas: Connectivity and Street Designations. Both of these categories are described in this section.

Connectivity

There are two prominent north/south roadways that provide bike lanes in the city (Willamette Drive and Salamo Road). However, these facilities are not well connected by other facilities that could allow for travel to other destinations within the city, particularly to the east and west. The lack of east/west on-street bicycle facilities creates a significant gap in the bicycle system to travel in and around the city. Overall, with so few connected bike lanes, connectivity of on-street bike lanes is poor. This lack of connectivity causes significant problems for bicyclists. Without connectivity within the bicycle system, this mode of travel is severely limited.

Street Designations

Arterials and collectors designated to include bike facilities do not fully address bicycle travel needs in and around the city. If not on an arterial or collector facility, bicycle trips generally should be accommodated on lower traffic volume streets. Many trips occur on local streets that connect to parks,

schools, retail activity centers, etc. There is a current need for designated routes that accommodate these trips. These facilities could be considered a "shared" facility or could have a specific designation such as a "bike boulevard" where actual treatments to the roadway are made that enhance the bicycle environment and/or make additional connections to bicycle destinations.

Because all of these needs are different, there is no single bicycle solution. The most common need is to provide a safe and interconnected system that legitimizes bicycling as a mode of travel for all user types.

User Types

Bicyclists are a varied group of people with different skill levels, abilities, bicycling experience, and trip types. Their needs and comfort level with the City of West Linn's bicycle infrastructure vary as a result of these differences. The City should accommodate these user types by providing adequate facilities for the majority of its users. There are multiple bicycle facility types available for the city to construct which appeal to the different user types. For instance, multi-use paths are often favored by less experienced or recreational users, while bike lanes on major roads tend to used by commuters and other more experienced users.

Current Policy

Policy related to bicycle lane infill is identified in the TSP Project Goals and Objectives. Bicycle policy 3 states:

> *Provide striped and signed bicycle lanes on all arterial and collector roadways consistent with the policies of the Transportation System Plan.*

The current policy for building and maintaining bicycle infrastructure (such as bicycle lanes) allows the opportunity to fill in gaps directly adjacent to new development, as well as to fill in gaps in the bicycle network even if the gap is not adjacent to a new development (or redevelopment). As defined in the Community Development Code, the land division provisions arrange for mitigation of impacts (including bicycle traffic) generated by development.

> *These impacts are to be mitigated at the developer's cost, by the provision of streets, sidewalks, bicycle and foot paths, and traffic control devices within, contiguous to, and nearby the development site.* [1]

This policy provides one funding strategy by collecting fees from new development to help fill in gaps in the bicycle system that may not be adjacent to the developing parcel.

However, as West Linn is a mature city, the potential for new development to fund infill bicycle improvements is limited. As such, an annual allocation of revenues dedicated towards bicycle projects could provide a means to fill gaps in the bicycle network.

[1] Community Development Code 85.010, Chapter 85, Land Division – General, pg. 85-2, City of West Linn, May 2007.

Facilities

Bicycle facilities can generally be categorized as multi-use/off-street bike paths, bike lanes, bike boulevards, and/or shared roadways. Each of these facilities serves a particular purpose for bicycle travel. Table 6-1 summarizes each of these facilities with a general description of the elements inherent to each facility.

Table 6-1: Bikeway Types

Bikeway	Description
Multi-use Path	Off-street route (typically recreationally focused) that can be used by several transportation modes, including bicycles, pedestrians and other non-motorized modes (i.e. skateboards, roller blades, etc.)
Bike Lane	Area within street right-of-way designated specifically for bicycle use.
Shared Roadway	Roadways where bicyclists and autos share the same travel lane. May include a wider outside lane and/or bicycle boulevard treatment (priority to through bikes on local streets).
Bike Boulevard	Lower-order, lower-volume streets with various treatments to promote safe and convenient bicycle travel. Usually accommodate bicyclists and motorists in the same travel lanes, often with no specific vehicle or bicycle lane delineation. Assign higher priority to through bicyclists, with secondary priority assigned to motorists. Also include treatments to slow vehicle traffic to enhance the bicycling environment.

Bicycle Facility Design Considerations

As their name implies, multi-use paths are conducive to a mix of user types and are typically constructed along an independent alignment such as a stream or greenway, but can also be built parallel to a roadway. Parallel off-street trails can be built with a buffer or curb-tight to the roadway. Off-street trails and sidewalks that are constructed on a curb-tight basis should be planned for 12 feet in width, which is desirable for mixed-use activity (pedestrian and bike). However, according to the American Association of State Highway and Transportation Officials (AASHTO)[2], mixed-use paths directly adjacent to roadways (with minimal or no separation) should be discouraged for the following reasons:

- Half of bicycle traffic would ride against the normal flow of vehicle traffic, contrary to the rules of the road.
- When the path ends, cyclists riding against traffic tend to continue to travel on the wrong side of the street, as do cyclists making their way to the path. Wrong-way bicycle travel is a major cause of vehicle/bicycle crashes.
- At intersections, motorists crossing the path often do not notice bicyclists approaching from certain directions, especially where sight distances are poor.
- Bicyclists on the path are required to stop or yield at cross-streets and driveways, unless otherwise posted.
- Stopped vehicles on a cross-street or driveway may block the path.
- Because of the closeness of vehicle traffic to opposing bicycle traffic, barriers are often

[2] *A Guide for the Development of Bicycle Facilities*, American Association of State Highway and Transportation Officials, 1999

necessary to separate motorists from cyclists. These barriers serve as obstructions, complicate facility maintenance and consume available right-of-way.
- Paths directly adjacent to high-volume roadways diminish users' experience by placing them in an uncomfortable environment. This could lead to a path's underutilization.

As cited by AASHTO[3] and The Oregon Department of Transportation (ODOT)[4], mixed-use paths can be designed along roadways, provided several design considerations are met:

- A minimum 5-foot buffer should be provided between the path and roadway to address potential conflicts between motorists and path users.
- There are few vehicle/path user conflict points (e.g., cross-streets or driveways).
- The path can be terminated at each end onto streets with good bicycle/pedestrian facilities or onto another safe, well-designed path through appropriate street crossing treatments.
- The path should not take the place of bicycle/pedestrian facilities (e.g., sidewalks and bicycle lanes) on the parallel street.

Bicycle lanes adjacent to the curb are preferred to bicycle lanes adjacent to parked cars or bicycle lanes combined with sidewalks. However, bike lanes adjacent to on-street parking are better than no bike lanes at all. Six-foot bicycle lanes are recommended and provide additional room for cyclists to steer clear of the curb or parked cars, while also maintaining a comfortable distance from adjacent moving traffic. Wide bike lanes also enable cyclists to maneuver around drainage grates, manhole covers, glass and debris. Provision of a bicycle lane not only benefits bicyclists, but also motor vehicles, which gain greater shy distance/emergency shoulder area, and pedestrians, which gain a buffer between walking areas and moving vehicles. On reconstruction projects where right-of-way is limited, reduced bicycle lane widths of five feet may need to be considered. Widening the curb travel lane (for example, from 12 feet to 14 or 15 feet) can provide bicycle accommodations as well. This extra width better accommodates bicycle travel and provides a greater measure of safety. However, with higher-volume roadways (e.g., streets with more than 3,000 ADT), dedicated bike lanes are much more preferable than wide outside lanes.

Grade separated bike lanes improve safety for bicyclists as compared to standard bike lanes. These bike lanes, on pavement raised approximately six inches above the roadway, provide users a greater sense of separation from traffic. These facilities may include a mountable, rolled curb, which allows cars to make right turns into driveways while increasing driver awareness of bicyclists. As the raised bike lane approaches intersections, it is dropped and becomes level with the roadway. Grade separated bicycle facilities are recommend along Willamette Drive.[5] Further examination and ODOT approval will be required prior to construction of raised bike lanes on Willamette Drive.

Signing and marking of bicycle lanes should comply with the current version of the *Manual on Uniform Traffic Control Devices (MUTCD)* that is approved by Oregon as well as the Oregon Supplement to the MUTCD. Design features in the roadway can improve bicycle safety as well. For example, using curb storm drain inlets rather than catch basins significantly improves bicycle facilities.

[3] IBID
[4] *Oregon Bicycle and Pedestrian Plan, An Element of the Oregon Transportation Plan*, Oregon Department of Transportation, Adopted June 14, 1995.
[5] *West Linn OR 43 Conceptual Design Plan*, Cogan Owens Cogan, SERA, DKS Associates, June 2007

Figure 6-1 illustrates an example of an appropriate warning signs. Supplemental "XING" or "ON BRIDGE ROADWAY" plaques may be used to draw more attention to the fact that slow moving forms of transportation may be using the roadway. When used, the supplemental plaques must be installed below the warning sign on the same sign post. Directional pavement markings may also be considered on shared roadways to supplement the bicycle warning signs when desired. The pavement markings illustrated in Figure 6-1 below are typically called "Sharrows" or "Shared Lane Markings" and are utilized on travel routes for bicycles that have parking, but no designated bicycle lanes. Sharrows are commonly used on streets where dedicated bike lanes are desirable, but are not possible for any number of reasons. The marking helps to align bicyclists to shift their travel pattern out of the direction of a parked car door opening into their travel path.

Figure 6-1: Bicycle Signs and Markings

Bicycle Warning Signs

Bike Route Signs

Bicycle Pavement Markings

It should be noted, however, that while the provision of "Bike Route" signage for bicyclists is an acceptable way for the City to demarcate bike routes, it needs to be coupled with pavement markings and/or wayfinding signage for bicyclists to get the most value out of the City's investment. Although this is an adopted MUTCD sign, the sign alone does not give the bicyclist much information, and all too often, these signs are not placed in useful locations (e.g., where a "bike route" makes a turn that is not intuitive to riders). Signage with additional wayfinding components is recommended.

Bike Boulevard

Bicycle boulevards generally follow lower-order streets with lower traffic volumes and vehicle speeds, such as Minor Collector or Local Streets passing through residential neighborhoods. Traffic controls along a boulevard assign priority to through cyclists while encouraging through vehicle traffic to use alternate parallel routes. Traffic calming and other treatments along the corridor reduce vehicle speeds so that motorists and bicyclists generally travel at the same speed, creating a safer and more-comfortable environment for all users. Boulevards also incorporate treatments to facilitate safe and convenient crossings where bicyclists must traverse major streets. Bicycle boulevards work best in well-connected street grids, where riders can follow reasonably direct and logical routes with few "twists and turns." Boulevards also work best when higher-order parallel streets exist to serve through vehicle traffic.

West Linn's bicycle boulevard network could be developed through a variety of improvements ranging from minor street enhancements (e.g., directional pavement markings) to larger-scale projects (e.g., intersection signalization). The various treatments fall into five major bicycle boulevard "application

levels" based on their degree of physical intensity, with Level 1 representing the least physically-intensive treatments that could be implemented at relatively low cost:

Level 1: Signage (e.g., wayfinding and warning signs along and approaching the bicycle boulevard)
Level 2: Pavement markings (e.g., directional pavement markings, shared lane markings)
Level 3: Intersection treatments (e.g., signalization, curb extensions, refuge islands)
Level 4: Traffic calming (e.g., speed humps, mini traffic circles)
Level 5: Traffic diversion (e.g., choker entrances, traffic diverters)

It should be noted that corridors targeted for higher-level applications would also receive relevant lower-level treatments. For instance, a street targeted for Level 3 applications should also include Level 1 and 2 applications as necessary. It should also be noted that some applications may be appropriate on some streets while inappropriate on others. In other words, it may not be appropriate or necessary to implement all "Level 2" applications on a Level 2 street. Furthermore, several treatments could fall within multiple categories as they achieve multiple goals.

A number of bicycle boulevards could be targeted for "Level 4" applications, including signage, pavement markings, intersection treatments and traffic calming. Each corridor would currently include several boulevard components (e.g., speed humps). Due to limited street connectivity, Level 5 bicycle boulevard applications (traffic diversion) are not recommended for West Linn. To identify and develop additional site-specific treatments, the city should involve the bicycling community, neighborhood groups, and the Public Works Department. Further analysis and engineering work may also be necessary to determine the feasibility of some applications.

Proposed bicycle boulevards include:

- Old River Road from Willamette Drive to North City Limits
- Pimlico Drive from Santa Anna Drive to Willamette Drive
- Clark Street / Long Street / Simpson Street / Kelly Street from Skyline Drive to Sunset Avenue (through Wilderness Park)

Bicycle Parking

The availability of bicycle parking is an important component of a well designed bicycle system. Lack of proper storage facilities discourages potential riders from traveling by bicycle. Bicycle racks should be located at significant activity generators including schools, parks, and commercial areas. Racks should be placed in highly-visible locations and within convenient proximity to main building entrances. Bike racks should be designed to provide two points of contact to the bicycle (e.g., so the user can lock both the wheel and the frame to the rack). Bike lockers or other storage facilities would be helpful at locations where long-term parking is expected, such as major employment centers. The attractiveness of bike parking may also be improved by providing covered parking and/or secured facilities where bicycles may be locked away.

Strategies

Bikeway improvements are aimed at closing the gaps in the bicycle network along arterial and collector roadways, establishing low-traffic routes that parallel arterials and collectors, and providing multi-modal links to improve livability. Several strategies were identified to address bicycle system needs and

to guide project prioritization. This prioritization process helps to focus community investment on those projects that are most effective at meeting important needs, while deferring other projects of lesser need.

The strategies for bicycle facilities are to:

- Fill in gaps in the existing network where bike corridors exist (arterials and collectors);
- Construct bike lanes on strategic arterials and collectors;
- Connect key bicycle corridors to schools, parks, and activity centers;
- Improve crossing safety and connectivity;
- Designate bicycle boulevards on lower volume streets that connect major bike facilities and/or bicycle destinations; and
- Provide appropriate facilities to secure bicycles at trip terminations.

These strategies are used to guide and develop projects which address the needs of the bicycling community in the City of West Linn, as well as bicyclists throughout the region.

Bicycle Master Plan

A list of potential bicycle projects to meet the identified needs and achieve these strategies was developed into a Bicycle Master Plan. The Master Plan shown in Figure 6-2 and summarized in Table 6-2 is an overall plan and summarizes the "wish list" of bicycle related projects in West Linn.

Each bicycle project was ranked based on how well it met the improvement strategies that were identified. A high, medium, and low designation was given to each project to indicate a general priority for implementation. Each of these projects will need further refinement to detail right-of-way requirements and costs associated with special design details as projects are pursued.

Table 6-2: Bicycle Master Plan

#	Priority	Location	Improvement	From	To	Cost $1,000s
1	High	Rosemont Road*	On-street Bike Lanes	Carriage Way	Summit Street	$1,425
2	High	Salamo Road*	On-street Bike Lanes	10th Street	Barrington Drive	$390
3	Med	Clark Street / Long Street / Simpson Street / Kelly Street	Bicycle Boulevard Treatment	Skyline Drive	Sunset Avenue	$100
4	Med	Old River Road	Bicycle Boulevard Treatment	Willamette Drive	North City Limits	$100
5	Med	Pimlico Drive	Bicycle Boulevard Treatment	Santa Anna Drive	Willamette Drive (Hwy 43)	$95
6	Med	Blankenship Road	On-street Bike Lanes	Ostman Road	Debok Road	$0**
7	Med	Hidden Springs Road*	On-street Bike Lanes	Rosemont Road	Willamette Drive	$335
8	Med	Santa Anita Drive*	On-street Bike Lanes	Rosemont Road	Hidden Springs Road	$525
9	Med	Skyline Drive*	On-street Bike Lanes	Summit Street	West A Street	$630
10	Med	Summit Street*	On-street Bike Lanes	Skyline Drive	Cornwall Street	$360
11	Med	Sunset Avenue	On-street Bike Lanes	Parker Road	Willamette Falls Drive	$910

#	Priority	Location	Improvement	From	To	Cost $1,000s
24	Med	Willamette Drive	On-street Bike Lanes - Raised	North City Limits	McKillican Street	$0
12	Med	Willamette Falls Drive*	On-street Bike Lanes	Epperly Street	West City Limits	$375
13	Med	Willamette Falls Drive*	On-street Bike Lanes	Willamette Drive	Ostman Drive	$2,430
14	Med	Johnson Road	Shoulder Bike Lane	Blankenship Road	City Limits	$25
15	Low	New Off-Street Accessway*	Construct new bicycle and pedestrian connection.	Wisteria Road	Bland Circle	$115
16	Low	New Off-Street Accessway*	Construct new bicycle and pedestrian connection.	Sinclair Street	Holly Street	$40
17	Low	New Off-Street Accessway*	Construct new bicycle and pedestrian connection.	Rosepark Drive	Rosemont Road	$40
18	Low	New Off-Street Accessway*	Construct new bicycle and pedestrian connection.	Hillcrest Court	Marylhurst Drive	$40
19	Low	10th Street*	On-street Bike Lanes	Salamo Road	Willamette Falls Drive	$195
20	Low	12th Street	On-street Bike Lanes	Willamette Falls Drive	Tualatin Avenue	$145
22	Low	Parker Road*	On-street Bike Lanes	Sunset Avenue	500' east of Coho Lane	$130
23	Low	Tualatin Avenue	On-street Bike Lanes	12th Street	Tualatin River	$130
					Total Cost	**$8,535**

*Included in previously adopted 1998 TSP.
** Included in Motor Vehicle Master Plan

Bicycle Action Plan

A bicycle action plan project list was created to identify bicycle projects that are reasonably expected to be funded by the year 2030, meeting the requirements of the updated Transportation Planning Rule[6]. Table 6-3 lists the full action plan (those projects listed as high priority in the Master Plan) identified in the TSP update analysis.

Table 6-3: Bicycle Action Plan and Cost Estimates

#	Location	Improvement	From	To	Cost $1,000s
1	Rosemont Road*	On-street Bike Lanes	Carriage Way	Summit Street	$1,425
2	Salamo Road*	On-street Bike Lanes	10th Street	Barrington Drive	$390
				Total Cost	**$1,815**

[6] *OAR Chapter 660*, Department of Land Conservation and Development, Division 012, Transportation Planning, adopted on March 15, 2005, effective April 2005.

West Linn Transportation System Plan

BICYCLE PLAN

LEGEND

Bicycle Projects

- Bicycle Lane - Raised
- Bicycle Lane - Standard
- Shoulder Bikeway
- Bicycle Boulevard Treatment
- Proposed Off-Street Path

Note: includes lanes under construction at the time of inventory.

- Project Number
- Off-Street Paths
- Existing Bicycle Facility
- City Hall
- Schools
- Library
- Parks
- Community Center
- Freeway
- Major Roads
- Streets
- Water
- City Limits

NOTE: Trail locations are conceptual as based on the previously adopted Parks Master Plan.

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TRANSPORTATION SOLUTIONS

Transit Plan

This chapter summarizes existing and future transit needs in the City of West Linn. The following sections outline the criteria used to evaluate needs, strategies for implementing a transit plan, and the City of West Linn transit plan. The method used to develop the transit plan combined TriMet, city staff and other agencies input.

