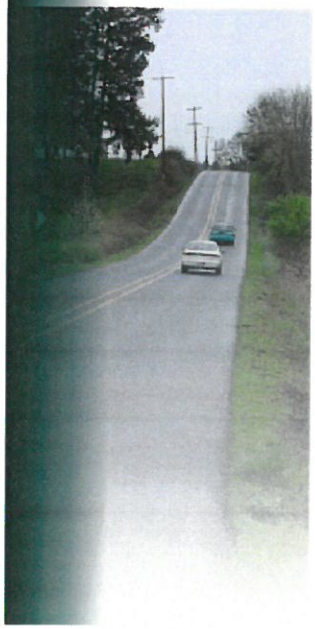

Final Report

Estacada
Transportation System Plan

Prepared for

City of Estacada

Prepared by

DKS *Associates*

TRANSPORTATION SOLUTIONS

Angelo Planning Group

August 2007

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Amended December 14, 2010 (Chapters 1, 4, 8 and 10)

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1. Executive Summary

Introduction

In May of 1999, the City of Estacada completed a nearly two-year planning effort to identify transportation system needs within the City over a 20-year period that culminated in a Draft Transportation System Plan (TSP). While this plan was never formally adopted, it provided the City with tools to guide the management and development of transportation facilities and to implement the vision of the community into a transportation system that addresses multimodal needs.

Since that time, there have been significant changes in regional and statewide planning efforts and requirements and plan development, in addition to continued growth in Estacada and surrounding communities, which have pressed the need to update the City's TSP. This plan update is aimed at fulfilling 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.

This TSP provides specific information regarding transportation needs to guide future transportation investment in the City and is based on needs required to meet transportation demand created by anticipated growth. For each travel mode, a Master Plan project map and list are provided to identify necessary projects to support the City's transportation goals and policies. The TSP identifies how land use and transportation decision making can be coordinated for community benefit. This chapter summarizes the TSP update process, study goals, modal plans, financing options, and recommended comprehensive plan and development code changes, all of which are discussed in more detail in the following chapters.

TSP Update Process and Public Involvement

The Estacada TSP update process included the following steps:

- Update goals and policies
- Inventory/data collection for a year 2006 baseline
- Evaluate existing conditions and future travel needs through forecasting
- Update transportation needs by mode and consider alternatives to address them
- Refine improvement lists to mitigate deficiencies by mode for 2030 conditions
- Update planning-level cost estimates of improvements
- Identify financing sources
- Recommend comprehensive plan and development code changes, and

- Present Recommended TSP to Estacada Planning Commission and City Council for adoption.

In addition to frequent coordination with ODOT and City staff, the following two committees were formed to guide the planning process:

- Technical Advisory Committee (TAC) – Representatives from ODOT, Clackamas County, the City of Estacada, the Department of Land Conservation and Development, Estacada Fire Department, and the Estacada School District 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 developing consensus on plan recommendations.
- Citizens Advisory Committee (CAC) – The Estacada Citizens Advisory Committee included representative community members. A series of meetings were held with the CAC to report interim study findings and discuss outstanding policy issues that required their direction.

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. Additionally, two public open houses were held, providing the opportunity for the general public to comment on the plan, make suggestions and provide feedback.

Study Goals

The City's Comprehensive Plan lays out a general policy framework for transportation services. Goals are defined as brief guiding statements that describe a desired result. Policies associated with each of the individual goals describe the actions needed to move the community in the direction of completing each goal.

The transportation-related goals and objectives established by the 1999 Draft TSP were chosen to guide the development and evaluation of alternatives, select a preferred transportation plan, and prioritize improvements. Since 1999, there have been changes to state transportation plan policies and regulations that have been addressed as a part of this TSP. In addition to retaining previously selected policies that are still applicable, new policies are recommended to incorporate recent initiatives within the City and County relevant to transportation facilities. The specific areas of the changes address the following key issues:

- Street design — New street design guidelines developed by the state provide options for narrower residential streets within new subdivisions. In addition, the City should formalize its application of neighborhood traffic management tools.
- Transportation Planning Rule (TPR) – The Oregon Land Conservation and

Development Commission recently adopted amendments to the TPR in OAR 660-12-0060 that clarify steps which must be taken to ensure that proposed comprehensive plan and zoning code map and text changes are consistent with the planned transportation system.

The goals developed to guide the TSP update are outlined below. The policies identified to implement the goals are described in Chapter 2.

Goal 1: Transportation facilities shall be designed and constructed in a manner which enhances the livability of Estacada.

Goal 2: Provide a transportation system which is safe, efficient, and reduces length of travel.

Goal 3: Provide a balanced transportation system that promotes alternate modes of transportation.

Goal 4: Provide for efficient movement of goods.

Goal 5: Develop transportation facilities which are accessible to all members of the community.

Goal 6: Develop a transportation system that is consistent with the City's adopted comprehensive land use plan, and with the adopted plans of state, local and regional jurisdictions.

Goal 7: Establish a clear and objective set of transportation design and development regulations that addresses all elements of the city transportation system and that promote access to and utilization of a multi-modal transportation system.

Goal 8: Identify and prioritize transportation improvement needs in the City of Estacada and identify a set of reliable funding sources to implement these improvements.

Modal Plans

The existing system network for each mode (pedestrian, bicycle, transit, motor vehicle, and other modes) was updated from the 1999 Draft TSP to reflect completed projects since the original plan was completed. A Master Plan (long-range project goals that meet planning requirements) was compiled for each transportation mode, which was designed to comply with relevant state and adjoining jurisdictions planning documents. The following sections summarize the Master Plans for each mode.

Pedestrians (Chapter 5)

The Pedestrian Master Plan, shown in Table 1-1, identifies improvements to provide a connected pedestrian network within the City of Estacada, focusing on arterial and collector

roadways and in high pedestrian activity areas. In addition, local streets should provide sidewalks where possible, and the City of Estacada Development Code regulations should require new development to provide pedestrian infrastructure as part of the development. All new roadways constructed should include sidewalks.

The projects are prioritized into high, medium, and low categories. High priority pedestrian projects are located on arterial roadways and provide improved access to major activity centers. Medium priority pedestrian projects are located on major collectors but are less critical to connecting activity centers. Low priority projects are sidewalk infill on collectors or neighborhood streets.

Table 1-1: Pedestrian Master Plan Projects

Priority	Project Location	Orientation	From	To	Length (Feet)	Estimated Cost ($)
Fill In Gaps in Sidewalks on Arterials and Collectors						
High	6th Avenue[1]	East/West	Wade Street	Broadway Street	800	$120,000
High	Eagle Creek Road	North/South	6th Avenue	River Mill Road	4,300	$650,000
High	OR 224	North/South	2nd Avenue	UGB	9,800	$1,470,000
High	River Mill Road	East/West	Farmstead Road	Eagle Creek Road	3,800	$650,000[2]
Medium	Eagle Creek Road	North/South	River Mill Road	Duus Road	4,300	$640,000
Medium	6th Avenue	East/West	Shafford Avenue	Cemetery Road	700	$100,000[2]
Low	North 1st Avenue	East/West	Wade Street	Shafford Avenue	1,700	$250,000[2]
Low	North 2nd Avenue	East/West	Wade Street	Shafford Avenue	1,700	$250,000[2]
Low	South 4th Avenue	East/West	Currin Street	Reagan Hill Road	2,600	$390,000[2]
Low	Coupland Road	East/West	Cemetery Road	UGB	3.400	$850,000[2]
Low	Pierce Street	North/South	1st Avenue	6th Avenue	1,700	$250,000[2]
Low	Wade Street	North/South	2nd Avenue	6th Avenue	1,800	$200,000[2]
Pedestrian Crossing[3]						
High	OR 224 at 2nd Avenue	North/South	2nd Avenue	Lake Shore Drive	-	-
High	OR 224 at Wade Street	North/South	Wade Street	Lake Shore Drive	-	-

Bicycles (Chapter 6)

The Bicycle Master Plan identifies improvements to provide a connected bicycle network within the City of Estacada, focusing on arterial and collector roadways. Typically, local streets do not require delineated bicycle lanes as traffic volumes are low enough that bicycles

[1] Improvement identified in previous Transportation System Plan (1999).

[2] Includes estimated right-of-way cost in 2006 dollars.

[3] Marked crosswalks on state highways require approval of the State Traffic Engineer.

and motor vehicles can safely share the right of way. 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, summarized in Table 1-2, is an overall plan that summarizes the "wish list" of bicycle-related projects in Estacada, providing a long-range map for planning bicycle facilities. The Bicycle Master Plan projects are prioritized into high, medium, and low categories depending on the combination of vehicular volume and posted speed limits of the roadway involved. The bicycle plan will require incremental implementation. As development occurs, streets are rebuilt and other opportunities (such as grant programs) arise, projects on the Master Plan should be pursued.

Table 1-2: Bicycle Master Plan Projects

Priority	Project Location	Orientation	From	To	Length (Feet)	Estimated Cost ($)
Bike Lanes on Arterials & Collectors						
High	Eagle Creek Road	North/South	6th Avenue	Duus Road	7,600	$460,000
Medium	River Mill Road	East/West	Eagle Creek Road	Farmstead Road	3,800	$230,000
Signing of Designated Bike Routes						
Medium	Main Street	North/South	OR 224	6th Avenue	3,300	$2,750
Medium	6th Avenue	East/West	Wade Street	Cemetery Road	2,400	$2,000
Medium	Broadway Street	North/South	OR 224	6th Avenue	3,100	$2,600

Transit (Chapter 7)

To meet transportation performance standards and serve future growth, the future transportation system needs multi-modal improvements to manage the forecasted travel demand. The effectiveness of transit service is supported by a quality pedestrian and bicycle system. Pedestrian and bicycle system improvements, as detailed in Chapters 5 and 6, respectively, should serve transit services as well as other activity centers.

Transit enhancements within the TriMet and SAM service area are ultimately decided based on regional transit goals. Transit projects are determined based on the identified needs and strategies and project feasibility. Estacada should continue to coordinate with TriMet and SAM to improve bus service within the City. Improvements to service frequency and/or the creation of an additional park-and-ride lot in the northern part of the City may increase the quality of service, increase ridership, and improve access for the transportation disadvantaged residents and employees in the City. The benefits and feasibility of additional stops and bus pullout locations should be investigated with TriMet and SAM.

Metro has established a vanpool program to encourage vanpool usage in the greater Portland metropolitan area. The program eligibility specifies that the travel may be between Estacada

and any location within the Metro urban growth boundary. Metro provides half of monthly van lease costs. Estacada should work with Metro to establish and promote vanpool services between Portland and Estacada.

In addition to existing public transit service providers, the City of Estacada should investigate the feasibility of local shuttle-based paratransit services that may more directly address the needs of the community. As described in Chapter 3, the existing paratransit services (the LIFT service provided by TriMet and the Estacada Community Center van service) provide a travel option to primarily the elderly, disabled, or other riders with health concerns. As the city grows, greater demand will arise for travel within the local area which may not be covered by the existing fixed route and paratransit services.

Motor Vehicles (Chapter 8)

To meet performance standards and address future growth, the future transportation system needs multi-modal improvements and strategies to manage the forecasted travel demand. 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

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 strategies include:

Neighborhood Traffic Management (NTM)

Neighborhood traffic management strategies are commonly used to slow down or reduce automotive traffic with the intent of improving safety for pedestrians or bicyclists. Estacada currently has limited neighborhood traffic management elements, such as on-street parking, in place on streets within the study area. When the City considers traffic calming measures, it will work with the community to find the traffic calming solution that best meets their needs and maintains roadway function. Any NTM project should provide an opportunity for comment by emergency agency staff to ensure public safety is not compromised.

Access Management

Access management involves the control or limiting of access on arterial and collector facilities to maximize capacity and preserve functional integrity. Numerous driveways erode the capacity of arterial and collector roadways and introduce a series of conflict points that present the potential for crashes and interfere with traffic flow.

Preservation of capacity is particularly important on higher volume roadways for maintaining traffic flow and mobility. Whereas local and neighborhood streets primarily function to provide direct access, collector and arterial streets serve greater traffic volume with the objective of facilitating through travel. Estacada, 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 access and mobility in Estacada:

- Provide right turn deceleration lanes on OR 224 where warranted.
- Provide left turn lanes where warranted for access onto cross streets.
- Develop policies and procedures to address access management through City land use review. Employ strategies to consolidate driveways, provide crossover easements, and to take property access from lower classified roads where feasible.
- Establish City access spacing standards for local, collector and arterial streets to be addressed by development and roadway construction projects.
- Implement City access spacing standards for new construction on County facilities within the urban growth boundary.
- Comply with ODOT access requirements on State facilities.

Local Street Connectivity

By providing connectivity between neighborhoods, out-of-direction travel and vehicle miles traveled (VMT) can be reduced, accessibility for various travel modes can be enhanced and traffic levels can be balanced throughout the street network. Additionally, public safety response time is reduced when there is a greater network of connecting streets.

To protect existing neighborhoods from potential traffic impacts of extending stub end streets, connector roadways should incorporate neighborhood traffic management into their design and construction. Signs to indicate the potential for future street extension should be posted at the time that street stubs are constructed. Additionally, development that constructs new streets or street extensions should be required to submit a proposed street map that:

- Provides full street connections with spacing of no more than 530 feet between connections except where prevented by barriers.
- Provides bike and pedestrian access ways in lieu of streets with spacing of no more than 330 feet except where prevented by barriers.
- Limits use of cul-de-sacs and other closed-end street systems to situations where barriers prevent full street connections.

- Includes no closed-end street longer than 200 feet or having no more than 25 dwelling units.
- Includes street cross-sections showing dimensions of ROW improvements, with streets designed for posted or expected speed limits which meet City design standards (or ODOT standards for state highways).

Functional Classification

An updated roadway functional classification map has been provided in Chapter 8. In addition to the inclusion of new streets to the transportation network, the classification of Shafford Avenue was changed from a Local Street to a Minor Collector. Also, with the proposed extension of 6th Avenue to intersect with OR 224, the segment of 6th Avenue from OR 224 to Wade Street would be classified as a Major Collector to provide continuity with the existing network.

Roadway Cross-section Standards

The design characteristics for streets in Estacada were developed to meet the function and demand for each facility type. Because the actual design of a roadway can vary from segment to segment due to adjacent land uses and traffic 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. Recommended roadway cross-section standards for each functional classification have been provided in Chapter 8, with additional recommendations provided for State highways that comply with ODOT's design standards.

Street cross-sections may vary among functional classifications as many elements are recommended, but have been left as "optional" to allow for flexibility. The actual treatment will be determined within the design and public process for implementation of each project.

Where center left turn lanes are identified, the actual design of the street may include sections without center turn lanes adjacent to environmentally sensitive or physically constrained areas or with median treatments, where feasible. Under some conditions a variance to the adopted street cross-sections may be requested from the City Engineer. Typical conditions that may warrant consideration of a variance include (but are not limited to) the following:

- Infill sites
- Innovative designs (roundabouts)
- Severe topographic or environmental constraints
- Existing developments and/or buildings that make it extremely difficult or impossible to meet the design standards.

On select non-grid residential local streets, consideration should be given to constructing the minimum curb to curb width (28 feet), as such streets are often associated with lower travel speeds and lesser environmental impacts. The Oregon Fire Code currently allows for unobstructed driving surface widths as low as 20 feet, which could be accommodated within City local street design standards where parking is allowed on only one side of the street. The City of Estacada should require this design on select residential local streets, with parking allowed on both sides of the street under conditions deemed appropriate by the City.

Transportation Demand Management

Transportation Demand Management (TDM) is the general term used to describe any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods. As growth in the Estacada area occurs, the number of vehicle trips and travel demand in the area will also increase. The provision of alternative mode choices and other TDM options could help reduce single occupancy vehicle travel and reduce the need for facility expansion.

Generally, TDM focuses on reducing vehicle miles traveled and promoting alternative modes of travel for large employers of an area. 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. A list of several strategies that could be applicable to the Estacada area has been provided in Chapter 8. Setting TDM goals and policies for new development will be necessary to help implement TDM measures in the future.

The City of Estacada should coordinate with Clackamas County, Sandy Area Metro (SAM), and TriMet to create procedures to assure that the TDM strategies are implemented. The City of Estacada, Clackamas County, Metro, SAM, 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, SAM, Metro, ODOT, and Clackamas County to develop productive TDM measures that reduce commuter vehicle miles and peak hour trips.
- 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.

- Implementation of motor vehicle minimum and maximum parking ratios for new development.
- Continued implementation of street connectivity requirements.
- Work with employers to install bicycle racks.
- Implementation of bicycle, pedestrian, motor vehicle and transit system Master Plans.

Roadway Improvements

A list of potential motor vehicle projects that would meet identified needs and achieve motor vehicle policies was developed into a Motor Vehicle Master Plan. The Motor Vehicle Master Plan is an overall plan summarizing the "wish list" of motor vehicle related projects in Estacada and identifies improvements to provide an operationally effective roadway network within the City. The Motor Vehicle Master Plan projects and estimated costs are summarized in Chapter 8, with each project assigned a project number that corresponds with the illustrative Motor Vehicle Master Plan Map in Figure 8-5. These projects are also summarized below in Table 1-3.

Table 1-3: Motor Vehicle Master Plan Projects

Project	Improvement	Estimated City Cost*	Estimated Total Costs	Potential Funding Sources**
OR 224 / River Mill Intersection	Construct traffic signal at intersection. Add left turn lane on westbound approach, modify eastbound approach to include a left turn lane and a shared through/right turn lane, and improve right turn lane on southbound approach to comply with ODOT standard design.	$875,000	$1,750,000	City, ODOT, Developer Exactions
Main St. Realignment at OR 211 / OR 224 Intersection	Realign Main St. to intersect at north approach of OR 211/ OR 224 Intersection. Add left turn lane on eastbound and southbound approaches.	$1,500,000	$3,000,000	City, ODOT, Developer Exactions
Main St. / OR 211 / OR 224 Intersection	Construct traffic signal at reconfigured intersection.	$150,000	$300,000	City, ODOT, Developer Exactions
OR 224 / New Collector Roadway (between Evergreen Ave. and River Mill Rd.)	Construct traffic signal at intersection. Add right turn lane on northbound and left turn lane on southbound approach.	$1,350,000	$2,700,000	City, ODOT, Developer Exactions
Eagle Creek Rd. / River Mill Rd. Intersection	Add left turn lane on northbound approach.	$43,000	$85,000	City, Developer Exactions
N. 6th Ave. / Cemetery Rd. Intersection	Add left turn lane on eastbound approach.	$133,000	$265,000	City, Developer Exactions
N. 6th Ave. Extension	New roadway from Eagle Creek Rd. to OR 224 at Evergreen Ave.	$280,000	$670,000	City, Developer Exactions
Industrial Way Extension	New roadway from Evergreen Rd. to River Mill Rd.	$140,000	$1,020,000	City, Developer Exactions
New Roadway	New roadway connecting Coupland Rd. to Cemetery Rd.	$580,000	$4,130,000	City, Developer Exactions
River Mill Rd. Extension	Extend River Mill Rd. to Cemetery Rd.	$700,000	$1,700,000	City, Developer Exactions
New Roadway	New roadway connecting OR 224 to Cemetery Rd.	$320,000	$2,270,000	City, Developer Exactions
Cemetery Rd. Extension	Extend Cemetery Rd. to Duus Rd.	$290,000	$2,050,000	City, Developer Exactions
Shafford Ave. Improvement	Upgrade Shafford Ave. from S. 4th Ave. N. 6th Ave.	$390,000	$390,000	City
OR 224 / Duus Rd. Intersection	Construct traffic signal. Include two eastbound right turn lanes, northbound left turn lane, and southbound left turn lane.	$135,000	$270,000	City, ODOT, Developer Exactions
OR 224 / Park Ave.	Widen OR 224 to include two northbound and two southbound through travel lanes between Duus Rd. and River Mill Rd.	$675,000	$1,350,000	City, ODOT, Developer Exactions

OR 224 Widening	Widen OR 224 to include two northbound and two southbound through travel lanes between Duus Rd. and River Mill Rd.	$5,750,000	$11,500,000	City, ODOT, Developer Exactions
Duus Road Extension	Extend Duus Rd. to OR 224	$1,675,000	$2,350,000	City, Developer Exactions
OR 224 / Evergreen Ave. Intersection	Construct traffic signal at intersection. Add left turn lane on westbound approach.	$395,000	$790,000	City, ODOT, Developer Exactions
Total		**$11,330,000**	**$28,490,000**	

* Estimated cost assumes a portion of project costs are funded by ODOT contributions or exactions from development projects.

** Identification of ODOT as the responsible jurisdiction does not constitute a commitment by ODOT to fund the improvement. Funding decisions are made through the STIP (State Transportation Improvement Program) process.

Trucks

Efficient truck movement plays a vital role in the economical movement of raw materials and finished products. The establishment 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 OR 224 is the only designated through truck route in the TSP study area. The objective of this route designation is to allow truck routes to focus on design criteria that are "truck friendly"; i.e. 12-foot travel lanes, longer access spacing, 35-foot (or larger) curb returns, and pavement design that accommodates a larger share of trucks.

Other Modes (Chapter 9)

Marine

The Clackamas River is not used for commercial goods movement. The river serves recreational purposes. No marine policies or recommendations are provided for Estacada other than to continue to support the recreational uses in and around the river, including the multi-use trail along the north bank.

Rail

There are no active rail facilities within the City of Estacada, nor are there expected to be any rail facilities within the City in the near future. Due to these considerations, no rail policies or recommendations are provided for Estacada.

Pipeline and Transmission Systems

High-voltage power transmission lines, operated by Portland General Electric, run through Estacada. No major pipelines cross through Estacada. No policies or recommendations

for pipelines and transmission systems are provided for Estacada.

Air

The Valley View Airport is a Category 4 public use airport located with the Estacada urban growth boundary. The airport is used by small recreational planes or light jets. No changes to policies are recommended for the airport. The City may propose airport overlay zones to encourage compatible development around the airport and to promote aviation safety by prohibiting structures, trees, and other objects from compromising takeoffs and landings at the airport. Surrounding land uses will continue to be subject to applicable federal and state aviation safety regulations, as described in Chapter 3. Within 5,000 feet of the runway, Federal Aviation Regulations protect airspace at 150 feet or less above the runway elevation. Protected airspaces may impact land uses within 9,000 feet of the Airport, with restrictions lessening as distance from the runway increases[4].

Most passenger and freight air transportation demands for the City of Estacada will continue to be serviced by Portland area airports including Portland International Airport (PDX), which is located approximately 32 miles northwest of the City.

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 Estacada utilizes a number of mechanisms to fund construction and maintenance of its transportation infrastructure, including:

- Fuel Tax and Vehicle License Fee
- System Development Charges
- General Fund Transfers
- ODOT Grants
- Exactions (Developer Required Improvements)

Under the above current programs, the City of Estacada anticipates collecting approximately $492,000 for street construction and repair each year, which would total to approximately $11.3 million over 23 years[5]. The costs outlined in the Transportation System Plan to

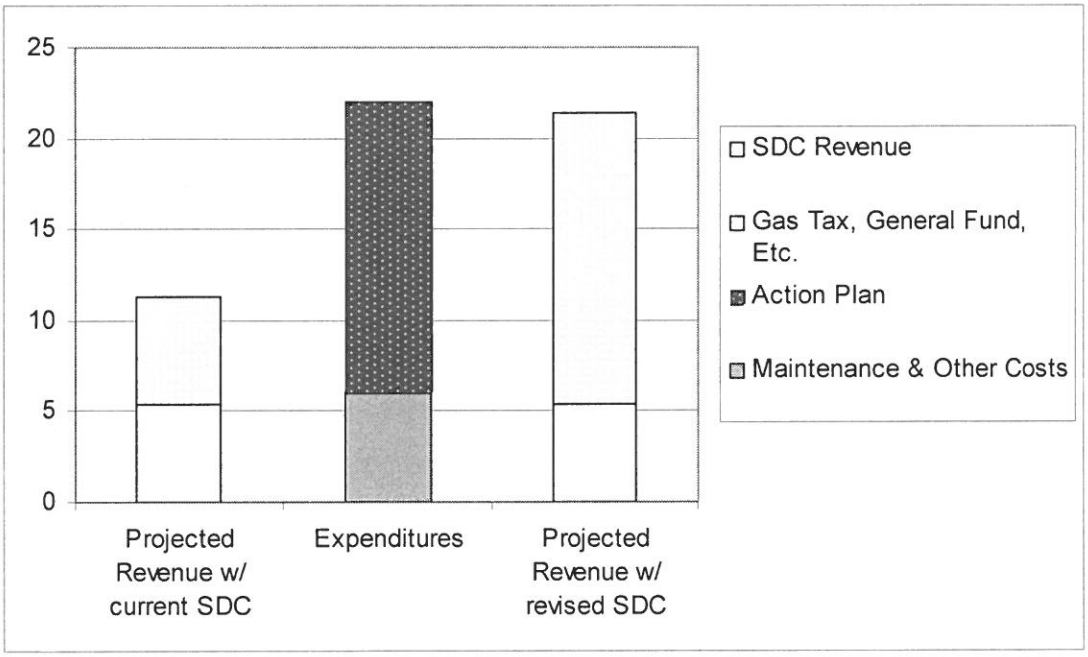
[4] More detailed information related to airport imaginary surface dimensions are located in the Oregon Department of Aviation's Airport Land Use Compatibility Guidebook. http://www.oregon.gov/Aviation/landuseguidebook.shtml

[5] This revenue level annualizes the expected growth over 23 years, and is a higher amount than expected for the next

implement all projects identified in the Motor Vehicle, Bicycle, and Pedestrian Master Plans totals $35 million. However, under the assumption that many projects would be partially or fully funded by other parties, such as the Oregon Department of Transportation or as part of new land development, the cost that the City would be responsible for to implement these projects is estimated at only $14.6 million.

In addition, the City will need to fund transportation projects currently listed on the City Construction Improvement Program (CIP), totaling $1.4 million and other transportation operations and maintenance programs adding another $6.1 million for a total cost over 23 years of approximately $22.1 million, as shown in Figure 1-1.

Figure 1-1: Estacada TSP Financial Summary (Million $)



The estimated $22.1 million in City costs for capital projects and other expenditures including maintenance exceeds the expected 23-year revenue estimate of $11.3 million by approximately $10.8 million. To fund all projects in the Transportation Master Plan and CIP, SDC rates would need to be set at 167% higher than the existing rate, or approximately $565 per ELNDT (e.g. approximately $5,410 per household). This provides an additional $10.0 million in projected funding for capital projects in addition to the existing revenue projections.

While the increased SDC rate would provide adequate funding for the proposed transportation projects, there would still be an $800,000 shortfall (or approximately $35,000 per year) in funding for maintenance and operations programs that were previously funded by SDC

fiscal year.

revenue that would now be diverted to capital projects. To fund these programs, it is recommended that the City consider new funding sources, such as local gas taxes, street utility fees, urban renewal districts, and other sources described in Chapter 10.

Comprehensive Plan & Development Code Changes

As part of the TSP update, changes to Estacada's Comprehensive Plan and Development code were recommended to bring consistency with the Transportation Planning Rule (TPR) and other state, county, and local plans. Specific issues addressed by these changes are outlined below, with a detailed discussion in Chapter 11.

Incorporation of TPR Goals into the Comprehensive Plan – Incorporate the overarching goals of the TPR to reduce reliance on the automobile and create a connection between transportation and land use planning.

Public Transportation Facilities Maintenance – Allow for necessary and desirable transportation facilities and maintenance by allowing transportation facilities to be included as an outright use in all zones.

Vehicular Access and Circulation Control – Set regulations and standards for vehicular access and circulation to promote safe and efficient roadways and access to developments.

Block Length and Perimeter – Decrease the current maximum block length and specify new maximum block lengths and perimeters for each zoning district.

Bicycle Parking – Promote non-vehicular modes of transportation by requiring the creation of permanent bicycle parking spaces for certain types of development.

Public Access Ways – Modify current ability of commission to require dedication for access ways to also allow for use of easements.

2. Plans, Goals and Policies

Overview

The transportation-related goals and objectives established by the 1999 TSP were adopted to guide the development and evaluation of alternatives, select a preferred transportation plan, and prioritize improvements. Since 1999, there have been changes to state transportation plan policies and regulations that should be addressed as a part of this TSP. In addition to retaining previously adopted policies that are still applicable, new policies are suggested to incorporate recent initiatives within the city and county as it relates to transportation facilities. The specific areas of the changes address the following key issues:

- Street design — New street design guidelines developed by the state suggest options for narrower residential streets within new subdivisions. In addition, the City should formalize its application of neighborhood traffic management tools.
- Transportation Planning Rule (TPR) – The Oregon Land Conservation and Development Commission recently adopted amendments to the TPR in OAR 660-12-0060 that clarify steps which must be taken to ensure that proposed comprehensive plan and zoning code map and text changes are consistent with the planned transportation system. The City should adopt policies and land use regulations consistent with this new rule requirement.

Goals and Policies

Goal 1. Transportation facilities shall be designed and constructed in a manner which enhances the livability of Estacada.

Policy a. Minimize the "barrier" effect of large arterial streets (e.g. Clackamas Highway/Highway 224).

Action: Pedestrian crossing spacing, traffic signal spacing and landscape standards for large arterial streets in Estacada shall be developed in conjunction with ODOT and Clackamas County.

Policy b. Make streets as "unobtrusive" to the community as possible. Livability near roadways including the surrounding neighborhood environment should be degraded little as possible. Considerations should be taken

for noise, aesthetics, safety, and the conditions for travel by non-motorized means.

Action: The city shall maintain design standards for local streets which address landscaping, cross section width, and provision of alternative modes for each functional classification.

Policy c. Build neighborhood streets to minimize speeding.

Action: The City shall allow for neighborhood traffic management in new development as well as existing neighborhoods for City streets.

Policy d. Encourage pedestrian and bicycle accessibility by providing safe, secure and desirable walkway routes, with a preferred spacing of no more than 330 feet, between elements of the pedestrian network (e.g., pathways, trails, streets).

Action: The city shall develop and maintain a "pedestrian grid" in Estacada, outlining pedestrian routes. Sidewalk standards shall be developed to define various widths, as necessary, for City street types.

Policy e. In residential areas, discourage extended use of on-street parking.

Action: The city shall maintain code provisions addressing extended on-street parking and on-street parking of vehicles used for commercial use or non-residential-type purposes (e.g. semi trucks or home businesses with extensive use of on-street parking).

Goal 2. Provide a transportation system which is safe, efficient, and reduces length of travel.

Policy a. Design of streets should relate to their intended use.

Action: A functional classification system shall be developed for Estacada which meets the City's needs and respects needs of other agencies (Clackamas County and ODOT). Appropriate design standards that recognize the unique attributes of the local area shall be developed for these roadways by the appropriate jurisdictions.

Action: A primary emergency response route system shall be developed for roadways within Estacada in coordination with Estacada Fire & Rescue. Appropriate traffic calming guidelines for these routes shall be developed in coordination with Estacada Fire & Rescue and other agencies (City of Estacada, Clackamas County, and ODOT).

Policy b. Level of service standards that are consistent with County and ODOT mobility standards shall be adopted and maintained at all intersections

within the city where streets included are of collector classification or higher.

Policy c. The City shall adopt access management spacing standards for all arterial and collector streets under its jurisdiction to improve safety and promote efficient through street movement. Access management measures shall be generally consistent with Clackamas County access guidelines to ensure consistency on city and county roads. ODOT access management standards will be met for state highways under ODOT jurisdiction.

Policy d. Local streets shall be designed to encourage a reduction in trip length by providing connectivity and limiting out-of-direction travel, without creating a strict grid-type network with long, straight streets which encourage speeding or through traffic. Provide connectivity to activity centers and designations with a priority for pedestrian connections. Wherever necessary, new streets built to provide connectivity shall incorporate traffic management design elements, particularly those which inhibit speeding. New or improved local streets should comply with adopted street spacing standards.

Policy e. Safe and secure pedestrian and bicycle ways shall be designed between parks and other activity centers in Estacada.

Goal 3. Provide a balanced transportation system that promotes alternate modes of transportation.

Policy a. Encourage the continued use of public transportation services and identify improvements to further promote transit in the community.

Policy b. Develop a comprehensive system of pedestrian and bicycle routes that link major activity centers within the study area.

Policy c. Consistent with the Clackamas County Bicycle Master Plan, bicycle ways should be constructed on arterials and collectors within Estacada (with construction or reconstruction projects). All schools, parks, public facilities and retail areas shall have direct access to a bicycle lane or route.

Action: The bicycle plan shall be defined and needs to connect key activity centers with adjacent access. Standards for bicycle facilities within Estacada shall be developed and maintained. Definition of needs for bicycle parking shall be required including guidelines on placement on sites. Where activity centers are on local streets, connections to bicycle lanes shall be designated.

Goal 4. Provide for efficient movement of goods.

Policy a. Designated arterial routes are essential for efficient movement of goods. Design of these facilities and adjacent land uses should reflect the needs of goods movement.

Policy b. Access management standards shall be preserved on arterial routes to reduce conflicts between vehicles and trucks, as well as conflicts between vehicles and pedestrians.

Goal 5. Develop transportation facilities which are accessible to all members of the community.

Policy a. Construct transportation facilities to meet the requirements of the Americans with Disabilities Act.

Policy b. Provide transportation options for the transportation disadvantaged.

Goal 6: Develop a transportation system that is consistent with the City's adopted comprehensive land use plan, and with the adopted plans of state, local and regional jurisdictions.

Policy a. The City shall implement the transportation plan based on the functional classification of streets.

