CHAPTER

3 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.

Figure 3-1: Study Area

Comment [d1]: There are actually 34 study locations while only 29 are shown in Figure 3-1. Please update figure.

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 neighborhoods 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
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 and meet ODOT grant requirements.
- 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.

Figure 3-2: Sidewalk Inventory

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.

The 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. The identified 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 two 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

Intersection	North/South Bicycle Volume	East/West Bicycle Volume
Highway 43 / Hidden Springs Drive	0	0
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
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.

Figure 3-3: Bicycle Facility Inventory

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.

Figure 3-4: Existing Transit

Motor Vehicle

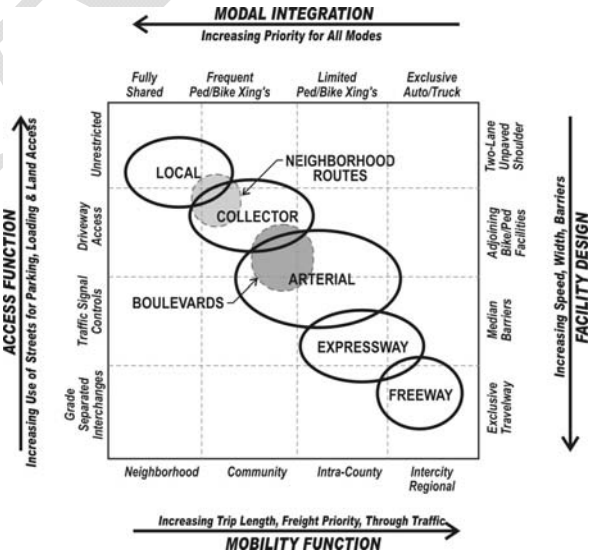
The motor vehicle system within the City of West Linn includes city streets, state highways, and an interstate freeway. This section is divided into a description of how the system has developed to date, then a more detailed review of how it is used and operated.

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[1] 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.

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

Figure 3-5: Existing Functional Classification

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.

[Street width data to be completed]

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

Corridor	Posted Speed	Street Width [ft]	ROW Width [ft]	Number of Lanes	Lane Width [ft]
Mapleton Drive		18-20	50	2	11
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.

Figure 3-6: Existing Ownership/Jurisdiction

Figure 3-7: Existing Intersection Controls

Pavement Conditions

[Section needs more data]

Pavement conditions in the City of West Linn vary and include some unpaved gravel surfaces within the city limits. In general, arterials and collectors should have good pavement quality, while is it acceptable for local streets should have good to fair pavement quality.

An inventory of pavement conditions was performed on major roadways in the City. Roadway pavement conditions are ranked as excellent, good, fair, poor, or failed. Excellent (A) conditions mean new to almost new conditions. Good (B) conditions mean stable pavement structure, with good ride quality. Minor surface erosion, cracking, patching or deformation may be present. Fair (C) conditions may have minor areas with structural weakness, with cracking and deformation easier to detect. Cracks will be deeper and some presence of alligator cracking. Patching may be evident but not excessive. Poor (D) conditions describe roadways that have areas of instability, marked with evidence of structural deficiency, numerous patches, and noticeable deformations. Alligator cracking is severe. Ride quality is poor and spot repair may be required. Failed (F) conditions include potholes, "pumping" of the sub-base. The pavement condition inventory is shown in Figure XXX.

[Can we fold in PMS data from the city system here?]

Comment [d2]: A PMS report completed June 2007 is available for insertion into the TSP. Please contact Sam Foxworthy, West Linn Streets Supervisor, at (503) 656-6081 to obtain a hardcopy or digital copy if available.

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 that is 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 District Highways. The standards vary depending on posted speed on the roadway, as shown in Table 3-7. The ODOT access management standards apply to the Oswego Highway (OR 43).

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)

Facility	Posted Speed (MPH)				
	55 or greater	50	40,45	30,35	20 or less
Statewide Highway (ft)	1320	1100	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 management are described 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)

Facility	Access Requirements		
	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)

Facility	Access Requirements		
	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.