Background

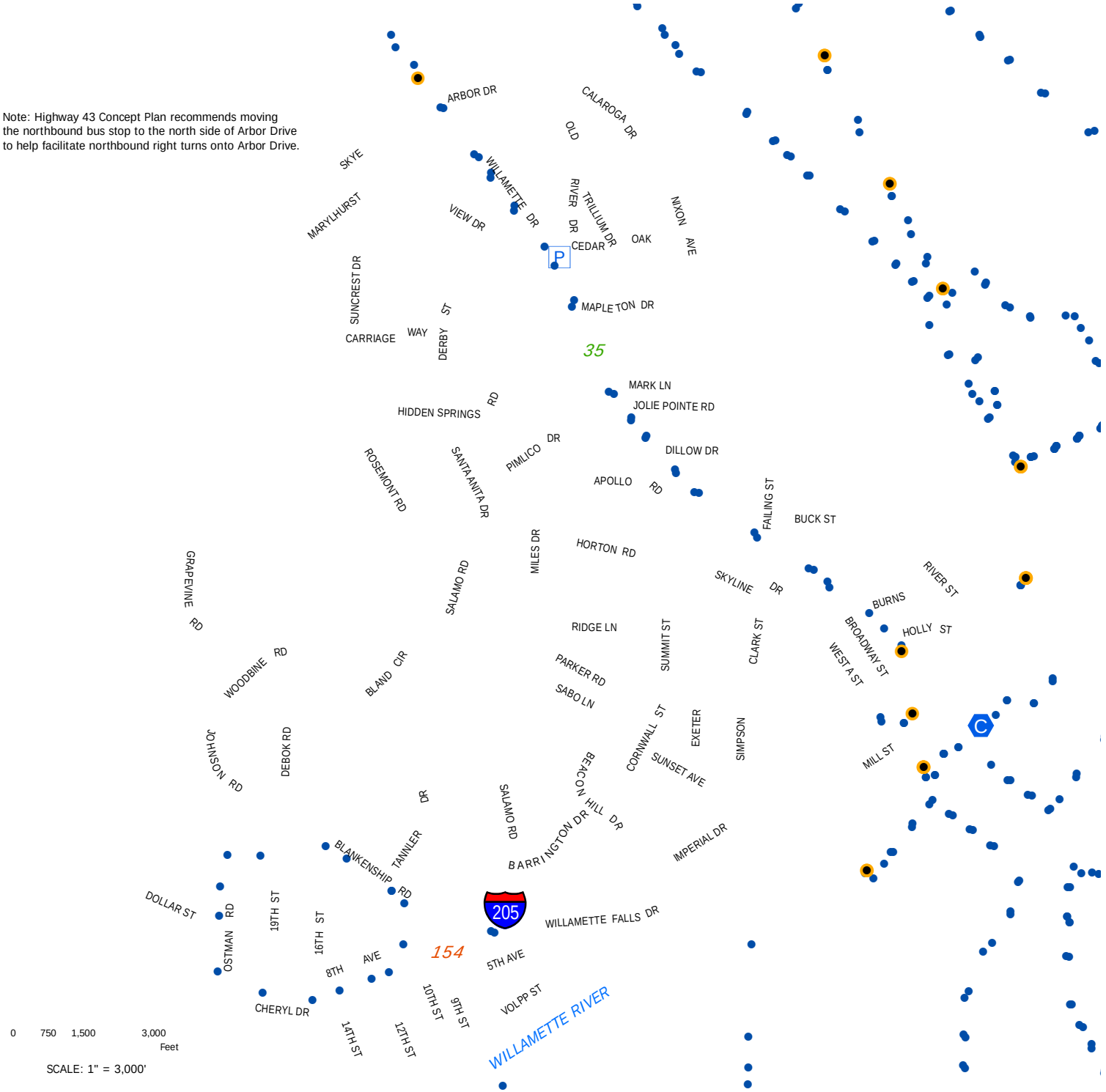
TriMet is the regional transit provider for the Portland area and operates the fixed route transit service in West Linn, which is located near the southern edge of TriMet's service area. West Linn is near the end point of the regional service system, with only two routes serving the city:

- Route 35- Macadam Avenue, from Portland City Center to Oregon City Transit Center
- Route 154- Willamette Falls Drive to Oregon City Transit Center

Route 35 operates between downtown Portland and the Oregon City Transit Center, and includes 18 stops along Highway 43 within the city limits of West Linn. There is one park-and-ride lot, located at the Emanuel United Presbyterian Church near the Cedar Oak Drive intersection with Highway 43 (refer to Figure 7-1). In addition to commutes into downtown Portland, this route can be used for connections to other routes via Transit Centers in Lake Oswego and in Oregon City.

Route 154 operates from the Oregon City Transit Center along Willamette Falls Drive, and returns via a loop along 10th Street, Blankenship Road, and Ostman Road. The route includes 18 stops, with connections possible from the Oregon City Transit Center. No park and ride lots are provided along the remainder of the route.

On weekdays, bus services for Route 35 operate between approximately 5 a.m. and midnight, with about 30 minutes between buses during commute hours. Off-peak hours have 45 to 60 minutes between successive buses. Route 154 operates between approximately 6 a.m. to 6 p.m., with about 30 minutes between buses during afternoon commute hours, and 60 minute headways during other periods.



Note: Highway 43 Concept Plan recommends moving the northbound bus stop to the north side of Arbor Drive to help facilitate northbound right turns onto Arbor Drive.

West Linn

Transportation System Plan

EXISTING/PROPOSED TRANSIT FACILITIES

LEGEND

35 — Bus Route w/ Route No. < 30 Min. Headway

154 — Bus Route w/ Route No. > 30 Min. Headway

Transit Facilities

- Stop
- Shelter
- Transit Center (C)
- Park and Ride (P)

- Freeway
- Major Roads
- Streets
- Railroad
- Water
- City Limits

Note: bus routes outside West Linn not shown

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TRANSPORTATION SOLUTIONS

The two bus routes that operate within the city combine to provide service within one-half mile of many of the city's residents. All residents to the east of Highway 43 lie within the one-half mile range, as do the residents of the Willamette neighborhood. Neighborhoods farther to the west of Highway 43, Skyline Ridge, Marylhurst, Hidden Springs, Rosemont Summit, and Sunset are not served by fixed route transit. Additionally, no direct connections exist to Tualatin and Wilsonville, which are neighboring suburban cities with significant employment areas.

Many bus riders on existing bus lines are West Linn residents commuting to employment in downtown Portland and adjacent areas. Commuters use this bus route not only out of personal preference (avoiding frustrating automobile traffic in their vehicles, socializing with other passengers, time spent on other activities during the commute rather than driving a motor vehicle) but also for economic reasons. For most bus commuters the cost of public transit is less than the cost to park a private vehicle in the Portland central city area. Bus fares range from $2.00 to $2.30 for each trip, depending on the length of the trip. Round trip fares into downtown Portland would be $4.60, which is far below the price to drive and park a private automobile in the Central City area.

The TriMet Spring 2007 Bus Ridership survey reported approximately 480 boardings and alightings (i.e., patrons getting onto or exiting the bus) for Route 35 within the city limits, and 180 boardings/alightings for Route 154 on a typical weekday. This probably represents somewhere between 240 to 300 bus patrons for Route 35 and 90 to 120 patrons for Route 154, depending on how many of these were one-way versus two-way trips. Outside of the city, Route 35 had an additional 3,600 on / off actions during the service day. By comparison, the TriMet system typically has 420,000 on / off actions on the buses, and another 210,000 on the light rail lines, according to the same 2007 Ridership Survey.

Transit Telephone Survey

The City of West Linn hired Research 13 to conduct a transit telephone survey of approximately 400 West Linn residents in August and September 2008. The sample size provides for a sampling variability of +/-5% at a 95% confidence level for the overall survey. Neighborhoods within the City were represented in the survey based on the proportion of the total City population. However, due to the small sample sizes of individual neighborhoods, the survey is not appropriate for projecting results to the neighborhood level.

The survey provides several general findings. Approximately one in five residents use transit at least once a month, while 5% use it 10 or more times and 2% use it 20 or more times. Potential target commute riders may be limited since only 49% of respondents commute to work (24% are retired or do not work outside the home, 12% work from home or telecommute, and 15% are unemployed or currently not working). Of those that do commute, only 2% utilize transit (92% drive alone, 4% carpool, and 2% walk or bike). A contributing factor for the low transit usage by commuters may be due to varied commute destinations. The most popular specific commute destination, downtown Portland, is only shared by 12% of commute respondents. A summary of the commute destinations is provided in Table 7-1.

Table 7-1: West Linn Commute Destinations

Destination	Percent of Commuters
Portland (downtown)	12%
Portland (other areas)	17%
Beaverton/Hillsoboro/Tigard	10%
Tualatin/Wilsonville	9%
West Linn	8%
Lake Grove/Lake Oswego	7%
Oregon City	6%
Varying locations (job site not constant)	13%
Other Destinations	18%

Transportation Disadvantaged

Many people have trouble using public transportation for reasons ranging from emotional and physical disabilities to financial difficulties. This group, referred to as the transportation disadvantaged, is a significant and growing segment of the U.S. population (Gray, Hoel, 1992) The largest group of the transportation disadvantaged consists of those over 65 and those with a physical or mental disability. Because these groups do not share the same travel patterns and because their travel needs are diverse, providing them with transit service is a challenge. However, it is critical that steps be taken to meet these needs, as this group frequently has few alternatives to transit service.

Federal law also mandates assistance for those with special needs. The Americans with Disabilities Act of 1990 requires transit agencies to make their services fully accessible to disabled persons and to provide para-transit services for those unable to use accessible transit.

The 2000 census indicates that 7.8 percent of West Linn's population (1,900 persons) is over the age of 65. Also, 3.9 percent (940 persons) are below the poverty level. While more recent census estimates do not contain this level of detailed information, it can be assumed that the number of transportation disadvantaged persons has risen along with the overall population. These individuals, and youths below the legal driving age and/or without access to a motor vehicle, represent some of the West Linn population considered transportation disadvantaged.

Special transit services are available to residents of West Linn through the Pioneer Community Center Transportation Program, TriMet Lift and Shuttle Services, Loaves and Fishes, and the Transportation Reaching People (TRP) Volunteer Program.

The Pioneer Community Center Program is part of the Clackamas County Transportation Consortium, which is dedicated to providing coordinated transportation services to seniors and ADA-eligible people. The program, funded by the County and the City of West Linn, operates one van. The van is lift-equipped and operates Monday through Friday, from 9 AM to 3:30 PM. Clients can call on the same day that a ride is needed. The users of this system are primarily seniors who have difficulty driving or taking fixed route buses.

TriMet, the primary public transportation provider in the region, provides door-to-door service to registered customers who are certified as unable to use TriMet's regular service because of a physical or mental disability. The service operates with lift-equipped mini-buses and vans from 4:30 AM to 2:30 AM, seven days a week. Services are provided within a three-quarter mile radius of regular TriMet fixed routes. The fare for this service is currently $1.70 per one-way ride; a book of ten tickets costs $17.00, and a LIFT Monthly Pass is $48.00.

Another special transit service available for West Linn residents is the Transportation Reaching People program. In this program, community volunteers use their own vehicles to provide rides for medical, business, and social service appointments, as well as for recreational trips for older citizens, disabled individuals, or those in rural areas without access to other means of transportation.

Needs

1. Routes 35 and 154 provide only a basic level of transit services for the community. The locations of these routes are convenient for roughly the eastern half and far southern portion of the community, but are too far away for convenient walking access for the majority of the city, which lies far beyond the typical one-half mile walking distance from a transit stop. This limited service excludes the Tanner Basin and neighborhoods along Rosemont Road.
2. There is no inter-city transit access to other nearby communities that have significant employment centers, such as Tualatin and Wilsonville. For example, the TriMet routing system requires two transfers to get to Tualatin, taking about 90 minutes. More efficient services are needed to these major employment centers, and major transit centers, such as the new Commuter Rail services from Wilsonville to downtown Beaverton.
3. Many West Linn residents feel the City is not well served by public transit. With only one major trunk line and the access provided along Willamette Falls Drive, residents perceive that they are not able to easily move within or out of the City on public transit. Provision of service is hampered by topography and a lack of east-west routes.
4. Another issue of concern is amenities, such as bus benches and bus shelters, which enhance a transit system and make a system more user-friendly. As bus transit has in the past suffered from image problems, steps that can make this mode as comfortable and accommodating as possible may help encourage ridership. TriMet generally limits placement of bus shelters to locations with 35 or more weekday boardings. Due to low ridership levels, the City may need to directly fund these amenities.

The Transit Investment Plan, created to direct regional transit growth in the TriMet service area and provide a framework for how transit investments are made, provides a list of priorities for regional transit service[1] planning methods. These priorities are, in order:

1. Maintain the quality of the existing system

[1] *Transit Investment Plan* TriMet, 2003.

2. Grow the high capacity transit system
3. Expand the Frequent Service system
4. Improve local service

Priorities were established to direct investment for expansion of service and provision of amenities. According to the hierarchy, local service expansion routes in West Linn receive the lowest priority for regional transit funds. However, local transit needs could be met through alternatives to fixed route expansion such as local shuttle services, vanpools, or the phasing of local service capital projects within the West Linn service area in partnership with TriMet.

Transportation Disadvantaged

No specific problems with transportation services for disadvantaged West Linn residents have been identified. As the population continues to age, the needs of the elderly and disabled are expected to increase.

The City of West Linn should continue to support the Clackamas County Transportation Consortium services to the elderly and ADA-eligible residents, and other services currently being provided. Also, because needs are expected to increase, West Linn should work with existing providers to assess the needs and develop ways to best meet them.

Some inexpensive ways in which the city of West Linn can assist in promoting the services currently offered to the elderly and disabled are to post notices on their public bulletin boards, and to use meetings with the public to make notices and fliers available.

Criteria

The City's Comprehensive Plan contains transportation goals and policies that guide transportation system development in West Linn. The Transit policies cover the full range of transit related issues. Several of the policies were identified as useful for addressing transit needs in the Transportation System Plan, and are listed below.

TRANSIT-RELATED GOALS

1. Provide a transportation system for the City of West Linn that:
   a. Provides for maximum mobility while encouraging modes of transportation other than the automobile.
   b. Provides for connectivity within and between neighborhoods and community centers, using new and existing transportation services that are consistent with Metro's street and walkway spacing standards.
   c. Is convenient, safe, and efficient.
2. Provide a cost-effective balanced transportation system, incorporating all modes of transportation (including motor vehicle, bicycle, pedestrian, transit, and other modes).
3. Develop transportation facilities that are accessible to all members of the community and minimize out-of-direction travel.

Transit Policies

1. Coordinate with TriMet to encourage the provision of transit **amenities** such as bus shelters to increase potential ridership.
2. Promote a cohesive transit network **connecting** the four commercial centers in Willamette, Bolton, Robinwood, and Tanner Basin.
3. Encourage provision of **regional** transit service between West Linn and other suburban communities in the Portland Metropolitan Area.
4. Encourage the development of modes of mass transit for those residents of the City who must **commute** to jobs outside the City limits.
5. Improve **pedestrian and bicyclist** accessibility along major transit routes and to transit stations.
6. Support a public transit system that is **accessible** to the largest number of people by:
   a. Locating transit-oriented development around transit stations, along major transit routes, and in the designated Town Center area.
   b. Supporting more intense and mixed-use zoning designations in areas around transit stations, along major transit routes, in the designated Town Center, Corridor (Highway 43) and along designated Main Street areas identified in the Metro 2040 Growth Concept Plan, through provisions in the Comprehensive Plan and Zoning Ordinance. The City will seek higher concentrations of employment opportunities, residential development and commercial uses in these areas. The City will ensure that development is built consistently with the density allowed by zoning, while protecting the livability of existing neighborhoods.
   c. Encouraging provision of housing for the elderly and moderate income families to be located in close proximity to public transit facilities and services, and interconnected transportation facilities such as walkways and bikeways.
   d. Coordinating with TriMet to ensure that pedestrians and disabled people are accommodated as needed at transit locations and with transit services.
   e. Coordinating with TriMet to ensure that transit opportunities are provided to employees at major employment and community centers.
   f. Ensuring that transit-oriented public facilities are located along the Primary Transit Network as defined in the Regional Transportation Plan.

Strategies

TriMet is responsible for any changes in routes through their annual transit service plan process. In order for the City to have its transit needs assessed, the City can provide input to TriMet through this process.

Several strategies were developed for the implementation of future transit facilities in West Linn. These strategies were developed to provide the City with priorities in providing guidance to TriMet since it is likely that available funding will be insufficient to address all of the projects identified in the Transit Master Plan. These priorities are not necessarily in order.

Strategy 1 - "Provide Express Routes to Regional Employment Centers"

This strategy is aimed at providing service directly from West Linn transit centers to regional employment centers such as Portland, Washington Square, the Sunset Corridor, Tualatin and Wilsonville. This might include a few local stops followed by express service to a central transit shelter or implementing a vanpool system for employees in these areas.

Strategy 2 – "Provide Bus Shelters/Improved User Amenities"

This strategy focuses on installation of bus shelters and other user amenities along bus routes in West Linn. The need for bus shelters at bus stops, as well as other user amenities, should be evaluated in conjunction with any new commercial or residential development adjacent to a transit street. Typical daily boarding thresholds of 35 patrons or more could be used to support installation of a covered bus shelter and bench.

Strategy 3 - "Provide Additional Park & Ride Lots"

This strategy provides park & ride lots at locations where concentrated transit demand exists or where it is desirable for TriMet to stop.

Strategy 4 - "Provide Access to Activity & Service Centers"

This strategy focuses on providing transit access to destinations such as community centers, hospitals, schools, churches, etc.

Table 7-2 summarizes these strategies in terms of meeting the transportation goals and policies of West Linn. The policies that appear in the table are from the City's Comprehensive Plan and are described in the preceding section.

Table 7-2: Transit Facility Strategies Comparisons

Strategy	Policies 1 Amenities	2 Connect	3 Regional	4 Commute	5 Ped/Bike	6 Accessible
1. Provide Express Routes to Regional Employment Centers		◐	●	●		❍
2. Provide Bus Shelters/Improved User Amenities	●				●	●
3. Provide Additional Park & Ride Lots	◐		◐	●	❍	●
4. Provide Access to Activity & Service Centers		●				◐

● Fully meets criteria
◐ Mostly meets criteria
❍ Partially meets criteria
Does not meet criteria

Transit Master Plan

Transit enhancements within the TriMet service area are ultimately decided based on regional transit goals. As such, West Linn has little control over dictating the expansion of local service or decreasing headways. These decisions can be influenced, however, if the proper densities are achieved along the transit routes, a decision over which the City has more control. Another tactic for increasing transit service to the City of West Linn is through inter-governmental agreements and funding strategies between the City of West Linn and TriMet in order to leverage transit dollars for local projects, providing better connections to transit facilities and supplying amenities at transit locations. Potential transit projects based on the transit strategies and feasibility are summarized in Table 7-3.

Table 7-3: Potential Transit Projects

Rank	Project	Agency Responsible	Description
1	Improve Service Coordination for Route 154	West Linn/ TriMet	Coordinate with TriMet to modify the schedule, stop locations, or add a layover to improve connections and service for Route 154.
2	Provide Transit Amenities at Major Transit Stops	West Linn/ TriMet	Provide shelters, information kiosks, etc along key transit routes in West Linn with land use development. Expand park and ride lots where demand exceeds existing capacity.
3	Improve Pedestrian Connections to Transit Facilities	West Linn/ TriMet	Construct sidewalks, crosswalks, etc. adjacent to transit routes and facilities (i.e. park-and-ride lots, bus stops, etc.). Within one-quarter mile of bus stops, focus on enhancing pedestrian access. Give priority to improvements within the designated overlay district downtown.
4	Increase Density Adjacent to Transit	West Linn	Direct growth to increase the density of houses within transit lines in the City of West Linn in an effort to support regional transit service goals.
5	Decrease Headways	TriMet	Provide more frequent transit service during peak commute periods.
6	Provide More Local Service	West Linn/ TriMet	Provide services along Rosemont Rd and/or Salamo Rd. Expand fixed-route services, as development requires. Time additional transit service to coordinate with major road extensions or street improvements. Enhance/expand pick up services.

