Estacada Transportation System Plan

Adopted: August 2007
Updated: June 2011 with Downtown and Riverside Area Plan, October 2016 with the Street Tree Master Plan, and September 2018 with Active Transportation Plan
Acknowledgements

2007 TSP Consultant Staff

John Bosket
DKA Associates, Inc.

Mat Dolata
DKS Associates, Inc.

D.J. Hefferman
Angelo Planning Group

2007 TSP Consultant Staff

Randy Ealy
City of Estacada

Chris Randall
City of Estacada

Sonya Kazen
Oregon Dept. of Transportation

2007 TSP Consultant Staff

Curt McLeod
Curran-McLeod

Mike McCallister
Clackamas County / Estacada Planning

Larry Olson
ODOT District 2C Maintenance

Alan Hull
Estacada Rural Fire District

Stacy Humphry
Dept. of Land Conservation & Development

Jason Grassman
Oregon Dept. of Transportation

Matt Crall
Dept. of Land Conservation & Development

Bill Mattes
Estacada School District
Acknowledgements (continued)

2007 TSP Citizens Advisory Committee

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<tr>
<th>Name</th>
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<tr>
<td>Steve Guilliams</td>
<td>Estacada Parks &amp; Recreation Commission</td>
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<tr>
<td>Bob Sanders</td>
<td>Quadrant Homes</td>
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<tr>
<td>Emil Hnidey</td>
<td>Infrastructure &amp; Budget Committee</td>
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<td>Steve Mueller</td>
<td>Westland Realty</td>
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<td>Robert Taylor</td>
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<td>Michael O’Meara</td>
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<td>Ken Oliver</td>
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<td>Dennis Anderson</td>
<td>Cascade Utilities</td>
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<tr>
<td>Mike Park</td>
<td>Mike Call</td>
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<td>Park Development, LLC</td>
<td>Estacada School District</td>
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<td>Alan Rademacher</td>
<td>Citizen</td>
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2007 TSP Estacada Planning Commission

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<tr>
<td>Allen Cameron</td>
<td>– Chair</td>
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<td>John James</td>
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<td>Dennis Anderson</td>
<td>Tom Sager – Vice Chair</td>
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<tr>
<td>Michael Ennis</td>
<td>David Piper</td>
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<td>Emil Hnidey</td>
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2007 TSP City Council

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<tr>
<td>Robert Austin</td>
<td>– Mayor</td>
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<td>Norm Ernst</td>
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<td>Becky Arnold</td>
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<td>Richard Hartwig</td>
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<tr>
<td>Michele Conditt</td>
<td>Kay Nelson</td>
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<td>Brent Dodril</td>
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The 2007 Estacada Transportation System Plan described in this document was partially funded by the Oregon Department of Transportation. The contents of this document do not necessarily reflect views or policies of the State of Oregon.
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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.

Between 1999 and 2007, there were significant changes in regional and statewide planning efforts and requirements and plan development, in addition to continued growth in Estacada and surrounding communities, which pressed the need to update the City’s TSP. A comprehensive TSP update in 2007 was aimed at fulfilling new Transportation Planning Rule (TPR) requirements for comprehensive transportation planning in the cities of Oregon and at presenting 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 document here, which is the City’s current TSP, originated from the 2007 effort. It was amended in 2011 with the adoption of the Downtown and Riverside Area Plan to incorporate certain transportation provisions related to those areas. It was again updated in October 2016 to include a Downtown area Street Tree Master Plan and yet again in September 2018 to incorporate active transportation planning priorities resulting from a 2017-2018 community planning process.

This current 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. The TSP, which has been updated with the supplemental Downtown and Riverside Area Plan, Street Tree Master Plan, and the Active Transportation Plan, each adopted herein by reference, identifies how land use and transportation decision-making can be coordinated for community benefit. This first chapter of the overall TSP summarizes the originating 2007 TSP update process, 2007 study goals, modal plans, and financing options, all of which are discussed in more detail in the following chapters and related supplemental plans.
2007 TSP Update Process and Public Involvement

The 2007 Estacada TSP update process included the following steps:

- Update 1999 transportation 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 2007 transportation 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 2007 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.

2007 Study Goals

As it does today in Chapter 11 of the City’s Comprehensive Plan, the City’s Comprehensive Plan in 2007 laid out a general policy framework for transportation services, which is used to set more specific goals and policies. 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 City’s 1999 Draft TSP described earlier were chosen to guide the development and evaluation of alternatives, select a preferred transportation plan, and prioritize improvements in preparing the 2007
TSP. Between 1999 and 2007, there had also been changes to state transportation plan policies and regulations that were addressed as a part of this TSP. Therefore, in addition to retaining 1999 transportation policies that were still applicable in 2007, new policies were recommended to incorporate state initiatives within the City and County relevant to transportation facilities. The specific areas of the changes addressed 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, it was determined the City should formalize its application of neighborhood traffic management tools.