Policy b. The City transportation system plan shall be consistent with the city's adopted land use plan and with transportation plans and policies of Clackamas County and ODOT.

Policy c. The City shall work with Clackamas County and other regional transportation partners to implement regional transportation demand management programs where appropriate.

Policy d. The City shall require property owners requesting a zone change, whether or not related to a comprehensive plan map amendment, to assess the impact of the proposed change on the transportation system and to mitigate significant impacts in accordance with applicable local, regional, and state regulations.

Goal 7: Establish a clear and objective set of transportation design and development regulations that addresses all elements of the city transportation system and that promote access to and utilization of a multi-modal transportation system.

Policy a. The City shall evaluate land development projects to determine possible adverse traffic impacts and to ensure that all new development contributes a fair share toward on-site and off-site transportation system improvement remedies.

Policy b. The City shall require dedication of land for future streets when development is approved. The property developer shall be required to make street improvements for their portion of the street commensurate with the proportional benefit that the improvement provides the development.

Policy c. The City shall require specific categories of development to prepare a traffic impact analysis to determine impacts and identify mitigation.

Policy d. The City shall adopt a uniform set of design guidelines that provide one or more typical cross sections associated with those functional street classifications under its jurisdiction. For example, the City may allow for a standard roadway cross-section and a boulevard cross-section for arterial and collector streets.

Policy e. The City shall adopt roadway design guidelines and standards that ensure sufficient right-of-way is provided for necessary roadway, bikeway, and pedestrian improvements.

Policy f. The City shall adopt roadway design guidelines and standards that ensure sufficient right-of-way is provided for necessary roadway, bikeway, and pedestrian improvements. City shall work with ODOT and County to determine right of way requirements for their respective facilities.

Policy g. The City shall adopt land use regulations that allow for transportation improvements outlined in the TSP as permitted uses in all city zoning districts.

Policy h. The City shall adopt land use regulations that require development applicants proposing amendments to the comprehensive plan to demonstrate that the proposal meets plan amendment requirements in OAR 660-12-0060.

Goal 8: Identify and prioritize transportation improvement needs in the City of Estacada and identify a set of reliable funding sources to implement these improvements.

Policy a. Develop a prioritized list of transportation improvement projects in the City, with associated construction cost estimates.

Policy b. Evaluate the adequacy of existing funding sources to serve projected transportation improvement needs and identify new, innovative funding sources.

Policy c. Maintain a transportation systems development charge to provide equitable development contribution to City transportation capital improvement projects.

3. Existing Conditions

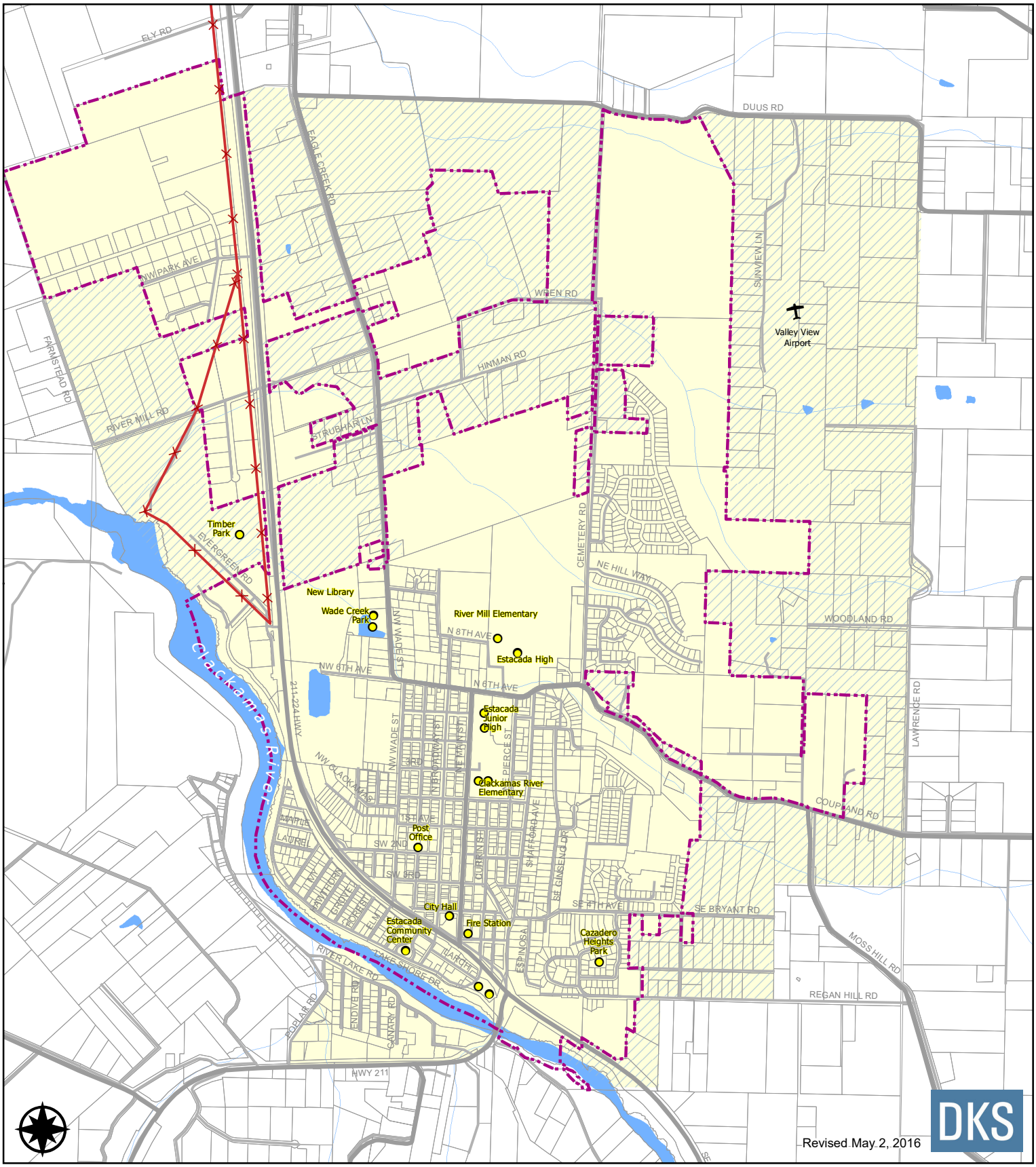
Overview

As part of the City of Estacada Transportation System Plan (TSP) Update, existing transportation conditions were assessed. This chapter summarizes all travel modes within Estacada including pedestrians, bicycles, transit, motor vehicles, freight, water, air, and pipelines. An inventory was conducted in Spring 2006 to establish base year conditions for the TSP Update. Much of this data provides a benchmark (basis of comparison) for future assessment of transportation performance in Estacada relative to existing and proposed policies.

The City of Estacada is oriented around the downtown central business district located in the southern part of the study area. Downtown Estacada, located north of the Clackamas Highway (Highway 211/224), is a relatively dense grid of mostly compact and walkable streets. Land use is mixed in proximity to the central area. Building entrances are located on streets, rather than parking lots, in much of the central city, providing an environment conducive to movement by pedestrians, bicycles and motor vehicles.

Twenty intersections within the study area were selected for operational evaluation. Traffic data was gathered at these locations and analyzed to evaluate area traffic conditions including volumes, capacities, and levels of service. The following sections describe the characteristics, usage, and performance of the existing transportation system in the City of Estacada.

The study area is shown in Figure 3-1.



City of Estacada

Transportation System Plan

Study Area

0 1,000 2,000 4,000 Feet

Figure 3-1

Legend

- major streets
- streets
- city limits
- urban growth boundary
- generators
- airport
- water
- ugb not in city limits
- tax lots
- utility line

Findings

This section highlights specific transportation issues observed under current (2006) conditions that will be addressed with this TSP Update. Existing conditions analysis includes an assessment of the ability of current transportation facilities to meet current travel demands based on agency standards. The major issues found after analyzing the existing transportation conditions in the Estacada community fall into three distinct categories: connectivity, capacity and safety.

Connectivity

A well connected transportation system provides three distinct advantages. First, it reduces travel time and miles of driving required as origins and destinations are connected through more direct routes. Secondly, local traffic is able to make trips to in-town destinations using well connected local streets as opposed to clogging up arterials. Thirdly, emergency vehicles have shorter response time to residential neighborhoods. Current connectivity issues that need to be addressed include:

- Additional multi-use paths, sidewalks, and bikeways connecting parks, retail centers and other trip generators with residential areas, increasing the opportunities for non-motorized trips and reducing single occupied vehicle trips.
- Additional bicycle and pedestrian crossings at Clackamas Highway, west of the existing Broadway Street intersection.

Capacity

Deficiencies of existing conditions must be addressed so the transportation system can handle the future increase in vehicular volume. The major issue affecting future capacity concerns in the City of Estacada is:

- Development in the northwest part of Estacada, especially along the Clackamas highway, where infrastructure needs must be analyzed to determine capacity issues once this area has been developed.

Safety

Transportation infrastructure must be safe and reliable for users of all modes, including pedestrians, bicyclists and motor vehicles. Identified safety issues in the existing conditions analysis include:

- Motor vehicle volumes along designated shared roadway bike routes in Estacada have increased to levels that threaten the safety of bicycle travel on roadways.
- No Estacada intersections are included in the most recent County Safety Priority Index System (SPIS) rankings. This indicates that, relative to other intersections in Clackamas County, no intersections in Estacada have severe safety issues.

The following sections review existing conditions associated with each mode including pedestrian, bicycle, transit, motor vehicle and other modes (such as rail, marine and pipeline).

Pedestrians

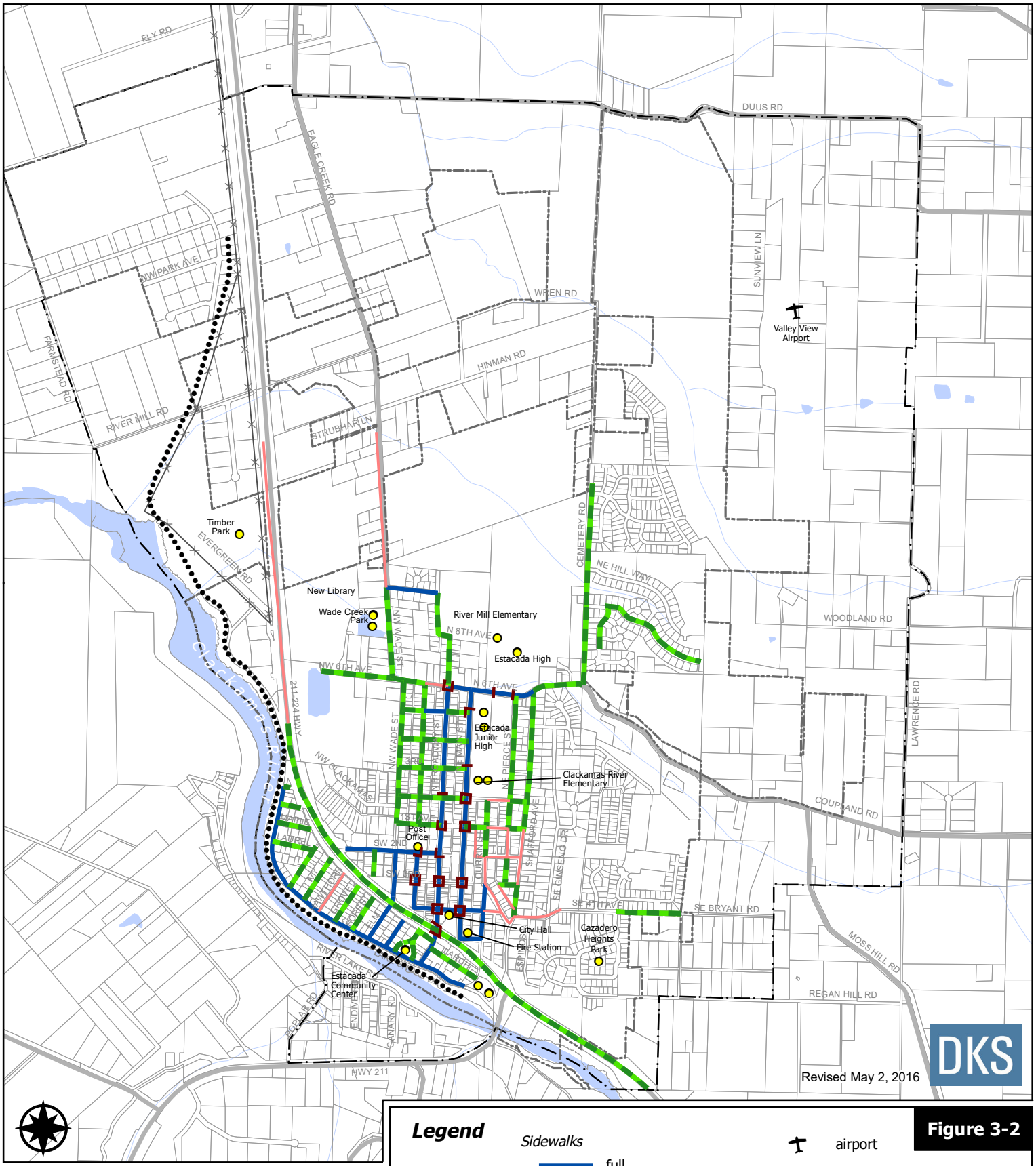
To assess the adequacy of the pedestrian facilities in Estacada, an inventory of sidewalks and crosswalks was obtained along all arterials, collectors, and most residential streets and compared to the locations of existing activity generators. In Estacada, these activity generators are parks, schools, City Hall, the city library, the Estacada Community Center, and the downtown central business district. It is desirable to provide at least one sidewalk connection between such generators and arterial and collector roadways to provide safe and attractive non-motorized travel options.

General Observations

Figure 3-2 shows the existing pedestrian facility inventory in Estacada as well as major activity generators. Major collectors in central Estacada such as SW 2nd Avenue, Broadway Street and Main Street have full sidewalks on both sides of the street along most segments. Collectors such as N. 6th Avenue, and S. 4th Avenue, which extend beyond central Estacada have sidewalks in many areas, but also have missing links. Coupland Road and Eagle Creek Road, collectors outside of the central city, lack sidewalks. Despite locations where sidewalks are not connected in Estacada, connectivity and pedestrian linkages are relatively good, particularly in the downtown area and near schools. In addition, many of the central residential streets have intermittent sidewalks on at least one side of the street, providing connections to roadways and other neighborhoods.

Pedestrian facility connectivity between neighborhoods east of Main Street and major activity generators is poor. In part, this is due to barriers presented by the location of Estacada Junior High School and Clackamas River Elementary School, as well as the natural topography south of South 1st Avenue. Consistent sidewalks are not present along 1st Avenue and North 2nd Avenue, east of Main Street.

There is a multi-use path that travels along the Clackamas River near SW Lakeshore Drive, beginning at the south end of SW Lakeshore Drive and terminating at Timber Park. There are no other multi-use paths or trails within the City.



City of Estacada

Transportation System Plan

Pedestrian Facilities

0 1,000 2,000 4,000 Feet

Figure 3-2

Legend

Sidewalks

- full
- intermittent
- no sidewalk
- marked crosswalks
- multi-use trail
- generators
- airport
- water
- city limits
- urban growth boundary
- tax lots
- utility line
- major streets

Activity Levels

Pedestrian crossing volumes at the study intersections were counted during the weekday vehicular PM peak hour (4 to 5 PM) and have been provided in Table 3-1. Intersections with total pedestrian volumes under 5 per hour are not included in the table. Although, the vehicular peak period occurs from 4 to 5 PM, some areas, especially those near schools, see higher pedestrian volumes earlier in the day.

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

Intersection	North/South Pedestrian Volume	East/West Pedestrian Volume
Broadway @ N. 6th Ave.	4	13
Shafford Ave. @ N. 6th Ave.	4	5
Main St. @ N 2nd Ave.	28	0
Broadway @ SW 2nd Ave.	8	5
Main St. @ S 4th Ave.	36	26
Hwy 211/224 @ Wade St.	3	5
Hwy 211/224 @ Broadway/Beech Rd.	0	5

Typically, most significant pedestrian movements occur near retail, recreational, and educational facilities. This trend is present in Estacada, as the table shows significant pedestrian volumes near the downtown core and near the schools along Broadway Street, Main Street, and N. 6th Avenue.

Along Clackamas Highway, pedestrian crossings are generally limited to the signalized crossing at Broadway, which is probably due to the combination of the width of the highway (ranges from 46 to 84 feet) and the high motor vehicle volumes and speeds. However, pedestrian movements at the intersection with Wade Street and SW Elm Road indicate there is a more westerly demand for crossings towards the residential and riverfront areas south of the Highway.

Issues to be Addressed

Deficiencies in the pedestrian facility network include:

- Connectivity between residential areas east of Main street to the major collectors and activity generators.
- Few adequate crossing opportunities on Clackamas Highway, especially to the northwest of downtown.
- Continuity of sidewalks along N 6th Avenue, which serves pedestrian traffic from nearby schools.
- Availability of pedestrian facilities along collectors outside of the central Estacada area. Consistent pedestrian facilities are not provided at transit stops

along Eagle Creek Road. Coupland Road has a beaten dirt trail along segments of the roadway indicating a demand for pedestrian and/or bicycle facilities.

Bicycles

The Oregon Bicycle and Pedestrian Plan[6] defines several types of bikeways and describes the design criteria for safe travel by bicycle. Estacada maintains four types of these bikeways: bike lanes, a multi-use path, shared roadways, and shoulder bikeways. According to the Oregon Bicycle and Pedestrian Plan, bike lanes exist where a portion of roadway, marked by a bike lane symbol stencil, is designated for use by bicycle riders. Multi-use paths are physically separated from motor vehicle traffic. Shared roadways are the most common bikeway and they are suitable in urban areas where traffic volumes are under 3,000 average daily vehicles and where speeds are no more than 25 miles per hour. Paved shoulders at least six feet wide are recommended for shoulder bikeways.

The current Estacada TSP identifies "Bike Streets" within the Estacada city limits. Figure 3-3 shows the existing Bicycle System Plan in Estacada. The majority of the arterials and major collectors in Estacada are designated as Bike Streets. Consequently, the existing bicycle system plan calls for adequate connections from neighborhoods to schools, transit stops, and the downtown area. Cyclists desiring to travel through the city can use the bike lanes or shoulder bikeways along Clackamas Highway and can use shared roadways on lower volume, neighborhood streets to reach destinations within the city.

Activity Levels

Bicycle counts were conducted during the weekday evening peak period (4 to 5 PM) at the study intersections in Estacada and are shown in Table 3-2. Volumes are not shown for intersections with no observed bicycle movements. The existing bicycle volumes can be expected to increase during the summer months.

[6] Oregon Bicycle and Pedestrian Plan, Oregon Department of Transportation, 1995

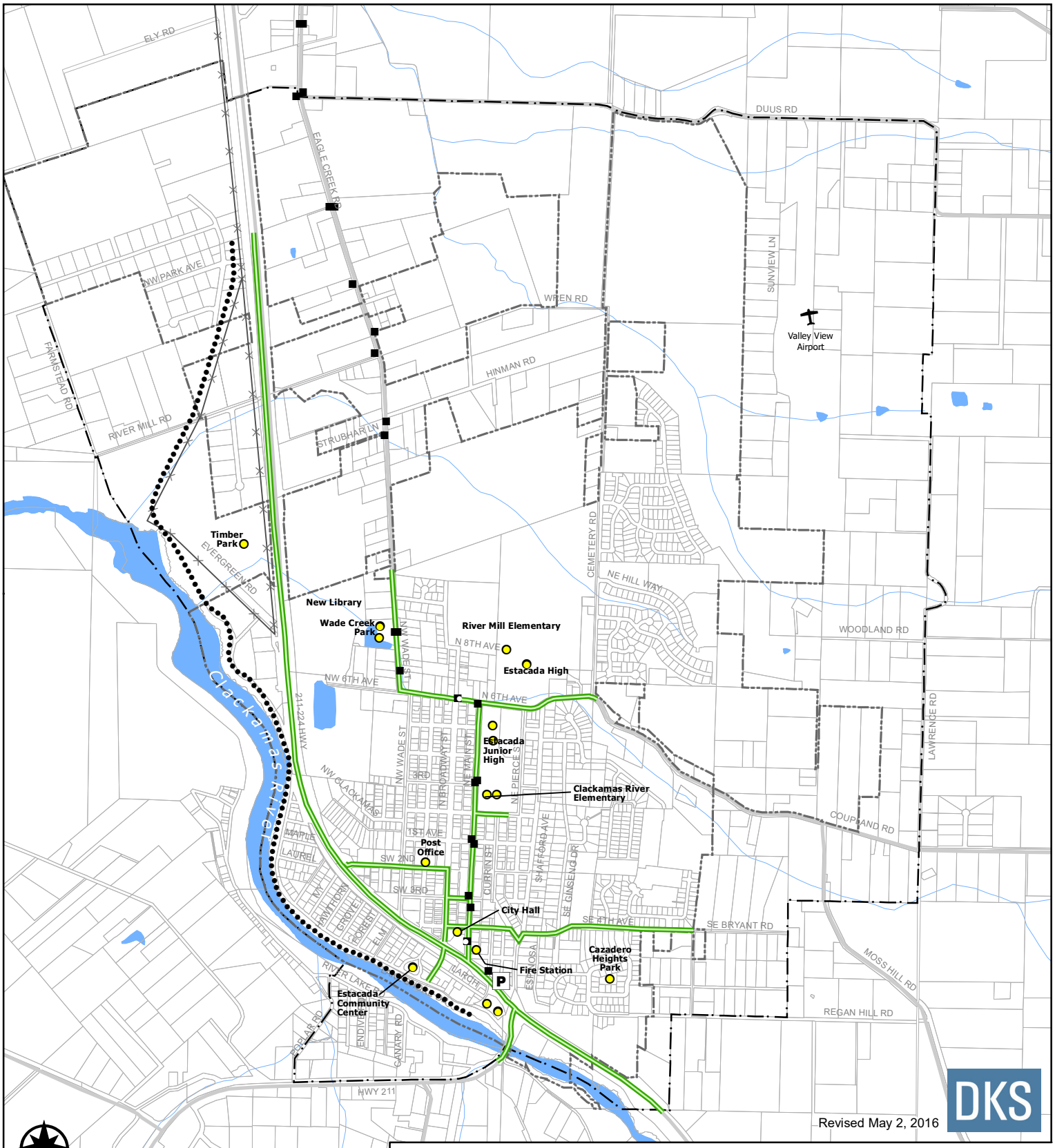
Table 3-2: PM Peak Hour Bicycle Crossing Volumes at Study Intersections

Intersection	East/West Bike Volume	North/South Bike Volume
Hwy 211/224 @ River Mill Road	2	0
Hwy 211/224 @ Evergreen Ave.	0	1
Hwy 211/224 @ Wade St.	2	2
Broadway @ N. 6th Ave.	5	4
Shafford Ave. @ N. 6th Ave.	4	2
Main St. @ NW 2nd Ave.	3	4
Broadway @ SW 2nd Ave.	1	3
Main St. @ SW 4th Ave.	6	8

Issues to be Addressed

Deficiencies in the bicycle facility network include:

- Motor vehicle volumes along all major collectors (N. 6th Avenue, NW Wade Street north of N. 6th Avenue, Main Street, Broadway Street, SW 2nd Avenue) designated as Bike Streets in the TSP Bicycle System plan have increased to above 3,000 average daily vehicles. At these volumes, the roadways do not meet the shared bikeway criteria specified in the Oregon Bicycle and Pedestrian Plan. Provision of bike lanes or traffic calming measures on these roadways may provide safe bikeways through the city. Alternatively, lower volume roadways could be marked as bikeways.



City of Estacada

Transportation System Plan

Bicycle Facilities

0 1,000 2,000 4,000 Feet

Figure 3-3

Legend

- bike streets
- park and ride
- bus stops
- sheltered stops
- multi-use trail
- generators
- airport
- water
- city limits
- urban growth boundary
- tax lots
- utility line
- major streets

Transit

Transit service is provided to Estacada by the Tri-County Metropolitan District of Oregon (TriMet) and the Sandy Area Metro (SAM). Figure 3-4 shows current bus routes serving Estacada, which includes TriMet route 31 and the SAM Estacada route.

TriMet Route 31 currently connects downtown Estacada, via Main Street, North 6th Street, Eagle Creek Road, and Clackamas Highway to the Portland metropolitan area. Travel time from downtown Estacada is approximately 40 minutes and 80 to 90 minutes to the Clackamas Town Center and downtown Portland, respectively. The route makes stops along the way including the Carver Community Center and the Milwaukie Transit Center. During Saturdays, as well as weekday middays and evenings, direct transit service is only provided to the Milwaukie Transit Center. Weekday service departing from Estacada operates from 4:43 AM to 8:33 PM, while Saturday service runs from 5:43 AM to 7:02 PM. TriMet one-way single fare "All Zone" tickets are $1.95 as of May 2006. A TriMet park-and-ride lot is located at 261 SE 5th Avenue in downtown Estacada.

The SAM Estacada service provides direct service to Sandy (approximately 25-minute travel time) and connecting service to Gresham via Highway 211 and Highway 26. The route is operated five times per day (departing Estacada City Hall at 5:30 AM, 8:30 AM, 2:30 PM, 4:30 PM, and 7:30 PM), exclusively on weekdays. SAM vehicles are 23 passenger buses. There is no fare on SAM service.

Activity Levels

Table 3-3 lists the average routes headways and corresponding level of service (based on the *Highway Capacity Manual* methodology[7]) for each of the routes serving Estacada.

Table 3-3: Transit Service Routes and Weekday Peak Period Level of Service

	Average Headways (minutes)			Level of Service		
Route	**AM**	**Midday**	**PM**	**AM**	**Midday**	**PM**
TriMet #31 Estacada	25	50	25	D	E	D
SAM Estacada	180	240	120	F	F	F

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.

[7] *2000 Highway Capacity Manual*, Transportation Research Board, 2000, Chapter 27.

Figure 3-4 shows existing transit stops, both standard signed and sheltered stops, in Estacada. TriMet typically considers locating transit shelters at stops with 35 or more boardings per day[8]. Estacada has two stops that currently have shelters: on the west side of Main Street, near City Hall, and on North 6th Avenue, near Broadway. SAM Estacada service stops only in front of City Hall in the Estacada city limits.

TriMet Route 31 ridership statistics indicate that 171 boardings occur on an average weekday in Estacada[9]. The stop at Main Street and SE 4th Avenue has by far the highest usage, with approximately 60% of all boardings in Estacada. SAM Estacada route ridership statistics indicate average monthly ridership increasing from 421 riders per month in 2004 to 899 in 2005 and 1,142 in 2006[10].

The TriMet Transit Investment Plan (TIP) includes proposed changes to route 31 in the future. The existing route is proposed to be limited to connections with Clackamas Town Center in light of planned light rail service linking Clackamas with downtown Portland and the rest of the light rail network.

Transportation service to disadvantaged peoples (those who are dependant on others for transportation due to physical or mental disability, income status, or age) in Estacada is provided through the Estacada Community Center. The Center uses 14-passenger vans to operate on-demand paratransit service five days per week during mid-day (11 AM to 1 PM). The service is used by approximately 200 individuals per month. TriMet also provides LIFT paratransit service is for people who are not able to ride buses because of disability or health. The LIFT service averaged 129 bookings per month with origins or destinations in Estacada during 2005. More detail information is provided in the Needs of the Transportation Disadvantaged section in Chapter 4.

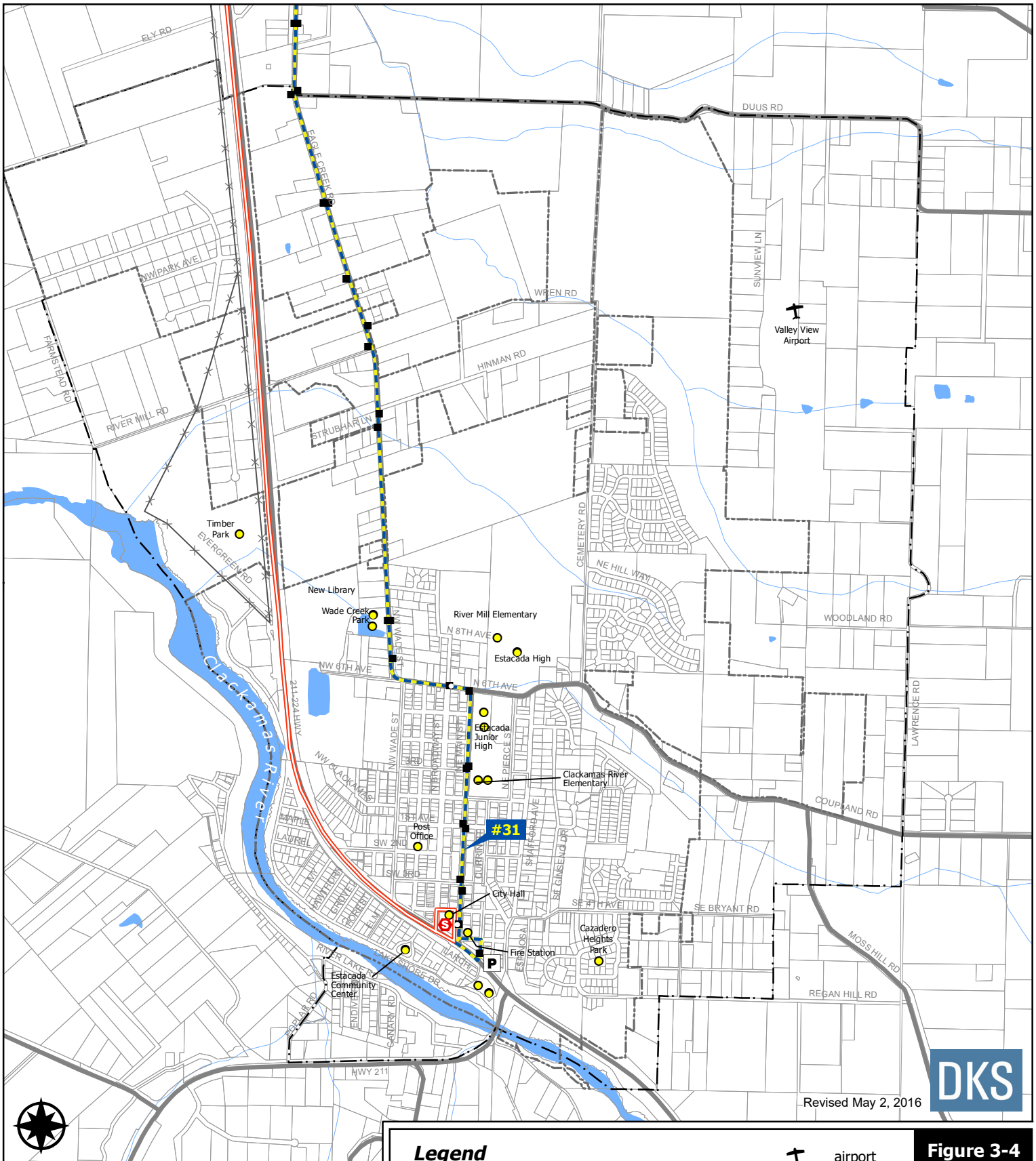
Issues to be Addressed

- The existing transit service headways could be reduced to encourage ridership.

[8] *Design Criteria*, TriMet, August 2002.

[9] TriMet Passenger Census – Fall 2005, Route 31, TriMet Transportation Planning

[10] Sandy Transit Stats, SAM Estacada Route Ridership Statistics. Provided by SAM Transit Manager in June 2006.



City of Estacada

Transportation System Plan

Transit Facilities

0 1,000 2,000 4,000 Feet

Figure 3-4

Legend

- P — park and ride
- ■ — Tri-Met bus stops
- ◘ — Tri-Met sheltered stops
- Tri-Met bus route
- S — SAM stop
- SAM route
- airport
- water
- city limits
- urban growth boundary
- major streets
- tax lots
- utility line

Motor Vehicles

System Description

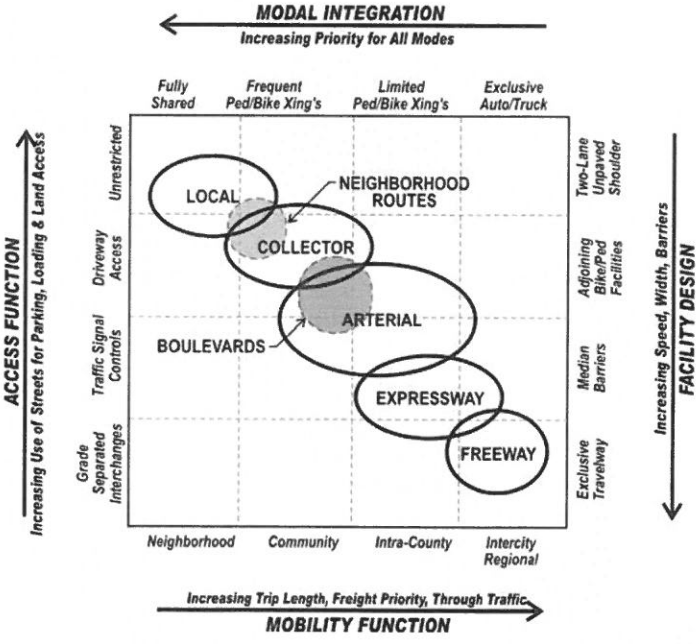
The motor vehicle system within the City of Estacada includes city streets, county roadways and state highways. This section is divided into a description of how the system is developed to date, then a more detailed review of how it is used and operated.