Coordinating with TriMet to improve the service of Route 154 could make the route a more attractive option for transit service in West Linn. Potential modifications could begin with the current route schedule, which makes it difficult for riders to connect with Route 35. A potential layover at the Oregon City Transit Center (that arrives before Route 35 and leaves after the Route) would allow riders to transfer more easily between the two routes, regardless of direction of travel. A second phase of improvements for Route 154 could include

modifications to the stop locations, including a stop (and potential park and ride) located at the library, an important community attraction.

Providing additional transit amenities at existing transit stops can improve and increase ridership. TriMet generally limits placement of bus shelters to locations with 35 or more weekday boardings. Due to low ridership levels, the City may need to directly fund these amenities[2]. A variety of shelter layout options exist to meet the specific needs and constraints of the location[3], though shelters need to meet local jurisdiction standards for structural integrity and wind load. By constructing 3-5 bus shelters (at a cost of approximately $10,000 each), transit use will become a more attractive option.

Currently, there is just one park and ride facility[4] located in the City of West Linn, providing the opportunity for residents to be connected via transit to the larger Portland region. Additional park and ride lots would increase transit accessibility for those individuals that do not live within walking distance of transit stops. Church sites in particular may allow midweek parking opportunities if shared usage agreements are feasible. Potential new locations could include the Bolton shopping center, West Linn Public Library, Willamette Christian Church, or along Blankenship Road. Due to low demand at the existing park and ride lot, TriMet is currently not considering specific additional park and ride locations at this time, but can assist in user agreements with potential site owners as the need arises[5].

Improving pedestrian connections to transit facilities is an important step in increasing accessibility of the existing transit facilities. Additional sidewalks and pedestrian refuge islands adjacent to Highway 43 will improve safety for not only potential transit riders but all pedestrians. Improvements described in the Highway 43 Concept Plan provide these crossing safety projects at key locations.

Implementation of a local circulator bus could be a joint City / TriMet effort and would increase transit coverage in West Linn. A potential route could include Salamo Road to Rosemont Road, down to Bolton shopping center and then returning along Willamette Falls Drive. Such a route would provide service to local destinations, as well as regional connections via Route 35 or 154. Previous service of Route 154 included service along Salamo Road and Rosemont Road (Figure 7-2) but was changed due to low ridership.

In addition to a fixed local route, local service improvements could include enhancing and expanding pick up services for those potential riders cannot use TriMet but do not qualify for existing pick up services.

[2] A similar city-funded effort has occurred in Lake Oswego. A TriMet crew would need to be hired to perform the work in order to meet union rules.
[3] Bus Stop Guidelines 2002, TriMet, October 2002.
[4] TriMet currently utilizes the parking lot of Emmanuel Presbyterian Church and has recently renewed the agreement at that location.
[5] Contact Young Park, Manager of Capitol Projects, TriMet.

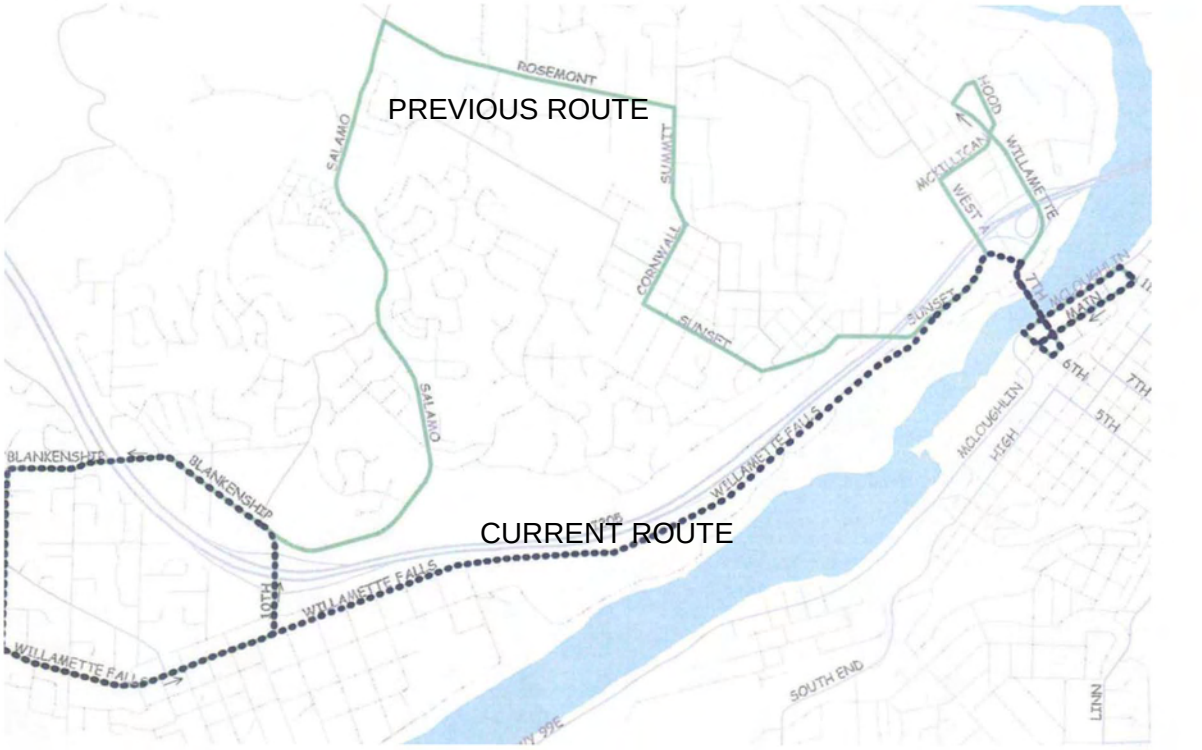


Figure 7-2: TriMet Route 154 – Previous and Current Service Routes[6]

In fall 2008, Westside Express Service (WES) will begin as commuter rail service in Washington County. The north-south route from Beaverton to Wilsonville will take approximately 30 minutes and will run on 30 minute headways during weekday commute periods. The route will link Beaverton, Tigard, Tualatin and Wilsonville directly and will provide connections to additional transit service and lines. The future WES service provides the opportunity to further connect West Linn riders with the surrounding Metro area. Current transit service from West Linn[7] to the Beaverton Transit Center requires approximately 90 minutes of travel. Future bus lines linking West Linn directly to Tualatin or other transit centers along the WES route would decrease travel time to Washington County locations.

The Metro Council has approved several options for further study to connect Lake Oswego to downtown Portland. The options (which include enhanced bus and streetcar extension alternatives) may provide the potential for future connections to transit service in West Linn.

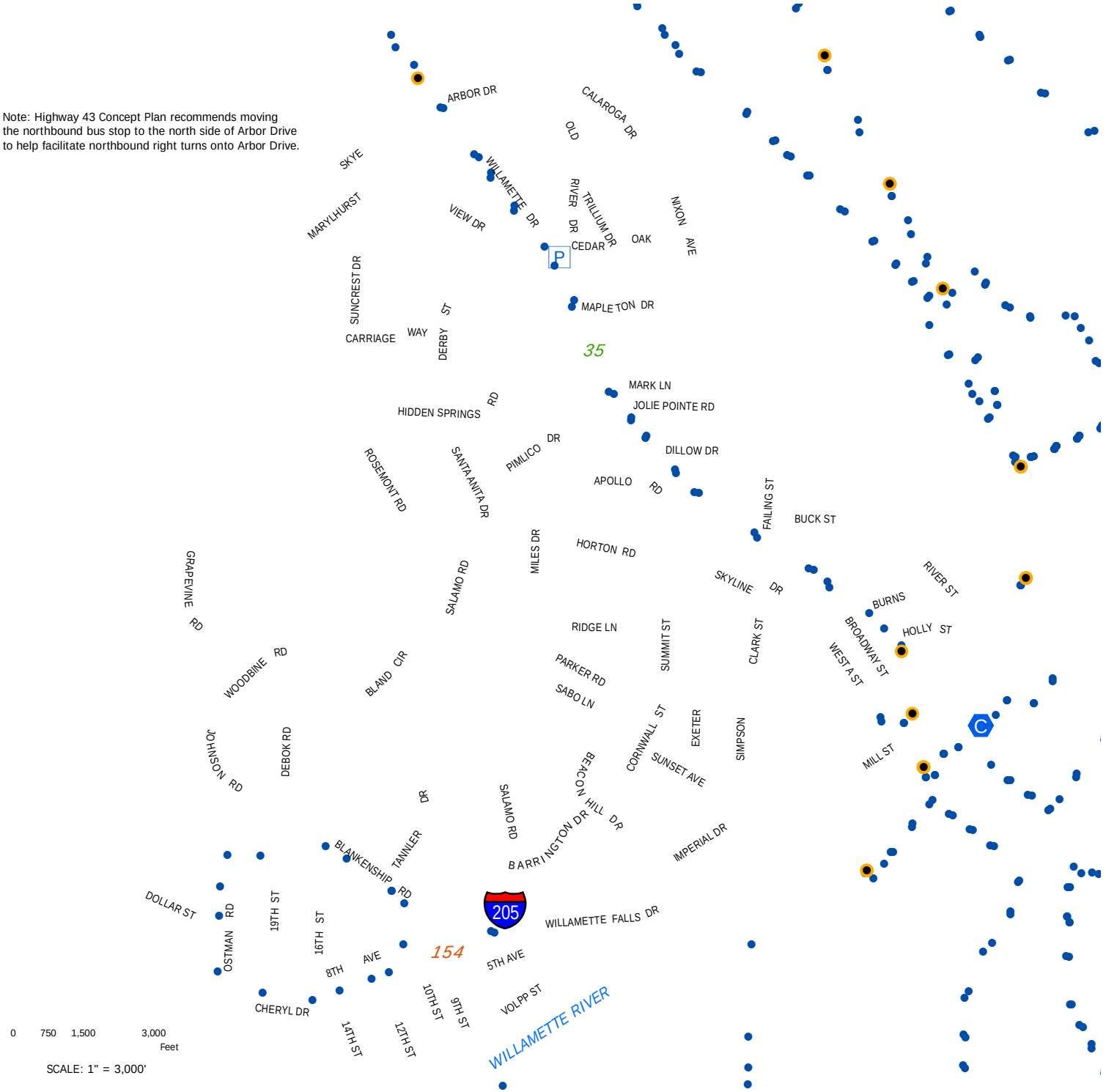
One aspect considered when assessing the potential for new bus service is the density of housing and employment. A land use density analysis was conducted to identify areas of the City that could be likely to support transit service. The minimum land use density[8] required to

[6] http://www.ci.west-linn.or.us/Community/bus/Bus154route.htm June 2008.
[7] Measured from 10th Street/Willamette Falls Drive, using TriMet's Trip Planner online service. http://trimet.org/
[8] Thresholds for minimum land use density to support fixed-route transit service are based on definitions in the 2000 *Highway Capacity Manual*, Chapter 27 for Transit service analysis methodologies.

support a fixed route transit bus service with 1-hour schedule between arrivals is about four (4) housing units per acre or three (3) employees per acre. Figure 7-3 shows those areas in West Linn that meet this transit supportive density threshold with both the base year 2005 and future year 2030 land use cases.

Two areas that meet the base year 2005 density levels are located adjacent to I-205 near Highway 43 (served by Route 35) and in the Willamette neighborhood loop currently served by Route 154. The third area that meets transit supportive density levels is along Salamo Road south of Rosemont Road, a location that is currently not served by transit. Additional areas that are projected to meet future density thresholds include a northern portion of the Willamette neighborhood and along Hidden Springs Road and the northern portion of Highway 43. Areas that meet the density thresholds in Figure 7-3 should be considered for future transit routes. However, service to the Hidden Springs area would be difficult due to the grade of roadways, and a central route serving the additional areas shown in Figure 7-3 would likely resemble the prior Route 154 (Figure 7-2).

To better understand the potential demand for transit, the City of West Linn should conduct an expanded survey of its residents to assess location, frequency, and willingness to pay for additional transit services and coverage in the City. Such a survey is beyond the scope of the TSP efforts but could be included in a comprehensive transit plan for the City that sets the foundation for additional transit routes.



Note: Highway 43 Concept Plan recommends moving the northbound bus stop to the north side of Arbor Drive to help facilitate northbound right turns onto Arbor Drive.

West Linn

Transportation System Plan

POTENTIAL TRANSIT SUPPORTIVE AREAS*

LEGEND

- 2005 Transit Supportive Area
- 2030 Transit Supportive Area
- 35 — Bus Route w/ Route No. < 30 Min. Headway
- 154 — Bus Route w/ Route No. > 30 Min. Headway

Transit Facilities

- Stop
- Shelter
- Transit Center
- Park and Ride

- Freeway
- Major Roads
- Streets
- Railroad
- Water
- City Limits

Note bus routes outside West Linn not shown.
*Potential transit supportive areas based based on quantitative housing and employment density data and do not necessarily reflect the views of residents

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Complementing Land Use Actions

There are three determining factors that play a role in the provision of a successful transit system: net housing density, transit level of service (frequencies) and proximity to station locations. The City of West Linn has the ability to control the net housing densities located around current and potential transit stops and the proximity of development to these stops. While TriMet makes decisions regarding the third factor, transit level of service, the focus of development and land use decisions within proximity of transit locations will greatly effect the service decisions made by TriMet.

In order to provide a density high enough to support frequent service scheduled for Route 35 within ten (10) years, housing density along the current transit corridor should be increased. Guiding development within the City of West Linn to this corridor would help support the regional transit goal of providing an efficient and effective transit system, as well as reducing reliance on automobile for inter-jurisdictional work trips made by individuals living or working in this corridor.

In order to promote higher density developments, the City should consider the following requirements in the City of West Linn Development Code that provides approval criteria related to public transit:

(a) Provisions within the plan shall be included for providing for transit if the development proposal is adjacent[9] to existing or proposed transit route;

(b) The requirements for transit facilities shall be based on:

- The location of other transit facilities in the area; and
- The size and type of the proposal.

(c) The following facilities may be required after City and TriMet review:

- Bus stop shelters;
- Turnouts for buses; and
- Connecting paths to the shelters.

Transit Action Plan

The transit action plan list was created to identify transit projects that are reasonably expected to be funded by the year 2030. Transit action plan projects are listed in Table 7-4, and are a refined list of the general projects listed in Table 7-3. Further refinement of the projects (including specific locations for transit shelters and potential local transit routes) will be developed through the Transit Expansion Study, which includes an expanded survey of residents to build on the initial survey conducted in August/September 2008. Costs are included to serve as a placeholder for these projects.

[9] The code provision should define adjacent as having a bus stop within 500 feet of the property.

Table 7-4: Transit Action Plan

Priority	Project	Agency Responsible	Description	Cost ($1,000s)
High	Improve Service Coordination for Route 154	West Linn/TriMet	Coordinate with TriMet to modify the schedule, stop locations, or add a layover to improve connections and service for Route 154	-
High	Transit Expansion Study and Survey	West Linn	Explore the feasibility of local fixed-route transit service including surveys of residents and potential users.	$75
High	Provide Transit Amenities at Major Transit Stops	West Linn/TriMet	Provide shelters, information kiosks, etc along key transit routes in West Linn with land use development. Specific locations (5) to be determined through transit study and survey.	$50
High	Improve Pedestrian Connections to Transit Facilities	West Linn/TriMet	Construct sidewalks, crosswalks, etc. adjacent to transit routes and facilities.	$0*
Med	Decrease Headways	TriMet	Provide more frequent transit service during peak commute periods.	-
Med/ Low	Provide More Local Service	West Linn/TriMet	Expand coverage by providing local service to connect to existing transit lines. Enhance/expand local pick up services. Specific locations/actions to be determined through transit study and survey. This project is a placeholder for funds pending the outcome of the study.	$50/yr
			Transit Project Total (for 23 years)	**$1,275**

NOTE: * Specific projects and costs included in Pedestrian Plan of this TSP

Motor Vehicle Master Plan

This chapter summarizes strategies to be used in evaluating the future needs of the City of West Linn's street network, and recommends improvements for motor vehicle (automobiles, trucks, buses and other vehicles) operations. The Motor Vehicle Plan is intended to develop projects to address the needs identified in Chapter 4 (Future Conditions), as well as identifying cost for those projects.

Strategies

To serve future growth and conform to the City of West Linn's future needs, a set of interrelated strategies needs to be implemented to meet city and state performance standards. Operational Projects, Capital Projects, and Policy changes are the three related strategies available to the city for managing the forecasted future travel demand. Operational Projects (such as signal timing improvements or ITS implementation) often involve the improvement of a city's existing transportation infrastructure. Capital Projects are generally larger scale improvements, and can involve physical improvements to existing infrastructure (such as widening a facility) or the planning and construction of new city infrastructure. Policy changes generally do not result in physical changes in the city's infrastructure, but rather a change in the implementation of how the city conducts business.

The impact of future growth would be severe without investment in transportation improvements. Strategies for meeting automobile facility needs include the following:

- Transportation System Management (TSM)
- Intelligent Transportation Systems (ITS)
- Functional Class
- Neighborhood Traffic Management
- Access Management
- Additional Traffic Signals on Arterial/Collector Intersections
- Local Street Connectivity
- Transportation Demand Management
- Intersection Capacity Improvements
- Regional Circulation Enhancements

The following sections outline the type of improvements that could be needed for the long-range Motor Vehicle Master Plan.

Transportation System Management (TSM)

Transportation System Management (TSM) focuses on low cost strategies within the existing transportation infrastructure to enhance operational performance. Finding ways to better manage transportation while maximizing urban mobility and treating all modes of travel as a coordinated system is a priority. TSM strategies include signal improvements, traffic signal coordination, traffic calming, access management, local street connectivity and intelligent transportation systems (ITS). Traffic signal coordination and systems typically provide the most significant tangible benefits to the traveling public. The primary focus of TSM measures are region-wide improvements, however there are a number of TSM measures that could be used in a smaller scale environment such as within the City of West Linn. The following sections discuss TSM measures that could be appropriate for the City of West Linn

Intelligent Transportation Systems (ITS)

ITS involves the application of advanced technologies and proven management techniques to relieve congestion, enhance safety, provide services to travelers and assist transportation system operators in implementing suitable traffic management strategies. ITS focuses on increasing the efficiency of existing transportation infrastructure, which enhances the overall system performance and reduces the need to add capacity (e.g. travel lanes). Efficiency is achieved by providing services and information to travelers so they can (and will) make better travel decisions and to transportation system operators so they can better manage the system and improve system reliability.

Clackamas County has prepared an ITS plan for the urbanized area of the County. The plan identifies opportunities for regional coordination and funding and calls for Clackamas County to dedicate funding sources for projects. The Clackamas County ITS Plan[1] identifies ITS projects in West Linn located along I-205 and Highway 43. Projects located in West Linn along each of these facilities (and planned implementation schedules) are:

Highway 43

- CCTV cameras at three locations [Planned 11-20 years]
- Detector station [Planned 11-20 years]
- Incident management corridor [Planned 11-20 years]
- Transit priority corridor (and information display) [Planned 6-10 years]
- Fiber optic cable [Planned 11-20 years]

Interstate 205

- CCTV cameras at four locations [*completed*]
- Fiber optic cable [*completed*]

Projects located along Highway 43 generally do not have a high priority in the regional plan (10+ years until implementation) and for this reason specific funding sources have not been identified. Potential funding sources for these ITS projects include the Metropolitan Transportation Improvement Program (MTIP) or programming City of West Linn transportation funds.

Other ITS projects to consider in the City may include transit signal priority, signal coordination and optimization, traffic monitoring and surveillance, information availability, and incident management. In order to support future ITS projects including traffic signal operations, the City of West Linn and

[1] Clackamas County ITS Plan, DKS Associates, Inc. and Zenn Associates, February 2003.

Clackamas County should require the installation of three-inch conduit along arterial and selected collector roadways during roadway improvement projects. ITS projects can require additional fiber optic cable to serve the new equipment along a roadway. A three-inch conduit would ensure adequate wiring capacity to accommodate future ITS projects.