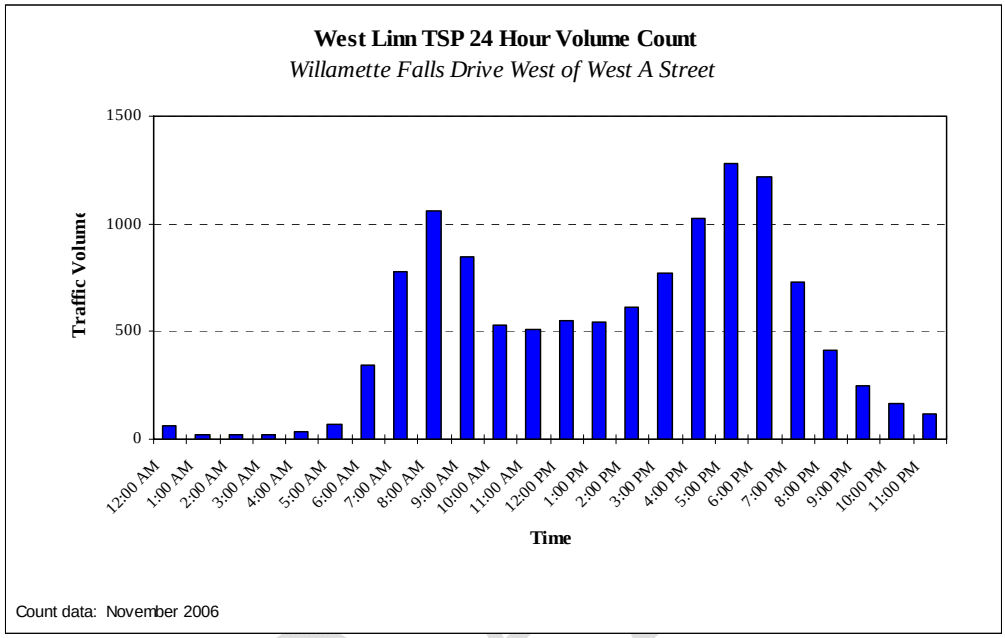
The figure indicates that the highest vehicle volumes (not including I-205) in West Linn occur along the principal arterial, Highway 43. Vehicle volumes on this roadway are over 20,700 vehicles per day.

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.

Figure 3-8: 24-Hour Volumes

Comment [d3]: Please include volume data at Pete's Mountain Road coming into the City at Tualatin Avenue/12th Street as part of Figure 3-8. There is increased development in the County out that way and I think that volume is important.

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



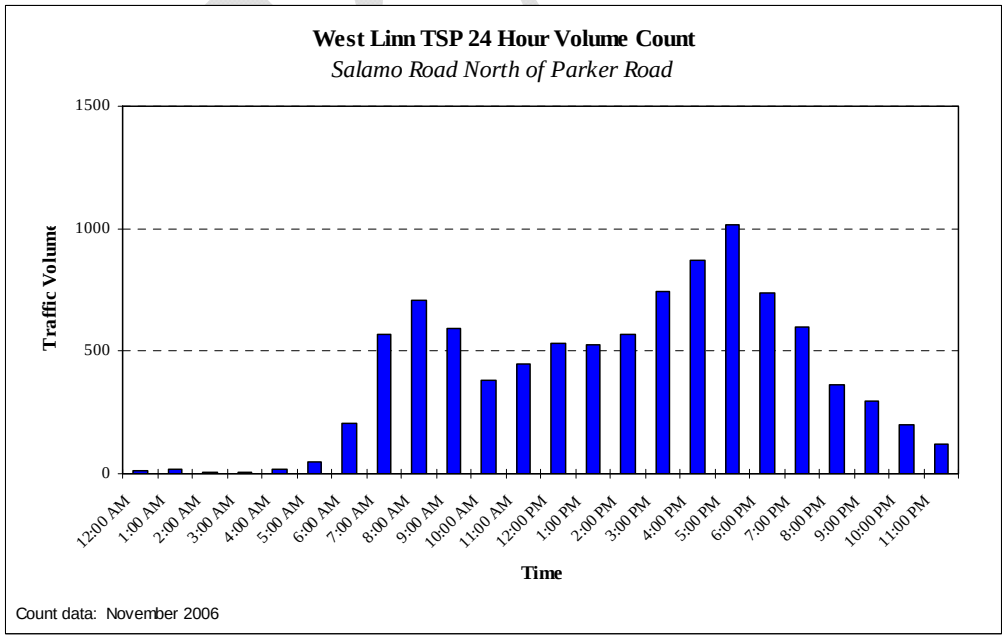


Figure 3-10a: Existing Intersection Volumes

Comment [d4]: Figures 10a through 10c only show 29 intersections when there are really 34 in the study area. Please update the Figures to include the additional 5 intersections. Thanks.

Figure 3-10b: Existing Intersection Volumes

Figure 3-10c: Existing Intersection Volumes

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[2] 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

[2] *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[3]. 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	Minimum	
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

[3] *2000 Highway Capacity Manual*, Transportation Research Board, 2000.

Intersection	LOS	Average Delay (Sec)	Volume/ Capacity (v/c)	Measure of Effectiveness		MOE Met?
				Agency	Minimum	
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
Blankenship Road / Tannler Dr	A/**F**	8.0	0.13 / 0.52	City	LOS D	**No**
10^{th} St / 8^{th} Ave	A/**F**	10.1	0.13 / 0.73	City	LOS D	**No**
Willamette Falls Dr / 12^{th} 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 / 19^{th} 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

Intersection	Total Collisions (Year 2003-2006)	Collision Rate
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 volumes and percentages at the study intersections are 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%
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.

Figure 3-11: Existing Freight