Functional Classification

Functional classification is the grouping of roadways by the character of service they provide. 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 existing Estacada functional class system for roadway facilities is depicted in Figure 3-5. The functional class system identified is based on the functional classification plan identified in the 1999 TSP. As the street network has not yet been completed/connected in some areas, as specified by the plan, some classifications are higher than would be warranted by their existing usage. For example, Evergreen Avenue is classified as a Collector, but has not been extended to intersect with River Mill Road, thus it currently serves more as a local street.

Clackamas County's Rural Functional Classification differs slightly from the TSP's functional classification plan. Highways 211 and 224 are identified as major arterials. Broadway Street, Main Street, Eagle Creek Road and Coupland road are classified as minor arterials. Duus Road is listed as a collector. The Clackamas County functional classification hierarchy is described in table 3-4 below[11].

[11] Clackamas County Comprehensive Plan, Chapter 5

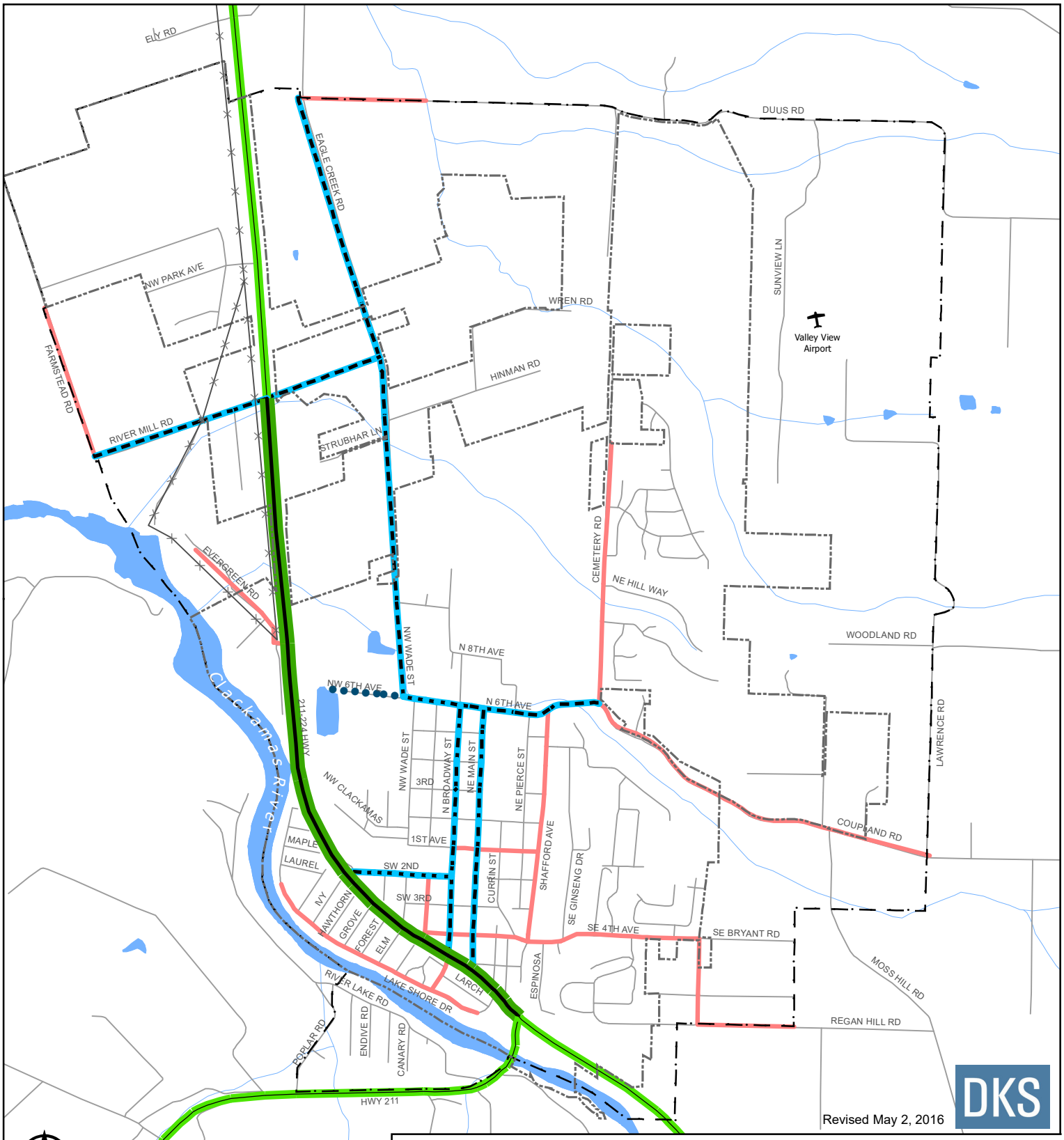
Table 3-4: Clackamas County Functional Classification Description

Classification	Description
Freeway/ Expressway	Serves interregional and intraregional trips. Carries heavy volume at high speed.
Major Arterial	Carries local and through traffic to and from destinations outside local communities and connects cities and rural centers. Moderate to heavy volume; moderate to high speed.
Minor Arterial	Connects collectors to higher order roadways. Carries moderate volume at moderate speed.
Collector	Principle carrier within neighborhoods or single land use areas. Links neighborhoods with major activity centers, other neighborhoods, and arterials. Generally not for through traffic. Low to moderate volume; low to moderate speed. New collectors should intersect minor arterials rather than major arterials.
Connector	Collects traffic from and distributes traffic to local streets within neighborhoods or industrial districts. Usually longer than local streets. Low traffic volumes and speeds. Primarily serves access and local circulation functions. Not for through traffic. Traffic calming measures may be appropriate. A connector should connect to a collector or minor arterial.
Local	Provides access to abutting property and connects to higher order roads. New local roads should intersect collectors, connectors, or, if necessary, minor arterials. Traffic calming measures may be appropriate. Not for through traffic.
Alley	May be public or private, to provide access to the rear of property. Alleys should intersect local roads or connectors. Not for through traffic.

The Oregon Highway Plan identifies Clackamas Highway as a District highway. 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.

A general functional classification issue not specifically related to Estacada occurs when developments are proposed within the allowed range of uses in a comprehensive plan, but the estimated added demand exceeds functional class parameters for the fronting county streets. For example, a high intensity use such as a shopping center may require more travel lanes on a collector facility than the three lanes typically allowed. The TSP will allow for the number of lanes to be determined independent of the functional classification.

Roadway jurisdiction (ownership and maintenance responsibilities) of the various roads in the City of Estacada is identified in Figure 3-5. Arterial and collector roadways outside of the Estacada city limits are under the jurisdiction of Clackamas County, while the city is responsible for all roads within city limits with the exception of Highways 211 and 224, which are state facilities managed by ODOT.



City of Estacada

Transportation System Plan

Functional Classification

0 1,000 2,000 4,000 Feet

Figure 3-5

Legend

Functional Classification

- arterial/highway
- arterial/highway, 4 lanes*
- major collector
- minor collector

**all others two lanes.*

- airport
- water
- city limits
- local street
- urban growth boundary
- tax lots
- utility line

Access Management Standards

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. Access management benefits typically include improved traffic flow, fewer vehicle conflicts, and reduced collisions. The standards vary depending on posted speed on the roadway, as shown in Table 3-5. The Clackamas County TSP indicates that rural access management standards will be dictated by AASHTO standards. The Estacada TSP recommends private access drive and public street intersection spacing on City streets for arterials, major collectors, minor collectors, or local roadways. The TSP standards are shown in Table 3-6

Table 3-5: ODOT Access Management Standards

Facility	*Posted Speed (MPH)*				
	55 or greater	*50*	*40,45*	*30,35*	*20 or less*
District Highway (feet)	700	550	500	350	350

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

Table 3-6: City Intersection Spacing Standards

	Public Street (feet)	*Private Access Drive (feet)*
Arterial	1320	500
Major Collector	600	150
Minor Collector	300	100
Local	150	50

Source: City of Estacada TSP (1999)

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 Estacada. The locations of marked parking spaces on city streets were also examined.

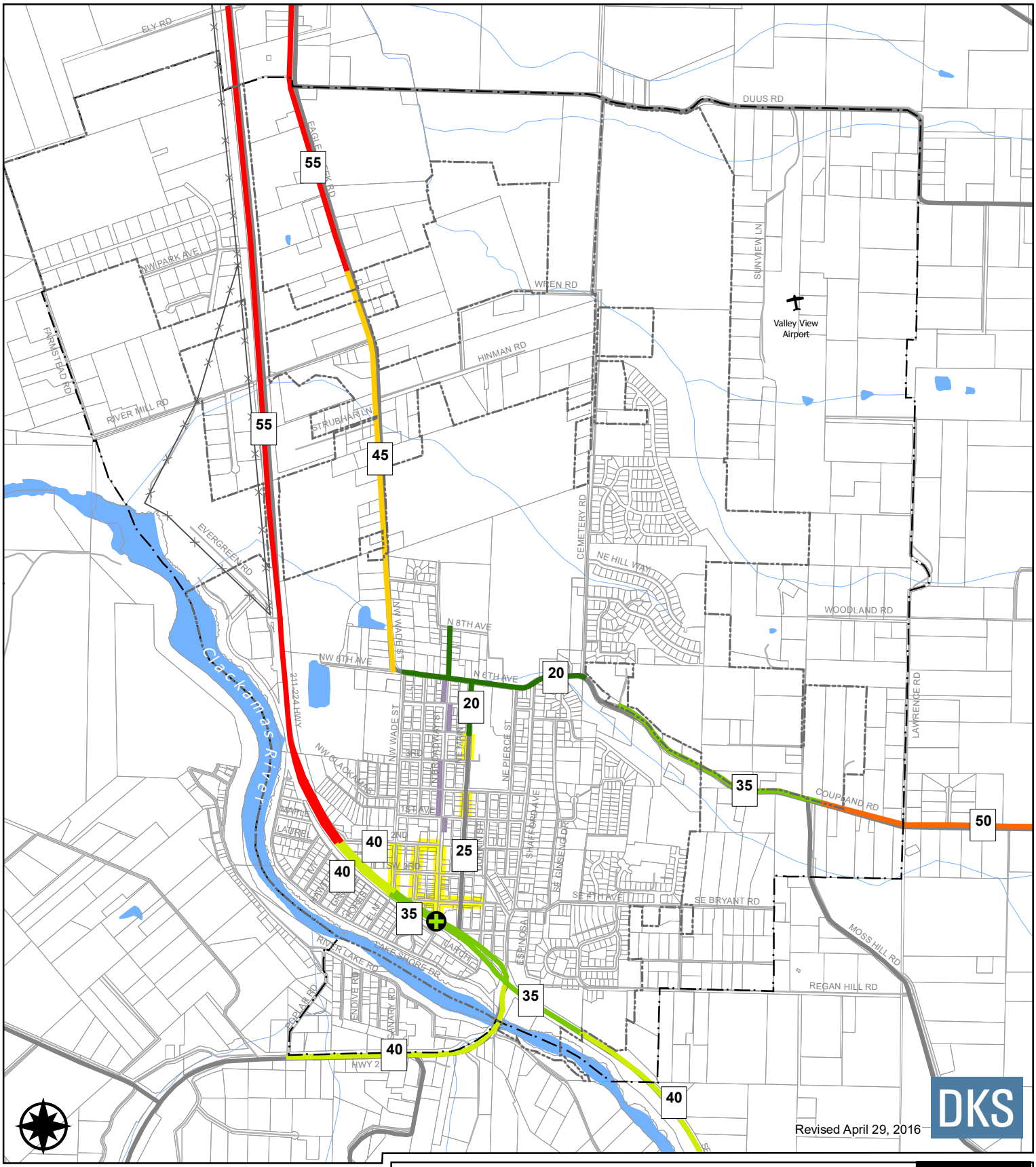
Highway 211/224, the Clackamas Highway, is the largest roadway in Estacada and provides residents with access to the Portland metropolitan area to the west and recreational opportunities in the Mount Hood National Forest to the east. It is the primary roadway for traffic passing to and through Estacada. Access to the highway is limited to public streets and a few private driveways. The highway includes turning lanes at many intersections and wide shoulders which are used as a right turn lane at some intersections.

Figure 3-6 shows a limited inventory of the posted speeds in Estacada. The majority of roadways in Estacada are posted at 25 miles per hour (mph) as they are local access roads. Collector roadways outside of the central Estacada grid such as Coupland Road and Eagle Creek Road are posted at higher speeds ranging from 35 to 55 mph. Clackamas Highway has speeds of 55 mph outside of the central city area with speeds decreasing to 35 or 40 mph through downtown Estacada. Speeds along most of Main Street and a portion of North 6th Street and North Broadway Street located in school zones are limited to 20 mph.

Additionally, Figure 3-6 shows the existing number of lanes on each roadway in Estacada. The Clackamas Highway is four lanes through most of the area within Estacada, except between Heiple Road and River Mill Road, where it has only two lanes. Ely Road, east of Clackamas Highway is one lane. The remaining roads in the City of Estacada are two lane roadways.

Roadway geometry and lane configurations show which movements can be made at each intersections and number of lanes at each approach of an intersection including dedicated turn lanes. This information is necessary to evaluate intersection capacity. Lane configurations for study intersections are illustrated in Appendix A, Figure 2.

The only traffic signal within the Estacada urban growth boundary exists at the intersection of Clackamas Highway with Broadway Street / Beech Road. Other intersection controls (stop signs or flashing red lights) are depicted in Appendix A, Figure 2. Lastly, Figure 3-6 shows the location of marked parking along major collector streets in Estacada.



City of Estacada

Transportation System Plan

Roadway Inventory

0 1,000 2,000 4,000 Feet

Figure 3-6

Legend

Marked Parking
- both sides
- one side

airport

traffic signal

Posted Speed Limits (25 MPH except where shown)
- 20 mph
- 35 mph
- 40 mph
- 45 mph
- 50 mph
- 55 mph

water

city limits

urban growth boundary

major streets

streets

tax lots

utility line

Emergency Response Routes

Emergency fire services are provided in Estacada by the Estacada Rural Fire District, which also provides emergency medical services. The main Estacada fire station is located at 261 SE 5th Avenue. Although no emergency routes are explicitly designated, the highway and major collector roadways are utilized as emergency routes[12] in providing service to Estacada. Generally, restrictive or deflective traffic calming devices (e.g. speed humps, raised intersections, and diverters) should not be located on primary emergency response routes.

Pavement Conditions

Pavement conditions in the City of Estacada vary and include some unpaved gravel surfaces within the city limits. Pavement conditions are illustrated in Figure 3-7. The evaluation of pavement conditions is based on the *CPE Street Condition Evaluation* with revisions from city staff to reflect more recent capital improvement projects. The *CPE Street Condition Evaluation* includes evaluations of pavement conditions on Estacada roadways based on a Pavement Quality Index (PQI). The PQI is a ranking of pavement conditions on a scale of 1 to 10. A PQI ranking higher than 6 is considered to be good while a PQI between 4 and 6 is considered fair. If the PQI is lower than 4, the street is considered to have poor pavement conditions. Generally speaking, arterials and collectors should have a good PQI ranking, while local streets should be good or fair.

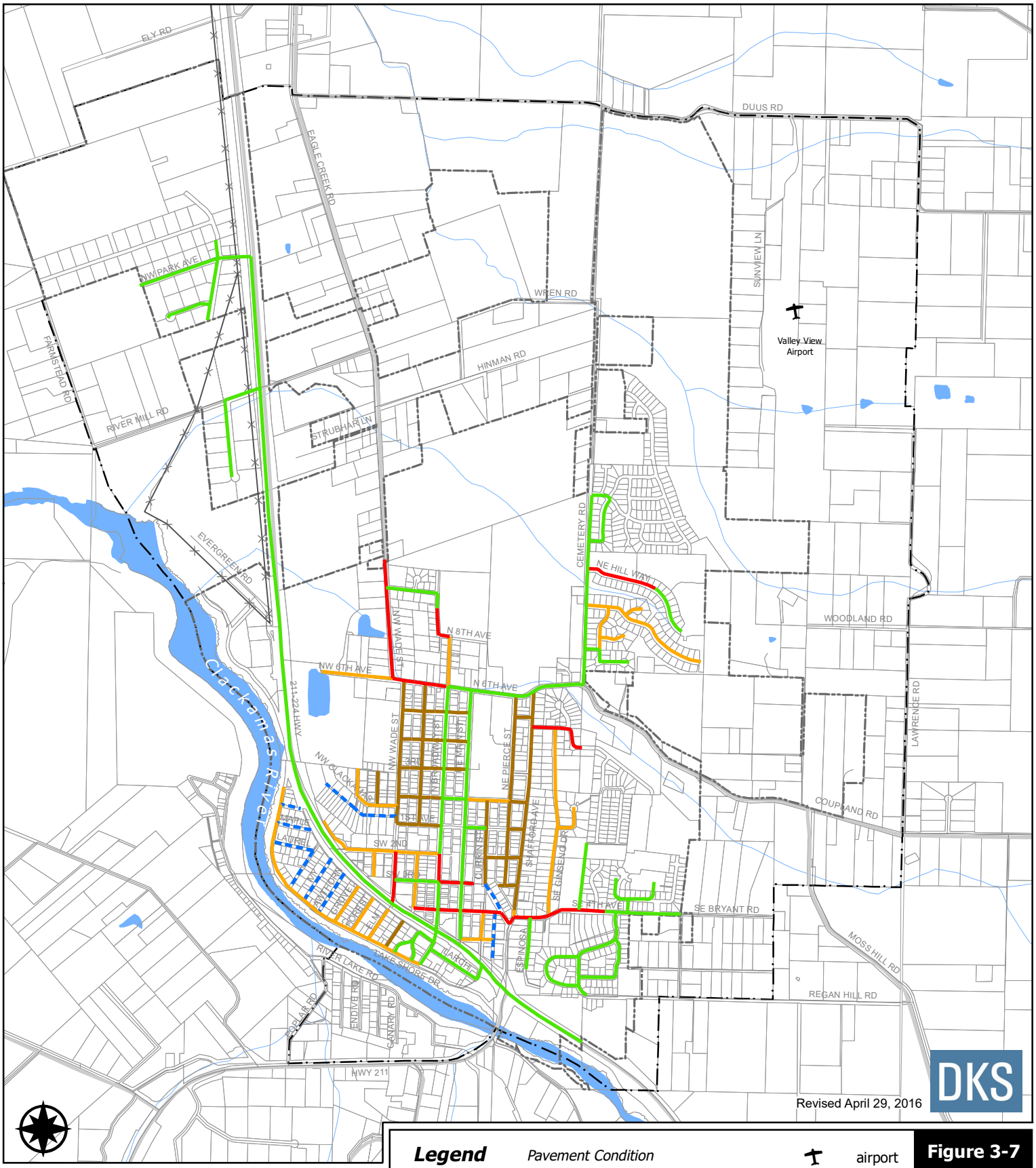
Activity Levels

An inventory of peak hour traffic conditions was performed in the spring of 2006 as part of the Estacada TSP Update and was augmented by traffic data collected for previous Estacada Transportation Studies[13] and ODOT traffic counts. Twenty study intersections where selected for analysis and four additional 24-hour bi-directional tube counts were conducted on Estacada roadways. The 24-hour counts were performed to help analyze daily traffic patterns including volumes in school zones, which may have peak periods earlier than other roadways. Study intersections were chosen in coordination with the City of Estacada and ODOT staff in order to address major roadways and noted areas of concern.

The traffic turn movement counts conducted as part of this inventory provide a basis for analyzing existing problem areas as well as establishing a base condition for future monitoring. Turn movement counts were conducted at nine intersections during the weekday evening (3-6 PM) peak period to determine existing operating conditions. Turn movement

[12] Conversation with Fred Hertel, Deputy Chief, Estacada Rural Fire District, April, 2006.

[13] Provided by the City of Estacada staff.



City of Estacada

Transportation System Plan

Pavement Conditions

0 1,000 2,000 4,000 Feet

Figure 3-7

Legend

Pavement Condition

- good
- fair
- poor
- 1st lift asphalt only
- unpaved
- not assessed

- airport
- water
- city limits
- urban growth boundary
- tax lots
- utility line
- major streets

counts previously conducted in 2005 [14] were used for 11 intersections during weekday evenings (4-6 PM). The peak hour volumes obtained were further refined to reflect 30th highest annual hour volumes (30HV), which are commonly used in facility design. These volumes account for seasonal variations in traffic and generally represent the levels of congestion present during the weekday p.m. peak hour in the summer time, when volumes are at their highest. The existing PM peak hour traffic volumes at study intersections are illustrated in Technical Appendix A, Figure 2.

Figure 3-8 shows the average daily two-way existing traffic volumes on roadways in the Estacada area. Daily traffic volumes are based on daily traffic count data and extrapolations of PM peak hour intersection counts. 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. In addition, seasonal recreational traffic can vary the traffic volumes in the City.

The figure indicates that the highest vehicle volumes in Estacada occur along Clackamas Highway, with daily volumes ranging from 7,600 near Wade Street to 11,000 at Heiple Road. Major collectors such as Main Street, 6th Avenue, and Eagle Creek Road are utilized by more than 3,000 vehicles per day. Smaller roadways in the downtown core such as SE 4th Avenue and SW Wade Street have daily volumes near 1,000 vehicles per day, while local streets such as Shafford Road and North 2nd Avenue have daily volumes in the hundreds of vehicles.

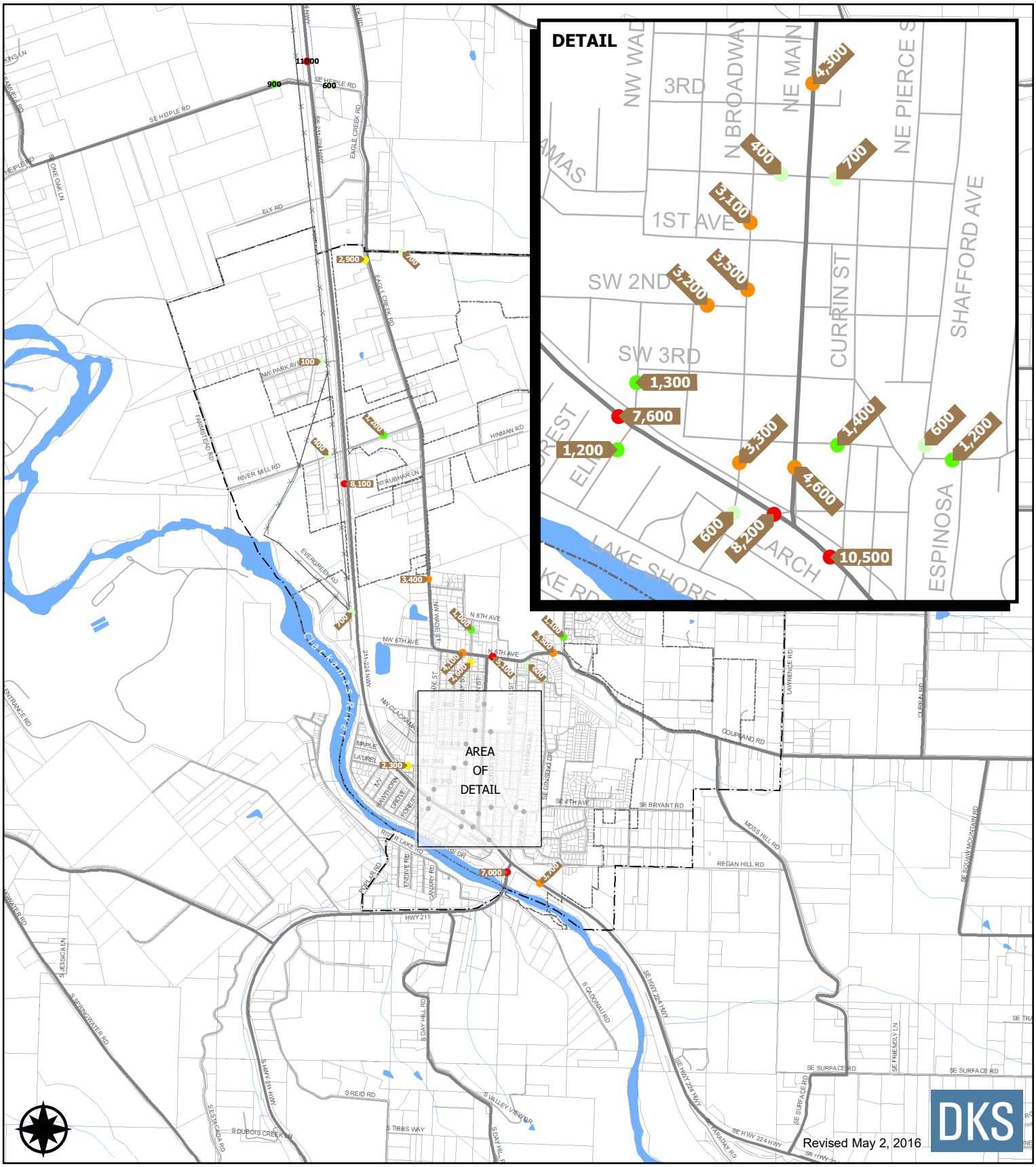
Truck Freight

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. ODOT[15] and Clackamas County do not identify any freight routes within the Estacada UGB, including the Clackamas Highway. The City of Estacada identifies a through truck route in Estacada on Main Street, as this was once the highway route through the City.

Truck (heavy vehicle) volumes and percentages of the traffic stream were collected as part of the intersection turn movement counts and were used in traffic level of service calculations. Table 3-7 lists the approximate percentage of trucks traveling along key corridors (arterials and major collectors) in Estacada.

[14] Estacada Comprehensive Plan Revision Transportation Impact Study, Parametrix, Inc., June 2005

[15] *1999 Oregon Highway Plan*, The Oregon Department of Transportation, May 1999.



City of Estacada

Transportation System Plan

Daily Traffic Volumes

0 1,000 2,000 4,000 Feet

Figure 3-8

Legend

major streets

streets

Average Daily Traffic Volume

- 0 - 700
- 700 - 1,400
- 1,400 - 3,000
- 3,000 - 5,000
- 5,000 - 11,000

water

urban growth boundary

city limits

tax lots

utility line

Table 3-7: Truck Percentages on Key Corridors

Intersection on Clackamas Highway	*Total Crashes*
Hwy 211/224 (North of Evergreen Avenue)	4%
Hwy 211/224 (North of Evergreen Avenue)	4%
Hwy 211/224 (South of Evergreen Avenue)	5%
Eagle Creek Road	7%
River Mill Road	7%
N 6th Avenue	4%
Main Street	5%
Broadway Street	2%
SW 2nd Avenue	1%

Land Use Plan

Land use plays a large role in driving transportation choices. Consequently, land use within the City of Estacada is a key ingredient in understanding current transportation patterns and roadway traffic volumes. Both the current land use zoning within the City and the Comprehensive Plan Land Use Designation are illustrated in the Appendix.

The Proposed 2004 Comprehensive Plan Update to the Urbanization Element would apply new land use designations to several areas in the city, particularly in the north portions of the city, along the Clackamas Highway and Eagle Creek Road. Compared with the existing land use designations, allowable uses in some areas would be more intense and a 130-acre land area would be added to Estacada's urban growth boundary (UGB) for light industrial uses. Several parcels currently designated as Light Industrial land use would shift to General Commercial, while other Light Industrial parcels would change to Multi-Family Residential designation. Land use designations in other areas would be modified to better reflect existing land uses including schools, parks, and other public facilities. The proposed land use is illustrated in the Appendix.

Traffic Operations

Definition of Traffic Level of Service

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.

Clackamas County Standard — Operating standards for Clackamas County [16] call for arterials and collectors in Estacada to be at LOS D or better, unless located in an area with land use designated as industrial or a high-employment development area. For industrial and high-employment areas, LOS E may be acceptable.

ODOT Standard — ODOT operating standards[17] for District Highways inside a UGB call for the maximum volume to capacity ratio for peak hour operating conditions to vary depending on speed, as shown in Table 3-8.

Table 3-8: ODOT Operating Standards

Posted Speed (MPH)	*>=45*	*40*	*<=35*
Volume to Capacity Ratio (v/c)	0.80	0.85	0.90

The standards are 0.90 where speeds are 35 mph or less (such as the Main Street intersection), 0.85 where speeds are between 35 and 45 mph (such as the SW 2nd Avenue intersection), and 0.80 at speeds of at least 45 mph (such as at the Evergreen Road intersection). Intersection approaches located outside of the Estacada urban growth boundary (such as Clackamas Highway at the Heiple Road intersection) should have a maximum v/c of 0.75 unless they are minor approaches at unsignalized intersections that must stop or yield the right of way (such as Heiple Road at Clackamas Highway), in which case the maximum v/c is 0.80. No city operational standards are specified in the Estacada TSP or Comprehensive Plan.

[16] Clackamas County Comprehensive Plan, Chapter 5

[17] *1999 Oregon Highway Plan - Amendment*, The Oregon Department of Transportation, July 2005.

Existing Operating Conditions

The 30HV intersection turn movement counts conducted during the evening peak periods were used to determine the existing 2006 LOS based on the *2000 Highway Capacity Manual* methodology for signalized and unsignalized intersections[18]. Traffic counts and level of service calculation sheets can be found in Appendix B. Table 3-9 lists the existing weekday PM peak hour intersection operation at the 20 study intersections. Each of the study intersections operates at a LOS of D or better and has an acceptable v/c ratio.

Table 3-9: Existing Weekday PM Peak Hour Intersection Level of Service

Intersection	Level of Service	Average Delay (Sec.)	Volume / Capacity	Standard Met?
Signalized Intersection				
Hwy 211/224 @ Broadway/Beech	B	12.6	0.28	Yes
Unsignalized Intersections				
Hwy 211/224 @ Heiple Rd.	A / C	1.3	0.02 / 0.10	Yes
Hwy 211/224 @ Ely Rd.	A / C	0.1	0.00 / 0.02	Yes
Hwy 211/224 @ Park Ave.	A / C	0.2	0.00 / 0.03	Yes
Hwy 211/224 @ River Mill Road	A / B	1.9	0.07 / 0.11	Yes
Hwy 211/224 @ Evergreen Ave	A / B	1.3	0.02 / 0.12	Yes
Hwy 211/224 @ SW 2nd Ave.	A / B	2.6	0.10 / 0.17	Yes
Hwy 211/224 @ Wade St. / Elm St.	A / B	2.7	0.03 / 0.16	Yes
Hwy 211/224 @ Main St.	A / C	4.5	0.08 / 0.49	Yes
Hwy 224 @ Hwy 211	A / C	5.9	0.02 / 0.54	Yes
Eagle Creek Rd. @ Duus Rd.	A / A	1.5	—	Yes
Eagle Creek Rd. @ River Mill Rd.	A / B	2.9	—	Yes
Broadway @ N. 6th Ave.	A / C	4.5	—	Yes
Main St. @ N. 6th Ave.*	B	10.0	0.39	Yes
Shafford Ave. @ N. 6th Ave.	A / B	2.1	—	Yes
Cemetery Rd. @ Coupland Rd.	A / A	2.6	—	Yes
Main St. @ SW 4th Ave.	A / B	3.2	—	Yes
Main St. @ NW 2nd Ave.	A / B	2.1	—	Yes
Broadway @ SW 2nd Ave.	A / B	6.1	—	Yes
Shafford Ave. @ SE 4th Ave.	A / A	3.2	—	Yes

Notes: Unsignalized Intersection Operations:
A/A = Major street turn LOS / Minor street turn LOS
#/# = Major street turn v/c / Minor street turn v/c
Signalized and All-Way Stop Intersections:

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

Delay = Average vehicle delay in the peak hour for entire intersection in seconds.
* All-Way Stop Intersection

Traffic Safety

The last five years (2000-2004) of crash data was obtained from ODOT and used to identify any high collision areas within Estacada. The analysis of crash data was separated into reviews of past highway performance and past city street performance.

Within the three-mile study area between Heiple Road and the Highway 224/211 intersection, Clackamas Highway experienced 29 crashes over the last five years. Of these crashes, 23 (approximately 79%) occurred at intersections, which were primarily turning and angle crashes. The six other crashes occurred at segments of the roadway that did not have intersections. Seven crashes in the corridor resulted in serious injuries, but there were no fatalities.

To assess the significance of the amount of crashes that have occurred, crash rates by intersection, as well as by highway segment, were calculated to relate crash frequencies with the volume of traffic served. Table 3-10 lists the total number of crashes experienced at study area highway intersections within the five-year period examined, as well as the resulting crash rate which indicates the number of crashes per million vehicles entering the intersections. Crash rates of 1.0 million entering vehicles (MEV) or greater are generally used as indicators that specific intersections should be investigated further for potential safety enhancements. As shown, all study intersections maintain crash rates well below 1.0 MEV.

Table 3-10: Highway Intersection Crash Rates

Intersection on Clackamas Highway	*Total Crashes*	*Crash Rate (MEV)*
Heiple Road	6	0.36
Park Avenue	2	0.13
River Mill Road	2	0.12
Wade Street	5	0.37
Broadway Street	3	0.18
Main Street	2	0.10
Currin Street	1	0.06
Highway 211	2	0.11

Crash rates identifying the number of crashes per million vehicle-miles (MVM) traveled for specified sections of Clackamas Highway, as well as statewide average crash rates for various facility types, were obtained from ODOT's *2004 State Highway Crash Rate Tables*[19].