Functional Classification

The functional class of a road aids in defining the primary function and associated design standards for the facility. The hierarchy of the facilities within the network in regards to the type of traffic served (through or local trips), balance of function (providing access and/or capacity), and the level of use (generally measured in vehicles per day) are generally dictated by the functional class.

How Street Functional Classification is Applied

Functional classification has two components: the extent of connectivity and the frequency of the facility type. Maps can be used to determine regional, city, 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. Spacing standards can be a guide for setting functional class, but other features and potential long term uses in the area must be considered. For instance, some areas may not experience significant changes in demand, while 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 streets, the City can manage public facilities pragmatically and cost-effectively. The hierarchy of these classifications does not directly affect the volumes on the roadways. However, standards that are specific to each facility type provide the characteristics that dictate relative attractiveness of a route and the mix of through and local traffic.

Identification of connectivity does not dictate the demand for a facility (which is a function of land use). Streets with the highest connectivity have the greatest potential for high traffic volumes, but do not necessarily 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 35-65% "through traffic." Without the connectivity provided by arterials and collectors, the impact of traffic intruding into neighborhoods and local streets increases substantially.

Classification Types

Freeways are state or interstate facilities that provide regional travel connections. These routes have the highest capacity and the most restrictive access requirements. Two local freeway interchanges at 10th Street and at Highway 43 serve the entire city of West Linn. Interchanges are grade-separated facilities with arterial or principal arterial streets. No intermediate vehicular or pedestrian access is allowed.

Principal Arterials are typically state highways that provide the high level roadway capacity to local land uses. These routes connect over the longest distance (sometimes miles long) and are less frequent than other arterial or collectors. These highways generally span several jurisdictions and often have

statewide importance (as defined in the ODOT State Highway Classification). These facilities should provide for a high level of transit service and include transit priority measures to expedite bus travel. **Arterial streets** serve to interconnect the City. 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 the key feature of an arterial route. Arterials are typically multiple miles in length.

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 citywide circulation function, do not require as extensive control of access (compared to arterials) and penetrate residential neighborhoods, distributing trips from the neighborhood and local street system. Collectors are typically greater than 0.5 to 1.0 miles in length.

Neighborhood Routes are usually long relative to local streets and provide connectivity to collectors or arterials. Since neighborhood routes have greater connectivity, they generally have more traffic than local streets and are used by residents in the area to access 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, certain measures should be considered to retain the neighborhood character and livability of these streets. Neighborhood traffic management measures are often appropriate (including devices such as speed humps, traffic circles and other devices - refer to later section in this chapter). However, it should **not** be construed that neighborhood routes automatically get speed humps or any other measures. While these streets have special needs, neighborhood traffic management is only one means of retaining neighborhood character and vitality.

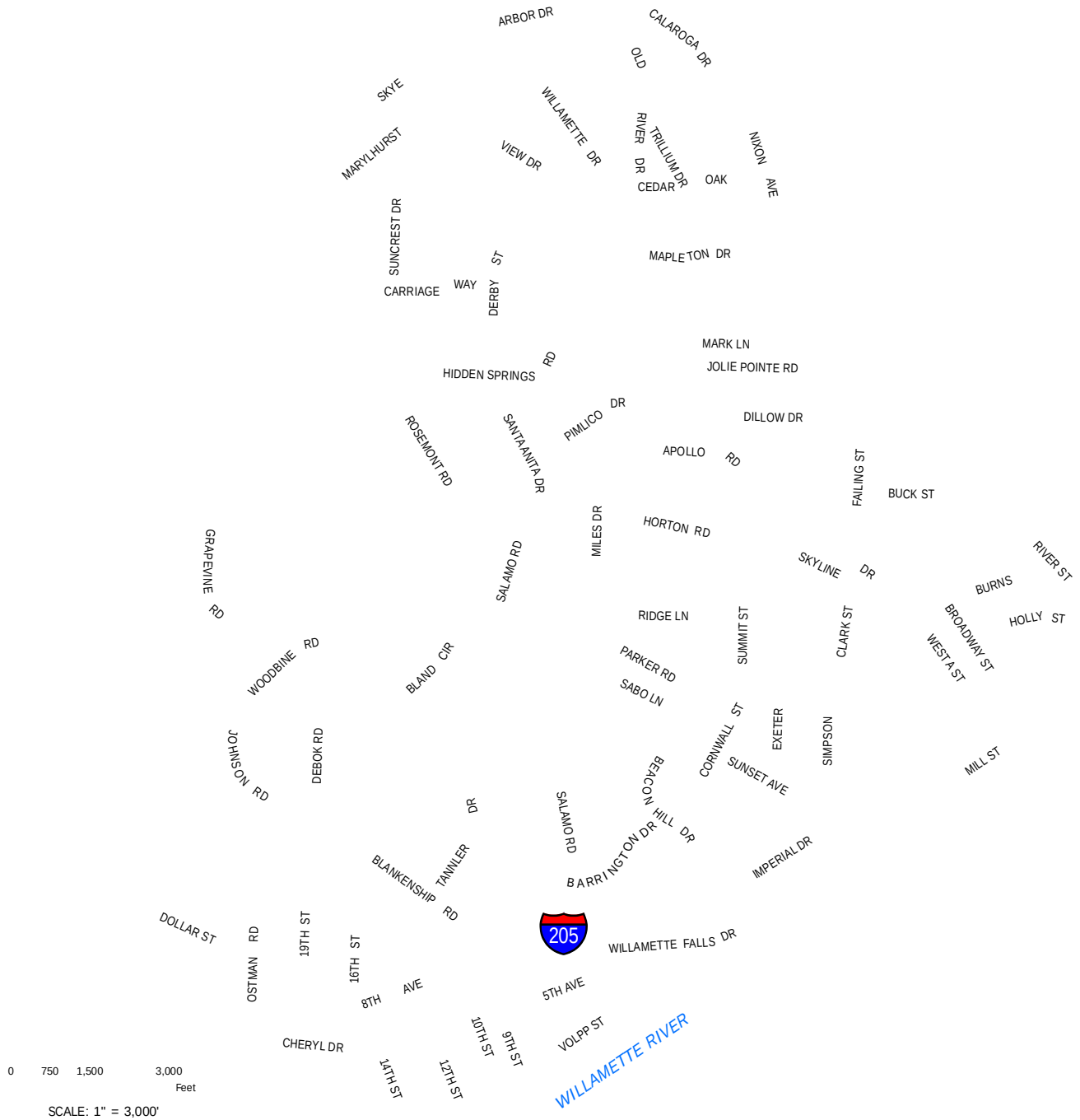
Local Streets have the sole function of providing access to immediate adjacent land. Service to "through traffic movement" on local streets is deliberately discouraged by design.

The proposed functional classification of roadways was developed following detailed review of the existing West Linn TSP, Clackamas County TSP, and the Metro RTP functional classification. No changes are proposed to the existing functional classification. The functional classification for the roadways in the City of West Linn is shown in Figure 8-1.

Roadway Cross-Section Standards

The design characteristics of streets in the City of West Linn need to meet the function and demand for each facility type. The actual design of a roadway can vary from segment to segment due to adjacent land uses and demands. The objective was to define a system that allows standardization of key characteristics to provide consistency, but also to provide criteria for application that provides some flexibility, while meeting the design standards. Table 8-1 outlines the width requirements for different street elements for streets in the City of West Linn. The cross-section standards for each functional classification are further detailed in Figures 8-2 through 8-5.

Unless prohibited by extreme topographic conditions, newly constructed streets shall meet the maximum standards indicated in the cross-sections. When widening an existing street, lesser standards than the maximum may be used to accommodate physical and existing development constraints. Examples of constrained street cross-sections are shown for arterial and collector streets. These constrained cases should be applied where future daily volumes do not require center left-turn pockets or raised medians. In some locations, "green streets" (those that utilize vegetation to manage drainage) may be appropriate due to design limitations or adjacent land use. Green street elements (shown in the cross section figures) may be included at the discretion of the city engineer and planning director.



West Linn Transportation System Plan

EXISTING/FUTURE FUNCTIONAL CLASS

LEGEND

- Freeway
- Principal Arterial
- Arterial
- Collector
- Neighborhood Route
- Local Street

- Railroad
- Water
- City Limits

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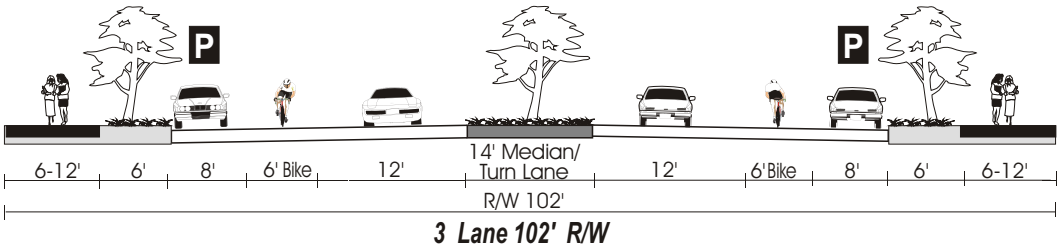
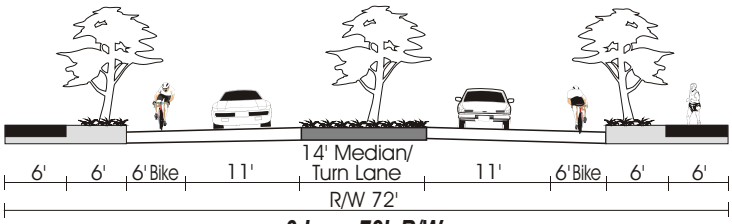
West Linn
Transportation
System Plan

Principal Arterial



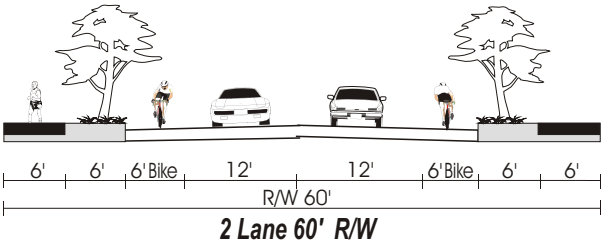
3 Lane 102' R/W

Arterial



3 Lane 72' R/W

Arterial Constrained



2 Lane 60' R/W

Standards	***Principal Arterial***	***Arterial***
Vehicle Lane Widths:	*11-14 ft.*	*11-12 ft.*
On Street Parking:	*Limited* *	*Limited* *
Bicycle Lanes: (See Chapter 5)	*4-6 ft.*	*4-6 ft.*
Sidewalks:	*6-12 ft.*	*6-12 ft.* ***
Landscape Strips:	*0-6 ft.*	*0-6 ft.* ***
Medians/Turn Lane Widths:	*0-14 ft.* **	*0-14 ft.* **
Neighborhood Traffic Management:	*Not Appropriate*	*Not Appropriate*

* *Note: On-street parking allowed in designated opportunity areas.*

** *Note: Two-lane arterial allowed in designated opportunity areas, or where property access is limited to right-turn movement only. (No center lane)*

*** *Note: When abutting commercially zoned property - sidewalks shall be 12' wide with street tree cut-outs and no separate landscape strip. When abutting residentially zoned property, sidewalks shall be 6' wide with 6' wide landscape strip.*

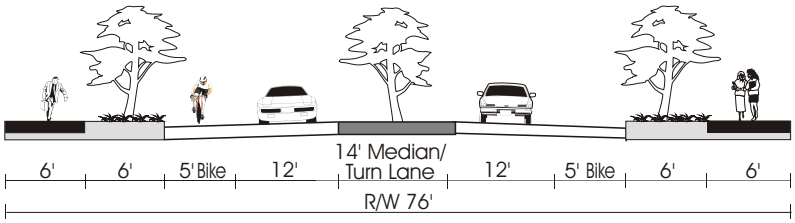
Legend

P - *On-street Parking Lane*

Figure 8-2
ARTERIAL
STREET CROSS SECTIONS

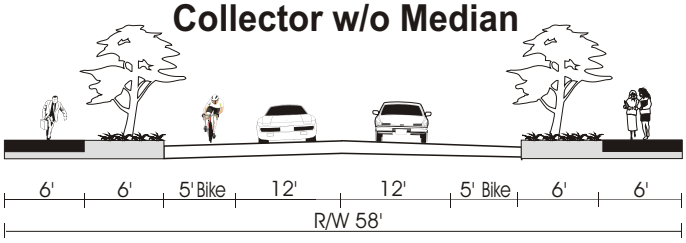
West Linn
Transportation
System Plan

Collector with Median/Center Lane



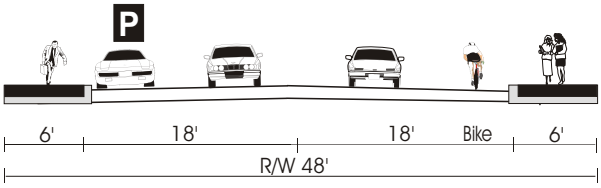
3 Lane 72' R/W

Collector w/o Median



2 Lane 58' R/W

Collector Constrained



2 Lane 48' R/W

Standards *Collector*

Vehicle Lane Widths:	*10-12 ft.*
On Street Parking:	*5-8 ft.*
Bicycle Lanes:	*4-6 ft.* *
Sidewalks:	*4-8 ft.*
Landscape Strips:	*0-6 ft.*
Medians/Turn Lane Widths:	*10-14 ft.* **
Neighborhood Traffic Management:	*Under Special Conditions*

* *Note: Bike lanes required where future traffic volumes > 3,000 ADT. When <3,000 ADT, 14' travel lanes will be provided.*

** *Note: Center turn lane maybe omitted where future traffic volumes < 5,000 ADT.*

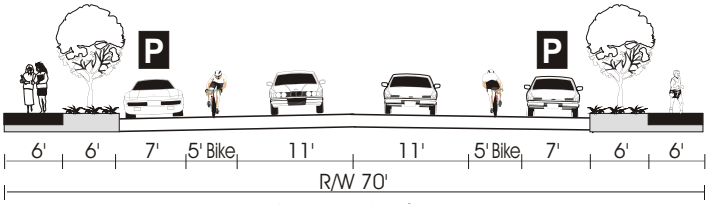
Legend

P *- On-street Parking Lane*

Figure 8-3
COLLECTOR
STREET CROSS SECTIONS

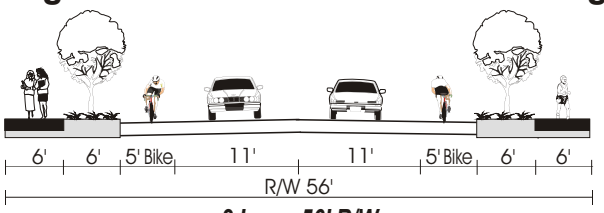
West Linn
Transportation System Plan

Neighborhood Route With Parking & Bike Lane *



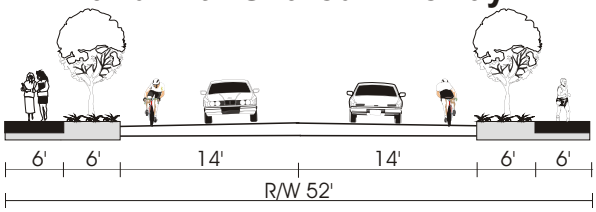
2 Lane 70' R/W

Neighborhood Route Without Parking *



2 Lane 56' R/W

Neighborhood Route Without Parking * ** and with Shared Bikeway



2 Lane 52' R/W

Standards	Neighborhood Route
Vehicle Lane Widths:	10-12 ft.
On Street Parking:	7-8 ft. ***
Bicycle Lanes: (See Chapter 5)	4-6 ft.
Sidewalks:	4-6 ft.
Landscape Strips:	0-6 ft.
Medians/Turn Lane Widths:	None
Neighborhood Traffic Management:	Under Special Conditions

* Note: When shown as a bicycle route on the Bicycle Route Plan.

** Note: Shared Bikeway will be used when volumes < 3,000 ADT.

*** Note: Allowance of on-street parking shall be based upon the nature and intensity of adjacent development and physical constraints.

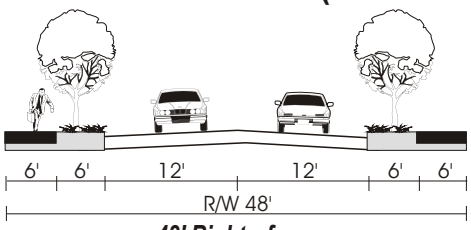
Legend

P - On-street Parking Lane

Figure 8-4
NEIGHBORHOOD ROUTE STREET CROSS SECTIONS

West Linn
Transportation
System Plan

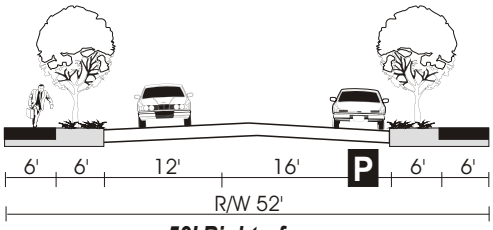
24' Local Residential (No Parking)



48' Right-of-way

<1,000 vpd

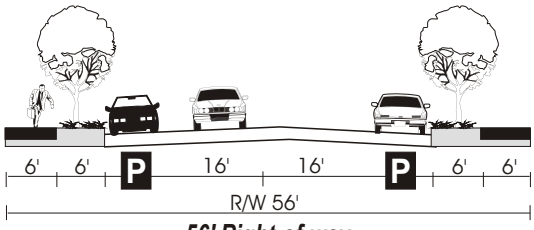
28' Local Residential (No Parking On One-side)



52' Right-of-way

<1,000 vpd

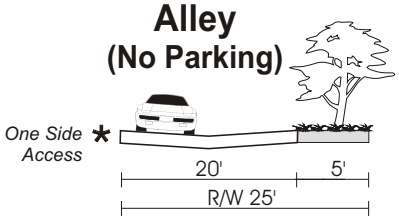
32' Local Residential



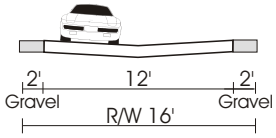
56' Right-of-way

<1,000 vpd

Alley (No Parking)



Alley (No Parking)



Legend

P *- On-street Parking Lane*

Note: Landscape stripe may be narrowed or eliminated and sidewalks may be narrowed to 4 feet and/or placed on one-side of the street in areas of severe physical constraints or constraints from existing development.

Figure 8-5
RESIDENTIAL LOCAL STREET CROSS SECTIONS

Table 8-1: City of West Linn Roadway Cross-Section Standards

Street Element	Characteristic	Width/Options
Vehicle Lane Widths:	Arterial	11 feet
(Minimum widths)	Collector	10 feet
	Neighborhood	10 feet
	Local	12 feet
	Turn Lane	10-14 feet
On-Street Parking:	Arterials	Limited (in designated opportunity areas)
	Collectors	Some (unstriped)
	Neighborhood	Some (8 feet)
	Local	Some (unstriped)
Bicycle Lanes:	New Construction	5 to 6 feet
(minimum widths)	Reconstruction	5 to 6 feet
Sidewalks:	Arterial	6 feet
(Minimum width)	Collector	6 feet
	Neighborhood/Local	6 feet
Landscape Strips:	Can be included on all streets	6 feet
Medians:	5-Lane	Optional
	3-Lane	Optional
	2-Lane	Consider if appropriate
Neighborhood Traffic Management:	Arterials	Not recommended
	Collectors	Under special conditions
	Neighborhood	Should consider if appropriate
	Local	Should consider if appropriate
Transit:	Arterial/Collectors	Appropriate
	Neighborhood/Local	Only in special circumstances
	Local	Not recommended

Note: These standards apply to City of West Linn facilities only. ODOT width standards apply for ODOT facilities.