[19] *2004 State Highway Crash Rate Tables (August 2005).* Retrieved May 26, 2006, from Oregon Dept. of Transportation Web site: http://www.oregon.gov/ODOT/TD/TDATA/car/docs/2004_RateBook.pdf

Highway sections analyzed in these tables are categorized by area type and functional classification to provide a basis for comparison between various facilities. For this analysis, Clackamas Highway within the Estacada City Limits was categorized as being in a "Rural City". Table 3-11 displays the crash rates calculated for this 2 ½ -mile segment over the last five years and compares them to statewide average rates for similar facilities in similar environments. As shown, the crash rate experienced over this corridor for each of the last five years has been well below the statewide average crash rate for similar facilities.

Table 3-11: Highway Segment Crash Rates (MVM)

	Year				
Facility	***2000***	***2001***	***2002***	***2003***	***2004***
Clackamas Highway	0.25	0.38	0.48	1.07	0.24
Statewide Average (for Non-freeways in Rural Cities)	1.40	1.48	1.23	1.40	1.11

The analysis of highway crash history was supplemented by reviewing ODOT's Safety Priority Index System listing for locations in the study corridor ranked among the state's top 10% of hazardous locations. The Safety Priority Index System (SPIS) is a method developed by ODOT for identifying hazardous locations on state highways. The SPIS score is based on three years of crash data and considers crash frequency, crash rate, and crash severity. ODOT bases its SPIS on 0.10-mile segments to account for variances in how crash locations are reported. This information is a general comparison of the overall safety of the highway based on crash information for all sections throughout the state. After reviewing this list for Clackamas Highway through the study area, it was found that SPIS ratings are relatively low, with no locations in the top 10% of hazardous locations.

The 5-year (2000-2004) crash data on Estacada city streets indicates that 38 crashes occurred during this time period. No fatalities occurred and 23 of the crashes resulted in only property damage, compared to 15 with injuries. The location and crash type for Estacada crashes from 2000 to 2004 is listed in Table 3-12 (three collisions were not tabulated because the locations were unspecified). The overall number and severity of crashes does not indicate that any immediate actions are necessary.

Table 3-12: 5-Year Crash Data (2000-2004) on Estacada City Streets

Roadway	Backing	Parking Maneuver	Pedestrian	Angle	Head-On	Side-swipe/ Over-taking	Rear-End	Turning Movement	Total
2nd Ave	-	1	-	1	-	-	-	-	**2**
4th Ave	-	-	-	-	-	-	-	1	**1**
6th Ave	-	-	1	-	-	-	3		**4**
Lake Shore Drive	1	-	-	-	-	-	-	-	**1**
Wade Street	-	-	-	-	-	-	-	4	**4**
Broadway Street	-	2	1	5	-	-	-	1	**9**
Main Street	2	1	-	1	-	1	-	3	**8**
Cedar Road	-	-	-	-	1	-	-	1	**2**
Currin Street	1	-	-	-		-	-	-	**1**
Shafford Street	-	-	-	1	1	-	-	-	**2**
Zorbist Street	-	-	1		-	-	-	-	**1**
Total	**4**	**4**	**3**	**8**	**2**	**1**	**3**	**10**	**35**

Other Travel Modes

There are four other modes of transportation included in the TSP Update: rail, pipeline, air, and water. Existing transportation systems for these modes are considered adequate for the current needs of the Estacada community.

Marine

The Clackamas River is located near the southern and western city limits and serves an important role in the community as a recreational waterway. However, there are no commercial waterways within the UGB.

Railroads

No passenger or freight railroads exist in the Estacada UGB. Passenger rail service is available in Portland.

Pipeline and Transmission System

High-voltage power transmission lines, operated by Portland General Electric, run through Estacada. The River Mill and Farraday Dam lines enter Estacada from Highway 211 and run into a substation at the southeast corner of the intersection on Clackamas Highway with Broadway Street. The line is protected by easements and maintains sufficient power to

provide for the City of Estacada. No major pipelines cross through Estacada.

Airport

The Valley View Airport is located off Duus Road in northeast Estacada within the urban growth boundary. The airport is privately owned but open to public use. Valley View Airport is classified as a Category 4 airport by ODOT and may be used by small recreational planes or light jets. The airport has no freight or industrial traffic. The runway is 3,780 feet long and 32 feet wide with asphalt pavement in good condition. Oregon Aeronautical personnel routinely perform inspections of the facilities. The airport has over 1,800 annual aircraft operations (take-offs and landings). Other passenger and freight air transportation is available in Portland at the Portland International Airport (PDX), located approximately 33 miles to the northwest. PDX can be reached by passenger car or transit (TriMet).

Land uses surrounding an airport are subject to regulations that ensure aviation safety. The Federal Aviation Administration defines runway protection zone criteria and protects the surrounding airspace through Federal Aviation Regulation Part 77. The Oregon Transportation Planning Rule requires adoption of land use regulations within airport noise corridors and airport imaginary surfaces in order to restrict physical hazards to air navigation. The Oregon Airport Planning Rule outlines local government requirements related to aviation facility planning. The Oregon Airport Land Use Compatibility Guidelines provide protection from incompatible land uses surrounding public airports. These policies set limitations to development in the area immediately surrounding the airport.

4. Future Conditions & Needs

Travel Demand and Land Use

The Estacada Transportation System Plan (TSP) Update addresses existing system needs and additional facilities that are required to serve future growth beyond the 2019 forecast year of the existing TSP. A forecast model for the year 2030 was developed to determine future traffic volumes in the City of Estacada. This model was based on current traffic counts, Metro regional model housing and employment projections[1], Estacada land use, ODOT forecasting methodology[2], and traffic network modeling. The methodology involves estimating trip growth by translating assumed housing and employment projections, planned land use, and buildable lands into person travel and assigning motor vehicles to the roadway network. These traffic volume projections form the basis for identifying potential roadway deficiencies. This section describes the forecasting process including key assumptions and the land use scenario developed from the existing land use as well as the current Comprehensive Plan designations and allowed densities. The land use scenario also includes proposed Comprehensive Plan Amendments to zoning in several areas within the City of Estacada Urban Growth Boundary (UBG) as well as a 125-acre UGB expansion, as identified in the City of Estacada – 2004 Draft Comprehensive Plan Update to the Urbanization Element.

Projected Land Use Growth

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 Estacada urban growth boundary and reflect the Comprehensive Plan (including proposed amendments within the Estacada UGB) and Metro's land use assumptions for the year 2030. Projected land uses for the 125-acre UGB expansion were based on a previously performed traffic impact study[3]

[1] 2030 Transportation Analysis Zone Forecast Allocations, Metro.

[2] Analysis Procedures Manual, ODOT Transportation Development Division, Planning Section, April 2006.

[3] Estacada Traffic Impact Study – Final Future Conditions Report, Parametrix Inc., June 2005. The land use and trip generation assumptions presented in this report were reviewed and accepted by ODOT and the City of Estacada.

Land uses were inventoried throughout the Portland metropolitan area by Metro. This land use database includes the number of households, the number of retail employees, the number of service employees, and the number of other employees. Although Estacada is not part of Metro, it is include in land use forecasts and other analyses due to its proximity to the Metro area.

For forecasting purposes, land use data is stratified into geographical areas called transportation analysis zones (TAZs). Metro's 2030 TAZ Forecast provides employment and household growth projections from a base year of 2005 for TAZs surrounding the City of Estacada. The City of Estacada is represented in two Metro TAZs: TAZ 876, which includes most of the city limits and areas to the south and east, and TAZ 816, which includes the northwest portion of the city (north of River Mill Road and west of Eagle Creek Road) and rural areas to the north. The TAZ boundaries for TAZ 816 and TAZ 876 are illustrated in the Appendix (Figure 4-2). Although the Metro TAZ areas extend well beyond the Estacada UGB, the analysis assumes all forecasted growth occurs within Estacada, since the surrounding areas are predominantly rural in nature.

Table 4-1 summarizes the land uses for existing conditions and the future 2030 scenario for the TAZs included in the Estacada TSP update study area. In order to identify the proper growth increment, both existing (2005) and future (2030) land use data reflect the entire Metro TAZs 816 and 876, whose border extend well beyond the Estacada UGB.

Table 4-1: Estacada TSP Study Area Land Use Summary

Land Use	2005	2030	Increase	Percent Increase
Households	2841	3618[4]	777	27%
Service Employees	167	283	116	69%
Retail Employees	377	757	380	101%
Other Employees[5]	1006	5659	4653	463%
Total Employees[5]	1550	6699	5149	332%

At the existing level of land development, the transportation system generally operates without significant deficiencies in the study area. As land uses are changed 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 households and other land uses. The location and design of retail land uses in a community can greatly affect transportation system operation.

[4] Metro's forecast calls for a decrease of 25 households for TAZ 816 in 2030. This forecasted decline in households for this TAZ is assumed to occur outside of the Estacada UGB. Therefore, zero growth is assumed for Estacada households in Metro TAZ 816.

[5] Includes 2030 projected employment increase of 3,977 industrial jobs for the proposed UGB expansion. This employment figure is based on an estimate of 2.33 employees per thousand square foot of light industrial land use. The square footage estimate is based on the square footage identified in the Estacada Traffic Impact Study – Final Future Conditions Report (Parametrix Inc., June 2005), modified for a 30% floor to area ratio.

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 4-1 indicates that significant employment growth (over 5,000 jobs) is expected in Estacada in the coming decades. This significant employment growth is primarily due to the forecasted land use in the proposed UGB expansion.[5] The forecast assumes full build out of the UGB expansion area with industrial land use with a 30% floor to area ratio, resulting in a large employment increase in the area. The transportation system should be monitored to make sure that land uses in the plan are balanced with transportation system capacity. This TSP update examines needs with the forecasted 2030 land uses.

Travel Demand Forecast

A determination of future traffic system needs in Estacada requires the ability to accurately forecast travel demand resulting from estimates of future housing 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 forecasting procedures.

Although the Metro Travel Demand Model, a computer based program for transportation planning for the Portland Metropolitan area, includes the Estacada area, the level of detail is too coarse in the area to provide a detailed analysis of traffic system performance in Estacada. For the Estacada TSP update, the regional 2030 model was used only as a basis for the housing and employment forecasts described above.

In order to accurately forecast 2030 traffic volume, future travel demand projections are based on adding three distinct segments of demand growth to existing traffic volumes:

- *Internal-Internal* trips: trips traveling within Estacada exclusively;
- *Internal-External and External Internal* trips: trips with either an origin or destination in Estacada with the opposite trip end in a location outside the Estacada TSP update study area; and
- *External-External* trips: trips that do not have an origin or destination in Estacada. In other words, this is through traffic that does not stop in Estacada.

Internal trips are based on local trip generation – trips resulting from the expected growth in employment and households within the current Estacada UGB based on Metro land use forecasts, as well as expected increase in trips resulting from development occurring in the UGB expansion that was not included in Metro's forecast. External trips are based on ODOT forecasted growth on Clackamas Highway[6]. External-external and internal-internal trips are

[6] *2024 Secondary Highway Future Volume Table*. Retrieved June 2006, from ODOT Web site: http://www.oregon.gov/ODOT/TD/TP/TADR.shtml

calculated by removing the external-internal and internal-external segments of the demand from the two forecast methods. By using this method, double counting of trips was avoided.

The combined local land use and external trip growth was then added to the existing traffic to yield a future volume forecast. This future volume forecast was analyzed to uncover areas of performance deficiencies in the roadway network. The methodology for determining forecasted 2030 traffic volumes in Estacada is described in further detail below.

Local Trip Generation

The trip generation process translates land use quantities (number of households, retail, service and other employment) into vehicle trip ends (number of vehicles entering or leaving a TAZ) using established trip generation rates. Typically, most traffic impact studies rely on the Institute of Transportation Engineers (ITE) research for analysis[7]. Table 4-2 provides a listing of PM peak hour trip rates used in this analysis.

Table 4-2: ITE PM Peak Hour Trip Rates

Growth Segment	Land Use Description	ITE Code	Vehicle Trips Per Land Use Unit
Households	Single Family Detached Housing Dwelling Units	210	1.01
Retail Employment	Specialty Retail Center Employees	814	1.34[8]
Service Employment	Specialty Retail Center Employees	814	1.34[9]
Other Employment	General Light Industrial	110	0.42

Forecasted PM peak hour trip growth was calculated by applying the ITE Trip Generation rates above to the Metro land use growth forecasts for TAZs. Additional trips were added to include the impact of potential development occurring at the proposed UGB expansion. Table 4-3 illustrates the estimated growth in vehicle trip ends (trip productions and attractions) generated within the Estacada study area during the PM peak hour between 2005 and 2030.

Table 4-3: Metro TAZ PM Peak Hour Vehicle Trip Generation Growth Forecast

Growth Segment	TAZ 816 Northwest Estacada /Clackamas County	TAZ 876 Estacada

[7] *Trip Generation Manual*, 7th Edition, Institute of Transportation Engineers, 2003.

[8,7] Because the Specialty Retail Center ITE code has no trip generation rate for PM peak hour based on employees, a daily rate had to be modified to a PM peak hour rate by utilizing the ratio of daily to PM peak hour trip generation rates of square footage-based trip generation rates.

Households	-	785
Retail Employment	66	444
Service Employment	43	113
Other Employment	1,707[10]	250
TOTAL	1,850[10]	1592

This forecast provides the internal-internal as well as the internal-external and external-internal trip growth segments, but not external-external trip growth. The following section describes external trip growth in more detail.

External Trip Growth

In addition to growth resulting from forecasted land use changes within the City of Estacada, growth of external traffic must be accounted for. Given that Clackamas Highway is the primary roadway for travel in Estacada with origins and/or destinations outside of the City, it was assumed that growth in external traffic would utilize Clackamas Highway.

Growth of external trips (trips that have an origin and/or a destination outside of Estacada) was projected based on forecasted traffic growth on Clackamas Highway. Traffic growth on Clackamas Highway is estimated by using the ODOT Future Volume Table[11], which forecasts traffic volume at several points along Clackamas Highway in 2024 based on historical growth trends. This data indicates an expected annual growth rate of approximately 1.7%, or total growth of 41% from 2006 to 2030. In addition to the growth projected by ODOT, a percentage of trips resulting from the development of the proposed UGB expansion area are distributed to external Clackamas Highway trips[12]. The projected growth on Clackamas Highway at each external location is illustrated in Table 4-4.

Table 4-4: Clackamas Highway PM Peak Hour Growth Forecast

Location	Direction	2006 Design Hour Volume	2030 Design Hour Volume	Total Projected Growth
Hwy 224	Enter	535	994	459
North of Heiple Rd.	Exit	336	507	171
Hwy 224	Enter	134	286	152

[10] Includes 1,673 trips resulting from projected employment increase of 3,977 industrial jobs for the proposed UGB expansion. The trip generation estimate is based on the Estacada Traffic Impact Study – Final Future Conditions Report (Parametrix Inc., June 2005), modified for a 30% floor to area ratio.

[11] *2024 Secondary Highway Future Volume Table*. Retrieved June 2006, from Oregon Dept. of Transportation Web site: http://www.oregon.gov/ODOT/TD/TP/TADR.shtml

[12] The distribution of additional trips resulting from the proposed UGB expansion area is based on a weighted average of trip productions and attractions to and from TAZs within the existing Estacada UGB.

East of Hwy 211	Exit	200	295	95
Hwy 211	Enter	340	652	312
South of Hwy 224	Exit	362	534	386

To separate external-external traffic growth from traffic using Clackamas Highway with either a trip origin or destination in Estacada (internal-external and external-internal trips, respectively) a probability of being an external-external trip was applied. The ODOT Analysis Procedures Manual[13] describes the process to calculate the probability of an external-external trip. By using this method, the external-external trip probability was estimated for travel to and from each end of the highway and applied to the forecasted trip growth at each location to yield the expected 2030 external-external trip growth. External-external trips are separated from external-internal and internal-external trips, thereby accounting for through trip growth on Clackamas Highway. The growth forecasted for Clackamas Highway was separated by type in Table 4-5.

Table 4-5: Clackamas Highway PM Peak Hour Growth Forecast by Trip Type

Location	Direction	Projected Growth from ODOT Growth Forecast	External-External Trip Probability	2030 External-External Trip Growth
Hwy 224	Enter	219	0.17	37
North of Heiple Rd.	Exit	138	0.09	12
Hwy 224	Enter	55	0.06	3
East of Hwy 211	Exit	82	0.16	13
Hwy 211	Enter	139	0.06	8
South of Hwy 224	Exit	148	0.16	24

TAZ Disaggregation

Since the Metro TAZs are too large to provide detailed information for traffic analysis in Estacada, the two Metro TAZs were subdivided into seven project TAZs to provide a more detailed representation of land use and access to the transportation system in Estacada. The TAZs are defined based on available vacant buildable land by comprehensive land use designations including proposed zoning changes specified in

[13] *Analysis Procedures Manual*, Oregon Dept. of Transportation: Transportation Development Division, April 2006, p.

the 2004 Draft Comprehensive Plan Update to the Urbanization Element[14]. The disaggregated TAZ boundaries are shown in the Appendix (Figure 4-1).

The forecasted growth in trips was allocated to the project TAZs based on land use (comprehensive plan land use designation including proposed amendments) proportionally to the approximate vacant buildable land in the TAZ as well as approved developments within the city that are not yet occupied. Travel demand growth due to retail and service employment was assigned to lands designated as commercial land use, other employment was assigned to industrial land uses, and household growth was assigned to residential land uses. Trip generation for the proposed UGB expansion was added based on information provided in the Estacada Traffic Impact Study – Final Future Conditions Report (Parametrix Inc., June 2005), modified for a 30% floor to area ratio. The allocation of trips between zones is described in detail in the Appendix (Revised Forecast Trip Growth in Estacada).

The total trips added from each Metro TAZ and project TAZ land use allocation are summarized in table 4-6.

Table 4-6: PM Peak Hour Trip Generation Growth in Estacada TAZs

TAZ	Vacant Buildable Land (Acres)	Land Use Designation	Total In/Out Trips
1	97	Commercial \ Industrial	611
2	188	Residential	169
3	36	Commercial	550
4	8	Industrial	318
5	778	Residential	580
6	168	Residential	587
7	9	Residential	14
UGB Expansion	125	Industrial	1,673
TOTAL	1,409	-	4,502

External zones outside of the study area are added to the network, at Clackamas Highway north of Estacada, and Clackamas Highway east of Estacada and Highway 211 south of the City to result in a 10-zone system with an additional zone to represent the proposed UGB expansion.

Trip Distribution

Trip distribution estimates how many trips travel from one zone in the model to any other zone. Distribution was based on the number of trip ends generated in each zone as either trips coming out from the zone (productions) or trips going into the zone (attractions). The percentage of each zone's total trips that are productions and

[14] City of Estacada – 2004 Comprehensive Plan Update

attractions are defined based on ITE trip generation research. The productions and attractions for each zone are used to determine an attraction probability and production probability for each zone, relative to other zones in the transportation network.

In projecting long-range future traffic volumes, it was important to consider potential changes in regional travel patterns as well. Although the locations and amounts of traffic generation in Estacada are essentially a function of future land use in the city, the distribution of trips was influenced by regional growth, particularly along Clackamas Highway. For this reason, external trips are included in the analysis as well.

External trips are added to the trip table, however, so as not to double-count the external-internal and internal-external trips, the growth in these trips calculated for Clackamas Highway was subtracted from the local trip growth. The production and attraction probabilities are used to distribute external trips to and from the appropriate TAZs.

Trip productions and attractions are balanced to result in a trip table that specifies the number of trips from each zone to each other zone in the network. The resulting trip table was the travel growth that was added to the existing traffic in Estacada for 2030 traffic volume projections.

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. The Traffix software package was used to represent the transportation network and to assign the additional growth volume to the existing roadway and intersection volumes. To account for the new roadways added to the 2030 roadway network, some of the existing 2006 base volumes were adjusted at impacted intersections.

Forecasted 2030 traffic volumes assigned to study intersection turning movements have been diagramed and are included in the Appendix (Figure 4-3). Compared to the existing traffic volumes collected on Clackamas Highway, the 2030 forecasts indicate highway traffic will increase at an annual growth rate of approximately 5.2% per year within the City.

Planned Improvements

Planned transportation improvements from ODOT's Statewide Transportation Improvement Program, Clackamas County's Rural Transportation System Plan, and Estacada's current Transportation System Plan that would improve connectivity or add system capacity were assumed to be in place by the forecast year of 2030 and were included in the analysis model. Key improvements affecting future traffic assignment and operations included:

Clackamas County Rural Transportation System Plan (2000)

- Hwy 211 (Hayden Rd. to Hwy 224): Four-lane widening with left turn lanes;
- Hwy 224 (Heiple Rd. to Estacada North UGB): Addition of passing lanes; and

Estacada Transportation System Plan (1999)

- N. 6th Ave. extension to Hwy 224;
- Industrial Way Blvd. extension; and
- New streets connecting Coupland Rd., Cemetery Rd, and Eagle Creek Rd.

In addition to these improvements, the current Estacada Transportation System Capital Improvement Plan (April 2005) identifies future signalization of the intersections on Highway 224 at River Mill Road, Industrial Way (Evergreen Avenue), and Highway 211. For the purposes of this deficiencies and needs analysis, these intersections were left unsignalized so that the need for signals could be reevaluated given the updated future volume forecasts.

2030 Motor Vehicle Operations

Motor Vehicle Operations

The analysis for the forecasted 2030 growth was essentially a no-build scenario including only transportation system improvements in Estacada that are expected to be constructed with the current funding levels (see "Planned Improvements" described above). Assuming these improvements were in place, the forecasted 2030 design hour traffic volumes were applied to study area intersections and reanalyzed, using the same methodology employed for existing conditions to assess future operations. Table 4-7 displays the results of this analysis.

Table 4-7: 2030 Intersection Traffic Operations

Intersection	Existing Conditions (2006) v/c	LOS	Future Conditions (2030) v/c	LOS	Mobility Standard v/c	Projected Year of Failure
State Facilities						
OR224 / Heiple	0.10	C	**>1.0**	F	0.80	2010
OR224 / Ely	0.02	C	0.17	F	0.80	-
OR224 / River Mill	0.11	B	**>1.0**	F	0.80	2010
OR224 / Park	0.03	C	**>1.0**	F	0.80	2020
OR224 / Evergreen	0.12	B	**>1.0**	F	0.80	2015
OR224 / 2nd	0.17	B	0.25	C	0.90	-
OR224 / Wade	0.16	B	0.58	F	0.90	-
OR224 / Main	0.49	C	**>1.0**	F	0.90	2015
OR224 / Broadway	0.28	B	0.53	A	0.90	-
OR224 / OR211	0.54	C	**>1.0**	F	0.90	2020
Local Facilities						
Eagle Creek / Duus	0.03	A	0.10	B	-	-
Eagle Creek / River Mill	0.13	B	0.83	D	-	-
6th / Main	0.39	B	0.89	D	-	-
6th / Broadway	0.14	C	0.57	D	-	-
6th / Shafford	0.06	B	0.22	C	-	-
6th / Cemetery	0.08	A	0.42	C	-	-
2nd / Main	0.07	B	0.09	B	-	-
2nd / Broadway	0.33	B	0.33	B	-	-
Shafford / Regan Hill	0.07	A	0.24	B	-	-
4th / Main	0.14	B	0.47	D	-	-

Note: Bold type indicates failure to meet adopted mobility standard.

As shown, most non-highway study intersections operate with a worse LOS compared to the existing conditions. While most non-highway intersections are projected to continue to operate well in 2030, providing a level of service C or better, four local intersections; 4th Avenue and Main Street, 6th Avenue and Broadway Street, 6th Avenue and Main Street, and Eagle Creek Road and Mill Creek Road operate at LOS D.

On the State system, most intersections on Clackamas Highway are projected to fail to meet adopted standards for mobility, with the exception of the intersections at Ely Road, 2nd Avenue, Wade Street, and Broadway Street. The results reported in Table 4-7 for non-failing intersections would likely be optimistic due to potential rerouting of some traffic at failing intersections (which have volumes that exceed intersection capacities). Assuming traffic will grow at a constant and linear rate, the failure rates for study intersections would begin as early as 2010, as shown in table 4-7. It should be recognized that actual development patterns within the City will significantly impact these timelines and that these estimates are for general planning purposes. The actual timing of these needs should be monitored as development within the City occurs, with prioritization of improvements adjusted as needed.

Needs of the Transportation Disadvantaged

It is important to provide quality transportation services for people who, because of disability or income status, do not have access to automotive transport of their own. Estacada has significant populations of low income, senior, and disabled residents who benefit from public transportation services. Table 4-8 compares transportation disadvantaged indicators in Estacada to Clackamas County. The economic indicators of median income and percentage of population below the poverty level was significantly lagging relative to the countywide statistics. Estacada has been identified (statewide) as an economically "Distressed City" by the Oregon Economic & Community Development Department.[15]

Table 4-8: Demographic Characteristics[16]

Location	Median Household Income	Percent of Population Below Poverty Level	Percent of Population Over 65	Percent of Population with Disability
Estacada	$39,200	12.9%	11.1%	22.1%
Clackamas County	$52,080	6.6%	11.1%	16.0%

[15] Oregon Economic & Community Development Department (http://www.econ.state.or.us/distlist.htm)

[16] U.S. Census Bureau, 2000 Census

Mobility needs for the transportation disadvantaged are accommodated through TriMet and SAM bus routes as well as paratransit services. The Estacada Community Center provides a 14-passenger van for on-demand mid-day services on weekdays for senior lunches at the community center as well as for flexible route medical trips. The service has been used by approximately 200 individuals per month. Demand for services has been increasing as more retirees move into Estacada (in part due to retirement facilities) and the service becomes publicized through word-of-mouth and advertisements. The service originally provided more flexibility in trip types, but was limited to lunches and medical appointments when demand exceeded what the available funding and volunteer drivers could provide.

TriMet provides scheduled bus service through Estacada Route #31 and service for people unable to use buses due to disability through the LIFT Paratransit program. Demand for disabled riders was indicated by data[17] that show 29 outbound and inbound monthly wheelchair lift operations occur at bus stops in Estacada. Of the 29 outbound and inbound lift operations, 27 inbound and 23 outbound lifts occur at the bus stop located at Main Street and Southeast 4th Avenue. LIFT program ridership in Estacada averaged 129 bookings per month for an average of 16 different riders[18]. SAM bus service accommodates disabled riders through vehicles that are wheelchair accessible, either through lifts or ramps. The SAM and TriMet bus routes provide access to employment, education, and recreation opportunities that transportation disadvantaged individuals would otherwise be unable to reach.

[17] 2005 TriMet Passenger Census, Fall 2005

[18] Young Park, Manager of Capital Projects, TriMet. Email sent June 2, 2006.

5. Pedestrian Plan

Introduction

This chapter summarizes existing and future pedestrian needs in the City of Estacada and outlines strategies and a recommended Pedestrian Master Plan. The criteria used in evaluating pedestrian needs and the strategies for addressing needs were identified through work with the City's Citizen Advisory Committee.

Policies

Several policies were considered for construction of future pedestrian facilities in Estacada. These policies are aimed at providing the City with priorities to direct its funds towards pedestrian projects that meet the goals of the City. The policies related to pedestrian facilities are:

- Policy 1d: Encourage pedestrian and bicycle accessibility by providing safe, secure and desirable walkway routes, with a preferred spacing of no more than 330 feet, between elements of the pedestrian network (e.g., pathways, trails, streets).
- Policy 2d: Local streets shall be designed to encourage a reduction in trip length by providing connectivity and limiting out-of-direction travel, without creating a strict grid-type network with long, straight streets which encourage speeding or through traffic. Provide connectivity to activity centers and designations with a priority for pedestrian connections. Wherever necessary, new streets built to provide connectivity shall incorporate traffic management design elements, particularly those which inhibit speeding. New or improved local streets should comply with adopted street spacing standards.
- Policy 2e: Safe and secure pedestrian and bicycle ways shall be designed between parks, schools, and other activity centers in Estacada.
- Policy 3b: Develop a comprehensive system of pedestrian and bicycle routes that link major activity centers within the study area.
- Policy 4b: Access management standards shall be preserved on all roadways to reduce conflicts between vehicles and trucks, as well as conflicts between vehicles and pedestrians.
- Policy 7e: The City shall adopt roadway design guidelines and standards that ensure sufficient right-of-way is provided for necessary roadway, bikeway, and pedestrian improvements.

Needs

Major and minor collector streets in Estacada form a limited sidewalk system (see Figure 3-2). Sidewalks are provided in much of the downtown commercial area, but are limited in the surrounding neighborhoods creating poor connectivity throughout the city. OR 224 serves as a significant barrier to pedestrian connectivity. The availability and convenience of crossing points along OR 224 is limited to the Broadway Street intersection, which is the only signalized crossing in the City. Gaps within the sidewalk and trail network discourage pedestrians and put them at an increased safety risk by requiring them to share the roadway with vehicles in certain locations. The barrier effect of hilly topography in parts of the City also contributes to poor sight distances and further justification for providing safe pedestrian facilities separate from the roadway. These conditions result in a poor existing pedestrian network outside of the downtown core.

An important existing pedestrian need in Estacada is providing sidewalks on all arterial and collector roadways and providing a connection from residential areas to major activity generators such as bus stops, schools, parks and commercial areas. This includes the need for safe, well lighted collector streets with suitable pedestrian amenities for on-street and crossing facilities to reduce barriers for pedestrian travel. Pedestrian facility needs in Estacada must consider the three most prevalent trip types:

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

Residential trips need a set of interconnected sidewalks radiating out from homes to destinations within one-half to one mile. Beyond these distances, walking trips of this type become substantially less common (over 20 minutes). Service based trips require direct, conflict-free connectivity between uses (for example, a shopping mall with its central spine walkway that connects multiple destinations). Service based trips need clearly defined connectivity. This requires commercial developments to locate front doors which relate directly to the public right-of-way and provide walking links between uses within one-half mile. Recreational walking trips have different needs. Off-street trails, well landscaped sidewalks and relationships to unique environment (waterways, trees, open space) are important.

The most common 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 mile in length.

Facilities

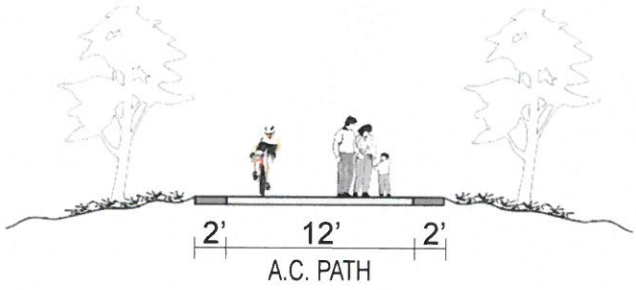
Sidewalks should be built to current design standards of the City of Estacada and in compliance with the Americans with Disabilities Act (at least four feet of unobstructed sidewalk).[34] Wider sidewalks may be constructed in commercial districts (see Figure 5-1) or on arterial streets. On facilities under State jurisdiction, the minimum sidewalk width allowed will be at least as wide as ODOT's design standards require. Additional pedestrian facilities may include accessways, pedestrian districts and pedestrian plazas.

- 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.

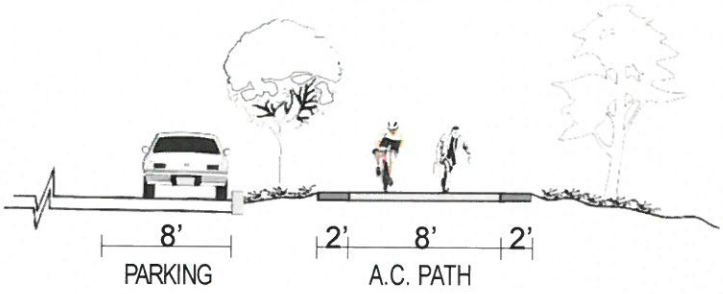
Metro 2004 Regional Transportation Plan (RTP) identifies a proposed Greenway Corridor along the Clackamas River from Estacada to the Metro boundary in Clackamas County. Plans for this corridor could be incorporated with the extension of the Lakeshore Trail within Estacada through Timber Park. A recommend design cross-section for trails and multi-use paths is illustrated in Figure 5-1.

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

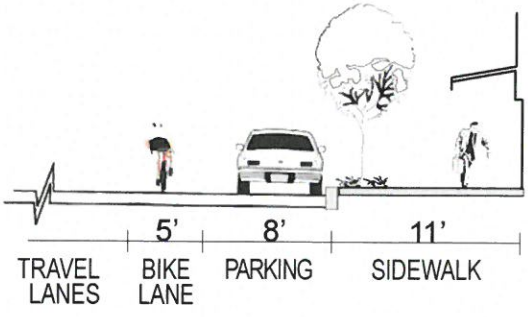
Multi-Purpose Trail



Riverfront Trail



Pedestrian Design for Commercial Districts



DKS Associates
TRANSPORTATION SOLUTIONS

City of Estacada
Transportation System Plan
Bikeway/Pedestrian Path Standards

Legend

Figure 5-1

Recommended Pedestrian Master Plan

A list of potential pedestrian projects to meet the identified needs and achieve these policies was developed into a Pedestrian Master Plan. The Pedestrian Master Plan identifies improvements to provide a connected pedestrian network within the City of Estacada, focusing on arterial and collector roadways and in high pedestrian activity areas. In addition, local streets should provide sidewalks where possible, and the City of Estacada Development Code regulations should require new development to provide pedestrian infrastructure as part of the development costs. All new roadways constructed should include sidewalks.

The Master Plan shown in Figure 5-2 and summarized in Table 5-1 is an overall plan and summarizes the 'wish list' of pedestrian related projects in Estacada. Projects that were identified in the previous TSP are identified with a footnote. The projects are prioritized into high, medium, and low categories. High priority pedestrian projects are located on arterial roadways and provide improved access to major activity centers. Medium priority pedestrian projects are located on major collectors but are less critical to connecting activity centers. Low priority projects are sidewalk infill on collectors or neighborhood streets.

While the majority of the projects identified address filling in the sidewalk system, it is also important to identify crossing improvements necessary to provide a safe and well connected sidewalk network. The number of lanes, high traffic volumes, and width of OR 224 make it a significant barrier to pedestrian travel. While most needed crossing points will be addressed by crosswalks at future signalized intersections added to improve traffic operations at OR 224 intersections, the 2nd Avenue and Wade Street intersections are locations where pedestrian crossings should be considered, but vehicular traffic projections do not indicate a need for signalization. The 2nd Avenue intersection is approximately 1,600 feet from the nearest signalized crossing at Broadway Street, while the Wade Street intersection is approximately 700 feet from Broadway Street. Pedestrian crossings at these intersections would provide much needed access from the west part of downtown to recreational opportunities along the river and the multi-use trail.

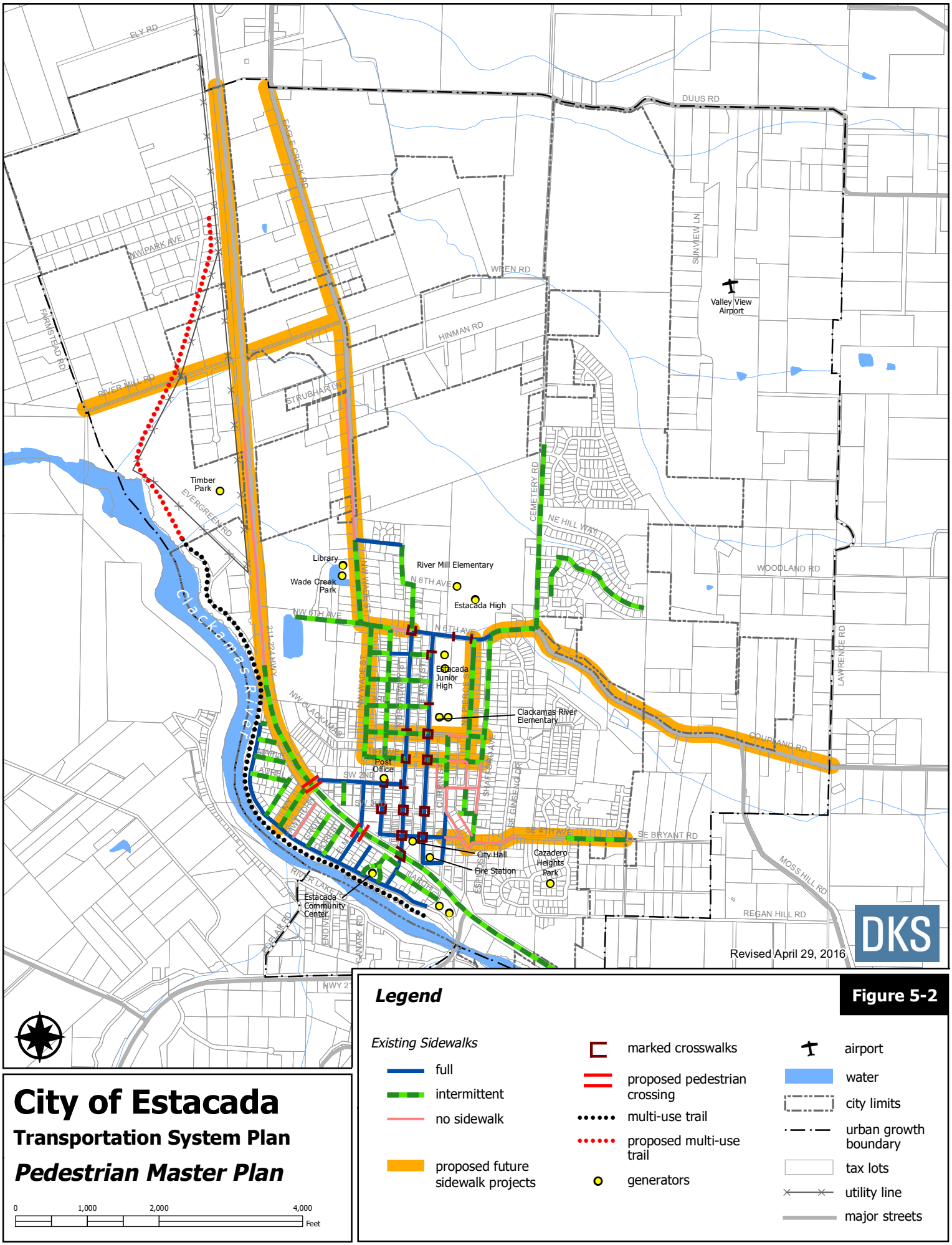
To facilitate these crossings, it is recommended that a pedestrian refuge be constructed in the raised median that is planned for installation on the south approach of the highway as part of the Highway 211-224 Gateway project. The crosswalks may be identified through pavement markings, but would remain unsignalized. Prior to installing a marked crosswalk on OR 224, approval must be obtained by the State Traffic Engineer.

Table 5-1: Pedestrian Master Plan Projects

Priority	Project Location	Orientation	From	To	Length (Feet)	Estimated Cost ($)
Fill In Gaps in Sidewalks on Arterials and Collectors						
High	6th Avenue[35]	East/West	Wade Street	Broadway Street	800	$120,000
High	Eagle Creek Road	North/South	6th Avenue	River Mill Road	4,300	$650,000
High	OR 224	North/South	2nd Avenue	UGB	9,800	$1,470,000
High	River Mill Road	East/West	Farmstead Road	Eagle Creek Road	3,800	$650,000[36]
Medium	Eagle Creek Road	North/South	River Mill Road	Duus Road	4,300	$640,000
Medium	6th Avenue[2]	East/West	Shafford Avenue	Cemetery Road	700	$100,000
Low	North 1st Avenue[2]	East/West	Wade Street	Shafford Avenue	1,700	$250,000
Low	North 2nd Avenue[2]	East/West	Wade Street	Shafford Avenue	1,700	$250,000
Low	South 4th Avenue[2]	East/West	Currin Street	Reagan Hill Road	2,600	$390,000
Low	Coupland Road	East/West	Cemetery Road	UGB	3.400	$850,000[2]
Low	Pierce Street[2]	North/South	1st Avenue	6th Avenue	1,700	$250,000
Low	Wade Street[2]	North/South	2nd Avenue	6th Avenue	1,800	$200,000
Pedestrian Crossing						
High	OR 224 at 2nd Avenue	North/South	2nd Avenue	Lake Shore Drive	-	-
High	OR 224 at Wade Street	North/South	Wade Street	Lake Shore Drive	-	-

[35] Improvement identified in previous Transportation System Plan (1999).

[36] Includes estimated right-of-way cost in 2006 dollars.



Legend

Figure 5-2

Existing Sidewalks

- full
- intermittent
- no sidewalk

- proposed future sidewalk projects

- marked crosswalks
- proposed pedestrian crossing
- multi-use trail
- proposed multi-use trail
- generators

- airport
- water
- city limits
- urban growth boundary
- tax lots
- utility line
- major streets

City of Estacada

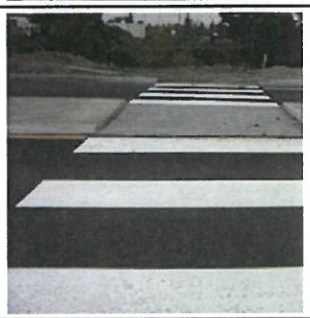
Transportation System Plan

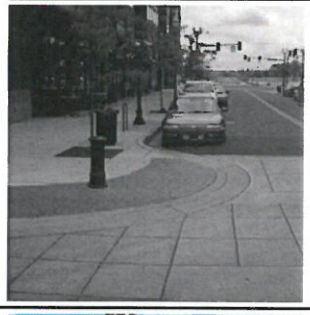
Pedestrian Master Plan

0 1,000 2,000 4,000 Feet

For pedestrian crossing enhancements, there is a range of possible improvements than can be applied as illustrated and described in Table 5-2. Each crossing location should be reviewed to determine the appropriate combination of improvements. For example, curb extensions are effective for reducing crosswalk lengths, and exposure to conflicting vehicles, but these are only reasonable where on-street parking is provided on both sides of the roadway. The curb extension 'shadows' the parked cars. Another example is the pedestrian count down timers, which can only be applied at existing or new traffic signal controlled crossings. These examples represent a tool box of solutions for pedestrian enhancements.

Table 5-2: Potential Measures for Enhancing Pedestrian Crossings

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

Improvement	Description	*Illustration*	*Cost Range*
Pedestrian Count Down Timer Signal	Install supplemental pedestrian signal controls to indicate the time remaining before crossing vehicles get 'green' signal indication.		$500 each signal head
Curb Extensions	Construct curb extension on road segments with on-street parking. Reduces pedestrian crossing area, and exposure to vehicle conflicts.		$5,000 to $8,000 depending on design amenities and aesthetic treatments.
Mid-Block Pedestrian Signal and Crossing	Construct new pedestrian signal that is synchronized with major street traffic progression to reduce interruption of through traffic. Appropriate near high pedestrian generators.		$100,000 to $150,000

6. Bicycle Plan

Introduction

This chapter summarizes existing and future facility needs for bicycles in the City of Estacada. The following sections evaluate needs, provide a number of strategies for implementing a bikeway plan and recommend a bikeway plan for the City of Estacada.

Policies

Several policies were considered for construction of future bikeway facilities in Estacada. These policies are aimed at providing the City with priorities since it is likely that the available funding will be insufficient to address all of the projects identified in the Bikeway Master Plan.

The policies for bicycle facilities are:

- Policy 1d: Encourage pedestrian and bicycle accessibility by providing safe, secure and desirable walkway routes, with a preferred spacing of no more than 330 feet, between elements of the pedestrian network (e.g., pathways, trails, streets).
- Policy 2e: Safe and secure pedestrian and bicycle ways shall be designed between parks, schools, and other activity centers in Estacada.
- Policy 3b: Develop a comprehensive system of pedestrian and bicycle routes that link major activity centers within the study area.
- Policy 3c: Consistent with the Clackamas County Bicycle Master Plan, bicycle ways should be constructed on arterials and collectors within Estacada (with construction or reconstruction projects). All schools, parks, public facilities and retail areas shall have direct access to a bicycle lane or route.
- Policy 4b: Access management standards shall be preserved on arterial routes to reduce conflicts between vehicles and trucks, as well as conflicts between vehicles and pedestrians.
- Policy 7e: The City shall adopt roadway design guidelines and standards that ensure sufficient right-of-way is provided for necessary roadway, bikeway, and pedestrian improvements.

Needs

The Transportation Planning Rule[37] indicates that all roadways classified as arterials or major (or higher order) collectors should have either bikeways when constructed or improved or an adjacent parallel facility provided. Bikeway improvements are aimed at closing the gaps in the bicycle network along arterial and collector roadways, in addition to providing multi-modal links to improve livability. Bicycle plan strategies outlined below were created to provide a basis for the bicycle master plan. The list of bicycle strategies includes:

- Connect key bicycle corridors to schools, parks, and activity centers
- Arterial Crossing Enhancements
- Bicycle corridors connecting neighborhoods
- Fill in gaps in the network where some bikeways exist (arterials and collectors)
- Bicycle corridors connecting to major recreational facilities
- Bicycle corridors that access retail areas

The existing bike lane system on arterial and collector streets does not provide adequate connections from neighborhoods to schools, parks, retail centers, or transit stops (see figure 3-3). Continuity and connectivity are key issues for bicyclists and the lack of facilities (or gaps) cause significant problems for bicyclists in Estacada. Without connectivity of the bicycle system, this mode of travel is severely limited. Local streets do not require dedicated bike facilities since the lower motor vehicle volumes and speeds typically allow for both autos and bikes to share the roadway. Cyclists desiring to travel through the City generally either share the roadway with motor vehicles on major streets or find alternate routes on lower volume local streets. There are designated on-street bike facilities (striped bike lane or wide shoulder) along OR 224 through much of the Estacada City limits. No other bike lanes are currently located within City limits.

Bicycle trips are different from pedestrian and motor vehicle trips. Common bicycle trips are longer than walking trips and generally shorter than motor vehicle trips. Where walking trips are attractive at lengths of a quarter mile (generally not more than a mile), bicycle trips are attractive up to three miles, which would include almost all trips made within the City of Estacada. Bicycle trips can generally fall into three groups: commuting, activity-based and recreational. Commuter trips are typically home/work/home (sometimes linking to transit) and are made on direct, major connecting roadways and/or local streets. Bicycle lanes provide good accommodations for these trips. Activity based trips can be home-to-school, home-to-park, home-to-neighborhood commercial or home-to-home. Many of these trips are made on local streets with some connections to arterials and collectors. Their needs are for lower volume/speed traffic streets, safety and connectivity. Recreational trips share many of the needs of both the commuter and activity-based trips, but create greater needs for off-street routes, connections to rural routes and safety. Typically, recreational bike trips will exceed

[37] OAR 660-012-0045 (3) (B)

the normal bike trip length.

Facilities

Bikeways can generally be categorized as bike lanes, shoulder bikeways, shared roadways, or off-street bike paths/multi-use trails. The term bikeway is used in this plan to represent any of the bicycle accommodations described in Table 6-1. The 1995 Oregon Bicycle and Pedestrian Plan specifies that bike lanes are recommended to be a minimum of 6 feet wide, or as narrow as 5 feet wide when adjacent to parking. Shoulder bikeways should be at least 6 feet wide but may be as narrow as 4 feet wide unless adjacent to a roadside barrier such as a curb or guardrail, in which case a minimum width of 5 feet should be used. The bicycle plan designates where bike lanes and multi-use paths are anticipated, with other bikeways expected to be in the form of shared roadways or shoulder bikeways.

Table 6-1: Bikeway Types

Bikeway	Description
Bike lane	Area within street right-of-way designated specifically for bicycle use.
Shoulder bikeway	Paved shoulders that should be at least 6 feet wide, with allowance for widths as narrow as 4 feet under certain conditions.
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.)
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).

Bicycle lanes adjacent to the curb are preferred to bicycle lanes adjacent to parked cars or bicycle lanes combined with sidewalks. Six-foot bicycle lanes are recommended. 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. This extra width makes bicycle travel more accommodating and provides a greater measure of safety). Off-street trails and sidewalks that are constructed under a curb tight basis should be planned for 12 feet in width, which is desirable for mixed-use activity (pedestrian and bike). Signing and marking of bicycle lanes should follow the *Manual on Uniform Traffic Control Devices*. Design features in the roadway can improve bicycle safety. For example, using curb storm drain inlets rather than catch basins significantly improves bicycle facilities. A typical cross-section for multi-use trails is illustrated in Figure 5-1.

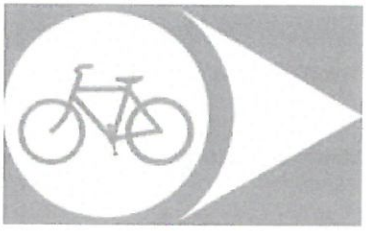
The current Estacada TSP identifies "Bike Streets" within the Estacada city limits. Figure 3-3 shows the existing Bicycle System Plan in Estacada. Although many of the streets currently marked as "Bike Streets" are shared roadways that due to growth in vehicular volumes now have daily volumes exceeding the threshold to be considered a shared bikeway, the speed limits remain low enough to allow for shared traffic. On shared roadways with daily vehicular traffic volumes above 3,000, the City should consider installing additional warning signs alerting motorists that bicycles may be entering the roadway. This signage would also be effective in raising awareness in areas with higher numbers of bicycle trips, such as around schools and the downtown. Figure 6-1 illustrates an example of an appropriate warning sign with a supplemental "Share the Road" plaque that 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 plaque 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. These markings (illustrated in Figure 6-1 below), appearing as small bicycle symbols approximately 12 inches in diameter and placed every 600 to 800 feet along a corridor, would provide an additional visual queue to motorists that they are traveling along a route used by bicycles and that they should use caution. However, as such markings are not currently recognized by the Manual on Uniform Traffic Control Devices or the State of Oregon, approval must be obtained from the Oregon Traffic Control Devices Committee prior to installation.

Figure 6-1: Bicycle Warning Signs and Markings

Bicycle Warning Sign

"Share the Road" Plaque



Bicycle Pavement Markings

The availability of bicycle parking and storage facilities are 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. The attractiveness of bike parking may also be improved by providing covered parking and or secured facilities where bicycles may be

locked away.

Recommended Bicycle Master Plan

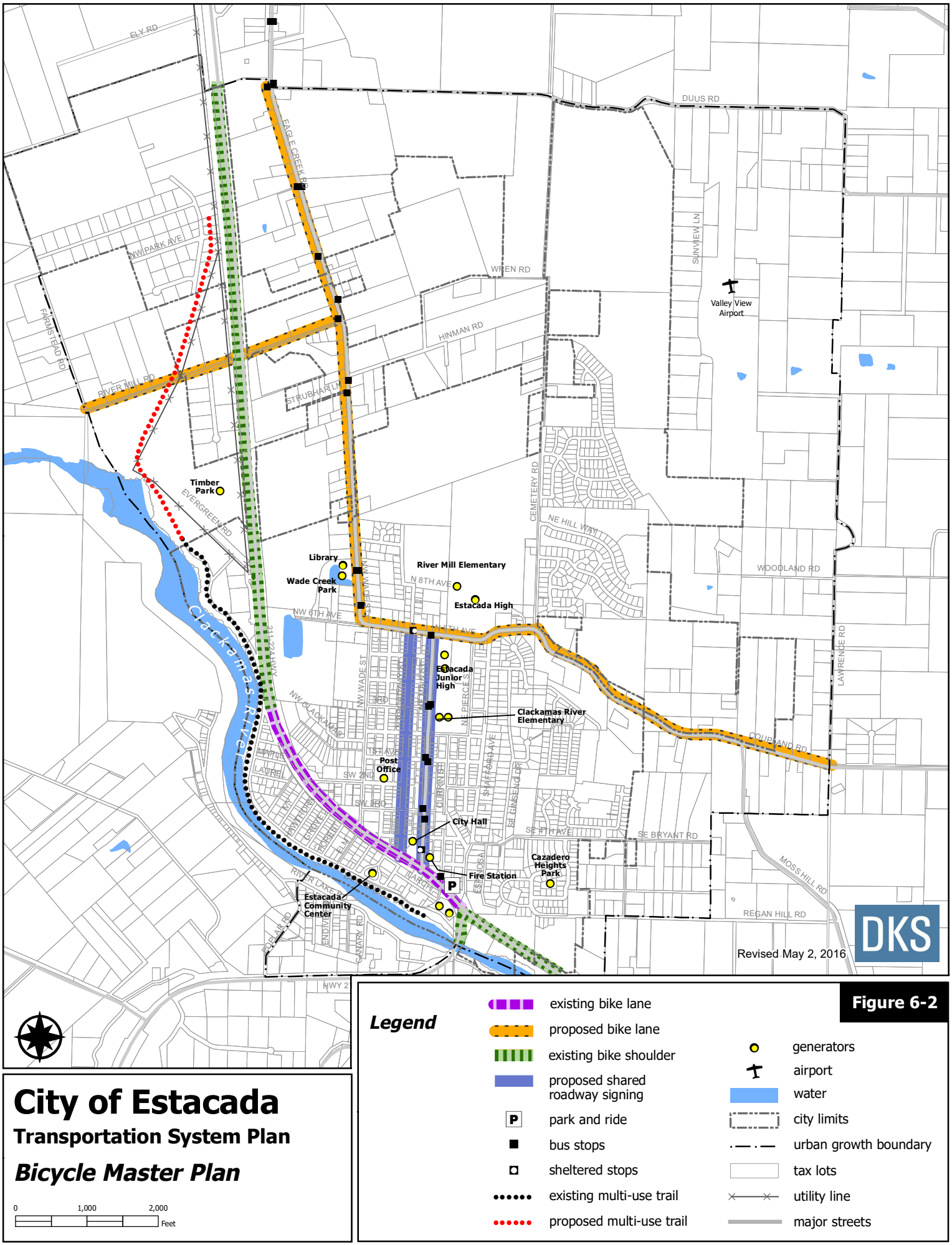
The Bicycle Facilities Master Plan identifies improvements to provide a connected bicycle network within the City of Estacada, focusing on arterial and collector roadways. Typically, local streets do not require delineated bicycle lanes as traffic volumes are low enough that bicycles and motor vehicles can share the same right of way safely. 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 that summarizes the 'wish list' of bicycle-related projects in Estacada, providing a long-range map for planning bicycle facilities. The Bicycle Master Plan projects are prioritized into high, medium, and low categories depending on the combination of vehicular volume and posted speed limits of the roadway involved.

Additional local facilities such as bike lanes, bike shoulders, off-street trails and crossing enhancements may become desirable in the future but are not included in this list of projects.

Table 6-2: Bicycle Master Plan Projects

Priority	Project Location	Orientation	From	To	Length (Feet)	Estimated Cost ($)
Bike Lanes on Arterials & Collectors						
High	Eagle Creek Road	North/South	6th Avenue	Duus Road	7,600	$460,000
Medium	River Mill Road	East/West	Eagle Creek Road	Farmstead Road	3,800	$230,000
Signing of Designated Bike Routes						
Medium	Main Street	North/South	OR 224	6th Avenue	3,300	$2,750
Medium	6th Avenue	East/West	Wade Street	Cemetery Road	2,400	$2,000
Medium	Broadway Street	North/South	OR 224	6th Avenue	3,100	$2,600



City of Estacada

Transportation System Plan

Bicycle Master Plan

0 1,000 2,000 Feet

Figure 6-2

Legend

- existing bike lane
- proposed bike lane
- existing bike shoulder
- proposed shared roadway signing
- park and ride
- bus stops
- sheltered stops
- existing multi-use trail
- proposed multi-use trail
- generators
- airport
- water
- city limits
- urban growth boundary
- tax lots
- utility line
- major streets

7. Public Transit Plan

Introduction

This chapter summarizes existing and future public transit needs in the City of Estacada. The following sections outline the criteria used to evaluate needs, strategies for implementing a transit plan and the recommended transit plan for Estacada.

Policies

Several policies were considered for development of future public transit services in Estacada. These policies are aimed at providing the City with priorities since it is likely that the available funding will be insufficient to address all of the projects identified in the Transit Master Plan.

The policies for transit services are:

- Policy 3a: Encourage the continued use of public transportation services and identify improvements to further promote transit in the community.
- Policy 5b: Provide transportation options for the transportation disadvantaged.
- Policy 6d: The City shall work with Clackamas County and other regional transportation partners to implement regional transportation demand management programs where appropriate.

Needs

TriMet is the regional transit provider for the Portland metro area and operates one bus route (Route 31) between Estacada and the Metro area. Sandy Area Metro (SAM) provides direct service to Sandy with connections to Gresham. A TriMet park-and-ride lot is located at 261 SE 5th Avenue in downtown Estacada.

Sandy Area Metro aims "To better serve the community with greater frequency and flexibility at less cost"[38]. TriMet's Transit Investment Plan[39] (TIP) identifies strategies for meeting regional public transportation needs, focusing on investments and improvements to the total transit system, such as improvements on existing lines. Therefore the TIP focuses on

[38] City of Sandy Website (http://www.ci.sandy.or.us/cs/transit/transfaq.htm), December, 2006.

[39] *FY 2007 Transit Investment Plan,* TriMet, 2006.

targeted, strategic improvements to the system, with priorities in the following order:

- Build the Total Transit System
- Expand the high capacity transit (commuter rail or bus rapid transit)
- Expand Frequent Service
- Improve local service

The quality of transit service within Estacada can be characterized by the following indicators:

- Transit route coverage,
- Frequency,
- Reliability, and
- User amenities

Transit Coverage

The minimum land use density[40] required to support a fixed route transit bus service with 1-hour scheduled between arrivals is about four housing units per acre or three employees per acre.

Transit Frequency

In addition to providing service to a geographic area, transit route frequency is a measure of transit quality of service and mode attractiveness. Given the current frequency of both the SAM and TriMet services, there is significant potential to increase ridership through more frequent service.

Transit Reliability

Transit service reliability is a key performance characteristic for retaining riders. Congested roadways, bottlenecks and traffic signals can delay transit vehicles and cause transit vehicles to arrive off schedule and close together.

Bus stop consolidation or relocation can also improve transit reliability. Transit stops should be spaced appropriately to provide adequate accessibility to riders while limiting bus delays from frequent stops. Typically, the recommended transit stop spacing in urban areas is approximately 500 feet minimum. Transit stop relocations should be coordinated with pedestrian improvements, such as curb extensions, as they are constructed.

User Amenities

The purpose of transit stop amenities is to improve the convenience and attractiveness of

[40] 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.

using the transit system. Good public transportation is important to the livability of a community. Accessible transit stops are essential to a useable system. Potential improvements to the overall system include:

- Information kiosks at bus stops – This amenity provides transit riders information such as forecasts for next bus arrival times.
- Bus shelters – Improve the convenience of using the transit system by providing a comfortable place to wait for the bus. This amenity is of particular importance at bus stops where usage is highest (such as the sheltered stop in front of City Hall.)
- Curb extensions – The extension of the sidewalk area into the parking lane provides a more convenient pedestrian connection to a stopped bus.
- Street lighting – Bus stops should be in highly visible locations so pedestrians can easily identify the locations and good security can be provided.

Bus Pullouts

Bus pullouts allow passengers to board and exit while the bus sits outside of the roadway travel lanes, which can improve safety and lessen delays for other vehicles. The ODOT Highway Design Manual recommends considering bus pullouts on stops located on state highways, especially in high speed or high volume locations. Bus pullouts along highways are generally warranted when stopping along a travel lane is inappropriate. Bus pullouts are most appropriate where average vehicle speed is at least 40 miles per hour, average peak hour curb lane traffic exceeds 250 vehicles, there are more than 5 bus stops per hour, or passenger boarding exceeds 30 per hour. Locations with a high rate of historical accidents or locations where transit dwelling times are desirable may also be considered for pullout locations. A far-side or mid-block stop is generally preferred when a bus pullout is warranted so that buses can easily reenter the traffic flow. Typical bus pullout design requires 10 feet of width outside of the traveled way.

Strategies

Estacada is currently dependent on the services provided by TriMet and SAM for fixed route transit services. 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. Service improvements related to coverage, frequency, reliability, and amenities are certainly desirable. Service frequency in particular may have the greatest impact on increasing transit ridership between Estacada and the surrounding areas. In addition, as the city grows in population, the geographic dispersion of households may warrant expanding the coverage area of transit routes.

Recommended Transit Plan

To meet transportation performance standards and serve future growth, the future transportation system needs multi-modal improvements to manage the forecasted travel demand. Future growth can be accommodated with significant investment in transportation improvements. The effectiveness of transit service is supported by a quality pedestrian and bicycle system. Pedestrian and bicycle system improvements, as detailed in Chapters 5 and 6, respectively, should serve transit services as well as other activity centers.

Transit enhancements within the TriMet and SAM service area are ultimately decided based on regional transit goals. Transit projects are determined based on the identified needs and strategies and project feasibility. Estacada should continue to coordinate with TriMet and SAM to improve bus service within the City. Improvements to service frequency and/or the creation of an additional park-and-ride lot in the northern part of the City may increase the quality of service, increase ridership, and better address the needs of the transportation disadvantaged residents and employees in the City. The benefits and feasibility of additional stops and bus pullout locations should be investigated together with TriMet and SAM.

Metro has established a vanpool program to encourage vanpool usage in the greater Portland metropolitan area. The program eligibility specifies that travel may be between Estacada and any location within the Metro urban growth boundary. Metro provides half of monthly van lease costs. Estacada should work with Metro to establish and promote vanpool services between Portland and Estacada.

In addition to existing public transit service providers, the City of Estacada should investigate the feasibility of local shuttle-based paratransit services that may more directly address the needs of the community. As described in Chapter 3, the existing paratransit services (the LIFT service provided by TriMet and the Estacada Community Center van service) provide a travel option to primarily the elderly, disabled, or other riders with health concerns. As the city grows, greater demand will arise for travel within the local area which may not be serviced by the existing fixed route and paratransit services.

8. Motor Vehicle Plan

Introduction

This chapter summarizes needs for the motor vehicle system for future conditions in the City of Estacada and recommends plans and strategies to address those needs. The Motor Vehicle modal plan is intended to be consistent with other jurisdictional plans including Clackamas County's *Transportation System Plan* (TSP) and the *1999 Oregon Highway Plan.*

Policies

Several policies were developed for future motor vehicle facilities in Estacada. These policies are aimed at providing the City with priorities to direct its funds towards motor vehicle projects that meet the goals of the City and were also used to evaluate alternatives considered.

The policies for motor vehicle facilities are:

- Policy 1a: Minimize the "barrier" effect of large arterial streets (e.g. OR 224/Highway 224).
- Policy 1b: Make streets as "unobtrusive" to the community as possible. Livability near roadways including the surrounding neighborhood environment should be degraded little as possible. Considerations should be taken for noise, aesthetics, safety, and the conditions for travel by non-motorized means.
- Policy 1c: Build neighborhood streets to minimize speeding.
- Policy 1e: In residential areas, discourage extended use of on-street parking.
- Policy 2a: Design of streets should relate to their intended use.
- Policy 2b: Level of service standards that are consistent with County and ODOT mobility standards shall be adopted and maintained at all intersections within the city where streets included are of collector classification or higher.
- Policy 2c: The City shall adopt access management spacing standards for all arterial and collector streets under its jurisdiction to improve safety and promote efficient through street movement. Access management measures shall be generally consistent with Clackamas County access guidelines to ensure consistency on city and county roads. ODOT access management standards will be addressed for state highways under ODOT jurisdiction.

- Policy 2d: Local streets shall be designed to encourage a reduction in trip length by providing connectivity and limiting out-of-direction travel, without creating a strict grid-type network with long, straight streets which encourage speeding or through traffic. Provide connectivity to activity centers and designations with a priority for pedestrian connections. Wherever necessary, new streets built to provide connectivity shall incorporate traffic management design elements, particularly those which inhibit speeding. New or improved local streets should comply with adopted street spacing standards.
- Policy 4a: Designated arterial routes are essential for efficient movement of goods. Design of these facilities and adjacent land uses should reflect the needs of goods movement.
- Policy 4b: Access management standards shall be preserved on arterial routes to reduce conflicts between vehicles and trucks, as well as conflicts between vehicles and pedestrians.
- Policy 5a: Construct transportation facilities to meet the requirements of the Americans with Disabilities Act.
- Policy 6a: The City shall implement the transportation plan based on the functional classification of streets.
- Policy 6b: The City transportation system plan shall be consistent with the city's adopted land use plan and with transportation plans and policies of Clackamas County and ODOT.
- Policy 6c: The City shall work with Clackamas County and other regional transportation partners to implement regional transportation demand management programs where appropriate.
- Policy 7a: The City shall evaluate land development projects to determine possible adverse traffic impacts and to ensure that all new development contributes a fair share toward on-site and off-site transportation system improvement remedies.
- Policy 7b: The City shall require dedication of land for future streets when development is approved. The property developer shall be required to make street improvements for their portion of the street commensurate with the proportional benefit that the improvement provides the development.
- Policy 7c: The City shall require specific categories of development to prepare a traffic impact analysis to determine impacts and identify mitigation.
- Policy 7d: The City shall adopt a uniform set of design guidelines that provide one or more typical cross sections associated with those functional street classifications under its jurisdiction. For example, the City may allow for a standard roadway cross-section and a boulevard cross-section for arterial and collector streets.
- Policy 7e: The City shall adopt roadway design guidelines and standards that ensure sufficient right-of-way is provided for necessary roadway, bikeway, and pedestrian improvements. City shall work with ODOT and County to determine right of way requirements for their respective facilities.

Strategies

To meet performance standards and address future growth, the future transportation system needs multi-modal improvements and strategies to manage the forecasted travel demand. 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), including:
  - Neighborhood Traffic Management
  - Access Management
  - Local Circulation Enhancements
- Transportation Demand Management Programs
- Additional Traffic Signals on Arterial/Collector Intersections
- Intersection Modifications
- Mitigate all intersections to meet State and Local performance standards
- Extend and create new streets into urbanizing areas

The following sections outline the type of improvements that would be necessary as part of a long-range Motor Vehicle Master Plan. Phasing of implementation will be necessary since all of the improvements cannot be done at once. This will require prioritization of projects and periodic updating to reflect current needs. Most importantly, the improvements outlined in the following sections are a guide to managing growth in Estacada as it occurs over the next 20 years and beyond.

Transportation System Management

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. These types of measures include such things as signal improvements, traffic signal coordination, traffic calming, access management, local street connectivity and intelligent transportation systems (ITS). Typically, the most significant measures that can provide tangible benefits to the traveling public are traffic signal coordination and systems. Measures that are more difficult to measure but provide system reliability to maintain transportation flows include transit signal priority and incident management.

TSM measures focus primarily on region-wide improvements. However, there are a number of TSM measures that could be used in a smaller scale environment such as the Estacada area. The following sections discuss TSM measures that could be appropriate for the Estacada 2030 TSP study area.

Neighborhood Traffic Management (NTM)

Neighborhood traffic management strategies are commonly used to slow down or reduce automotive traffic with the intent of improving safety for pedestrians or bicyclists. Estacada currently has limited neighborhood traffic management elements, such as on-street parking, in place on streets within the study area. When the City considers traffic calming measures, it will work with the community to find the traffic calming solution that best meets their needs and maintains roadway function. Any NTM project should provide an opportunity for comment by emergency agency staff to ensure public safety is not compromised.