Neighborhood Traffic Management (NTM)

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 West Linn currently utilizes a variety of NTM elements such as speed humps, raised pavement markings, median, bulb-outs, etc.

The City has an established traffic safety committee which meets on a monthly basis that oversees NTM issues among their other responsibilities. The committee has a set procedure for NTM implementation that starts with the identification of a perceived problem by concerned citizens, after which the committee conducts a speed/volume survey to identify if the problem exists. Once the problem has been identified and classified, the committee discusses the various approaches to solving the problem. There are many different NTM options available to the committee, which are described in the technical appendix. Typically, the committee starts with lower cost solutions, such as education and enforcement and if it is deemed that either of these solutions are not having the desired effect, an engineering solution is selected by the committee. The implementation of the selected NTM solution may be funded by the city and/or the concerned citizens. Often the city pays for the logistics of the NTM implementation and the citizens pay for the material costs.

The city should continue this effort with additional traffic calming measures (where applicable) and work with the community to find the traffic calming solution that best meets their needs while maintaining roadway function. Table 8-2 lists common NTM applications that Tualatin Valley Fire and

Rescue typically supports as long as minimum street criteria are met. Any NTM project should include coordination with emergency agency staff to ensure public safety is not compromised.

Table 8-2: Traffic Calming Measures by Roadway Functional Classification

Traffic Calming Measure	Roadway Classification		
	Minor Arterial*	**Major Collector**	**Minor Collector/ Local Street**
Curb Extensions	Supported	Supported	Calming measures are alright on lesser response routes that have connectivity (more than two accesses) and are accepted and field tested by Tualatin Valley Fire and Rescue.
Medians	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	
Meandering Alignments	Not Supported	Not Supported	

Note: Traffic calming measures are supported with the qualification that they meet Tualatin Valley Fire and Rescue guidelines including minimum street width, emergency vehicle turning radius, and accessibility/connectivity

Access Management

Access Management is a policy tool which seeks to balance mobility, the need to provide efficient, safe and timely travel with the ability to allow access to individual properties. Proper implementation of access management techniques should guarantee reduced congestion, reduced accident rates, less need for roadway widening, conservation of energy, and reduced air pollution.

Access management limits the number and spacing of vehicular access on arterial and collector facilities to maintain the capacity of the facilities and preserve their functional integrity. Access management strives to strike a balance between maintaining the integrity of the facility and providing access to adjacent parcels. Numerous driveways can erode the capacity of arterial and collector roadways. Preservation of capacity is particularly important on higher volume roadways, such as Highway 43, 10th Street, and Willamette Falls Drive for maintaining traffic flow and mobility. Numerous driveways or street intersections increase the number of conflicts and potential for collisions and decrease mobility and traffic flow. The City of West Linn, as with every city, needs a balance of streets that provide access with streets that serve mobility.

Several access management strategies were identified to improve local access and mobility in the City of West Linn:

- Develop formalized access management plans for specific major and minor arterial streets in the City of West Linn to provide a detailed assessment of current conditions, and document specific measures to maximize the capacity of each existing facilities and protect their functional integrity.
- Work with land use development applications to consolidate driveways where feasible.
- Provide left turn lanes where warranted for access onto cross streets.

- Construct raised medians to provide for right-in/right-out driveways as appropriate.

New development and roadway projects on city street facilities should meet the recommended access spacing standards summarized in Table 8-3.

Table 8-3: Access Spacing Standards for City Street Facilities

Roadway Functional Classification	Area	Traffic Signals (miles)	Public Intersections (feet)	Private Driveways (feet)	Median Opening (feet)
Arterial	Urban	½	600	300	600
	Opportunity	¼	NA	NA	NA
Collector	All	¼	200	150	NA
Neighborhood Route	All	¼	150	100	NA
Local Residential Street	All	NA	100	50	NA
Local Commercial Street	All	NA	100	50	NA

"Urban" refers to intersections inside the West Linn urban growth boundary and outside the central business district or designated town centers.
"Opportunity" refers to the designated opportunity areas located in the Robinwood, Bolton, and Willamette neighborhoods.

Many existing roadways and/or driveways do not currently meet these standards. These access points were installed when traffic volumes were substantially lower and no access spacing criteria were mandated. With higher traffic volume in the future, the need for access control on all arterial and collector roadways is critical to allow for safe mobility.

Highway 43 Access Management Plan

Preserving capacity on state facilities is especially important, since a large number of regional trips are served daily on both of these facilities (I-205 and Highway 43) in West Linn. Substandard performance because of a lack of capacity could force drivers to look for alternative routes along city streets. Preservation of capacity through specific access spacing standards on state facilities is outlined in the *Oregon Highway Plan* (OHP)[2] for Highway 43. Table 8-4 lists the minimum access spacing standard requirements for segments of Highway 43, based on speed and functional classification.

Table 8-4: ODOT Access Spacing Standards for Highway 43

Location	Speed (mph)	Highway Classification	NHS*	Truck Route	Freight Route	Access Spacing Standard (ft)
MP 8.04 (City Limit) – MP 11.29 (I-205 NB Off-Ramp)	35	Statewide	Yes	No	No	720
MP 11.29 (I-205 NB Off Ramp) – 11.43 (City Limit)	35	District	No	No	No	350

Note: 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 Special Transportation Areas (STA) driveways are discouraged. However, where driveways are allowed and where land use patterns permit, the minimum access management spacing for driveways is 175 feet (55 meters) or mid-block if the current city block is less than 350 feet (110 meters)[3].
* National Highway System

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 queuing vehicles. Being nearly built-out, there will not likely be many new roads constructed within the City of West Linn. Currently all of the signalized

[2] *OAR 734-051 Highway Approaches, Access Control, Spacing Standards and Medians*, adopted per ORS 374.310(1).
[3] Oregon Department of Transportation (ODOT), 1999 *Oregon Highway Plan* (OHP)

intersections within the city are either along Highway 43 or are located at or near the two interchanges with I-205. However, as traffic volumes increase as a result of potential in-fill and regional growth, the need for new signals along the existing street system may be necessary to manage traffic flow. When this is the case, traffic signal warrants should be evaluated to determine if a traffic signal is an appropriate solution (if a deficiency exists). Traffic signals should only be implemented when deemed necessary by the city engineer to enhance safety and promote mobility. ODOT identifies ½ mile as the desirable spacing of signalized intersections on regional and statewide highways but recognizes that shorter signal spacing may be appropriate due to a number of factors including existing road layout and land use patterns[4]. Signal spacing below these standards should be studied in detail to consider traffic signal coordination and the impacts of vehicle flow and queuing within the area. At that time adjacent signals and the spacing between them can be evaluated.

Local Street Connectivity

The City of West Linn's many cul-de-sacs, steep topography, and major facilities such as Highway 43 and I-205 limit intercity connectivity. Therefore, many intercity trips are forced to travel along the few through streets that do connect across these barriers.

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. Additionally, public safety response time can also be reduced.

Some of the congestion on roads such as Rosemont Road, Salamo Road, or Hidden Springs Road could be improved through improved neighborhood connectivity. Improved connectivity in the area east of Highway 43 and in the Tanner Basin area can provide circulation to existing or future traffic signals that will result in less delay and better safety for access onto the highway. Several short roadway connections will be needed within neighborhood areas to connect disjointed local streets and to reduce out-of-direction travel for vehicles, pedestrians and bicyclists.

The proposed Local Connectivity Plan for the City of West Linn is shown in Figure 8-6. In most cases, the improvements would involve the changing of a streets functional classification from local street to neighborhood route. In limited cases, a short length of new road would be necessary for improved connectivity. The arrows on Figure 8-6 represent recommended connections and the general direction for the placement of the connection in existing configurations. In each case, the specific alignments and design may be modified dependent upon future development review.

The criteria for providing local connections are based on the Metro RTP requirements for new residential or mixed-use developments.

- Every 330 feet, a grid for pedestrians and bicycles (may include paved roadway or trails)
- Every 530 feet, a grid for automobiles (local street or higher classification)

[4] MUTCD signal warrants must be met based on ODOT methodology and OAR 734-020-460 (1) A traffic signal shall not be installed unless one or more of the warrants identified in the MUTCD are met or will be met consistent with the requirements of OAR734-020-0490. The satisfaction of a warrant or warrants, however, is not in itself justification for a traffic signal. Installation of a signal must be approved by the State Traffic Engineer on a regional or state highway.

West Linn

Transportation System Plan Update

LEGEND

- ⟷ - Local Street Connection
- ⟺ - Pedestrian/Bike Connection (No Autos)

NOTE: General connection route indicated. Precise alignments to be determined

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TRANSPORTATION SOLUTIONS

NO SCALE

Figure 8-6

FUTURE LOCAL STREET CONNECTIVITY IMPROVEMENTS

The arrows shown on Figure 8-6 indicate priority local and neighborhood connections only. Local connections for existing stub end streets, cul-de-sacs, or extended cul-de-sacs in the road network are, for the most part, not identified on this figure. Pedestrian connections from any cul-de-sac should be considered mandatory as future development and redevelopment occurs. The goal would continue to be improved city connectivity for all modes of transportation.

Topography and environmental conditions limit the level of connectivity in several areas of the City of West Linn. The area to the west of Highway 43 is recognized as being particularly challenging because of the steep terrain and the existing built-out nature of that area.

Transportation Demand Management

Transportation Demand Management (TDM) is a policy tool as well as a general term used to describe any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods. As growth in the City of West Linn occurs, the number of vehicle trips and travel demand in the area will also increase. The ability to change a user's travel behavior and provide alternative mode choices will help accommodate this potential growth in trips.

Generally, TDM focuses on reducing vehicle miles traveled and promoting alternative modes of travel for large employers of an area. This is due in part to the Employee Commute Options (ECO) rules that were passed by the Oregon Legislature in 1993 (and revised in February 2007) to help protect the health of Portland area residents from air pollution and to ensure that the area complied with the Federal Clean Air Act.

Research has shown that a comprehensive set of complementary policies implemented over a large geographic area can have a measured effect on the number of vehicle miles traveled to/from that area. However, the same research indicates that in order for TDM measures to be effective, they should go beyond the low-cost, uncontroversial measures commonly used such as carpooling, transportation coordinators/associations, priority parking spaces, etc. Setting TDM goals and policies for new development would be necessary to help implement TDM measures in the future.

The more effective TDM measures include elements related to parking and congestion pricing, improved services for alternative modes of travel, and other market-based measures. However, TDM includes a wide variety of actions that are specifically tailored to the individual needs of an area. Table 8-5 provides a list of several strategies outlined in the ECO program that could be applicable to the West Linn area. However, the limited amount of commercial development in West Linn may restrict the potential impact for reducing traffic demand through implementation of these strategies. Due to the unique nature of the land use, an alternative strategy for the City to consider may be to enhance/expand commercial areas in the City to support greater local employment and reduce the reliance on commuter routes. While such an action may not reduce the total number of vehicle trips, expanding these local employment centers would still have the potential to reduce vehicle miles traveled (VMT) through reduction of trip distance.

Table 8-5: 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 who take transit to work on a regular basis, the employer pays for all or part of the cost of a monthly transit pass.	19-32% (full subsidy, high transit service) 2-3% (half subsidy, medium transit service)
Cash Out Employee Parking	An employer that has been subsidizing parking (free parking) discontinues the subsidy and charges all employees for parking. An amount equivalent to the previous subsidy is then provided to each employee, who then can decide which mode of travel to use.	Reduction / Transit 8-20% High 5-9% Medium 2-4% Low
Reduced Parking Cost for HOVs	Parking costs charged to employees reduced for high occupancy vehicles (HOV) such as carpools/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)
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 interested in carpooling or vanpooling provide information to a transportation coordinator regarding their work hours, availability of a vehicle and place of residence. The coordinator matches employees who can reasonably rideshare together.	1-2%
Provide Vanpools	Employees that live near each other are organized into a vanpool for their trip to work. The employer may subsidize the cost of operation and maintaining the van.	15-25% (company provided van with fee) 30-40% (company subsidized van)
Other strategies	Includes: gift/awards for alternative mode use, walking program, company vehicles, guaranteed ride home program, paid time off. See report for details.	0-3% (per strategy)

Source: G*uidance for Estimating Trip Reductions from Commute Options*, Oregon Department of Environmental Quality, August 1996.

With many regional trips destined to, or traveling through, the West Linn area, region-wide TDM measures should help to reduce congestion. Setting TDM goals and policies for new development will be necessary to help implement TDM measures in the future. Metro has established non-SOV (Single Occupancy Vehicle) mode share targets to be achieved by 2040. The 2040 non-SOV modal target for town centers (as designated along the southern portion of Highway 43 in West Linn) is 45-55%, while industrial, employment, and neighborhood areas (the designations for remaining areas of West Linn) have a non-SOV modal target of 40-45%.[5]

The Metro 2025 Regional Demand Model provides an analysis tool for monitoring non-SOV trip percentages between the various RTP funding scenarios[6]. The forecasted non-SOV trip percentages take into account all RTP improvement projects (including transit, pedestrian, and bicycle system improvements. The RTP projects included in the 2025 financially constrained model are listed in Table 8-6.

Table 8-6: TDM Improvements included in the RTP 2025 Financially Constrained System

RTP #	Location	Improvement	Jurisdiction	Time-Line	Cost ($1,000s)
5062	Milwaukie town center area	Implements a transportation management association program with employers	TriMet/Milwaukie	2016-25	$200
5150	Oregon City Regional Center	Implements a transportation management association program with employers	TriMet/Oregon City	2016-25	$200
8050	SMART district	Regional employer outreach, transit marketing, vanpool and carpool, station cars and car sharing programs	Metro/SMART	2004-25	$1,500
8052	Financially Constrained	Regional employer outreach, transit marketing, vanpool and carpool, station cars and car sharing programs	Metro/TriMet	2004-25	$16,979
8053	Region-wide	Implementation of innovative transportation solutions in locations with high regional significance	Metro/TriMet	2004-25	$6,068
8054	Region-wide	Continue provision of ECO information clearinghouse services	Metro/DEQ	2004-25	$1,213
8055	Region-wide	Implementation of innovative transportation solutions in locations with high regional significance	Metro/TriMet	2004-25	$3,000
8056	Region-wide	Future implementation and sustainability of TMA's with employers	Metro/TriMet	2004-25	$4,000
			TOTAL		**$33,160**

Note: These regional improvements are assumed in Metro's RTP Financially Constrained System and do not correspond with the local improvements included in the action plan of this TSP.

[5] Based on the *2004 Metro Regional Transportation Plan*, Ordinance No. 03-1024 (July 8, 2004), page 1-65. These targets are also consistent with the 2035 Regional Transportation Plan update.

[6] An illustrative set of RTP improvement project scenario is not available for the more recent 2030 Regional Demand Model.

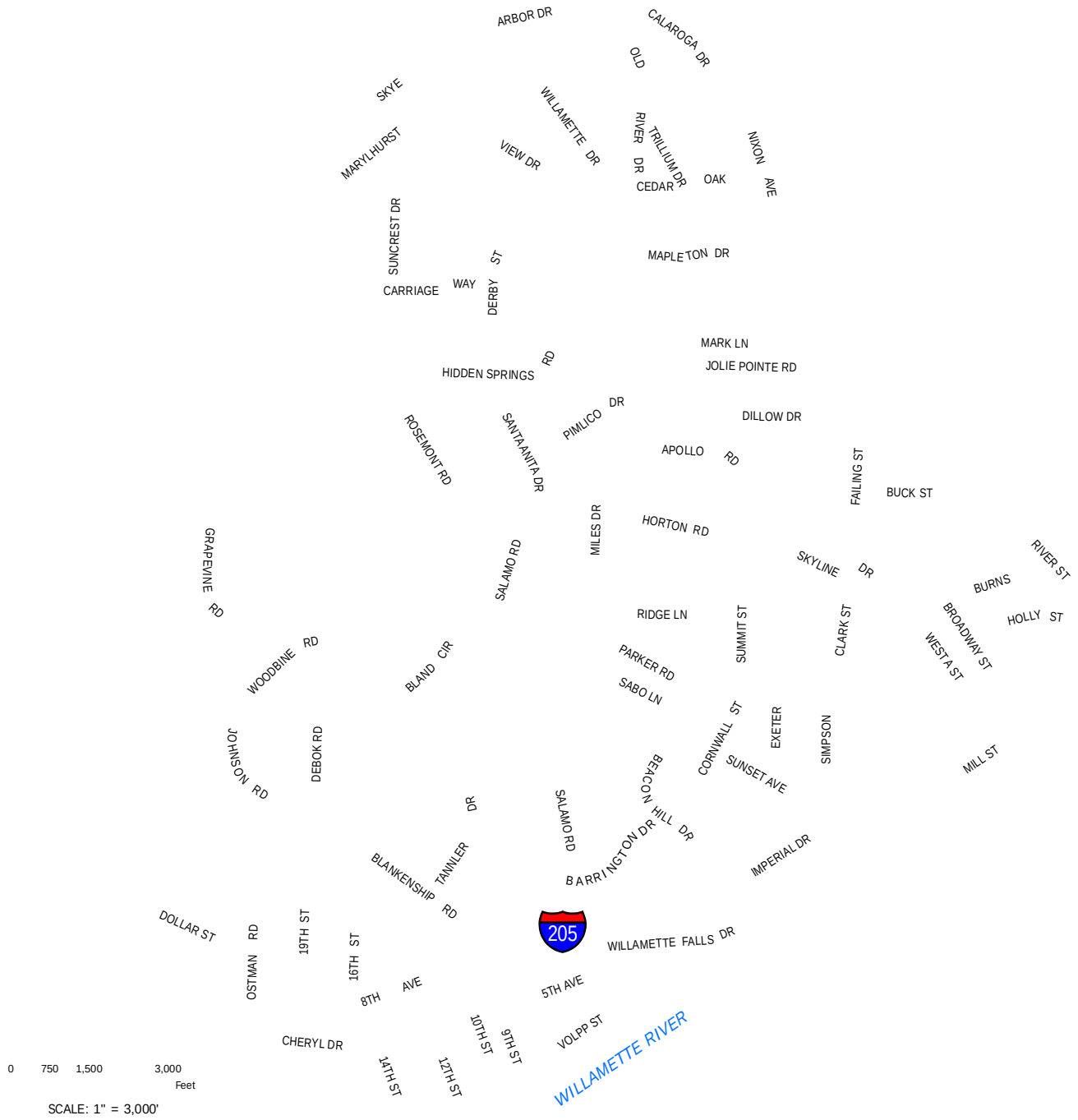
The overall West Linn study area forecasted non-SOV percentage with the RTP financially constrained improvements is 40.7%. Additional improvements in the RTP illustrative scenario[7] increase the overall non-SOV percentage to 42.2%, which corresponds to an increase of approximately 2%. Figure 8-7 shows the non-SOV percentage increase at the TAZ level, which shows the areas with the greatest growth toward meeting the 2040 targets previously identified (40-45% and 45-55% depending on location).

These forecasted non-SOV percentages obtained by the travel demand model can only be achieved with significant improvements to the transportation system and implementation of trip reduction strategies. The City of West Linn should coordinate with Clackamas County and TriMet to implement strategies to assure that the TDM assumptions in the RTP (listed in Table 8-6) are implemented. The City of West Linn, Clackamas County, and TriMet should coordinate to implement the pedestrian, bicycle, and transit system improvements, which offer alternative modes of travel. The recommended TDM action plan includes:

- Support continued efforts by TriMet, Metro, ODOT, and Clackamas County to develop productive TDM measures that reduce commuter vehicle miles and peak hour trips.
- Update the City of West Linn Goals and Policies to adopt the 2040 Regional Non-SOV Modal Targets.
- Encourage the development of high speed communication in all part of the city (fiber optic, digital cable, DSL, etc). The objective would be to allow employers and residents the maximum opportunity to rely upon other systems for conducting business and activities than the transportation system during peak periods.
- Encourage developments that effectively mix land uses to reduce vehicle trip generation. These plans may include development linkages (particularly non-auto) that support greater use of alternative modes.
- Continued implementation of motor vehicle parking ratios (minimum and maximum[8]) for new development.
- Continued implementation of building orientation and transit planning requirements for new development.
- Continued implementation of street connectivity requirements.
- Require new employment development to install bicycle racks.
- Implementation of bicycle, pedestrian, motor vehicle and transit system action plans as presented in this TSP.