Access Management

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

Access management involves the control or limiting of access on arterial and collector facilities to maximize their capacity and preserve their functional integrity. Numerous driveways erode the capacity of arterial and collector roadways and introduce a series of conflict points that present the potential for crashes and interfere with traffic flow. Preservation of capacity is particularly important on higher volume roadways for maintaining traffic flow and mobility. Whereas local and neighborhood streets primarily function to provide direct access, collector and arterial streets serve greater traffic volume with the objective of facilitating through travel. Estacada, 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 access and mobility in Estacada:

- Provide right turn deceleration lanes on OR 224 where warranted.
- Provide left turn lanes where warranted for access onto cross streets.
- Develop policies and procedures to address access management through City land use review. Employ strategies to consolidate driveways, provide crossover easements, and to take property access from lower classified roads where feasible.
- Establish City access spacing standards for local, collector and arterial streets to be addressed by development and roadway construction projects.
- Implement City access spacing standards for new construction on County facilities within the urban growth boundary.
- Comply with ODOT access requirements on State facilities.

New development and roadway projects involving City street facilities should meet the recommended access spacing standards summarized in Table 8-1. In cases where physical constraints or unique site characteristics limit the ability for the access spacing standards shown in Table 8-2 to be met, the City of Estacada should retain the right to grant an access spacing variance.

Table 8-1: Recommended Minimum Access Spacing Standards for City Street Facilities[1]

Functional Classification	Distance between Public Streets	Distance between Private Accesses and other Private Access or Public Streets
Arterial	See Table 8-2	See Table 8-2
Major Collector	300 feet	75 feet
Minor Collector	300 feet	75 feet
Neighborhood/Local	150 feet	15 feet

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

Any proposed accesses to State facilities must be approved by ODOT. The *1999 Oregon Highway Plan* identifies access management objectives for all classifications of roadways under State jurisdiction. Both OR 224 and OR 211 are classified as District Highways by ODOT, which maintain a management objective that balances the needs of through traffic movement with direct property access. Based on these objectives, ODOT has established access spacing standards for all highway classifications that vary with proximity to urbanized areas and changes in posted speeds. These standards are also provided in the *1999 Oregon Highway Plan*. Table 8-3 identifies the ODOT access spacing standards for District Highways that are applicable within the Estacada urban growth boundary. Note that the spacing standards below are only to be applied to accesses on the same side of the highway.

[1] Access spacing standards for collectors and neighborhood/local streets do not apply to single-family residential developments.

Table 8-2: Minimum Access Spacing Standards for ODOT District Highways

Posted Speed	Minimum Distance between Accesses (Private or Public)
55 mph or more	700
50 mph	550
40-45 mph	500
30-35 mph	350
25 mph or less	350

ODOT's access management requirements are implemented through OAR 734-051. These rules outline the criteria and procedure for approach permitting decisions, including the application process, conditions under which deviations from established access spacing standards can be allowed, and procedures for appealing decisions.

Clackamas County also maintains access spacing standards for facilities under County jurisdiction. However, it is recommended that the City of Estacada work with the County to reach an agreement that would allow for the implementation of City access spacing standards on all County facilities within the urban growth boundary.

Local Street Connectivity

Many of the existing local street networks, such as those in the downtown area, provide good connectivity with multiple options for travel in any direction. However, some of the newer residential neighborhoods have been developed with limited opportunities for ingress or egress, with some neighborhoods funneling all traffic onto a single street. This type of street network results in out-of-direction travel for motorists and an imbalance of traffic volumes that impacts residential frontage. The outcome can result in the need for investments in wider roads, traffic signals and turn lanes that could otherwise be avoided.

By providing connectivity between neighborhoods, out-of-direction travel and vehicle miles traveled (VMT) can be reduced, accessibility between various travel modes can be enhanced and traffic levels can be balanced out between various streets. Additionally, public safety response time is reduced.

Some of these local connections can contribute with other street improvements to mitigate capacity deficiencies by better dispersing traffic. Several roadway connections will be needed within neighborhood areas to reduce out of direction travel for vehicles, pedestrians and bicyclists. This is most important in the areas where a significant amount of new development is possible.

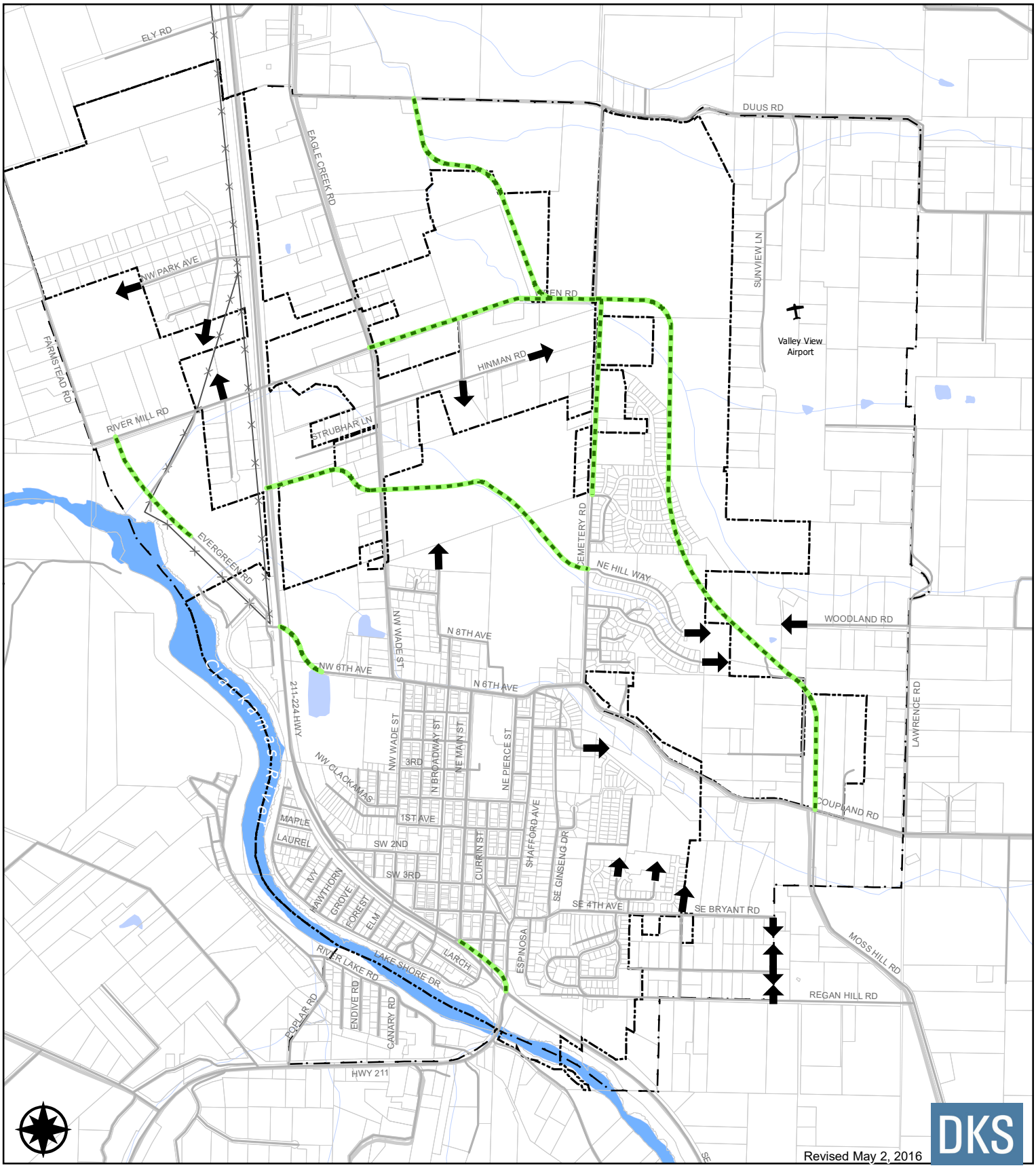
Figure 8-1 shows the proposed Local Street Connectivity Plan for Estacada. In most cases, the connector alignments are not specific and are aimed at reducing potential neighborhood traffic impacts by better balancing traffic flows on neighborhood routes. The arrows shown in the figures represent potential connections and the general direction for the placement of the connection. In each case, the specific alignments and design will be better determined as part of development review.

The criteria used for providing local connections are based on Portland Metro Regional Transportation Plan requirements for new residential or mixed-use developments.

- Every 330 feet, a grid for pedestrians and bicycles
- Every 530 feet, a grid for automobiles

To protect existing neighborhoods from potential traffic impacts of extending stub end streets, connector roadways should incorporate neighborhood traffic management into their design and construction. All stub streets should have signs indicating the potential for future connectivity. Additionally, new development that constructs new streets, or street extensions, must provide a proposed street map that:

- Provides full street connections with spacing of no more than 530 feet between connections except where prevented by barriers
- Provides bike and pedestrian access ways in lieu of streets with spacing of no more than 330 feet except where prevented by barriers
- Limits use of cul-de-sacs and other closed-end street systems to situations where barriers prevent full street connections
- Includes no close-end street longer than 200 feet or having no more than 25 dwelling units
- Includes street cross-sections showing dimensions of ROW improvements, with streets designed for posted or expected speed limits which meet City design standards (or ODOT standards for state highways)



City of Estacada

Transportation System Plan

Local Street Connectivity

0 1,000 2,000 4,000 Feet

Figure 8-1

Legend

- future streets
- conceptual street connection*
- tax lots
- utility line
- airport
- streets
- water
- city limits
- urban growth boundary

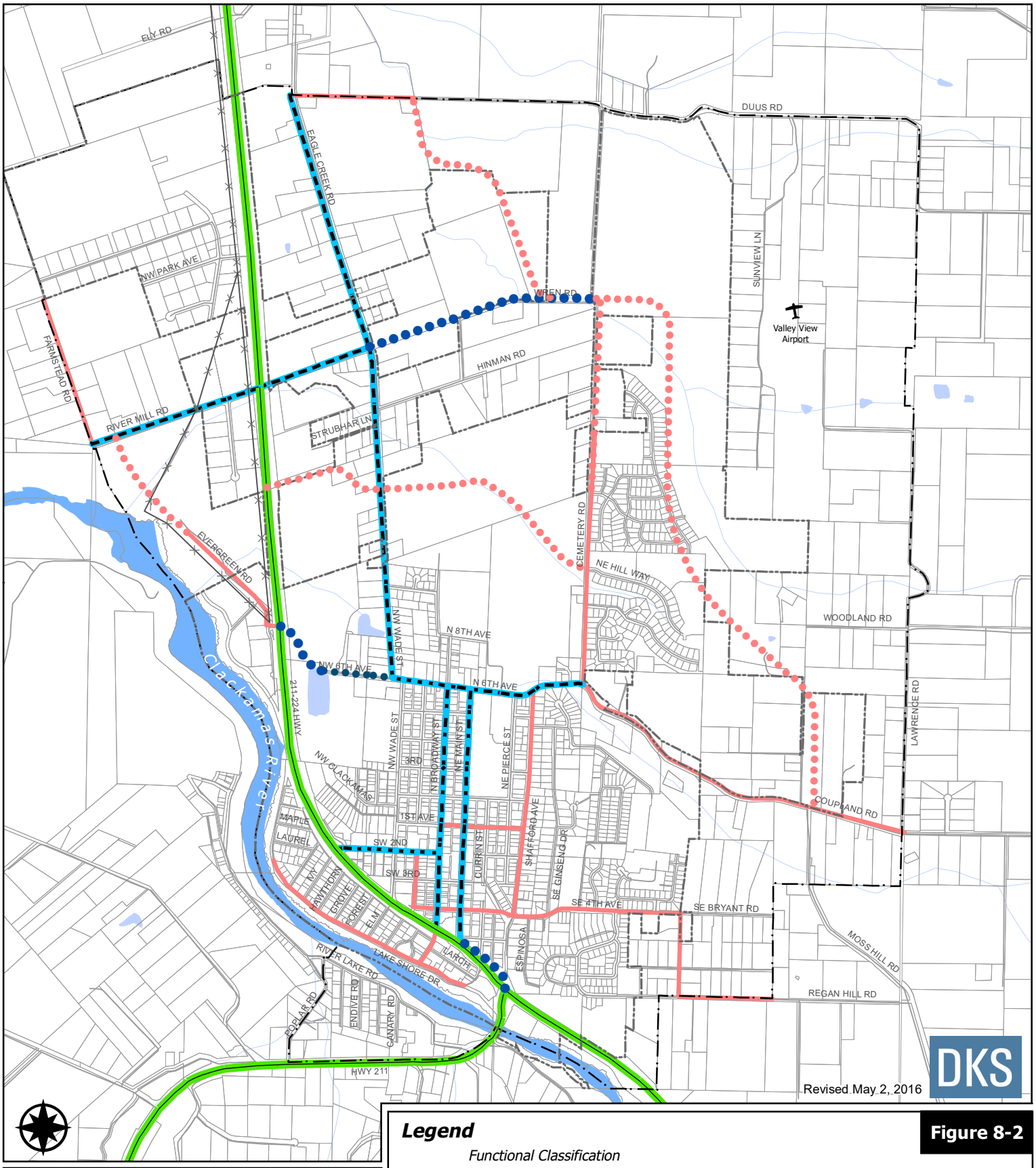
*additional studies should be completed for specific alignments.

The arrows shown on Figure 8-1 indicate priority connections only. Topography and environmental conditions limit the level of connectivity in several areas of Estacada. Other stub end streets in the City's road network may become cul-de-sacs, extended cul-de-sacs or provide local connections. Pedestrian connections from the end of any stub end street that results in a cul-de-sac should be considered mandatory as future development occurs. The goal would continue to be improved city connectivity for all modes of transportation.

Functional Classification

The proposed functional classification map (shown in Figure 8-2) differs from the existing roadway classification. In addition to the inclusion of new streets to the transportation network, the classification of Shafford Avenue was changed from a Local Street to a Minor Collector. Also, with the proposed extension of 6th Avenue to intersect with OR 224, the segment of 6th Avenue from OR 224 to Wade Street would be classified as a Major Collector to provide continuity with the existing network.

The proposed functional classification was developed following detailed review of the existing Estacada TSP and Clackamas County TSP. The criteria used to assess connectivity have two components: the extent of connectivity and the frequency of the facility type. Maps can be used to determine regional, city/district and neighborhood connections. The frequency or need for facilities of certain classifications is not routine or easy to package into a single criterion. While planning textbooks call for arterial spacing of a mile, collector spacing of a quarter to a half-mile, and neighborhood connections at an eighth to a sixteenth of a mile, this does not form the only basis for defining functional classification. Changes in land use, environmental issues or barriers, topographic constraints, and demand for facilities can change the frequency for routes of certain functional classifications. While spacing standards can be a guide, they must consider other features and potential long term uses in the area (some areas would not experience significant changes in demand, where others will). It is acceptable for the City to re-classify street functional designations to have different naming conventions than the Clackamas County street functional classifications, however, the general intent and purpose of the facility, whatever the name, should be consistent with regional, state and federal guidelines.



City of Estacada

Transportation System Plan

Functional Classification

0 1,000 2,000 4,000 Feet

Figure 8-2

Legend

Functional Classification

- arterial/highway
- major collector
- proposed major collector
- minor collector
- proposed minor collector
- local street
- airport
- water
- city limits
- urban growth boundary
- tax lots
- utility line

Roadway Cross-Section Standards

The design characteristics of streets in Estacada were developed to meet the function and demand for each facility type. Because 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 8-3 summarizes the proposed street characteristics for Estacada, with illustrations of recommended roadway cross-sections for major collectors, minor collectors, and local streets provided in Figure 8-3. These design characteristics do not pertain to arterials, as the only arterial streets designated within the City are under State jurisdiction. On facilities under State jurisdiction, ODOT's design standards from the current *Highway Design Manual* will apply, with any deviation from those standards requiring approval of a design exception.

Table 8-3: Proposed Street Characteristics

Street Element	Characteristic	Width/Options
Vehicle Lane Widths:	Truck Route =	12 feet
(Minimum widths)	Bus Route =	11 feet
	Arterial =	12 feet
	Major Collector =	12 feet
	Minor Collector =	11 feet
	Local =	10 feet
	Turn Lane =	12 feet[2]
On-Street Parking:		8 feet[3]
Bicycle Lanes[4]:	New Construction =	5 to 6 feet
(minimum widths)	Reconstruction =	5 to 6 feet
Sidewalks[5]:	Arterial =	6 to 11 feet
(Minimum width, including curb)	Collector =	5 to 8 feet
	Local =	5 to 8 feet
Landscape Strips:		4 to 6 feet
Medians:	5-Lane =	Required
	3-Lane =	Required
	2-Lane =	Optional
Neighborhood Traffic Management:	Arterial =	Prohibited
	Collector =	Under special conditions
	Local =	Should consider if appropriate
Transit:	Arterial/Collector =	Appropriate
	Local =	Only in special circumstances

[2] In constrained conditions on collectors and local routes, a minimum width of 10 feet may be considered.

[3] On arterials, on-street parking should be limited to special circumstances.

[4] 6-foot bike lanes preferred, unless adjacent to parking. Shoulder bikeways of 4 feet allowed, with minimum of 5 feet when adjacent to a roadside barrier.

[5] Wider sidewalks may be constructed in commercial districts (see Chapter 5).

As shown in Figure 8-3, street cross-sections may vary among functional classifications as many elements are recommended, but have been left as "optional" to allow for flexibility. The actual treatment will be determined within the design and public process for implementation of each project. Minor Collectors and Local Streets are similar in design, with both requiring 60 feet of right-of-way. However, the curb to curb width on Minor Collectors is generally greater as the minimum travel lane width allowed is 11 feet, as opposed to the 10-foot travel lanes allowed on Local Streets.

On select non-grid residential local streets, consideration should be given to constructing the minimum curb to curb width (28 feet), as such streets are often associated with lower travel speeds and lesser environmental impacts. The Oregon Fire Code currently allows for unobstructed driving surface widths as low as 20 feet, which could be accommodated within City local street design standards where parking is allowed on only one side of the street. The City of Estacada should require this design on select residential local streets, with parking allowed on both sides of the street under conditions deemed appropriate by the City.

Major Collectors are substantially wider, requiring right-of-way widths up to 84 feet. On these facilities, bike lanes are required and the inclusion of a 12-foot turn lane is an option where needed.

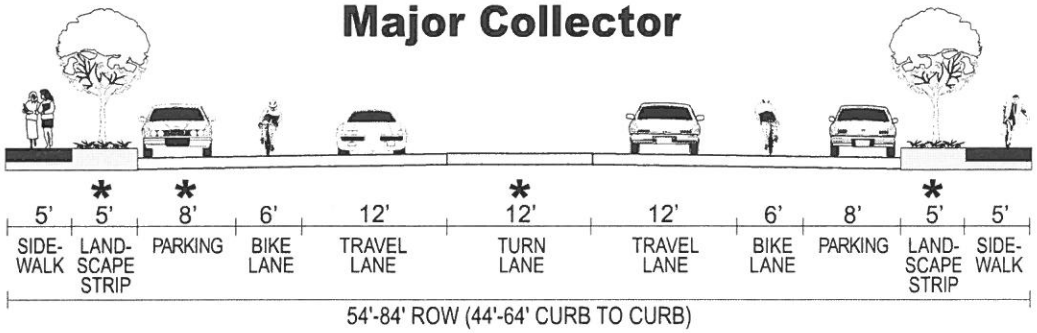
Where center left turn lanes are identified, the actual design of the street may include sections without center turn lanes adjacent to environmentally sensitive or physically constrained areas or with median treatments, where feasible. Under some conditions a variance to the adopted street cross-sections may be requested from the City Engineer. Typical conditions that may warrant consideration of a variance include (but are not limited to) the following:

- Infill sites
- Innovative designs (roundabouts)
- Severe topographic or environmental constraints
- Existing developments and/or buildings that make it extremely difficult or impossible to meet the design standards.

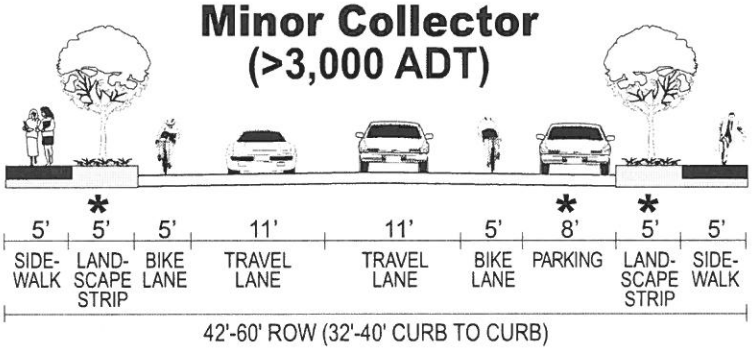
Facilities under State jurisdiction must be constructed in accordance with ODOT's design standards from the *Highway Design Manual*, with any deviation from those standards requiring approval of a design exception.. Within the City of Estacada, this would include both OR 224 and OR 211, which represent the only arterial-level facilities in the City. Figure 8-4 provides illustrations of the ultimate roadway cross-sections for various segments of the highways that are to be implemented as these facilities are modernized.

Within Figure 8-4, three different cross-sections have been provided for specified areas characterized by different travel speeds and surrounding environments. Of particular note is the section of OR 224 between SW 2nd Avenue and SE Currin Street, which is planned for improvement through a combination of an ODOT preservation project and a transportation enhancement grant. The cross-section shown for this segment represents a preliminary design and is expected to be further refined through the project development process.

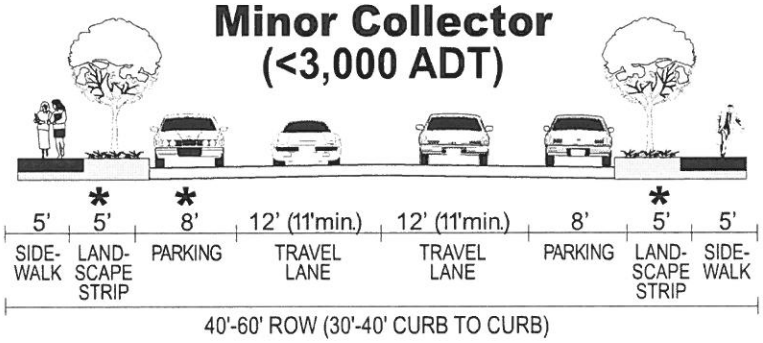
Major Collector



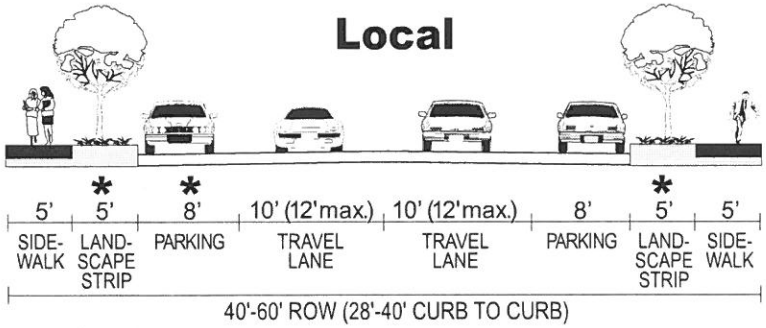
Minor Collector (>3,000 ADT)



Minor Collector (<3,000 ADT)



Local



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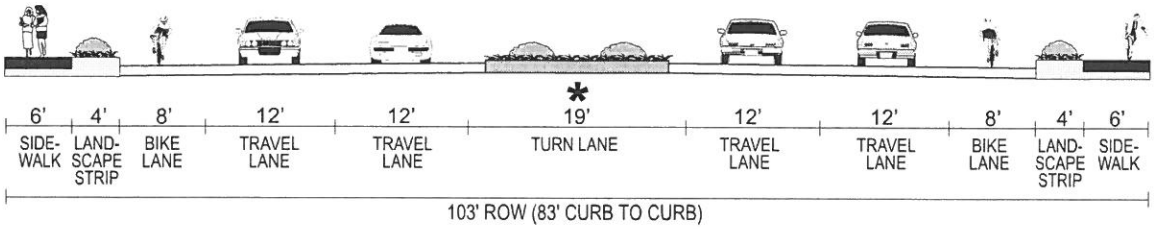
City of Estacada
Transportation System Plan
Street Design Standards

Figure 8-3

Legend
* - Optional

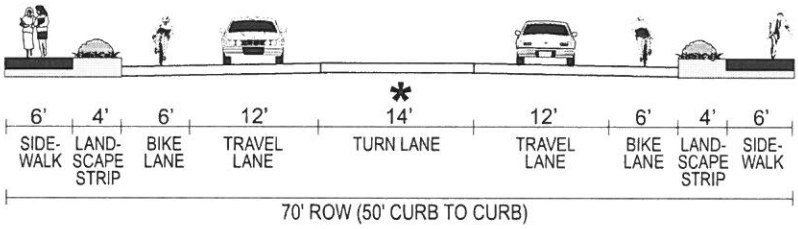
Notes
1.) 10' sidewalks may be requested in commercial districts per Estacada subdivision ordinances
2.) 11' travel lanes minimum for minor collector
3.) A 4' ROW easement is required for local streets if travel lanes are only 10' wide

OR 224: Northern UGB to SW 2nd Avenue



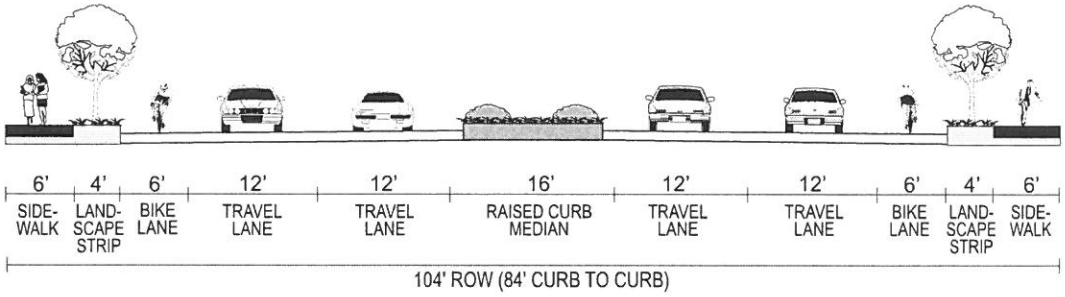
* - *At posted speeds above 45 mph, a design exception from ODOT will be required.*

OR 224: SE Currin Street to Southern UGB
OR 211: OR 224 to Western UGB



* - *Optional*

OR 224: SW 2nd Avenue to SE Currin Street



* - *To be refined through project development process.*

Designs and dimensions for state highways shown in the Estacada TSP are generally consistent with current ODOT design standards. At the time of proposed roadway construction, however, specific designs and dimensions and any necessary design exceptions must be reviewed and approved by ODOT. An intergovernmental agreement between the City and ODOT for maintenance of sidewalks, trees and landscaping, signals and other roadway features may be necessary.

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City of Estacada
Transportation System Plan

State Highway Cross-Sections

Figure 8-4

Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is the general term used to describe any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods. As growth in the Estacada area 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 growth.

Generally, TDM focuses on reducing vehicle miles traveled and promoting alternative modes of travel for large employers of an area. Research has shown that a comprehensive set of complementary policies implemented over a large geographic area can have an effect on the number of vehicle miles traveled to/from that area.[6] 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.

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 8-4 provides a list of several strategies that could be applicable to the Estacada area.

[6] *The Potential for Land Use Demand Management Policies to Reduce Automobile Trips*, ODOT, by ECO Northwest, June 1992.

Table 8-4: 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)
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 who are 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 then 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% (subsidized van)
Gift/Awards for Alternative Mode Use	Employees are offered the opportunity to receive a gift or an award for using modes other than driving alone.	0-3%
Walking Program	Provide support services for those who walk to work. This could include buying walking shoes or providing lockers and showers.	0-3%
Company Cars for Business Travel	Employees are allowed to use company cars for business-related travel during the day	0-1%
Guaranteed Ride Home Program	A company owned or leased vehicle is provided in the case of an emergency for employees that use alternative modes.	1-3%
Time off with Pay for Alternative Mode Use	Employees are offered time off with pay as an incentive to use alternative modes.	1-2%

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

Setting TDM goals and policies for new development will be necessary to help implement TDM measures in the future.

Significant decreases in the percent of trips made by single occupant vehicles can only be achieved with significant improvements to the transportation system and implementation of trip reduction strategies. The City of Estacada should coordinate with Clackamas County, Sandy Area Metro (SAM), and Tri-Met to create procedures to assure that the TDM strategies are implemented. The City of Estacada, Clackamas County, Metro, SAM, and Tri-Met 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, SAM, Metro, ODOT, and Clackamas County to develop productive TDM measures that reduce commuter vehicle miles and peak hour trips.
- 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.
- Implementation of motor vehicle minimum and maximum parking ratios for new development.
- Continued implementation of street connectivity requirements.
- Work with employers to install bicycle racks.
- Implementation of bicycle, pedestrian, motor vehicle and transit system Master Plans.

Recommended Motor Vehicle Master Plan

A list of potential motor vehicle projects that would meet identified needs and achieve motor vehicle policies was developed into a Motor Vehicle Master Plan. The Motor Vehicle Master Plan is an overall plan summarizing the "wish list" of motor vehicle related projects in Estacada and identifies improvements to provide an operationally effective roadway network within the City. The Motor Vehicle Master Plan projects and estimated costs are summarized in Table 8-5, with each project assigned a project number that corresponds with the illustrative Motor Vehicle Master Plan Map in Figure 8-5.

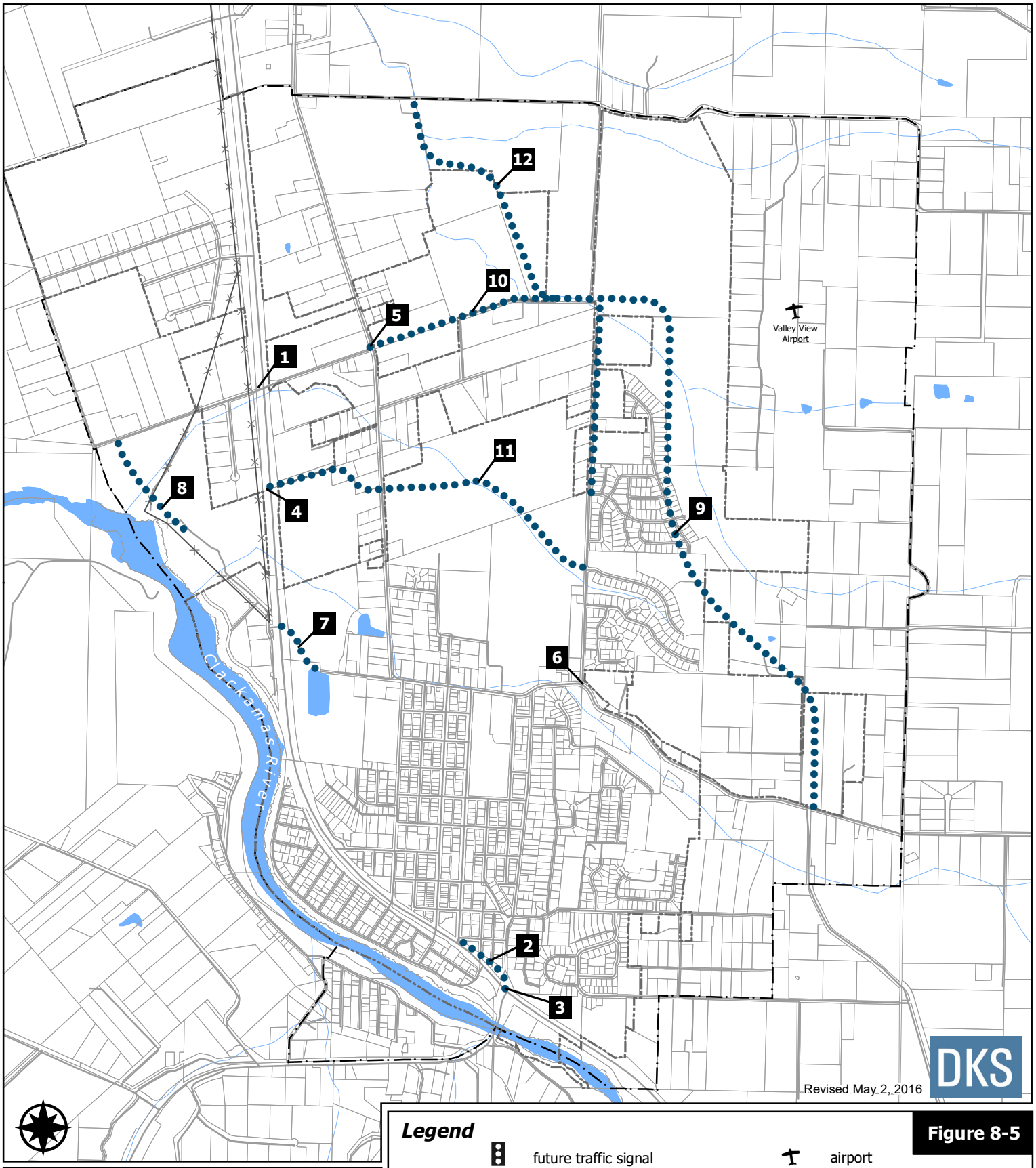
Phasing of implementation will be necessary since not all the improvements can be done at once. This will require prioritization of projects and periodic updating to reflect current needs. The improvements outlined in Table 8-5 are a guide to defining the types of right-of-way and street needs that will be required as development occurs.

The improvements identified in the Master Plan combine both those identified in prior plans (1999 Estacada TSP) and those determined from the outcome of the TSP update analysis. Projects that were identified in the previous TSP are identified with an asterisk (*). The resulting operations at study intersections with these improvements in place are discussed in the following sections, including a summary of the alternatives development.

Table 8-5: Motor Vehicle Master Plan Projects

Project Number	Project	Improvement	Estimated Costs
1	OR 224 / River Mill Rd. Intersection	Add left turn lane on westbound approach, modify eastbound approach to include a left turn lane and a shared through/right turn lane, improve right turn lane on southbound approach to comply with ODOT standard design, and construct traffic signal.	$1,750,000
2	Main St. Realignment at OR 211 / OR 224 Intersection	Realign Main St. to intersect at north approach of OR 211/ OR 224 Intersection. Add left turn lane on eastbound and southbound approaches.	$3,000,000
3	*Main St. / OR 211 / OR 224 Intersection	Construct traffic signal at reconfigured intersection.	$300,000
4	OR 224 / New Collector Roadway (between Evergreen Ave. and River Mill Rd.)	Construct traffic signal at intersection. Add right turn lane on northbound approach and left turn lane on southbound approach.	$2,700,000
5	Eagle Creek Rd. / River Mill Rd.	Add left turn lane on northbound approach.	$85,000
6	N. 6th Ave. / Cemetery Rd	Add left turn lane on eastbound approach.	$265,000
7	*N. 6th Ave. Extension	From Eagle Creek Rd. to OR 224 at Evergreen Ave.	$670,000
8	*Industrial Way Extension	From Evergreen Rd. to River Mill Rd.	$1,02,000
9	*New Roadway	Connecting Coupland Rd. to Cemetery Rd.	$4,130,000
10	River Mill Rd. Extension	Extend River Mill Rd. to Cemetery Rd.	$1,700,000
11	New Roadway	Connecting OR 224 to Cemetery Rd.	$2,270,000
12	Cemetery Rd. Extension	Extend Cemetery Rd. to Duus Rd.	$2,050,000
13	Shafford Ave. Improvement	Upgrade Shafford Ave. from S. 4th Ave. N. 6th Ave.	$390,000
14	OR 224 / Duus Rd. Intersection	Construct traffic signal. Include two eastbound right turn lanes, northbound left turn lane, and southbound left turn lane.	$270,000
15	OR 224 / Park Ave.	Construct traffic signal and two eastbound right turn lanes.	$1,350,000
16	OR 224 Widening	Widen OR 224 to include two northbound and two southbound through travel lanes between Duus Rd. and River Mill Rd.	$11,500,000
17	Duus Road Extension	Extend Duus Rd. to OR 224	$2,350,000
18	OR 224 / Evergreen Ave.	Construct traffic signal at intersection. Add left turn lane on westbound approach.	$790,000

* Project identified in current Estacada TSP



City of Estacada

Transportation System Plan

Motor Vehicle Master Plan

0 1,000 2,000 4,000 Feet

Figure 8-5

Legend

- future traffic signal
- future streets
- streets
- # project number (Table 8-5)
- airport
- water
- city limits
- urban growth boundary
- tax lots
- utility line

Capacity Needs

The motor vehicle capacity needs in Estacada were determined for future conditions through the year 2030. The analysis procedures employed, along with the findings for future deficiencies and needs, were documented in Chapter 4. This section identifies the future intersection operations with implementation of all Master Plan projects, as identified above.

Future Intersection Capacity Analysis

The future year 2030 No-Build conditions were identified in Chapter 4. Year 2030 traffic volume forecasts were analyzed to identify locations where peak hour performance will drop below minimum desirable levels, focusing on the 20 study intersections. Traffic volumes were developed as described previously and applied to existing intersection geometries, accounting for transportation improvement projects that have already been planned for. The value in reviewing the motor vehicle system performance is that it highlights where the system fails to meet performance standards. These locations were reviewed to consider street improvement alternatives that could better serve planned growth.

The 2030 Motor Vehicle Master Plan shown in Table 8-5 includes improvements identified in the existing 1999 Estacada TSP plus additional projects identified as needed through this analysis. Table 8-6 shows the forecasted motor vehicle operations at study intersections in the Estacada 2030 TSP study area for the No-Build scenario (taken from Chapter 4), as well as for conditions that would be present with all Master Plan improvements in place.

Under No-Build conditions in 2030, the five intersections on OR 224 at Park Avenue, River Mill Road, Evergreen Avenue, Main Street, and OR 211 would not meet adopted performance standards. However, with the improvement projects identified in the Master Plan, performance can be mitigated back to within acceptable limits at these locations. It should also be recognized that the construction of new roadways throughout the City will help to improve overall connectivity, which may also provide operational benefits to area intersections.

It should be noted that the recommendation to widen OR 224 to a five-lane cross-section from Duus Road to River Mill Road should be coordinated with another project to continue the widening from Duus Road to Heiple Road, where two southbound through lanes already exist. This improvement would avoid leaving a small two-lane section of highway between sections maintaining five lanes and would also extend the two southbound through lanes needed at the OR 224/Duus Road intersection to achieve better lane utilization. Because this area lies outside of the Estacada urban growth boundary, it was not included in the Motor Vehicle Master Plan. However, there may be an opportunity to coordinate with ODOT and Clackamas County to combine this project with the project on the Clackamas County Rural TSP to add passing lanes on OR 224 between Heiple Road and the northern Estacada urban growth boundary.

Table 8-6: 2030 Intersection Traffic Operations

Intersection	No-Build Conditions (2030) v/c	LOS	Master Plan Conditions (2030) v/c	LOS	Mobility Standard v/c
State Facilities					
OR 224 / Heiple Rd	0.17	E	0.17	E	0.70**
OR 224 / Ely Rd	0.17	F	0.15	F	0.80
OR 224 / Duus Rd	-	-	0.61	B	0.75**
OR 224 / Park Ave	**>1.0**	F	0.68	B	0.75**
OR 224 / River Mill Rd	**>1.0**	F	0.67	B	0.75**
OR 224 / New Collector	-	-	0.58	B	0.75**
OR 224 / Evergreen Ave	**>1.0**	F	0.63	B	0.75**
OR 224 / 2nd Ave	0.25	C	0.26	C	0.85
OR 224 / Wade St	0.58	F	0.59	F	0.90
OR 224 / Main St	**>1.0**	F	-	-	0.90
OR 224 / Broadway St	0.53	A	0.51	B	0.90
* OR 224 / OR211	**>1.0**	F	0.77	C	0.80**
Local Facilities					
Eagle Creek Rd / Duus Rd	0.10	B	0.20	B	-
Eagle Creek Rd / River Mill Rd	0.83	D	0.77	D	-
6th Ave / Main St	0.89	D	0.73	C	-
6th Ave / Broadway St	0.57	D	0.45	C	-
6th Ave / Shafford Rd	0.22	C	0.18	C	-
6th Ave / Cemetery Rd	0.42	C	0.21	B	-
2nd Ave / Main St	0.09	B	0.08	B	-
2nd Ave / Broadway St	0.33	B	0.34	B	-
Shafford Rd / Regan Hill Rd	0.24	B	0.33	B	-
4th Ave / Main St	0.47	D	0.43	D	-

Notes: * OR 224/ OR 211 intersection includes Main St. realignment in Master Plan.

** Mitigated intersections on State facilities are evaluated against Highway Design Manual standards.

Bold values indicate failure to meet adopted mobility standard.

Unsignalized intersections indicate LOS and v/c for critical movement.

While the City of Estacada does not maintain a standard for motor vehicle mobility, adoption of a standard requiring a minimum LOS D is recommended.

All intersections on the City street network will operate well, with improvements only added to the Master Plan to enhance safety.

Preliminary Traffic Signal Warrants

Preliminary signal warrants[7] were evaluated at all unsignalized intersections that failed to meet operational standards under the 2030 No-Build conditions, where lower cost improvements would not be sufficient. Meeting these warrants does not guarantee that a traffic signal will be installed. Before a signal can be installed on a State highway, a traffic signal investigation must be conducted, including an assessment of whether signal warrants would be met at the time of construction. This investigation must be reviewed by the Oregon Department of Transportation, with approval of the request granted by the State Traffic Engineer. Signals on non-state facilities need to be reviewed and approved by appropriate local officials.

Since only peak hour traffic volumes were available for study intersections, peak hour volumes were factored to estimate average daily traffic volumes, under the assumption that peak hour volumes were approximately 10% of daily volumes. This assumption was based on comparisons of peak hour volumes to daily volumes at select locations in the City where daily counts were available.

The Preliminary Signal Warrants use two conditions to test for the potential need for signalization. Condition A (Minimum Vehicular Volume) reflects whether there is enough volume on both the main street and side street to warrant a traffic signal. Condition B (Interruption of Continuous Traffic) is also a measure of volume, but puts more emphasis on the volume of the main street. If either Condition A or Condition B is met, the intersection is considered to meet preliminary warrants for signalization. The results of this analysis are shown in Table 8-7.

Table 8-7: 2030 Signal Warrant Analysis

Intersection	2030 Master Plan		
	Cond. A Met	Cond. B Met	Signal Warrant Met
Duus Rd. / OR 224	Yes	Yes	Yes
Park Ave. / OR 224	Yes	Yes	Yes
River Mill Rd. / OR 224	No	Yes	Yes
New Collector / OR 224	No	No	No
Evergreen Ave. / OR 224	No	No	No
Main Street / OR 211 / OR 224	Yes	Yes	Yes

[7] Preliminary Traffic Signal Warrant Analysis, Analysis Procedures Manual, Oregon Department of Transportation – Transportation Planning Analysis Unit. Average Daily Traffic volumes were estimated based on peak hour volumes.

Based on the preliminary signal warrant analysis findings, a traffic signal at the intersection of OR 211 and OR 224 with a realigned Main Street connecting at the north approach, is recommended as a project on the Motor Vehicle Master Plan. The traffic signal control at this intersection would improve existing traffic operations and safety for both vehicles and pedestrians. In addition, the growth in the northwest portion of the City will create a need for traffic signals at the intersections on OR 224 at Duus Road, Park Avenue, and River Mill Road.

The intersections on OR 224 at the new collector and at Evergreen Avenue would also benefit operationally from the installation of traffic signals, but the stop-controlled minor street volumes would be too low to warrant such treatment. However, as signalization of these intersections is necessary to comply with adopted performance standards, the traffic signals were included on the Motor Vehicle Master Plan.

Deceleration Turn Lane Warrants

An additional investigation was performed to identify needs for left and right turn deceleration lanes on unsignalized, uncontrolled approaches where traffic volumes are high enough that the frequency of conflicts may compromise safety. In some situations, left and/or right turn deceleration lanes are recommended to ensure safe operating conditions. Turn lane warrants were evaluated for study intersections and where needs were found, these improvements were included in the Motor Vehicle Master Plan. Locations where additional turn lanes were found to be needed include:

- OR 224 at River Mill Road: southbound right turn lane
- OR 224 at the New Collector (between Evergreen Avenue and River Mill Road): northbound right turn lane and southbound left turn lane
- Cemetery Road at N. 6th Avenue: eastbound left turn lane
- Eagle Creek Road at River Mill Road: northbound left turn lane

Other Alternatives Considered

Multiple alternatives for addressing capacity needs identified in 2030 were considered during the development of the Motor Vehicle Master Plan project list, however some alternatives were not carried past a qualitative level of review. These alternatives are described below.

OR 224 at Duus Road

With this intersection acting as one of two major gateways to the 125-acre urban growth boundary expansion area, it must serve significant volumes of traffic turning to and from OR 224. Adding additional access points on OR 224 to serve this area was considered, but choosing alternatives that would use a minimal number of access points on the highway was preferred, as increasing access points would lead to degradation of highway safety. Furthermore, the construction of additional local streets between the highway and the Clackamas River would improve overall connectivity, but the amount of out of direction

travel that would be necessary to mitigate highway operations does not make this a reasonable alternative on its own.

OR 224 at Park Avenue

With this intersection acting as one of two major gateways to the 125-acre urban growth boundary expansion area, it must serve significant volumes of traffic turning to and from OR 224. Adding additional access points on OR 224 to serve this area was considered, but choosing alternatives that would use a minimal number of access points on the highway was preferred, as increasing access points would lead to degradation of highway safety. Furthermore, the construction of additional local streets between the highway and the Clackamas River would improve overall connectivity, but the amount of out of direction travel that would be necessary to mitigate highway operations does not make this a reasonable alternative on its own.

OR 224 at River Mill Road

To mitigate the failing conditions forecast on OR 224 at River Mill Road, alternatives that did not require the installation of a traffic signal were also considered. Such alternatives included:

- **Prohibition of left turns from River Mill Road**

  Prohibitions of left turns would degrade connectivity and divert congestion to adjacent intersections. Therefore, it is not recommended.

- **Construction of new street connections**

  An extension of Duus Road from its current terminus at Eagle Creek Road to intersect with OR 224 was considered as a way to improve connectivity and better distribute traffic demand. However, with the expansion of the urban growth boundary to include an additional 125 acres of industrial land, traffic demand in the northwest area of the city increases such that even with the extension of Duus Road to OR 224 additional improvements are needed at the intersection with River Mill Road.

The planning effort to develop the previous Transportation System Plan for the City of Estacada (Kittelson & Associates, Inc., May 1999) also identified future failure at this intersection and recommended the installation of a traffic signal to improve this condition, which concurs with the recommendations in this plan.

OR 224 at Evergreen Road

To mitigate the failing conditions forecast on OR 224 at Evergreen Road, only the recommended alternative was considered, as it was determined to be a low-cost, effective improvement.

OR 224 at Main Street

The failure of the intersection on OR 224 at Main Street was also identified as part of the planning effort to develop the previous Transportation System Plan, with three alternatives considered including:

- **Implementing a one-way couplet on Main Street and Broadway Street;**

  This alternative would only convert Main Street and Broadway Street into a one-way couplet system for one block north of OR 224, with northbound traffic on Main Street and southbound traffic on Broadway Street. This alternative would improve operations at the intersection on OR 224 at Main Street, but would require the use of the highway for downtown circulation and would have significant impacts on the downtown.

- **Installing a traffic signal on OR 224 at Main Street; and**

  This alternative would maximize downtown accessibility and provide additional pedestrian crossing opportunities on OR 224, but would also introduce a new traffic signal in very close proximity (approximately 300 feet) to the existing traffic signal at Broadway Street.

- **Installing a traffic signal on OR 224 at 2nd Avenue.**

  Installing a traffic signal at 2nd Avenue rather than at Main Street would improve traffic signal spacing from the existing signal at Broadway Street, but it is unlikely that it would divert much traffic away from Main Street, which provides a more direct connection to the core of the downtown.

The planning effort to develop the previous Transportation System Plan for the City of Estacada (Kittelson & Associates, Inc., May 1999) recommended the implementation of the alternative that converts Broadway Street and Main Street into a couplet system. However, the recommended alternative in this plan is preferred as it would have lesser impacts on downtown circulation, would improve access spacing on OR 224, and would take advantage of a traffic signal on OR 224 that would be already be needed to address another deficiency.

OR 224 at OR 211

The failure of the intersection on OR 224 at OR 211 was also identified as part of the planning effort to develop the previous Transportation System Plan, with three alternatives considered including:

- **Modifying traffic controls to stop OR 224;**

  This was the original configuration of traffic control prior to the 1970's and was corrected to meet driver expectations regarding route continuity. Therefore, returning it to this state is not recommended.

- **Install a traffic signal; and**

  This improvement would mitigate failing operations forecast to occur in 2030 and maintain adequate signal spacing between the existing signal at Broadway Street.

- **Construct a roundabout.**

  This improvement would also mitigate failing operations, but would require a higher cost of construction and may not meet driver expectations as well as a traffic signal, which has already been used throughout this corridor.

The planning effort to develop the previous Transportation System Plan recommended the implementation of the alternative that modifies traffic control to stop OR 224 instead of OR 211. While this would be the lowest cost improvement, it would not meet driver expectations and was removed by ODOT years ago for that reason. Therefore, it is not recommended that it be considered further. The alternative including the installation of a traffic signal is consistent with the recommendations in this plan.

Trucks

Efficient truck movement plays a vital role in the economical movement of raw materials and finished products. The establishment 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 OR 224 is the only designated through truck route in the TSP study area. The objective of this route designation is to allow truck routes to focus on design criteria that are "truck friendly"; i.e. 12-foot travel lanes, longer access spacing, 35-foot (or larger) curb returns, and pavement design that accommodates a larger share of trucks.

The OR 224 designation as a truck route is consistent with Clackamas County TSP designations. Existing signage identifies Main Street as a truck route, although this is no longer accurate.

9. Other Modes Plan

Introduction

This chapter summarizes existing and future rail, air, marine, pipeline and transmission system transportation needs in the City of Estacada. While auto, transit, bicycle and pedestrian transportation modes have a more significant effect on the quality of life in Estacada, other modes of transportation are also considered.

Policies

No goals or policies were developed related to rail, air, marine, transmission or pipeline transportation systems.

Recommended Facilities

Marine

The Clackamas River is not used for commercial goods movement. The river serves recreational purposes. No policies or recommendations in this area of transportation are provided for Estacada other than to continue to support the recreational uses in and around the river, including the multi-use trail along the north bank.

Rail

There are no active rail facilities within the City of Estacada, nor are there expected to be any rail facilities within the City in the near future. Due to these considerations, no policies or recommendations in this area of transportation are provided for Estacada.

Pipeline and Transmission Systems

High-voltage power transmission lines, operated by Portland General Electric, run through Estacada. Power is transferred from the River Mill Dam, located east of Estacada on the Clackamas River, to the Estacada Substation located on the southeast corner of the Clackamas Highway/ Broadway Street intersection. The power lines carry power beyond Estacada along the Clackamas River. The lines are protected by easements and maintain sufficient power to provide for the City of Estacada. No major pipelines cross through Estacada. No policies or recommendations in this area of transportation are provided for Estacada.

Air

The Valley View Airport is a Category 4 public use airport located with the Estacada urban growth boundary. The airport is used by small recreational planes or light jets. No changes to policies are recommended for the airport. The City may propose airport overlay zones to encourage compatible development around the airport and to promote aviation safety by prohibiting structures, trees, and other objects from compromising takeoffs and landings at the airport. Surrounding land uses will continue to be subject to applicable federal and state aviation safety regulations, as described in Chapter 3. Within 5,000 feet of the runway, Federal Aviation Regulations protect airspace at 150 feet or less above the runway elevation. Protected airspaces may impact land uses within 9,000 feet of the Airport, with restrictions lessoning as distance from the runway increases[48].

Most passenger and freight air transportation demands for the City of Estacada will continue to be serviced by Portland area airports including Portland International Airport (PDX), which is located approximately 32 miles northwest of the City.

[48] More detailed information related to airport imaginary surface dimensions are located in the Oregon Department of Aviation's Airport Land Use Compatibility Guidebook. http://www.oregon.gov/Aviation/landuseguidebook.shtml

10. Financing and Implementation

Introduction

This chapter outlines funding strategies and sources that can be used to meet the needs of the transportation system. The costs for the recommended transportation improvements are identified and compared to the potential revenue sources. Options are discussed regarding how costs of the Transportation Master Plan and revenues can be balanced.

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 Estacada currently utilizes several sources to fund construction of its transportation infrastructure as described below. These sources collect revenue that is used to maintain street facilities or construct new roadway improvements, with some restrictions on the type and location of projects. In Estacada, as in many other Oregon cities, street revenues are also used to fund administrative costs such as salaries, benefits, expenses and other services related to street projects. Some sources of revenue are collected annually while others are provided on a project-specific basis.

The City of Estacada anticipates collecting approximately $492,000 for street construction and repair each year[1]. This revenue will be generated from the state (fuel taxes, license fees and grants), general fund transfers, system development charges, and other revenue sources. Total revenues to be collected over 23 years between 2007 and 2030 would be $11,316,000 with current funding sources and projected population and employment growth.

[1] The City has historically allocated $35,000-$90,000 a year for capital outlays (including maintenance) from the gas tax revenues. This historical allocation is expected to increase over the next 23 years.

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. Estacada currently uses these funds for street operating and maintenance needs.

Oregon gas taxes are collected as a fixed amount per gallon of gasoline served. The gas tax in Oregon has not increased since 1992 (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 1992 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.

In 2006, Estacada received about $120,000 in State gas tax and vehicle license fee revenue. Essentially all of these funds are spent on surface maintenance of local streets and administrative costs. 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. Estacada is expected to receive approximately $2.8 million over the next 23 years.

System Development Charge

The System Development Charge (SDC) for streets is used as a funding source for capacity projects for the transportation system. The SDC is collected from new development based on the proposed land use and size. SDC fees are based on each land use's potential vehicle trip generation. The current SDC rate was set in 1999 and updated in 2007. SDCs are based on the number of Equivalent Length New Daily Trips (ELNDT) estimated for each development. The current SDC rate is $211.60 per ELDNT. The SDC for a single-family residence is $2,025.

For fiscal year 2006/2007, the income from SDCs within Estacada was $45,300. Average SDC revenues over the last six years were $45,730, but varied from $10,000 to $183,000 depending on the development that occurred in a given year. The SDC income potential over the next 23 years was estimated based on the forecasted household and employment growth within the City urban growth boundary. Based on land use forecasts[2], Estacada is expected to collect approximately $6 million from SDC fees over the next 23 years.

[2] This revenue estimate should be refined as more specific development data becomes available.

General Fund Transfer

The transfer of monies from the general fund has been used to help finance transportation services in Estacada. An annual average of $67,000 has been transferred from the general fund over the last six years. This money is primarily used to cover administrative expenditures such as salaries and overhead.

ODOT Grants

Estacada has received at least $25,000 annually from ODOT's Special Cities Allotment Grant for small community funding. These grants come from a statewide $1 million distribution for cities with less than 5,000 population. It is anticipated that this grant money will continue to be a revenue source for city street projects.

Exactions

These are improvements that are obtained as conditions of development approval. Developers are required to improve their street frontage and, in some cases, provide off site improvements depending upon the level of traffic generation and the impact to the transportation system. This has been a common method of funding sidewalk improvements within the City, but is a difficult funding source to plan for because exactions are highly variable and currently unknown.

Other Revenue Sources

Development plan review fees, voluntary property owner contributions, and investment interest have provided additional revenues for the City street fund. An average of $17,000 in revenue has been received from these sources over the last 6 years and totaled $27,500 in the 2006-2007 fiscal year. An average estimate of $20,000 per year is assumed through the 2030.

Summary

Table 10-1 summarizes the current funding sources. Under the above funding programs, the City of Estacada will collect approximately $492,000 for street fund revenues each year. Administrative costs have averaged approximately $160,000 per year leaving $332,000 for street construction and repair each year. Total gross revenues collected by 2030 are anticipated to be $11.3 million with the current sources (in 2006 dollars).

If the City spends more than the above revenues collected for transportation purposes, the funding will most likely need to be taken from City reserve funds or increases in other revenue sources such as SDCs or street utility fees. Therefore, it is reasonable to expect that additional capital and maintenance responsibilities in the City would require new or expanded revenue sources. If the forecasted future growth does not occur, the amount of SDC revenue would be reduced significantly.

Table 10-1: Transportation Revenues for Estacada (2006 Dollars)

Funding Category	Annual Amount	Estimated Revenues Through 2030
State Fuel Apportionment & Vehicle License Fee	$ 120,000	$ 2,760,000
SCA Grant	$ 25,000	$ 575,000
General Fund Transfer	$ 67,000	$ 1,541,000
Other Revenues (Investment Income, Fees, etc.)	$ 20,000	$ 460,000
System Development Charge (Street)	$ 260,000	$ 5,980,000
Total Revenues	**$492,000**	**$11,316,000**

Source: City of Estacada, Adopted Budget, Fiscal Years 2001-2002 through 2006-2007.

Projects and Programs

This section presents the recommended projects and programs necessary for the City of Estacada to serve projected local transportation needs for the next 23 years. Pedestrian, Bicycle, Transit, and Motor Vehicle projects were identified in the Master Plan for each mode, and represent those projects that are needed to satisfy performance standards, or other policies established for the Estacada Transportation System Plan.

Project Cost Estimates

Cost estimates (general, order of magnitude) were developed for the projects identified in the motor vehicle, bicycle, transit, and pedestrian elements. 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[3]. All cost estimates are based on 2006 dollars.

Many of the projects overlap elements of various modes. Therefore, where improvements for different modes are identified in the same location, costs are combined into one project to capture efficiencies in construction. 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.

[3] Cost estimates are planning–level only and will be refined when projects are programmed into the City C.I.P and/or ODOT STIP. 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.

Other Transportation Programs and Services

In addition to the physical system improvements identified in the previous chapters, transportation facilities will require on-going operation and maintenance improvements in a variety of areas. These programs are recommended to respond to the specific policies and needs for 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 within Estacada was estimated at $66,000[4], a portion of which is paid for by gas tax revenues from the state. Routine maintenance and capital outlay projects that improve the existing roadway conditions (including SCA Grant projects) are included. Over 23 years, the City's road maintenance responsibility accounts for $1.5 million. The actual maintenance costs could vary from this estimate. (Maintenance costs for Clackamas County and ODOT roads are addressed by the respective road authority and are not included in this estimate.)

Street Lighting

Street lighting costs are included under the City's street fund project. This expense averaged approximately $32,000 per year over the last six years. The expected total expense over the next 23 years is $736,000.

Signs and Striping

Costs for signing and striping of streets averaged approximately $5,000 per year and are expected to account for $115,000 in expenses over the next 23 years.

Neighborhood Traffic Management (NTM)

Specific NTM projects are not defined. These projects will be based upon City placement and design criteria and would be subject to neighborhood consensus. A City-wide NTM program, if desired, should be developed with criteria and policies adopted by the City Council. Speed humps can cost $2,000 to $4,000 each and traffic circles can cost $3,000 to $8,000 each. It is important, where appropriate, that any new development incorporate elements of NTM as part of its on-site mitigation of traffic impacts. No allocation is identified for the implementation of NTM projects, as exactions are expected to cover costs where projects are deemed to be necessary.

Other Expenditures

Administrative costs such as personnel (payroll, benefits, etc.), materials and services (supplies, utilities, etc.) are included as part of street fund expenditures. These

[4] Estimate based on: City of Estacada, Adopted Budget, Fiscal Year 2001-2002 through 2006-2007.

expenses are partially covered by transfers from the City General Fund but are also supported by other street fund revenues. This expense averaged approximately $160,000 per year over the last six years. Over the next 23 years, these other expenditures are expected to total is $3.7 million.

Summary

Table 10-2 illustrates expected transportation expenditures. Based on current expenditures, the total cost of programs (excluding new road construction projects or other capacity improving capital projects) is expected to be $264,000 annually or $6.1 million over the next 23 years. With the revenue projection identified, this leaves approximately $5.2 million for capital improvements. However, SDC revenues should be used entirely for capital projects and not for any maintenance, lighting or other expenses. Therefore, the City would need to find additional revenue sources to fund the gap between projected expenditures (all expenditures in Table 10-2 excluding capital projects - $264,000 annually) and revenues (all revenues in Table 10-1 excluding SDCs - $232,000 annually).

Table 10-2: Transportation Expenditures for Estacada (2006 Dollars)

Expense Category	Annual Amount	Estimated Expenses Through 2030
Maintenance	$ 67,000	$ 1,541,000
Street Lighting	$ 32,000	$ 736,000
Signing and Striping	$ 5,000	$ 115,000
Other Expenses (Administrative Costs)	$ 160,000	$ 3,680,000
Capital Projects.	$ 228,000	$ 5,244,000
Total Expenditures	**$492,000**	**$11,316,000**

Source: City of Estacada, Adopted Budget, Fiscal Years 2001-2002 through 2006-2007.

Estacada TSP Master Plan and Costs

The costs outlined in the Transportation System Plan to implement the Master Plans for Streets, Bicycles, and Pedestrians total $35 million. Other potential transit, transportation operations, or maintenance programs would add significant costs to the estimate. Refer to Chapters 5 through 9 for details on the individual projects by travel mode. Note that some projects listed in the Transportation System Plan are expected to be partially or fully funded by ODOT or through exactions required of new development. Assumptions regarding non-City funding sources have been reflected in Table 10-4 for each Transportation Master Plan project. Given these assumptions, the total cost for the City share of Master Plan funding is $14.6 million.

In addition to Master Plan projects, other projects currently identified in Construction Improvement Program (CIP) must also be funded. These projects are identified in Table 10-3 and total $1.8 million, with City SDCs expected to cover $1.4 million and exactions or other revenue sources covering the remainder.

Table 10-3: Estacada CIP Projects

Project	Improvement	Estimated City Cost*	Estimated Total Costs
Broadway Street	Extend roadway north to new collector.	$306,000	$76,500
Regan Hill / 4th Ave. / Shafford Intersection	Intersection improvement	$678,000	$678,000
System Planning	SDC Update Master Planning	$76,000	$76,000
Downtown Roadway Improvement Program	Safety improvements and overlay in downtown roadways including Broadway Street, Maine Street and S. 4th Avenue	$190,000	$190,000
OR 224 Improvement	Facility upgrade from OR 211 to South 2nd Avenue.	$135,000	$13,500
Cemetery Road	Upgrade north of 6th Avenue	$197,000	$197,000
Carol Street	Upgrade between Shafford Avenue and Ginseng Drive	$44,000	$44,000
Oak View Drive	Upgrade east of Ginseng Drive	$11,000	$11,000
West View Lane	Upgrade east of Ginseng Drive	$20,000	$20,000
Foothills Drive	Upgrade east of Cemetery Road	$20,000	$20,000
Hill Way	Upgrade east of Cemetery Road	$32,000	$32,000
North Broadway	Upgrade north of 6th Avenue	$25,000	$25,000
Miscellaneous Roadway Projects	Roadway and intersection upgrades as needed.	$27,000	$27,000
New Connector	OR 224 to River Mill Road via Strubhar Lane	$54,000	$5,400
Total		**$1,415,400**	**$1,815,000**

* Estimated cost assumes a portion of project costs are funded by ODOT contributions or exactions from development projects.

The estimated $22.1 million in City costs for capital projects and other expenditures including maintenance exceeds the expected 23-year revenue estimate of $11.3 million (see Table 10-1) by approximately $10.8 million. To fund all projects in the Transportation Master Plan and CIP, SDC rates would need to be set at 167% higher than the existing rate, or approximately $565 per ELNDT (or approximately $5,410 per household). This provides an additional $10.0 million in projected funding for capital projects in addition to the existing revenue projections. Alternative solutions to address this funding deficit for Master Plan projects are discussed in the next section. In addition to new funding sources

obtained by the City, ODOT may provide partial funding on roadways within their jurisdiction.

Table 10-4 identifies the Transportation Master Plan for Estacada which includes transportation projects identified to be needed for all modes of travel. The Transportation Master Plan identifies total project cots as well as estimated City costs and potential funding sources. This plan assumes that maintenance, lighting, signing, striping and other street fund costs are funded by other revenue sources including the state tax revenues, grants, general fund transfers, and other revenue sources. The Transportation Master Plan total (including current CIP) is approximately $16 million. With the identified increase in SDCs, an estimate of $16 million in capital project funding is available.