[7] The additional illustrative project in the region is RTP #8051: Regional employer outreach, transit marketing, vanpool and carpool, station cars and car sharing programs

[8] Minimum parking ratios allow vehicular storage when travelers do not have the flexibility to choose transit. Maximum parking ratios assist TDM goals by capping the number of stalls available for vehicles.



West Linn

Transportation System Plan

GROWTH IN NON SOV USE

LEGEND

Change in 2025 Non-SOV
(Priority Minus Fin. Constrained)

1 Percent or Less

2 Percent

Other

West Linn City Limits

Railroad

Water

N

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2030 Transportation Demand Management Scenario

The implementation of various TDM strategies are generally aimed at reducing the trips that begin and end within the City, specifically with a trip end in the downtown area. The target trips for reduction in West Linn make up approximately 9% of the total number of trips[9] on the street system. As the trips are focused in the downtown core; the trip reduction is significantly less in the rest of the City.

The system improvements that make up this scenario include build-out of each of the multi-modal plans presented in this TSP (pedestrians, bicycles, transit, TDM). The 2030 forecasts for this scenario are based on potential reduction that could be achieved with each of these elements in place. These TDM measures are estimated to have approximately a 2% reduction of trips locally (and 5% reduction in trips regionally), which was applied to the 9% of target trips yielding an estimated trip reduction of 3%. This scenario focuses on improvements that are alternatives to increasing facility capacity for motor vehicles and (for comparative purposes) does not include capacity improvements in West Linn.

The v/c ratios were compared between the 2030 No-Build and 2030 Transportation Demand Management Scenarios to quantify the impacts that the implementation of TDM measures may have on the West Linn street system. The highest change in v/c ratios generally occurred along Highway 43 and Hidden Springs Road. The drop in v/c ratio of these areas was generally 0.03 to 0.04, but ranged from 0.01 to 0.06 along these roads. Similar impacts occurred throughout the city, with many roads exhibiting changes less than 0.02. This indicates that the relative changes due to this scenario would have a limited impact on the transportation system.

While a comprehensive TDM program may not address the transportation operational issues in West Linn during the PM peak times, employers that have more than 100 employees should be required to implement a van pool program, flexible working hours or another transportation demand management strategy that would influence regional trips be implemented and administered by these large employers to obtain compliance with OAR 340-242-0010 (through 0290). Setting TDM goals and policies for new development will be necessary to implement TDM measures in the future.

Safety

The analysis in the Existing Conditions Chapter revealed that there are currently no major safety issues at any of the intersections studied for this TSP. ODOT uses the safety priority index system (SPIS) to prioritize safety improvements based on crash frequency and severity on state facilities. A potential southbound climbing lane for trucks traveling on I-205 out of West Linn is the only location in West Linn identified in the Top 5% Report[10]. No locations along Highway 43 were listed.

There are, however, several strategies for improving safety in the City of West Linn that are consistent with the prior TSP. These strategies are aimed at identifying priorities that meet the goals and policies of the city and should be carried forward with this TSP.

- Work with other agencies such as Clackamas County, ODOT, the school district, as well as local businesses and neighborhood groups to help prioritize and fund safety programs in a coordinated approach
- Develop a citywide safety priority system which identifies high accident locations, ranks the locations and identifies safety mitigation measures
- Consider installation of red light photo equipment where appropriate
- Address safety issues on an as needed basis

[9] Excluding though traffic on I-205

[10] *Top 5 Percent Report*, ODOT Traffic-Roadway Section, August 30, 2007.

Maintenance

The City of West Linn has a Pavement Management System (PMS) program in place for cost effective maintenance treatments and strategies for city streets. A PMS program is a systematic method of organizing and analyzing information about pavement conditions. As a management tool, it aids the decision-making process by determining the magnitude of the problem, the optimum way to spend funds for the greatest return on the dollar, and the consequences of insufficient funding or of spending allotted money unwisely. The City of West Linn seeks to maintain an annual program of pavement management and monitors conditions in setting priorities for overlays, slurry seals and joint sealing. With over 106 miles of roadway to maintain, road maintenance is one of the largest transportation expenditures.

Motor Vehicle Alternatives Analysis

To accommodate future growth in local and regional traffic volumes and mitigate operational deficiencies revealed in the road system operational analysis, additional capacity improvements are recommended at multiple study intersections. The following sections summarize the evaluation of intersection capacity and connectivity improvements along city streets and specific recommended improvements along the Highway 43 corridor and the 10th Street/I-205 interchange area.

The future capacity deficiencies of study intersections were presented in Chapter 4, Table 3. Table 8-8 summarizes the Base 2030 PM peak hour operations for the 21 intersections, grouped by traffic control type, that are projected to not meet performance standards without additional improvements. The projected future performance for each location is listed, as well as the performance standard for the intersection (based on jurisdiction and other factors, as appropriate) that is exceeded. The 13 study intersections that are not listed in Table 8-8 are projected to meet 2030 PM peak hour performance standards as indicated in Chapter 4, Table 3.

Capacity analysis has been performed for the Highway 43 corridor and the 10th Street/I-205 interchange area. To utilize previous analysis efforts, study intersections were combined into three general groups:

- Highway 43,
- 10th Street/I-205 interchange area, and
- Other West Linn intersections (generally located along Rosemont Road or other areas not associated with the first two groups).

Some of the alternatives considered for each group include local improvements such as lane channelization or traffic control. 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 1,000-feet may be required for arterial and collector facilities. Different signal spacing standards may be applied to lower classifications of roadways. The Traffic Signal Spacing section includes additional information regarding traffic signals on ODOT facilities.

Roundabouts may be a feasible alternative to traffic signals when two-way or all-way stop control do not provide adequate intersection capacity. Roundabouts generally require a diameter of approximately 130-200 feet, limiting implementation in some areas (such as those that are previously developed) due to geometric constraints. However, the center area of the roundabout provides an opportunity for landscaping, which is helping it to gain popularity in both urban and rural design. The capacity of roundabouts is limited by the amount of circulating traffic. Care should be taken to locate roundabouts away from rail crossings and traffic signals in order to avoid issues regarding vehicle queues.

Table 8-8: 2030 Base PM Peak Hour Level of Service – Intersections Not Meeting Standards

	Future Base Case (2030)			Performance Standard		
Intersection	**LOS**	**Average Delay (s)**	**Volume/ Capacity (v/c)**	**Agency**	**Maximum Allowed**	**Standard Met?**
Signalized Intersections						
Highway 43 / Hidden Springs Rd	D	42.8	**1**	ODOT	v/c 0.99	**No**
Highway 43 / I-205 SB	E	69.1	**>1.0**	ODOT	v/c 0.85	**No**
10th St / Blankenship Dr	**F**	>80.0	**>1.0**	ODOT	v/c 0.85	**No**
10th St / I-205 SB	**F**	>80.0	**>1.0**	ODOT	v/c 0.85	**No**
All-Way Stop Intersections						
Salamo Rd / Rosemont Rd	**F**	>50.0	>1.0	City	LOS D	**No**
Willamette Falls Dr / 10th St	**F**	>50.0	>1.0	City	LOS D	**No**
Unsignalized Intersections						
Highway 43 / Arbor Dr	B/**F**	>50.0	0.04/**>1.0**	ODOT	v/c 0.99/0.90	**No**
Highway 43 / Jolie Pointe Rd	B/**F**	>50.0	0.12/**>1.0**	ODOT	v/c 0.99/0.90	**No**
Highway 43 / Pimlico Dr	C/**F**	>50.0	0.37/**>1.0**	ODOT	v/c 0.99/0.90	**No**
Highway 43 / Holmes St	B/**F**	>50.0	0.03/**>1.0**	ODOT	v/c 0.99/0.90	**No**
Highway 43 / Burns St	D/**F**	>50.0	0.49/**>1.0**	ODOT	v/c 1.1/0.90	**No**
Highway 43 / Willamette Falls Dr	D/**F**	>50.0	0.77/**>1.0**	ODOT	v/c 0.99/0.90	**No**
Willamette Falls Dr / Sunset Ave	A/**E**	47.6	0.67/0.74	City	LOS D	**No**
Rosemont Rd / Carriage Way	A/**F**	>50.0	0.12/0.51	City	LOS D	**No**
Rosemont Rd / Hidden Springs Rd	B/**F**	>50.0	0.07/>1.0	City	LOS D	**No**
Salamo Rd / Parker Rd	A/**F**	>50.0	0.13/0.79	City	LOS D	**No**
Blankenship Rd / Tannler Dr	B/**F**	>50.0	0.19/>1.0	City	LOS D	**No**
10th St / 8th Ave	B/**F**	>50.0	0.18/>1.0	City	LOS D	**No**
Willamette Falls Dr / 12th St	B/**F**	>50.0	0.44/>1.0	City	LOS D	**No**
Willamette Falls Dr / Dollar St (East)	A/**F**	>50.0	0.15/0.74	City	LOS D	**No**
Willamette Falls Dr / Ostman Rd	B/**F**	>50.0	0.01/0.23	City	LOS D	**No**
Willamette Falls Dr / Dollar St (West)[11]	A/**F**	>50.0	0.13/0.71	City	LOS D	**No**

Notes: LOS = Level of Service
Delay = Average vehicle delay in the peak hour for entire intersection in seconds.
MOE = Measure of Effectiveness
Unsignalized Intersection Operations:
A/A = Major street turn LOS / Minor street turn LOS
Delay = Worst Case for Minor Street
#/# = Major street turn v/c / Minor street turn v/c

Highway 43 Corridor

The *West Linn OR 43 Conceptual Design Plan*[12] analyzed intersections along the Highway 43 corridor and addressed multi-modal circulation concepts to guide future design. The plan maintains the current cross-section of one travel lane in each direction in order to keep the local character and meet community concerns, while not impacting existing right of way. Improvements such as adding left turn lanes to the median and traffic control would be made in some locations to increase capacity. However, due to the stated constraints, performance standards would still not be met at several locations, and design exceptions would need to be pursued from ODOT.

[11] This intersection is an unauthorized connection across PGE property that will be closed when Clackamas County replaces the bridge over the Tualatin River.
[12] West Linn OR 43 Conceptual Design Plan – Final Report, June 29, 2007.

The performance standards listed in the Oregon Highway Plan are applied to determine if the existing lane and control configurations at a location can provide sufficient capacity. The appropriate mobility standards for each location are listed previously in Table 8-8. If these performance standards are not met, capacity improvements that are sufficient to meet the design standards provided in the Oregon Design Manual apply. Signalized intersections through that corridor that are improved must meet a v/c standard of 0.80, as a statewide non-freight route inside a metropolitan planning organization (MPO). Unsignalized intersections (and Willamette Falls Drive as a District Road) must be improved to a v/c standard of 0.85. Operations of the study intersections along Highway 43 with the addition of the proposed concept plan improvements (which were not included in Table 8-8) are listed in Table 8-9.

Table 8-9: 2030 Weekday PM Peak Hour Level of Service – Hwy 43 Concept Plan Improvements

	W/ Proposed Improvements			Performance Standard		
Intersection	**LOS**	**Average Delay (Sec)**	**Volume/ Capacity (v/c)**	**Agency**	**Maximum Allowed**	**Standard Met?**
Signalized Intersections						
Highway 43 / Hidden Springs Rd	D	42.7	**0.99**	ODOT	v/c 0.80	**No**
Highway 43 / Pimlico Dr	D	40.9	**0.99**	ODOT	v/c 0.80	**No**
Highway 43 / I-205 SB*	E	69.1	**>1.0**	ODOT	v/c 0.80	**No**
Unsignalized Intersections						
Highway 43 / Arbor Dr*	B/**F**	>50.0	0.04/**>1.0**	ODOT	v/c 0.80/0.85	**No**
Highway 43 / Jolie Pointe Rd*	B/**F**	>50.0	0.12/**>1.0**	ODOT	v/c 0.80/0.85	**No**
Highway 43 / Holmes St*	B/**F**	>50.0	0.03/**>1.0**	ODOT	v/c 0.80/0.85	**No**
Highway 43 / Burns St*	D/**F**	>50.0	0.49/**>1.0**	ODOT	v/c 0.80/0.85	**No**
Highway 43 / Willamette Falls Dr*	D/**F**	>50.0	0.77/**>1.0**	ODOT	v/c 0.85/0.85	**No**

Notes: LOS = Level of Service

Delay = Average vehicle delay in the peak hour for entire intersection in seconds.

Unsignalized Intersection Operations:

A/A = Major street turn LOS / Minor street turn LOS

Delay = Worst Case for Minor Street

#/# = Major street turn v/c / Minor street turn v/c

** Improvements to increase intersection capacity at this location are not included in Highway 43 Conceptual Design Plan. Operations are listed for 2030 Base Case (which assumes no improvements).*

Most of the locations are not included in the Plan or have limited capacity improvements. The eight locations that do not meet performance standards under the 2030 Base Case would also not meet standards with the Conceptual Design Plan improvements in place.

Widening Highway 43 to a 5-lane section with two travel lanes in each direction was investigated to determine the potential capacity benefit. The existing right of way (ROW) along Highway 43 is generally 60-80 feet. In addition to structure impacts, approximately 500,000 ft^2 of ROW would need to be acquired in order to widen the facility to a 96 ft, 5-lane section. It was determined that most of the intersections along the corridor would meet performance standards. However, the Highway 43/I-205 Southbound ramps and Highway 43/Willamette Falls Drive would need additional improvements in order to meet performance standards.

The intersection of Highway 43/Willamette Falls Drive lies between the signalized intersection of Highway 43/I-205 Northbound Off-Ramp and the Oregon City Bridge. These physical features constrain the ability for realignment of the intersection, and also meter (or limit) the potential traffic arriving at the intersection. In order to meet future intersection performance standards, a traffic signal could be added in coordination with the adjacent existing signal at the I-205 Off Ramps. Table 8-10 lists the performance of all study intersections along Highway 43 with the corridor widened to a 5-lane section and a traffic signal at Willamette Falls Drive.

Table 8-10: 2030 Weekday PM Peak Hour Level of Service – Hwy 43 5-Lane Widening and Improvements

		Future Base Case			Highway 43 5-Lane Section			Performance Standard		
Intersection # on Map	Intersection	LOS	Average Delay (Sec)	Volume/ Capacity (v/c)	LOS	Average Delay (Sec)	Volume/ Capacity (v/c)	Agency	Maximum Allowed	Standard Met?
	Signalized Intersections									
2	Highway 43 / Marylhurst Dr-Lazy River Way	C	26.7	0.94	B	11.3	0.55	ODOT	v/c 0.80	Yes
4	Highway 43 / Cedaroak Dr	B	18.3	0.82	C	30.8	0.79	ODOT	v/c 0.80	Yes
5	Highway 43 / Hidden Springs Rd	D	42.8	**1**	C	26.6	0.80	ODOT	v/c 0.80	Yes
8	Highway 43 / West A St	C	31.1	0.97	B	14.1	0.59	ODOT	v/c 0.80	Yes
12	Highway 43 / Hood St-McKillican St	E	62.7	1.07	D	36.1	0.76	ODOT	v/c 0.80	Yes
13	Highway 43 / I-205 SB*	E	69.1	**>1.0**		*unchanged*		ODOT	v/c 0.80	**No**
14	Highway 43 / I-205 NB*	B	10.2	0.41		*unchanged*		ODOT	v/c 0.80	Yes
15	Highway 43 / Willamette Falls Dr	D/**F**	>50.0	0.77/**>1.0**	C	29.3	0.72	ODOT	v/c 0.80	Yes
	Unsignalized Intersections									
1	Highway 43 / Arbor Dr	B/**F**	>50.0	0.04/**>1.0**	B/F	>50	0.04/0.68	ODOT	v/c 0.80/0.85	Yes
3	Highway 43 / Walling Way	B/**F**	>50.0	0.00/0.92	B/E	36.9	0.04/0.47	ODOT	v/c 0.80/0.85	Yes
6	Highway 43 / Jolie Pointe Rd	B/**F**	>50.0	0.12/**>1.0**	B/D	27.0	0.12/0.33	ODOT	v/c 0.80/0.85	Yes
7	Highway 43 / Pimlico Dr**	C/**F**	>50.0	0.37/**>1.0**	B	14.8	0.61	ODOT	v/c 0.80	Yes
9	Highway 43 / Holmes St	B/**F**	>50.0	0.03/**>1.0**	A/C	17.3	0.00/0.09	ODOT	v/c 0.80/0.85	Yes
10	Highway 43 / Lewis St	B/**F**	>50.0	0.01/0.54	B/C	20.7	0.01/0.10	ODOT	v/c 0.80/0.85	Yes
11	Highway 43 / Burns St**	D/**F**	>50.0	0.49/**>1.0**	C	23.4	0.54	ODOT	v/c 0.80	Yes

Notes: *LOS = Level of Service*
Delay = Average vehicle delay in the peak hour for entire intersection in seconds.
MOE = Measure of Effectiveness

Unsignalized Intersection Operations:
A/A = Major street turn LOS / Minor street turn LOS
Delay = Worst Case for Minor Street
#/# = Major street turn v/c / Minor street turn v/c

** Five lane section already exists and performance is unchanged under this scenario*
*** Traffic signal improvement also added*

10th Street Interchange Area

The *10th Street Area Plan*[13] includes analysis of intersections along and in proximity to the 10th Street corridor. Through coordination with the 10th Street Traffic Task Force, the following three groups of improvement alternatives were developed and evaluated:

- Group A: 10th Street Capacity Enhancements
- Group B: Willamette Falls Drive Enhancements and Management Tools
- Group C: Major System Improvements.

Details regarding the configuration and performance of each group of improvements are located in the Plan. Recommendations were made following the analysis of each group of alternatives. These recommendations included dropping or advancing the consideration for improvements based on their performance and other evaluation criteria. Several recommendations for additional project consideration or further analysis in the TSP include:

- Advancing most individual projects from Group A to the motor vehicle master plan list,
- Determine appropriate intersection control for Willamette Falls Drive/ 10th Street,
- Consider Group B projects for inclusion in TSP,
- Advance the single point urban interchange (SPUI) on 10th Street for consideration, and
- Advance preference for additional I-205 capacity.

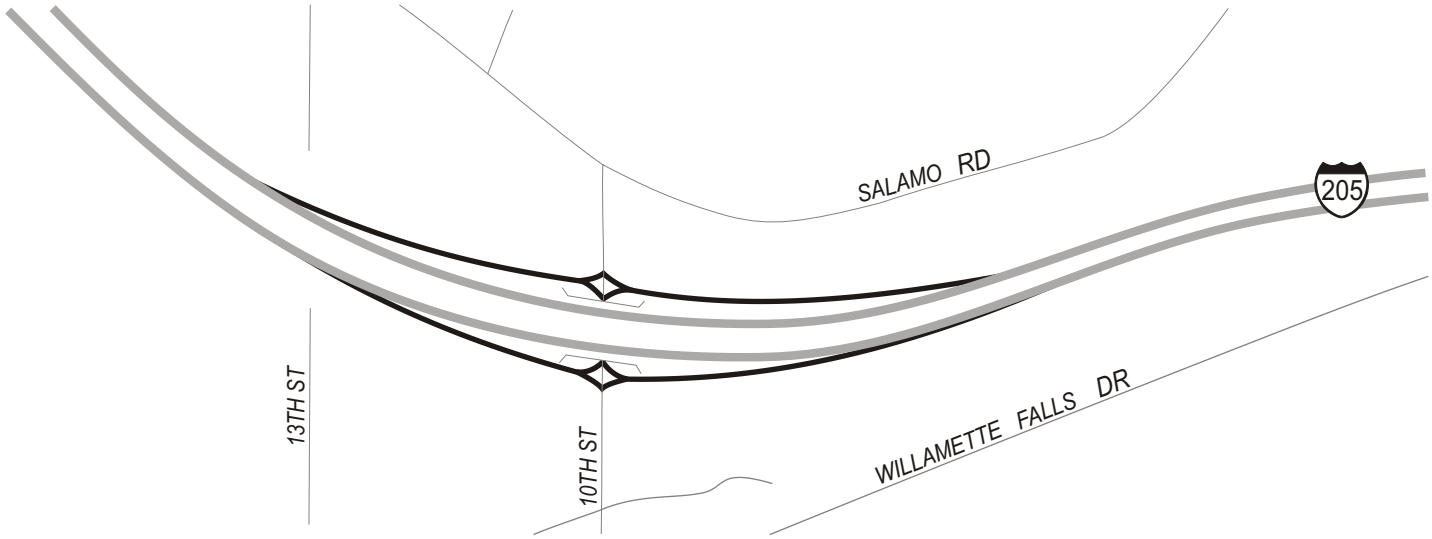
The potential for replacing the diamond ramp configuration of the 10th Street/I-205 interchange with a SPUI (Figure 8-8) was evaluated based on the recommendations of the prior analysis. The ramps are closely spaced with the adjacent signalized intersections at 8th Court and Blankenship Road under the existing configuration. The adjacent intersections are located approximately 1,000 feet apart (inside edge to inside edge), with the ramps occupying 650 feet of that space. The current location of the ramps limits vehicle storage at signalized intersections to approximately 150 feet for Blankenship Road and 250 feet for 8th Court. Consolidating the ramps into a SPUI would allow the space between adjacent intersections to increase, providing additional storage for potential vehicle queues.

Measurements of several SPUI locations in the region[14] indicate that approximately 350-400 feet (measured between the outside edges of the ramps) would be required along 10th Street for the ramp configuration. This would allow approximately 300 feet of storage to each adjacent intersection. Note that the increase of storage would also require realignment of the ramps. An operational analysis of the SPUI indicated that it would operate at LOS D with v/c = 0.88 for the 2030 PM peak hour.

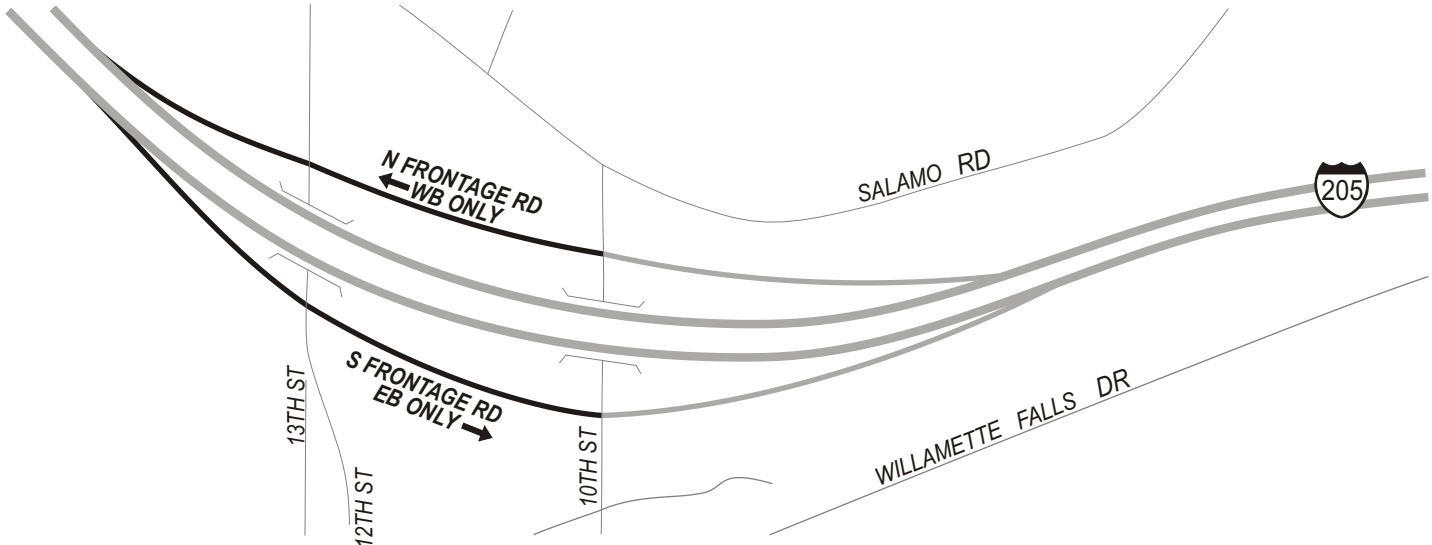
The operational impact of replacing the current 10th Street interchange configuration with a split-diamond interchange (configuration is shown in Figure 8-8) was also analyzed. This alternative would include a second crossing at 13th Street that (connected to the 10th Street crossing with one-way frontage roads), that would reduce reliance on 10th Street for local access to and from Interstate 205. While the implementation of a split diamond configuration and the associated traffic shifts would improve operations, several of the adjacent study intersections would not meet performance standards without additional improvements. In addition, the adjacent current land use is not consistent with the commercial land use surrounding other split-diamond locations in the region, and the historical residential neighborhoods of West Linn would not be compatible with the additional traffic and noise. Study intersection operations for this alternative are listed in Table 8-11.

[13] *City of West Linn TSP Update - 10th Street Area Plan*, prepared by DKS Associates, November 2, 2007.
[14] These locations consisted of Market Street/I-5 in Salem and four locations in Vancouver, WA.

Existing Configuration



Single Point Urban Interchange (SPUI)



Split Diamond Interchange

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NO SCALE

Figure 8-8

10TH STREET INTERCHANGE CONFIGURATION ALTERNATIVES

Table 8-11: 2030 Weekday PM Peak Hour Intersection Operations – Split Diamond Alternative

	Future Base Case (2030)			2030 Split Diamond Alt			
Intersection	**LOS**	**Delay (Sec)**	**Volume/ Capacity (v/c)**	**LOS**	**Delay (Sec)**	**Volume/ Capacity (v/c)**	**Standard Met?**
Signalized Intersections							
10th St / Blankenship Rd	**F**	>80.0	>1.0	**F**	>80.0	0.86	**N**
10th St / I-205 SB Ramps	F	>80.0	**>1.0**	F	>80.0	**0.93**	**N**
10th St / I-205 NB Ramps	E	64.3	**>1.0**	D	36.0	**0.92**	**N**
13th St / I-205 SB Ramps	-	-	**-**	B	11.8	**0.64**	Y
13th St / I-205 NB Ramps	-	-	**-**	B	12.0	**0.55**	Y
All-Way Stop Intersections							
10th St / Willamette Falls Dr	**F**	>50.0	**>1.0**	**F**	>50.0	**>1.0**	**N**
Unsignalied Intersections							
Blankenship Rd / Tannler Dr	B/**F**	>50.0	0.19/>1.0	B/**F**	>50.0	0.14/>1.0	**N**
10th St / 8th Ave	B/**F**	>50.0	0.18/>1.0	B/**F**	>50.0	0.17/>1.0	**N**
Willamette Falls Dr / 12th St	B/**F**	>50.0	0.44/>1.0	B/**F**	>50.0	0.43/>1.0	**N**

Notes: *LOS = Level of Service*
Delay = Average vehicle delay in the peak hour for entire intersection in seconds.
MOE = Measure of Effectiveness
Unsignalized Intersection Operations:
A/A = Major street turn LOS / Minor street turn LOS
Delay = Worst Case for Minor Street
#/# = Major street turn v/c / Minor street turn v/c

A summary for the 10th Street interchange alternatives is presented in Table 8-12.

Table 8-12: 10th Street Interchange Alternative Benefit Comparison

Alternative	**Affordable Cost**	**Limited Land Use impacts**	**Traffic Operations**	**Intersection Spacing**	**Local Circulation**
Minor Improvements (Turn lanes, traffic control)	●	●	◐	○	○
SPUI	◐	●	◐	◐	○
Split Diamond	○	○	●	○	●

Level of Benefit:
○ Limited
◐ Moderate
● Highest

Other Locations

Improvements for intersections that were not included in the two other groups (Highway 43 corridor or 10th Street Interchange Area) were analyzed independently. All remaining intersections are under the jurisdiction of City of West Linn and would meet performance standards with improvements to lane configuration or traffic control. Table 8-13 includes the 2030 PM peak hour intersection operations at locations that would not meet performance standards without the inclusion of local improvements[15].

[15] The improvements and cost estimates that are assumed at each locations are listed in Table 8-13.

Table 8-13: 2030 Weekday PM Peak Hour Intersection Operations – Other West Linn Locations

	Future Base Case (2030)			Future (2030) + Improvements			
Intersection	LOS	Delay (Sec)	Volume/ Capacity (v/c)	LOS	Delay (Sec)	Volume/ Capacity (v/c)	Standard Met?
Signalized Intersections							
Salamo Rd / Rosemont Rd	**F**	>50.0	**>1.0**	C	26.6	0.86	Y
Rosemont Rd / Hidden Springs Rd	B/**F**	>50.0	0.07/**>1.0**	C	21.0	0.72	Y
Salamo Rd / Parker Rd	A/**F**	>50.0	0.13/0.79	B	14.7	0.57	Y
Willamette Falls Dr / Sunset Ave	A/**E**	47.6	0.67/0.74	B	12.1	0.77	Y
Unsignalized Intersections							
Rosemont Rd / Carriage Way	A/**F**	>50.0	0.12/0.51	A/C	23.5	0.12/0.27	Y
Willamette Falls Dr / Dollar St (East)	A/**F**	>50.0	0.15/0.74	A/D	31.4	0.15/0.34	Y
Willamette Falls Dr / Ostman Rd	B/**F**	>50.0	0.01/0.23	B/D	32.2	0.01/0.11	Y

Notes: *LOS = Level of Service*
Delay = Average vehicle delay in the peak hour for entire intersection in seconds.
MOE = Measure of Effectiveness
Unsignalized Intersection Operations:
A/A = Major street turn LOS / Minor street turn LOS
Delay = Worst Case for Minor Street
#/# = Major street turn v/c / Minor street turn v/c

Master Plan and Action Plan

The Motor Vehicle Master Plan is a list of potential motor vehicle projects to meet the identified needs of motor vehicles using the transportation system in West Linn. This list is an overall plan and summarizes the "wish list" of motor vehicle projects in West Linn. The intention of the list is to address all potential projects that meet system needs, regardless of priority or funding requirements. A Motor Vehicle Action Plan project list was created to identify those Motor Vehicle Master Plan projects that are reasonably expected to be funded by the year 2030, which meets the requirements of the updated Transportation Planning Rule[16]. The Action Plan consists of projects that the City should give priority to in allocating funding and/or pursuing additional funding. As development occurs, streets are rebuilt and other opportunities (grant programs) arise, projects on the Master Plan could be pursued as well.

The Motor Vehicle Master Plan and Action Plan projects identified in the TSP update analysis are included in Table 8-14. Note that all projects included in the Action Plan are also included in the broader context of the Master Plan. The planning level cost estimates provided are based on general unit costs for transportation improvements, but do not reflect the unique project elements that can significantly add to project costs. Each of these project costs will need further refinement to detail right-of-way requirements and costs associated with special design details as projects are pursued. Figure 8-9 depicts the approximate locations of the Motor Vehicle Master Plan projects.

Inclusion of an improvement project in the TSP does not commit the City or ODOT to allow, construct or participate in funding the specific improvement. Projects on the State Highway System that are contained in the TSP are not considered reasonably likely to be funded projects until they are programmed into the Statewide Transportation Improvement Plan (STIP). As such, projects proposed

[16] *OAR Chapter 660*, Department of Land Conservation and Development, Division 012, Transportation Planning, adopted on March 15, 2005, effective April 2005.

in the TSP that are located on a State highway cannot be considered mitigation for future development or land use actions until they are programmed into the STIP. Unanticipated issues related to project funding, as well as the environment, land use, the economy, changes in the use of the transportation system, or other concerns may be causes for re-evaluation of alternatives discussed below and possible removal of a project from consideration for funding or construction. Highway projects that are programmed to be constructed may have to be altered or canceled at a later time to meet changing budgets or unanticipated conditions.

Table 8-14: Motor Vehicle Master Plan and Action Plan Projects

Project Number	Location	Description	Plan	Cost ($1,000)
		City of West Linn Facility Projects		
1	Salamo Road / Rosemont Road	Add a traffic signal when warranted	Action	$250
2	Willamette Falls Drive / Sunset Avenue	Add a traffic signal when warranted	Action	$250
3	Rosemont Road / Carriage Way	Add a center median on Rosemont Road to allow two-stage left turn from Carriage Way	Action	$1,420
4	Rosemont Way / Hidden Springs Road	Add a traffic signal when warranted and northbound/southbound left turn lanes on Rosemont Road	Action	$750
5	Willamette Falls Drive / Ostman Road	Widen Willamette Falls Drive with center median 500' on each side of intersection to allow for two-stage left turn from Ostman Rd	Action	$1,285
6	Willamette Falls Drive / Dollar Street (east)	Widen Willamette Falls Drive with center median 500' on each side of intersection for two-stage left turn from Dollar St	Action	$1,420
7	10th Street (I-205 SB Ramps to 8th Court)	Widen to 5-lane section with center turn lane and 2 travel lanes each direction	Action	$1,625
8	10th Street (8th Ave to Willamette Falls Drive)	Add through lanes on 10th Street for a total of 2 lanes in each direction. Prohibit northbound left turn movement and replace left turn lane with ped island.	Action	$480
9	Blankenship Road / 10th Street	Add 2nd eastbound right turn lane and restripe westbound approach to have exclusive left turn and shared left-thru lane	Action	$500
10	10th Street / Willamette Falls Drive	Change/upgrade traffic control to either signal or roundabout	Action	$800
11	10th Street / 8th Avenue	Add right-in right-out access at the time of 8th Court extension.	Action	$20
12	10th Street / I-205 NB Ramps	Add turn lanes (northbound right turn lane, stripe southbound approach to have dual left turn lanes and one thru lane, add exclusive NB Off-ramp left turn lane, and widen NB On-ramp to have two receiving lanes to support dual SB left turn movement)	Action	$1,000
13	8th Court	Extend 8th Ct to Willamette Falls Dr. to provide additional access to 8th Court retail. (Concurrently make 10th Street/ 8th Avenue right-in right-out access.)	Action	$2,000
14	Willamette Falls Drive /12th Street	All way stop control/ traffic signal when warrants are met	Action	$250
15	Willamette Falls Drive /14th Street	All way stop control when warrants are met	Action	$10

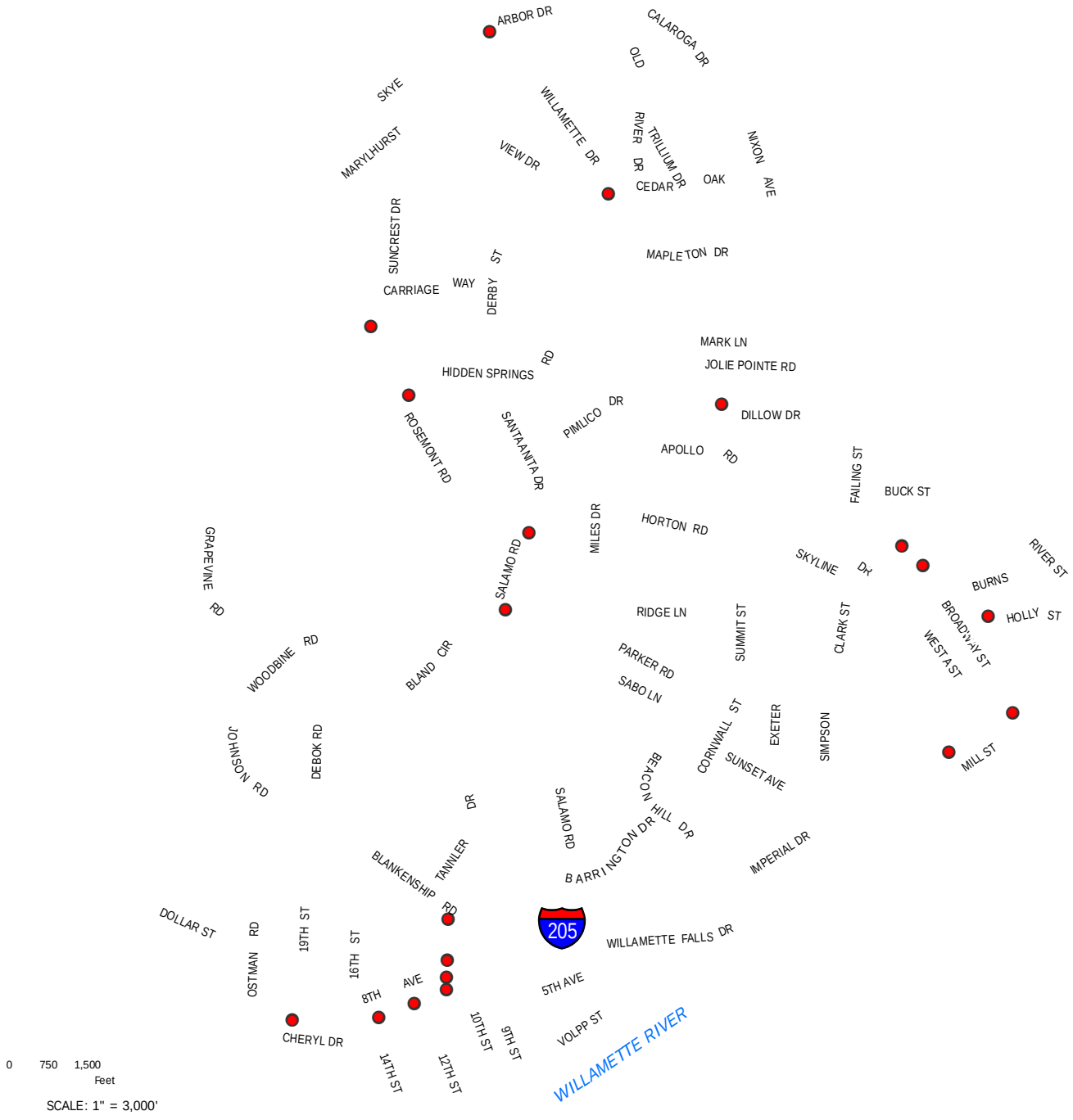
Project Number	Location	Description	Plan	Cost ($1,000)
16	Willamette Falls Drive /19th Street	All way stop control when warrants are met	Action	$10
17	8th Avenue	Modify Dollar St connection to reconnect to 8th Avenue, and provide alternative route for local trips.	Action	$1,000
18	19th Street / Blankenship Road	Upgrade to current City standards from Blankenship Rd/Debok Road to Willamette Falls Drive	Master	$5,895
19	8th Avenue	Upgrade from 10th Street to Dollar Street	Action	$1,695
20	Salamo Road / Parker Road	Add a traffic signal when warranted	Action	$250
		ODOT Facility Projects		
21	Highway 43 / Willamette Falls Drive	Add a traffic signal that is coordinated with adjacent signal at I-205 NB Off Ramps	Action	$250
22	I 205/10th Street Interchange	Construct a long-term interchange improvement (SPUI or Split Diamond)	Master	$15,000-$30,000*
		ODOT Facility Projects (Highway 43 Concept Plan Improvements)		
23	Highway 43 / Arbor Drive	Add left turn lanes on Highway 43 (cost included in Highway 43 segment cost, listed below)	Action	$0
24	Highway 43 / Cedar Oak Drive	Realign shopping center driveway located to the southeast with intersection	Action	$500
25	Highway 43 / Holmes Street	Modify circulation to allow exit only traffic from Holmes Street	Action	$10
26	Highway 43 / Lewis Street	Modify circulation to prohibit left turns out from Lewis Street	Action	$10
27	Highway 43 / Pimlico Drive	Add a traffic signal when warranted	Action	$250
28	Highway 43 / Hood Street /McKillican Street	Modify traffic signal timing to have protected/permitted phasing on Hood and McKillican	Action	$50
29	North City Limit to Marylhurst	Highway 43 Improvements**	Action	$2,920
30	Marylhurst to Hidden Springs	Highway 43 Improvements**	Action	$4,195
31	Hidden Springs to Pimlico	Highway 43 Improvements**	Action	$5,385
32	Pimlico to Buck	Highway 43 Improvements**	Action	$3,335
33	West A Street to Webb	Highway 43 Improvements**	Action	$2,065
34	Webb to Hood-McKillican	Highway 43 Improvements**	Action	$1,910
			City of West Linn Projects Subtotal	$20,650
			ODOT Facility Projects Subtotal	$15,250-$30,250
			ODOT Facility Projects (Highway 43 Concept Plan) Subtotal	$20,630
			Total Cost	$56,530-$71,530

Notes:
**Cost of SPUI would be approximately $15,000,000 while the split diamond configuration would cost approximately $30,000,000*
*** Refer to Highway 43 Concept Plan for details*

West Linn

Transportation System Plan

MOTOR VEHICLE MASTER PLAN PROJECT LOCATIONS



LEGEND

- Facility Improvement
- Intersection Improvement
- Project Number
- Railroad
- Water
- City Limits

N

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TRANSPORTATION SOLUTIONS

Other Travel Modes

This chapter summarizes the availability and use of other travel modes in West Linn such as rail, interstate bus, air, water, freight and pipeline.