Table 10-4: Estacada Master Plan Projects

Project	Improvement	Estimated City Cost*	Estimated Total Costs	Potential Funding Sources**
Motor Vehicle Projects				
OR 224 / River Mill Intersection	Construct traffic signal at intersection. Add left turn lane on westbound approach, modify eastbound approach to include a left turn lane and a shared through/right turn lane, and improve right turn lane on southbound approach to comply with ODOT standard design.	$875,000	$1,750,000	City, ODOT, Developer Exactions
Main St. Realignment at OR 211 / OR 224 Intersection	Realign Main St. to intersect at north approach of OR 211/ OR 224 Intersection. Add left turn lane on eastbound and southbound approaches.	$1,500,000	$3,000,000	City, ODOT, Developer Exactions
Main St. / OR 211 / OR 224 Intersection	Construct traffic signal at reconfigured intersection.	$150,000	$300,000	City, ODOT, Developer Exactions
OR 224 / New Collector Roadway (between Evergreen Ave. and River Mill Rd.)	Construct traffic signal at intersection. Add right turn lane on northbound and left turn lane on southbound approach.	$1,350,000	$2,700,000	City, ODOT, Developer Exactions
Eagle Creek Rd. / River Mill Rd. Intersection	Add left turn lane on northbound approach.	$43,000	$85,000	City, Developer Exactions
N. 6th Ave. / Cemetery Rd. Intersection	Add left turn lane on eastbound approach.	$133,000	$265,000	City, Developer Exactions
N. 6th Ave. Extension	New roadway from Eagle Creek Rd. to OR 224 at Evergreen Ave.	$280,000	$670,000	City, Developer Exactions
Industrial Way Extension	New roadway from Evergreen Rd. to River Mill Rd.	$140,000	$1,020,000	City, Developer Exactions
New Roadway	New roadway connecting Coupland Rd. to Cemetery Rd.	$580,000	$4,130,000	City, Developer Exactions
River Mill Rd. Extension	Extend River Mill Rd. to Cemetery Rd.	$700,000	$1,700,000	City, Developer Exactions
New Roadway	New roadway connecting OR 224 to Cemetery Rd.	$320,000	$2,270,000	City, Developer Exactions
Cemetery Rd. Extension	Extend Cemetery Rd. to Duus Rd.	$290,000	$2,050,000	City, Developer Exactions
Shafford Ave. Improvement	Upgrade Shafford Ave. from S. 4th Ave. N. 6th Ave.	$390,000	$390,000	City

Table 10-4 (continued): Estacada Master Plan Projects

Project	Improvement	Estimated City Cost*	Estimated Total Costs	Potential Funding Sources**
OR 224 / Duus Rd. Intersection	Construct traffic signal. Include two eastbound right turn lanes, northbound left turn lane, and southbound left turn lane.	$135,000	$270,000	City, ODOT, Developer Exactions
OR 224 / Park Ave.	Widen OR 224 to include two northbound and two southbound through travel lanes between Duus Rd. and River Mill Rd.	$675,000	$1,350,000	City, ODOT, Developer Exactions
OR 224 Widening	Widen OR 224 to include two northbound and two southbound through travel lanes between Duus Rd. and River Mill Rd.	$5,750,000	$11,500,000	City, ODOT, Developer Exactions
Duus Road Extension	Extend Duus Rd. to OR 224	$1,675,000	$2,350,000	City, Developer Exactions
OR 224 / Evergreen Ave. Intersection	Construct traffic signal at intersection. Add left turn lane on westbound approach.	$395,000	$790,000	City, ODOT, Developer Exactions
Total		**$11,330,000**	**$28,490,000**	
Bicycle Projects				
Eagle Creek Road Bike Lanes	Bike lanes from 6th Avenue to Duus Road	$230,000	$460,000	City, Developer Exactions
River Mill Road Bike Lanes	Bike lanes from Eagle Creek Road to Farmstead Road	$115,000	$230,000	City, Developer Exactions
Designated Bike Route Signing on Main Street	From OR 224 to 6th Avenue	$2,750	$2,750	City
Designated Bike Route Signing on Main Street	From Wade Street to Cemetery Road	$2,000	$2,000	City
Designated Bike Route	Signing on Main Street from OR 224 to 6th Avenue	$2,600	$2,600	City
Total		**$352,350**	**$697,350**	

Table 10-4 (continued): Estacada Master Plan Projects

Pedestrian Projects				
6th Avenue	Sidewalk from Wade Street to Broadway Street	$60,000	$120,000	City, Developer Exactions
Eagle Creek Road	Sidewalk from 6th Avenue to River Mill Road	$325,000	$650,000	City, Developer Exactions
OR 224	Sidewalk from 2nd Avenue to UGB	$735,000	$1,470,000	City, ODOT
River Mill Road	Sidewalk from Farmstead Road to Eagle Creek Road	$325,000	$650,000	City, Developer Exactions
Eagle Creek Road	Sidewalk from River Mill Road to Duus Road	$320,000	$640,000	City, Developer Exactions
6th Avenue	Sidewalk from Shafford Avenue to Cemetery Road	$50,000	$100,000	City, Developer Exactions
North 1st Avenue	Sidewalk from Wade Street to Shafford Avenue	$125,000	$250,000	City, Developer Exactions
North 2nd Avenue	Sidewalk from Wade Street to Shafford Avenue	$125,000	$250,000	City, Developer Exactions
South 4th Avenue	Sidewalk from Currin Street to Reagan Hill Road	$195,000	$390,000	City, Developer Exactions
Coupland Road	Sidewalk from the Cemetery Road to the UGB	$425,000	$850,000	City, Developer Exactions
Pierce Street	Sidewalk from 1st Avenue to 6th Avenue	$125,000	$250,000	City, Developer Exactions
Wade Street	Sidewalk from 2nd Avenue to 6th Avenue	$100,000	$200,000	City, Developer Exactions
OR 224 Pedestrian Crossing	Crossing at 2nd Avenue intersection	-	-	City, ODOT
OR 224 Pedestrian Crossing	Crossing at Wade Street intersection	-	-	City, ODOT
Total		**$2,910,000**	**$5,820,000**	

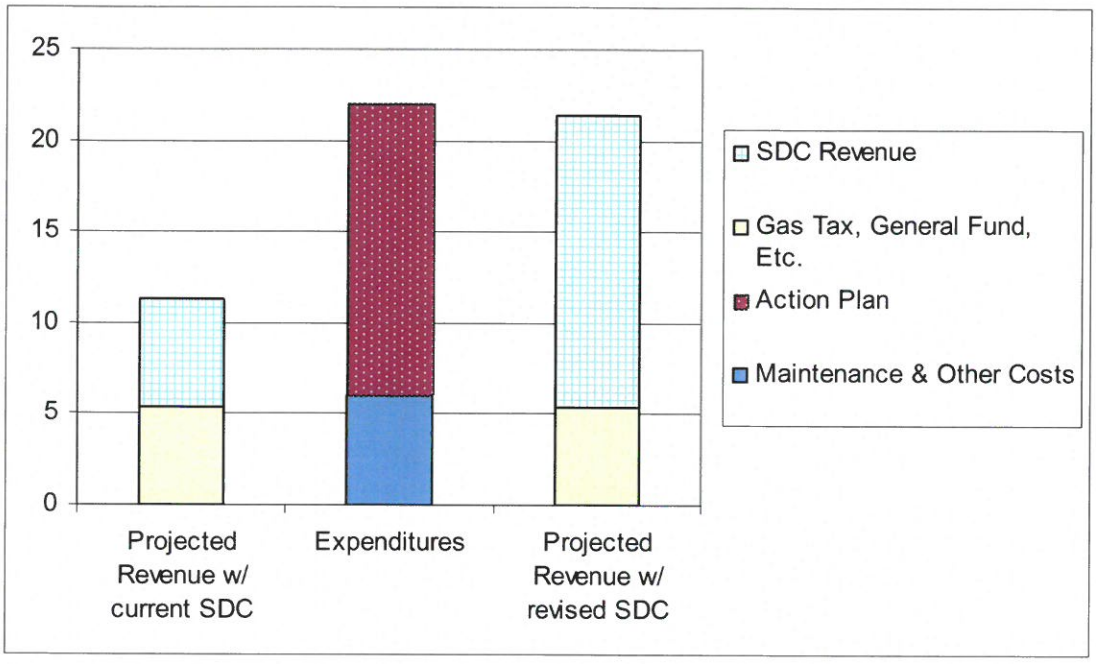
*Estimated cost assumes a portion of project costs are funded by ODOT contributions or exactions from development projects.

**Identification of ODOT as the responsible jurisdiction does not constitute a commitment by ODOT to fund the improvement. Funding decisions are made through the STIP (State Transportation Improvement Program) process.

TSP Financial Summary

A summary of TSP transportation financing is illustrated in Figure 10-1. The figure shows projected revenues with current SDC rates to be $11.3 million. Funding of the Transportation Master Plan and other expenditures including maintenance totals $22.1 million. By raising SDC rates 167%, projected revenues are increased to $21.4 million. The remaining gap for maintenance, lighting, striping, signing and other expenses would need to be covered by other revenue sources as described in the following section.

Figure 10-1: Estacada TSP Financial Summary (Million $)



New Funding Sources and Opportunities

The new transportation improvement projects and recommended programs will require funding beyond the levels currently collected by the City. There are several potential funding sources for transportation improvements which are summarized below. These are sources that have been used in the past by agencies in Oregon. In most cases, these funding sources, when used collectively, are sufficient to fund transportation improvements for local communities. Due to the complexity of today's transportation projects, it is necessary to seek several avenues of funding. Unique or hybrid funding of projects generally would include these funding sources combined in a new package.

Transportation program funding options range from local taxes, assessments, and charges to state and federal appropriations, grants, and loans. All of these resources can be constrained based on a variety of factors, including the willingness of local leadership and the electorate to burden citizens and businesses; the availability of local funds to be dedicated or diverted to transportation issues from other competing City programs; and the availability and competitiveness of state and federal funds. Nonetheless, it is important for the City to consider all of its options and understand where opportunities exist to provide and enhance funding for its transportation programs.

The following funding sources have been used by cities to fund the capital and maintenance aspects of their transportation programs, and should be considered by the City to address needs identified in the Transportation System Plan.

General Fund Revenues

At the discretion of the City Council, the City can allocate General Fund revenues to pay for its Transportation program. (General Fund revenues primarily include property taxes, use taxes, and other miscellaneous taxes and fees imposed by the City.) Allocation is completed as a part of the City's annual budget process, and funding for transportation is constrained by competing community priorities set by the City Council. General Fund resources can fund any aspect of the program, from capital improvements to operations, maintenance, and administration. General fund revenues have been used in Estacada to help fund the street fund, but those revenues are exceeded by expenditures for administrative costs such as payroll, benefits, and services. Additional revenues available from this source to fund new aspects of the Transportation program would only become available to the extent that either General Fund revenues increase or City Council directs and diverts funding from other City programs.

Voter-Approved Local Gas Tax

Communities such as Sandy, Woodburn, and Tillamook have adopted local gas taxes by public vote. In Sandy, the tax is one cent per gallon, paid to the city monthly by fuel distributors. The process for presenting such a tax to voters would need to be consistent with State as well as City of Estacada laws.

Street Utility Fee Revenue

A number of Oregon cities supplement their street funds with street utility fees. Metro cities with adopted street utility fees include Lake Oswego, Wilsonville and Tualatin. Establishing user fees to fund applicable transportation activities and/or capital construction ensures that those who create the demand for service pay for it proportionate to their use. The street utility fees are recurring monthly or bi-monthly charges paid by all residential, commercial, industrial, and institutional users. The fees are charged proportionate with the amount of traffic generated, so a retail commercial user pays a higher rate than a residential user. Typically, there are provisions for reduced fees for those that can demonstrate they use less than the average rate implies, for example, a residence without automobile or truck ownership.

From a transportation system health perspective, creating a street utility fee would help to support the ongoing viability of the program by establishing a source of reliable, dedicated funding for that specific function. Fee revenues can be used to secure revenue bond debt to finance capital construction. A street utility can be formed by Council action and does not require a public vote.

A preliminary estimate for street utility fee revenue in Estacada ranges between $70,000 to $130,000 annually, based on average rates charged around the state. A specific fee study would be necessary to establish a fee program for the City of Estacada to determine specific allocations for residents and businesses.

Expanded SDC Rate for Transportation

The City's transportation SDC rate is within the typical range in Oregon. At the current rate of $211.60 per trip, a single family residence is charged approximately $2,025. A typical transportation SDC in Oregon is $2,000 per single family residence. However, without an increase in funding, operational deficiencies would not be addressed through a reasonably funded Transportation Master Plan. Because funds collected at the current SDC rate would not provide adequate funding for identified projects (including most newly proposed roadways which provide improved connectivity and/or new capacity for motor vehicles as well as sidewalks for pedestrians and facilities for bicycles), it is suggested that the SDC program and rate be re-examined to adjust for the TSP recommended Transportation Master Plan.

By increasing the current rate, the SDC program would provide funding for the Transportation Master Plan listed in Table 10-4. As part of construction of new roadways, appropriate bicycle and pedestrian facilities will be constructed in accordance with roadway design standards for the designated functional class of the roadway.

Other Funding Sources

Urban Renewal District

An Urban Renewal District (URD) is a tax funded district within a City. URDs are funded with the incremental increases in property taxes that result from construction of infrastructure improvements. This type of tax increment financing has been used in Oregon since 1960. It is tax-increment funded rather than fee-funded and can provide for renewal that includes, but is not limited to, transportation projects. Downtown Estacada is currently being proposed for designation as an URD.

Local Improvement District Assessment Revenue

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

Direct Appropriations

The City can seek direct appropriations from the State Legislature and / or U.S. Congress for transportation capital improvements. There may be projects identified in the Transportation Master Plan for which the City may want to pursue these special, one-time appropriations.

Special Assessments

A variety of special assessments are available to be used in Oregon to defray costs of sidewalks, curbs, gutters, street lighting, parking and CBD or commercial zone transportation improvements. These assessments would fall within the Measure 50 limitations. A regional example from Portland would be the Westside LRT where the local share of funding was voter approved as an additional property tax.

Employment Taxes

TriMet collects a tax for transit operations in the Portland region, including Estacada, through payroll and self employment taxes. Approximately $145 million are collected annually in the Portland region for transit.

Debt Financing

While not direct funding sources, debt financing can be used to mitigate the immediate impacts of significant capital improvement projects and spread costs over the useful life of a project. Though interest costs are incurred, the use of debt financing can serve not only as a practical means of funding major improvements, but is also viewed as an equitable funding strategy, spreading the burden of repayment over existing and future customers who will benefit from the projects. The caution in relying on debt service is that a funding source must still be identified to fulfill annual repayment obligations.

Voter-Approved General Obligation Bond Proceeds: Subject to voter approval, the City can issue General Obligation (G.O.) bonds to debt finance capital improvement projects. G.O. bonds are backed by the increased taxing authority of the City, and the annual principal and interest repayment is funded through a new, voter-approved assessment on property City-wide (a property tax increase). Depending on the critical nature of projects identified in the Transportation Master Plan, and the willingness of the electorate to accept increased taxation for transportation improvements, voter-approved G.O. bonds may be a feasible funding option for specific projects. Proceeds may not be used for ongoing maintenance.

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

Oregon Transportation Infrastructure Bank

The Oregon Transportation Infrastructure Bank is a statewide revolving loan fund started as part of a federal pilot program. The fund is designed to promote innovative financing solutions to transportation needs.

Oregon Immediate Opportunity Fund

The Oregon Immediate Opportunity Fund (IOF) provides grant funding needed for street or road improvements to influence the location or retention of a firm, revitalize business or industrial centers, and prepare Oregon Certified Project Ready Industrial Sites. Maximum grant limits range from $250,000 to $1,000,000 depending on the nature of the request.

Recommended Funding Strategies

The City Council will determine and recommend any funding strategies needed to address shortfalls in revenue needed to implement the TSP.

Consideration could be given to the adoption of street utility fees, which can provide a stable source of dedicated revenue for transportation system operations and maintenance and / or capital construction. A street utility fee program can be initiated by City Council action, and billed through the City utility billing system. Rate revenues can also secure revenue bond debt if used to finance capital improvements.

It is also recommended the City consider updating its transportation SDC with a 167% increase to cover the new City funded capital projects identified in the TSP Master Plans for which existing funding is inadequate. This would help to ensure that local growth pays its fair share of new transportation facilities that are required to serve future development. Exactions may also be used to fund new roadways which support mobility for new developments and mitigate impacts of new developments on existing roadway infrastructure. A local gas tax is also recommended to provide a reliable transportation program revenue source. In addition, the City should actively pursue grants and other special program funding in order to mitigate the costs to its citizens of transportation capital construction.

11. Plan Implementation Recommendations

Introduction

The following document recommends changes to bring the Estacada Comprehensive Plan and Development Code into consistency with the state Transportation Planning Rule (TPR) and other state, county and local Plans. These recommendations are based in part on those recommendations made in the Background Plan and Document Review, and with comments from Technical Advisory Committee members.

Comprehensive Plan and Development Code Changes

Proposed changes are identified in the table below. Language that is recommended for deletion is ~~struck out~~ and proposed new language is highlighted in yellow. It is worth noting that in the subject tables below, some recommendations are contingent on, or rely on, the acceptance of other recommendations within that same subject table (i.e. if one recommended change within subject table is implemented, the other recommended changes within that same subject table must also be implemented to ensure the proper effect of the change).

Incorporation of TPR Goals into the Plan: Addressing TRP goals (OAR 660-012)	
Comprehensive Plan Deficiency: The Comprehensive Plan does not incorporate the overarching goals of the Oregon Transportation Planning Rule (TPR) into the goals of the City.	**Comprehensive Plan Recommendation:** The Comprehensive Plan should be modified to incorporate the twin overarching goals of the TPR. These are to reduce automobile use and create a connection between transportation planning and land use planning. Policy statement 6, under Goal 12 (Transportation Element) of the Estacada Comprehensive Plan should be modified as follows: 6. The City shall establish a strong connection between transportation and land use planning, and in both will strive to reduce and discourage dependence on automobile travel, single occupancy vehicle use, and drive-in land uses. The goal is to develop a transportation system with safe and attractive options for walking, bicycling and transit, and land uses which support these alternative travel modes.

Public Transportation Facilities and Maintenance: Addressing TPR, ORS 660-012-0020(2)(c)(A),(B) and (C)	
Comprehensive Plan Deficiency: The Comprehensive Plan does not include policy that enables the establishment of the types of public transportation facilities and maintenance which should be allowed as outright or conditional uses in the City's land use districts. **Code Deficiency:** The Code does not indicate whether public transportation improvement and maintenance projects are allowed in its zoning districts. To comply with the TPR, the City's code must specify what kinds of public transportation facilities and activities are permitted in each district.	**Plan Recommendation:** To allow for necessary and desirable transportation facilities and maintenance, the following policy statement should be added to the list of policy statements under Goal 12 (Transportation Element) of the City's Plan. Recommended (new) Policy Statement 7: 7. The City shall allow the development of public transportation facilities and maintenance activities in its zoning districts and establish clear standards for their development and use. **Code Recommendation:** The zoning sections of the Estacada Code should be modified to include transportation facilities as an outright use in each of the City's zones. Each applicable zoning district should allow, as an outright use, transportation facilities including public improvements of streets, transit stops and stations, parking (outright in commercial, conditional in residential), and bicycle and pedestrian facilities, and operation, maintenance, preservation, and construction of these facilities. Because revisions are required for each applicable zoning district, the recommended changes to the permitted use sections of each zone in the code are not presented here. Furthermore, public transportation facilities and improvements that are not part of the City's Comprehensive Plan and are not specifically mentioned as outright uses in the zoning districts should be allowed in all districts as conditional uses. This serves as a catch-all for any necessary facilities not specifically identified in the City's code or policy language, while retaining the approval criteria for conditional uses. This can be achieved by making the Code changes below. **Additional Code Changes:** **16.88.010(A)** A. The use is listed as a conditional use in the underlying district , or is a use for public transportation improvements and maintenance as defined in section 16.88.015.

	Recommended (new) Code Section 16.88.015 for Conditional Public Transportation Uses: 16.88.015 Criteria for Conditional Use for Certain Public Transportation Facilities and Maintenance. The planning commission may allow a conditional use for the operation, maintenance, preservation, and construction of public transportation facilities beyond those listed as outright uses in the city's zoning districts. Public transportation uses under this section must satisfy the conditional use requirements listed in 16.88.010 and are subject to the same requirements as other conditional uses listed in the City's zoning districts.

Vehicular Access and Circulation Control Addressing TPR, OAR 660-12-045(2)(a)	
Comprehensive Plan Deficiency: The Plan does not include a policy to ensure that new developments and uses provide safe and efficient access and circulation for vehicles	**Comprehensive Plan Recommendation:** The Plan should enable the City to set regulations and standards for vehicular access and circulation to promote safe and efficient vehicle access to streets and developments. The Plan should adopt the following policy language as policy number 8, under goal 12 of the City's Comprehensive Plan. Recommended New Policy Statements: 8. The City shall set standards to ensure that new development and or modified land uses provide safe and efficient access and circulation for vehicles and pedestrians. 9. The City shall coordinate land use planning and development review with ODOT to address Oregon Highway Plan access management standards for OR 211 and OR 224 within the City.
Code Deficiency: The code does not provide street access spacing requirements which are needed to ensure efficient and safe access.	**Code Recommendations:** Public street standards should specify access spacing for various street classifications. In addition, proposed new provisions for shared parking and internal circulation requirements for large or multi-parcel commercial developments can minimize the need for access points. The following changes are recommended.

	Recommended Addition to Section 16.116.030: Under section 16.116.030, the table labeled "Roadway Classifications and Guidelines" should be re-labeled "Roadway Classifications and Standards". This will facilitate enforcement and encourage conformity. The "Roadway Classifications and *Standards*" table should also be modified to set standards for the minimum distance between access points. The table should be modified to include a new column labeled "minimum distance between accesses", specifying the minimum distance required from a proposed street access to a street intersection, driveway, or other street access. Under this new column the City should include minimum access spacing for each classification of roadway. **Recommended Additions to 16.116.010** (New) Section 16.116.010(G) should include the following additions: G. Access[53] 1. Choice of Access Points. When a lot or parcel abuts two or more streets of different classifications under 16.116.030, the lot or parcel's access point shall connect with the road of the lesser classification. For example, access points on local streets shall be preferred to access points on collectors. The planning commission has the discretion to grant a variance from this requirement if, in the commission's opinion, the site conditions or topography make a variance appropriate. 2. When Abutting an Arterial Street. Property access to abutting arterials shall be minimized. Where such access is necessary, shared driveways may be required by the planning commission in conformance with the Code. 3. Access Point Spacing Standards. New and modified accesses shall conform to this and other sections of the Code. a. Except as provided under subsection iii, below, the distance from a street intersection to a driveway or other street access shall meet the minimum spacing requirements for the street' classification specified in section 16.116.030. b. New property access shall not be permitted within fifty (50) feet of an intersection unless no other reasonable access to the property is available. Where no other alternatives exist, the planning

[53] **Note:** The following recommended language includes subsection numbers to indicate an appropriate location for the new or revised language in the code. Subsequent subsections are not listed, but will need to be **renumbered** to accommodate the new section in the recommended location.

commission may allow construction of an access connection at a point less than 50 feet from an intersection, provided the access is as far away from the intersection as possible. In such cases, the planning commission may impose turning restrictions (i.e., right in/out, right in only, or right out only);

c. The planning commission may reduce required separation distance of access points where they prove impractical due to lot dimensions, existing development, other physical features, or conflicting code requirements.

4. Off-Street Parking Access. Access to and from off-street parking areas shall not permit backing onto a public street, except for single-family dwellings;

5. Joint and Cross Access - Requirement. The number of driveway and private street intersections with public streets should be minimized by the use of shared driveways for adjoining lots where feasible. When necessary for traffic safety and access management purposes, or to access flag lots, the city may require joint access and/or shared driveways in the following situations as follows:

a. For shared parking areas;

b. For adjacent developments, where access onto an arterial is limited;

c. For multi-tenant developments, and developments on multiple lots or parcels. Such joint accesses and shared driveways shall incorporate all of the following:

i. A continuous service drive or cross-access corridor that provides for driveway separation consistent with the applicable transportation authority's access management classification system and standards;

ii. A design speed of 10 miles per hour and a maximum width of 20 feet, in addition to any parking alongside the driveway; additional driveway width or fire lanes may be approved when necessary to accommodate specific types of service vehicles, loading vehicles, or emergency service provider vehicles;

iii. Driveway stubs to property lines (for future extension) and other design features to make it easy to see that the abutting properties may be required with future development to connect to the cross-access driveway;

6. Joint and Cross Access – Reduction in Required Parking Allowed. When a shared driveway is provided or required as a condition of approval, the land uses adjacent to the shared driveway may have their minimum parking standards reduced in accordance with the shared parking provisions of 16.76.010(C)

7. Joint and Cross Access – Easement and Use and Maintenance

	Agreement. Pursuant to this Section, property owners shall: a. Record an easement with the deed allowing cross-access to and from other properties served by the joint-use driveways and cross-access or service drive; b. Record an agreement with the deed that remaining access rights along the roadway for the subject property shall be dedicated to the City and pre-existing driveways will be closed and eliminated after construction of the joint-use driveway; c. Record a joint maintenance agreement with the deed defining maintenance responsibilities of property owners.

Block Length and Perimeter Addressing TPR, OAR 660-12-045(2)(a)	
Code Deficiency: The Code's current uniform maximum block length is much longer than recommended lengths, does not address maximum perimeters, and makes no allowances for different zoning districts.	**Code Recommendation:** The Code should decrease the current maximum block length of one thousand two hundred (1200) feet, and specify new maximum block lengths and perimeters for each zoning district. **Code Changes to 16.116.010:** Subsection "N" from Code section 16.116.010 should be stricken and replaced by the following language; recommended lengths are [*italicized in brackets*]). 16.116.010 N. Block Length. In order to promote efficient vehicular and pedestrian circulation throughout the city, block lengths between street lines shall adhere to the following standards. 1. Residential Districts: Minimum of [*100*] foot block length and maximum of [*600*] length; maximum [*1,400*] foot block perimeter; 2. Commercial Districts: Minimum of [*100*] foot length and maximum of [*600*] foot length; maximum [*1,400*] foot perimeter; 3. Not applicable to Industrial or Open Space Districts.

Bicycle Parking Addressing TPR, OAR 660-012-0045(3)	
Code Deficiency: The Code currently does not require permanent bicycle parking for new development or uses.	**Code Recommendation:** Both the Comprehensive Plan and the TPR state as a policy objective that the city should promote non-vehicular modes of transportation. To further this goal the city should require the creation of permanent bicycle parking spaces for certain types of development. These requirement should be located in section 16.76.010 **Changes to Code:** It is recommended that section 16.76.010 be amended as follows and that the chapter and section title be changed. 16.76.010 Off-~~s~~Street ~~p~~Parking, Bicycle Parking, and ~~off-street l~~Loading Requirements. R. Bicycle Parking. 1. Minimum Required Bicycle Parking Spaces. Uses shall provide long- and short-term bicycle parking spaces, as designated in Table in this section. Where two options are provided (e.g., 2 spaces, or 1 per 8 bedrooms), the option resulting in more bicycle parking is used. 2. Exemptions. This Section does not apply to single-family and two-family housing (attached, detached, or manufactured housing), home occupations, agriculture and livestock uses. 3. Location and Design. Bicycle parking should be no farther from the main building entrance than the distance to the closest vehicle space, or 50 feet, whichever is less. Long-term (i.e., covered) bicycle parking should be incorporated whenever possible into building design. Short-term bicycle parking, when allowed within a public right-of-way, should be coordinated with the design of street furniture., as applicable. 4. Visibility and Security. Bicycle parking for customers and visitors shall be visible from street sidewalks or building entrances to provide sufficient security from theft and damage; 5. Options for Storage. Long-term bicycle parking requirements for multiple family uses and employee parking can be met by providing a bicycle storage room, bicycle lockers, racks, or other secure storage space inside or outside of the building; 6. Lighting. For security, bicycle parking shall be at least as well lit as vehicle parking.. 7. Reserved Areas. Areas set aside for bicycle parking shall be

	clearly marked and reserved for bicycle parking only. 8. Hazards. Bicycle parking shall not impede or create a hazard to pedestrians. If the City adds a bicycle parking requirement, like that recommended above, section 16.76.010 must add a table or other instrument outlining the bicycle parking requirements for different uses. See example below.

Example: Bicycle Parking Table

Minimum Required Bicycle Parking Spaces			
Use Categories	**Specific Uses**	**Long-term Spaces** (covered or enclosed)	**Short-term Spaces** (near building entry)
Residential Categories			
Household Living	Multifamily	1 per 4 units	2, or 1 per 20 units
Group Living		2, or 1 per 20 bedrooms	None
	Dormitory	1 per 8 bedrooms	None
Commercial Categories			
Retail Sales And Service		2, or 1 per 12,000 sq. ft. of floor area	2, or 1 per 5,000 sq. ft. of floor area
	Lodging	2, or 1 per 20 rentable rooms	2, or 1 per 20 rentable rooms
Office		2, or 1 per 10,000 sq. ft. of floor area	2, or 1 per 40,000 sq. ft. of floor area
Commercial Outdoor Recreation		8, or 1 per 20 auto spaces	None
Major Event Entertainment		8, or 1 per 40 seats or per CU review	None
Industrial Categories			
Manufacturing And Production		2, or 1 per 15,000 sq. ft. of floor area	None
Warehouse And Freight Movement		2, or 1 per 40,000 sq. ft. of floor area	None
Institutional Categories			
Basic Utilities	Bus transit center	8	None
Community Service		2, or 1 per 10,000 sq. ft. of floor area	2, or 1 per 10,000 sq. ft. of floor area
	Park and ride	8, or 5 per acre	None

Minimum Required Bicycle Parking Spaces			
Use Categories	**Specific Uses**	**Long-term Spaces** (covered or enclosed)	**Short-term Spaces** (near building entry)
Parks (active recreation areas only)		None	8, or per CU review
Schools	Grades 2-5	1 per classroom, or per CU review	1 per classroom, or per CU review
	Grades 6-12	2 per classroom, or per CU review	4 per school, or per CU review
Colleges	Excluding dormitories (see Group Living, above)	2, or 1 per 20,000 sq. ft. of net building area, or per CU review	2, or 1 per 10,000 sq. ft. of net building area, or per CU review
Medical Centers		2, or 1 per 70,000 sq. ft. of net building area, or per CU review	2, or 1 per 40,000 sq. ft. of net building area, or per CU review
Religious Institutions and Places of Worship		2, or 1 per 4,000 sq. ft. of net building area	2, or 1 per 2,000 sq. ft. of net building area
Daycare		2, or 1 per 10,000 sq. ft. of net building area	None
Other Categories			
Other Categories	Determined through Land Use Review, Site Design Review, or CU Review, as applicable		

Public Access Ways Addressing TPR, OAR 660-012-0045(3)	
Code Deficiency: The current Public Access Ways section, 16.116.010(G), does not specifically allow the city to require certain access way facilities, such as lighting for safety, or a requirement for hard surface construction. Additionally, the section calls for dedication; a requirement for easements rather than dedication is recommended.	**Code Recommendation:** When the commission deems it reasonable to require an access way as part of a subdivision it can do so either by easement or dedication. The Code currently allows the commission to require a dedication when appropriate.[54] In that situation the city takes title and control of the access way. When the city takes an easement, the landowner keeps title to the access way and therefore has an interest in maintaining the access way, and can be required to do so. In this way an easement may be preferable to a dedication. The following recommendation changes the commission's power to require dedications to require easements. The remainder of the recommendation below can be adopted even if the City decides to retain the existing requirement for dedication. 16.116.010 G. Public Access Ways. When necessary for public convenience and safety, the city may require a subdivider to ~~dedicate to the~~ provide the City with an easement for public access ways ten (10) to twenty (20) feet in width to connect cul-de-sacs, to pass through oddly shaped or unusually long blocks, to provide for networks of public paths according to adopted plans or to provide access to schools, parks, collector or arterial pedestrian facilities, or other public areas, and be of such design and location as reasonably required to facilitate public use. Determinations of necessity regarding need, location, and design of access ways will be made by the commission at the commission's discretion, taking into consideration the requirements in City Code Chapter 12/Driveways. 1. The commission may require lighting, landscaping, setbacks, specific access way surfacing, or other design elements to ensure the safety, ease of use, and efficiency of the access way.

[54] Section 16.120.020 (E)(3)(f) (Procedure for land partitioning) states that public street dedication is required, if applicable, as set forth in the process in Section 16.116.040. City acceptance of the road must be complete prior to final approval of the partition;

Amendments Addressing TPR, OAR 660-12-0060	
Code Deficiency: The current regulations do not ensure that amendments to land use designations, densities, and design standards are consistent with the functions, capacities and levels of service of facilities identified in the TSP.	**Code Recommendation:** It is recommended that the city amend the code to include clarification that approval of amendments to land use designations, densities, and design standards is contingent on findings of consistency with the planned transportation system, as adopted in the City's TSP. To comply with the Rule, it is recommended that a new Section 16.128.050, Transportation Planning Rule Compliance, be added to the Amendments section. The purpose of this subsection is to specify how land use amendments are to comply with the TPR. New language is included to provide guidance in determining when a code amendment is considered to have an impact on transportation facilities. The new subsection also discusses how to ensure that proposed amendments to the comprehensive plan or to the development code are consistent with the TSP when the amendment significantly affects a transportation facility. These proposed code amendments are consistent with OAR 660-12-0060, which requires that amendments to functional plans, acknowledged comprehensive plans, and land use regulations that significantly affect an existing or planned transportation facility must ensure that the allowed land uses are consistent with the identified function, capacity, and performance standards of the facility. 16.128.050 Transportation Planning Rule Compliance A. Review of Applications for Effect on Transportation Facilities. When a development application includes a proposed comprehensive plan amendment, zone change, or land use regulation change, the proposal shall be reviewed to determine whether it significantly affects a transportation facility, in accordance with Oregon Administrative Rule (OAR) 660-012-0060 (the Transportation Planning Rule – "TPR"). "Significant" means the proposal would: 1. Change the functional classification of an existing or planned transportation facility (exclusive of correction of map errors in an adopted plan); 2. Change standards implementing a functional classification system; or 3. As measured at the end of the planning period identified in the adopted transportation system plan:

	a. Allow land uses or levels of development that would result in types or levels of travel or access that are inconsistent with the functional classification of an existing or planned transportation facility; b. Reduce the performance of an existing or planned transportation facility below the minimum acceptable performance standard identified in the TSP or comprehensive plan; or c. Worsen the performance of an existing or planned transportation facility that is otherwise projected to perform below the minimum acceptable performance standard identified in the TSP or comprehensive plan. B. Amendments That Affect Transportation Facilities. Amendments to the comprehensive plan and land use regulations that significantly affect a transportation facility shall ensure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the TSP. This shall be accomplished by one or a combination of the following: 1. Adopting measures that demonstrate allowed land uses are consistent with the planned function, capacity, and performance standards of the transportation facility. 2. Amending the TSP or comprehensive plan to provide transportation facilities, improvements or services adequate to support the proposed land uses consistent with the requirements of -0060 of the TPR. 3. Altering land use designations, densities, or design requirements to reduce demand for automobile travel and meet travel needs through other modes of transportation. 4. Amending the TSP to modify the planned function, capacity or performance standards of the transportation facility. C. Traffic Impact Statement. A Traffic Impact Statement (TIS) shall be submitted at the pre-application meeting by the applicant. The TIS shall include documentation of the anticipated traffic impact associated with the proposed land use action and a judgment whether or not the proposed action would result in an increase, decrease, or no change in the amount of traffic allowed by current land use regulation. The TIS shall be signed by an Oregon registered Traffic Engineer. D. Traffic Impact Analysis. Based on review of the TIS, the City may require submittal of a Traffic Impact Analysis (TIA). The TIA shall be prepared in accordance with City regulations and submitted with the land use application for a comprehensive plan amendment, land use zoning district amendment, or land use regulation amendment.