Rail transportation

No rail services are currently provided to the City of West Linn. Oregon City is provided service by the Southern Pacific Railroad, which runs parallel to Highway 99E.

The closest rail passenger service is provided by AMTRAK, with a stop in downtown Portland at the Union Station. A South-North light-rail system has been proposed to extend to Oregon City. A future high-speed rail system in the Willamette Valley is currently being discussed. This rail line would most likely link Salem with Portland, and perhaps head north to Vancouver, British Columbia.

Needs and Deficiencies

Travel time on existing transit service to the AMTRAK can be long for the West Linn resident. If either of the new rail systems currently being discussed become a reality, West Linn residents would need access to these facilities by all appropriate modes.

Recommended Improvements

Given West Linn's current density and the urban form of the Portland metropolitan area, it is unlikely that passenger rail transportation will come directly to the City of West Linn. It is recommended that residents continue to use the services and facilities in the Portland area. Potential improvements in service exist with the expansion of regional systems currently being discussed. West Linn should continue to support and promote regional improvements to the transit system, and be actively involved in the coordination of these services and possible connecting services to best serve its residents. As the details of these systems and potential connecting points are not yet known, it is not possible to incorporate them into existing plans and facility improvements. West Linn should advocate for good connections from the city to future passenger rail stations.

Interstate Bus Transportation

Interstate bus service is available from downtown Portland at the Greyhound station. West Linn residents can reach this station either by private automobile or by the Route 35 Tri-Met line. Greyhound does not currently operate any suburban bus stations near West Linn.

Needs and Deficiencies

Same for West Linn residents as with the AMTRAK train service.

Recommended Improvements

If market conditions warrant, Greyhound or another interstate bus service would serve West Linn residents better with a suburban station south of Portland. Oregon City used to have an interstate bus station, and West Linn would recommend re-activating this facility. However, a decision to provide such a station would be market-oriented since inter-city bus service providers are private corporations.

Air Transportation

Domestic and international air passenger service is provided at the Portland International Airport, approximately 20 miles from West Linn. On-demand taxi service provides service to the airport. The General Aviation Airport in Aurora also serves the needs of West Linn residents. Some of the local airports open to the public for private aircraft in the area include Happy Valley, Oregon City, Mulino and Canby.

Needs and Deficiencies

Access to the Portland Airport can be hampered by traffic congestion on I-205, the most direct and commonly used route to the airport. Transit service, which involves transferring in Portland, is a time-consuming and indirect way to access the Portland Airport.

Proposed Improvements

West Linn residents are encouraged to continue to use the services and facilities available at the Portland Metropolitan Airport and at the General Aviation Airport in Aurora. As air will continue to grow as a popular and efficient form of transportation, it is important that West Linn residents have a convenient and reliable method for getting to the airports. Although I-205 provides direct access to the Portland Airport, increasing traffic makes its reliability questionable. The City of West Linn needs to petition and support ODOT in their efforts to improve flow on this important link with capital improvements, and with traffic management efforts.

Water Transportation

West Linn lies along the west side of the Willamette River. The Willamette Falls Locks, operated by the U.S. Army Corps of Engineers, are a part of the water-borne transportation system through West Linn. The locks are on the National Register of Historic Places. The channel is maintained to a depth of eight feet and 150-foot width between Cedar Island and Oregon City (200-foot width to Portland). This passageway is used by both commercial and recreational boats.

Needs and Deficiencies

The locks and river do not currently provide transportation alternatives to the West Linn resident. The potential for river taxis and ferries should be examined in the future.

Proposed Improvements

As the City recognizes the river and locks as an efficient mode of transportation for commercial traffic, land use decisions and policy development concerning the locks and riverfront should promote the continued use of these facilities.

Use of the river to transport people, either by river taxi or a ferry is a concept West Linn residents have suggested and are open to. The provision of such services is market-driven and will not be provided by a private company until it becomes economically viable. As the implementation of this type of service would require an immense capital undertaking, it would not be fiscally responsible for the City to undertake such a project. However, because river taxis and ferries offer potential transportation alternatives, future policy and land use decisions should protect and promote their use in the future by allowing for landing and docking sites.

Freight and Goods Movement

Freight movement within the City of West Linn consists of 1) the delivery of goods to commercial sites along Highway 43, 2) freight movement associated with the West Linn Paper plant, and 3) commercial freight traffic going through West Linn to other destinations on I-205 and Highway 43.

Needs and Deficiencies

The considerable truck traffic on I-205 combined with the lack of truck climbing lanes and short merging distances between ramps, often results in conflicts between automobiles and truck traffic, and slows traffic flow near the West Linn (Highway 43)/I-205 interchange.

Proposed Improvements

The two routes within West Linn most used for freight movement by truck are I-205 and Highway 43, both under the jurisdiction of the Oregon Department of Transportation. It is recommended that the state monitor the traffic and accident patterns along I-205, especially in the vicinity of the Highway 43 interchange.

Highway 43, which extends from Gibbs Street in Portland to Main Street in Oregon City, is a multi-modal major arterial, designed to accommodate the movement of people and goods in and around the region. The Draft Interim Corridor Strategy is dedicated to ensuring adequate access to I-205 from the corridor and to removing future bottlenecks at this location. It is recommended that West Linn continue to be involved in this corridor study and in the development of appropriate plans to improve goods movement in the corridor. West Linn should encourage measures which result in non-local freight trips bypassing Highway 43.

Pipeline

There are no pipelines transporting commodities in West Linn except those used in the West Linn Paper Company industrial complex, and pipelines from the Smurfit Paper Mill in Oregon City to settling ponds along the Willamette River in West Linn. A sewage force main that is part of the Tri-City Sewerage District facility crosses the Willamette River. Several Northwest Natural Gas mains run through West Linn. Also, the South Fork Water Board has a potable water pipeline across the Willamette River serving West Linn.

Needs and Deficiencies

There are currently no needs and deficiencies identified.

Proposed Improvements

West Linn should remain open to increased transmission through pipelines and utility ducts, particularly to carry communication cables needed to meet the increasing demand of technology. Any improvements that can enable residents to work and carry out business from their homes will help alleviate the demand on the city's road system.

Finance and Implementation

This chapter outlines the funding needs and potential sources that can be used for the transportation system. Nearly all city street projects and the high priority pedestrian and bicycle projects are adequately funded with current transportation programs, but there a significant funding gaps for a large number of non-motorized vehicle projects. Approximately $30 million additional is needed to fill key gaps in the system or upgrade older streets up to current standards.

In addition, improvements on State facilities require significant investment through regional or state partners; typically 75 to 85% of the total project cost. The state projects listed in the city's TSP are not included in adopted regional plans to date. The expected local share of the state improvements has been included in budget allocation, but the city will need to seek to amend regional and state transportation plans to incorporate these projects in order for the full system needs to be met. The primary state project in the city is the upgrading of Highway 43 to provide full pedestrian and bicycle facilities, center turn lanes at key locations, and upgraded traffic controls at major intersections.

Current Funding Strategies

Transportation funding is commonly viewed as a user fee system where the users of the system pay for infrastructure through motor vehicle fees (such as gas tax and registration fees) or transit fares. However, a greater share of motor vehicle user fees goes to road maintenance, operation and preservation of the system rather than construction of new system capacity. Much of what the public views as new construction is commonly funded (partially or fully) through local improvement districts (LIDs) and frontage or off-site improvements required as mitigation for land development.

The City of West Linn utilizes a number of mechanisms to fund construction of its transportation infrastructure as described below. The first two sources collect revenue each year that is used to repair street facilities or construct new streets, with some restrictions on the type and location of projects. The third program is different in that it does not generate on-going revenue, but is a means to acquire needed property and improvements (Exaction) as development occurs. The street maintenance fee is a constant annual revenue source used for maintenance.

State Fuel Tax and Vehicle License Fee

The State of Oregon Highway Trust Fund collects various taxes and fees on fuel, vehicle licenses, and permits. A portion is paid to cities annually on a per capita basis. By statute, the money may be used for any road-related purpose.

Oregon gas taxes are collected as a fixed amount per gallon of gasoline served. The gas tax in Oregon has not increased since 1993 (currently 24 cents per gallon.) The tax does not vary with gas prices changes, nor is there an adjustment for inflation. The lack of change since 1993 means that the net revenue collected has gradually eroded as the cost to construct and repair transportation systems has increased. Fuel efficiency in new vehicles has further reduced the revenue stream.

Oregon vehicle registration fees are collected as a fixed amount at the time a vehicle is registered with the Department of Motor Vehicles. Vehicle registration fees in Oregon have recently increased from $15 per vehicle per year to $27 per vehicle per year for passenger cars, with similar increases for other vehicle types. There is no adjustment for inflation tied to vehicle registration fees.

West Linn receives about $1,115,000 per year in gas tax and vehicle license fee revenue. Approximately $462,000 annually is spent on personnel costs, leaving $653,000 remaining for other transportation needs. Because there is no index for cost inflation, this revenue level will increase only proportionate with the city's population growth relative to Clackamas County growth.

System Development Charge

The System Development Charge (SDC) for streets is used as a funding source for projects that add capacity to the transportation system. The SDC is collected from new development based on the proposed land use and size and is proportional to each land use's potential PM peak hour vehicle trip generation. The current SDC rate (updated June 2008) per PM peak hour trip is $4,849, which includes $4,628 towards improvements. The City has approximately $500,000 in SDC credits that will be reimbursed to developers.

While the City of West Linn is expected to have limited commercial development, household growth is projected to grow at approximately a 1% (90 households per year)[1] rate through 2030. There is limited land available for multifamily housing and future housing growth was assumed to consist of 20% multifamily and 80% single family homes. The estimated annual SDC street revenue is projected to be approximately $390,000. The total SDC fees collected over the next 23 years, less the $500,000 in existing credits, would generate approximately $8,470,000 in streets revenue.

Exactions

These are improvements that are obtained when development is permitted. Developers are required to improve their frontage and, in some cases, provide off-site improvements depending upon their level of traffic generation and the impact to the transportation system. Off-site mitigation measures can include, but are not limited to, Master Plan projects identified in the TSP.

Street Maintenance Fee

A street maintenance fee (included with utility bills) collects $4.40 per household, per month, and up to $440 from businesses. The fee is a dedicated revenue source that funds roadway surface repair and maintenance, street lighting, ice and snow removal, traffic control/calming, sidewalk and curb repair, and bicycle and pedestrian path maintenance. The fees raise approximately $714,000 annually for the City. A recent levy was defeated (Measure 3-285) in May 2008, which would have replaced the fee.

[1] Based on Metro land use forecasts and verified with City of West Linn Building Department

Summary

Table 10-1 summarizes the current renewable funding sources, including recent annual revenues and the projected revenues through the planning horizon year 2030. Assuming the renewable funding sources outlined above, the City of West Linn will collect approximately $714,000 for transportation operations and maintenance and $1.56 million for capital improvements each year. This revenue will be generated from the state (fuel taxes and license fees), the maintenance fee, SDC, solid waste franchise fee, and other revenue sources. Total revenues to be collected over 23 years between 2007 and 2030 would be $39.2 million with current funding sources and projected population and employment growth.

Table 10-1: Summary of Current Revenues for Transportation

Funding Category	Funding Allocation	Estimated Revenues Through 2030	Annual Amount (2008)
State Fuel Apportionment & Vehicle License Fee	Capital Improvements	$15,019,000	$653,000
Maintenance Fee	Operations and Maintenance	$15,708,000	$714,000
System Development Charge	Capital Improvements	$8,470,000	$368,000
	Total O&M Revenues	**$15,708,000**	**$714,000**
	Total Capital Revenues	**$23,489,000**	**$1,021,000**
	TOTAL REVENUES	**$39,197,000**	**$1,735,000**

Note: Revenues through 2030. Maintenance fee begins FY 2009. SDC Rate based on expected growth and adjusted to account for existing credits of approximately $500,000 to be paid.

Source: City of West Linn, Adopted Budget, Fiscal Year 2008

Projects and Programs

This section presents the recommended projects and programs developed for the City of West Linn to serve local travel for the coming 23 years. The Pedestrian, Bicycle, Transit, and Motor Vehicle projects were identified in the Action Plan for each mode, and represent those projects that have the highest priority for implementation to satisfy performance standards or other policies established for the West Linn Transportation System Plan. The costs for the remaining projects noted in the modal Master Plans are identified, but these have not been included in the funding needs analysis for the City because the Action Plan is limited to projects most likely to be funded within the planning horizon. Other projects on the Master Plan list require additional funding, and they are expected to be built beyond the 23-year horizon or completed with development exactions or other unanticipated funding sources.

Project Cost Estimates

Cost estimates (general planning level) were developed for the projects identified for the motor vehicle, bicycle, transit, and pedestrian elements. Cost estimates from the existing City planned projects were used in this study, if they were determined to be reasonable. Other projects were estimated using general unit costs for transportation improvements, but do not reflect the unique

project elements that can significantly add to project costs[2]. Development of more detailed project costs can be prepared in the future with more refined financial analysis. Since many of the projects overlap elements of various modes, the costs were developed at a project level incorporating all modes, as appropriate. It may be desirable to break project mode elements out separately. However, in most cases, there are greater cost efficiencies undertaking a combined, overall project. Each project cost will need further refinement to detail right-of-way requirements and costs associated with special design details as projects are pursued.

All cost estimates are based on 2007 dollars. Historical construction costs price index has increased by 2.5 to 2.75 percent per year according to Engineering News Record research[3] . Construction costs have increased 100 percent in the 20 years from 1979 to 1999.

Other Transportation Programs and Services

In addition to the physical system improvements identified in the previous section, the transportation facilities will require on-going operation and maintenance improvements across a variety of areas. These other transportation programs are recommended to respond to the specific policies and needs in maintaining roadway pavement quality, allocations for implementing neighborhood traffic management, and on-going update and support of related planning documents.

- Roadway Maintenance: The annual cost of maintaining the streets and sidewalks within West Linn was estimated at $714,000, funded through the street maintenance fee. This does not include road maintenance responsibilities on the arterial streets that are serviced by Clackamas County or ODOT. Over 23 years, the City's road maintenance responsibility accounts for $15.7 million. The actual maintenance costs could vary from this estimate.
- Street Lighting: The annual cost of lighting the City's street is approximately $231,000 (actual FY 2008 amount), which only includes power and maintenance charges but does not address repair or replacement charges. The annual cost to support street lighting is expected to increase approximately $100,000 per year in order to address repair and replacement needs. The total cost for street lighting through 2030 was estimated to be approximately $7.6 million.

West Linn Costs for TSP Action Plans

The costs outlined in the Transportation System Plan to implement the Action Plans for Streets, Transit, Bicycles, and Pedestrians total $21.3 million. The addition of several other recommended transportation operations and maintenance programs would add $23.3 million for a total cost over 23 years of $44.6 million. While the cost of the Highway 43 Concept Plan will likely be funded by various sources, a 15% local share contribution is assumed by the City of West Linn in order to make the project attractive for other funding agencies. The Action Plan costs through 2030 are summarized in Table 11-2.

[2] General plan level cost estimates do not reflect specific project construction costs, but represent an average estimate. Further preliminary engineering evaluation is required to determine impacts to right-of-way, environmental mitigation and/or utilities. This level of cost-estimating is typically completed during project development and design. Experience has shown that individual projects costs can increase by 25 to 75 percent as a result of the above factors.

[3] Engineering News Record Construction Cost Index as reported for the past ten years for 20 cities around the United States. Reference: http://www.enr.com/features/conEco/costIndexes/constIndexHist.asp

Table 10-2: West Linn Transportation Action Plans Costs over 23 years (2007 Dollars)

Transportation Element	Approximate Cost ($1,000)
System Improvement Projects (Action Plans projects to be funded by City)	
Motor Vehicle – City of West Linn Facilities	$15,015
Motor Vehicle – State Facilities** (15% contribution)	$3,132
Bicycle	$1,815
Transit	$1,275
Pedestrian	$0*
Total Capital Projects	**$21,237**
Operations, Maintenance and Other Programs and Services	
Roadway Maintenance ($714,000 per year)	$15,708
Street Lighting ($331,000 per year)	$7,613
Total Operations and Maintenance Programs	**$23,321**
23 YEAR TOTAL COST	**$44,558**
23 YEAR TOTAL FUNDING	**$39,197**
23 YEAR ADDITIONAL NEED	***$5,361***

* Pedestrian projects and funding are included in the Highway 43 Concept Plan
** Includes Highway 43 Concept Plan

The total $44.6 million cost of the plan fully utilizes the expected 23-year revenue estimate of $39.2 million (see Table 10-1). The relative gap between available revenue and total expenditures of projects included in the plan (approximately 10%) indicates that projects included in the Action Plan are reasonably likely to be funded (Table 10-2). While the Action Plan is reasonably likely to be funded, additional projects included in the Master Plan will not be funded. The projects costs for the remaining projects noted in the modal Master Plans require additional funding beyond existing program levels, and they are expected to be built beyond the 23-year horizon or completed with development exactions or other unanticipated funding sources. Table 10-3 summarizes the additional Master Plan projects for each mode that are not included in the reasonably fundable Action Plan.

Table 10-3: Master Plan Projects not in Action Plan – Costs over 23 years (2007 Dollars)

Transportation Element	Approximate Cost ($1,000)
System Improvement Projects (Not funded by City in Action Plan)	
Motor Vehicle	$5,895
Bicycle	$6,720
Pedestrian	$19,700
23 YEAR TOTAL in 2007 Dollars	**$32,315**