- Transportation Planning Rule (TPR) – Before the 2007 update, the Oregon Land Conservation and Development Commission adopted amendments to the TPR in OAR 660-120060 that clarified 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 2007 TSP update are outlined below. The policies identified to implement the goals are described in TSP 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 in 2007 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 originally compiled for each transportation mode, which was designed to comply with relevant state and adjoining jurisdictions planning documents. Yet the 2007 TSP was again updated in 2011 with the adoption of the Downtown and Riverside Area Plan, in 2016 with the adoption of the Street Tree Master Plan, and in 2018 with the adoption of the City’s Active Transportation Plan. This current document here formally incorporates these updates’ amendments, including to the pedestrian and bicycle modal Master Plans updated with the 2018 Active Transportation Plan. The following sections summarize the Master Plans for each mode, as amended.

Pedestrians (TSP Chapter 5)

The 2007 TSP identified certain transportation improvements necessary to provide a connected pedestrian network within Estacada based on 2007 data and priorities. These data and priorities were updated during an active transportation planning process between 2017 and 2018 and are detailed separately in the City’s adopted Active Transportation Plan. Chapter 5 of this TSP hereby incorporates the pedestrian-related provisions of the Active Transportation Plan and lists the pedestrian-related transportation policies that shall serve as a basis for transportation system development.

Bicycles (TSP Chapter 6)

The City had a Bicycle Master Plan in its 2007 TSP that identified transportation improvements necessary to provide a connected bicycle network within the City of Estacada, focusing on arterial and collector roadways. The City’s bicycle-related transportation priorities were amended in 2018 with the adoption of the separate Active Transportation Plan. Chapter 6 of this TSP hereby incorporates the bicycle-related provisions of the Active Transportation Plan and outlines bicycle-related transportation policies.

Transit (TSP 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 and the City’s Active Transportation Plan, 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 (TSP 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**
A 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 in the 2007 TSP update process. 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 general 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 and standards for specific transportation routes provided in the City’s Active Transportation Plan.

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. Recommendations for specific routes in the City’s Active Transportation Plan shall take precedence over the general cross-section standards provided in this TSP.

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 the City’s Active Transportation Plan.

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 on the next page in Table 1-1.
Table 1-1: Motor Vehicle Master Plan Projects, in 2007 TSP

<table>
<thead>
<tr>
<th>Project</th>
<th>Improvement</th>
<th>Estimated City Cost</th>
<th>Estimated Total Costs</th>
<th>Potential Funding Sources**</th>
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<tr>
<td>OR 224 / River Mill Intersection</td>
<td>Add left turn lane on westbound approach</td>
<td>$275,000</td>
<td>$550,000</td>
<td>City, ODOT, Developer Exactions</td>
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<tr>
<td>Main St. Realignment at OR 211 / OR 224</td>
<td>Realign Main St. to intersect at north approach of OR 211 / OR 224</td>
<td>$1,500,000</td>
<td>$3,000,000</td>
<td>City, ODOT, Developer Exactions</td>
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<td></td>
<td>Intersection, Add left turn lane on eastbound and southbound approaches.</td>
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<tr>
<td>Main St. / OR 211 / OR 224 Intersection</td>
<td>Construct traffic signal at reconfigured intersection.</td>
<td>$150,000</td>
<td>$300,000</td>
<td>City, ODOT, Developer Exactions</td>
</tr>
<tr>
<td>OR 224 / New Collector Roadway (between Evergreen Ave. and River Mill Rd.)</td>
<td>Add right turn lane on northbound approach, left turn lane on southbound approach, and construct traffic signal.</td>
<td>$1,350,000</td>
<td>$2,700,000</td>
<td>City, ODOT, Developer Exactions</td>
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<td>Eagle Creek Rd. / River Mill Rd. Intersection</td>
<td>Add left turn lane on northbound approach.</td>
<td>$43,000</td>
<td>$85,000</td>
<td>City, Developer Exactions</td>
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<tr>
<td>N. 6th Ave. / Cemetery Rd. Intersection</td>
<td>Add left turn lane on eastbound approach.</td>
<td>$133,000</td>
<td>$265,000</td>
<td>City, Developer Exactions</td>
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<td>N. 6th Ave. Extension</td>
<td>New roadway from Eagle Creek Rd. to OR 224 at Evergreen Ave.</td>
<td>$280,000</td>
<td>$670,000</td>
<td>City, Developer Exactions</td>
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<td>Industrial Way Extension</td>
<td>New roadway from Evergreen Rd. to River Mill Rd.</td>
<td>$140,000</td>
<td>$1,020,000</td>
<td>City, Developer Exactions</td>
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<td>New Roadway</td>
<td>New roadway connecting Coupland Rd. to Cemetery Rd.</td>
<td>$580,000</td>
<td>$4,130,000</td>
<td>City, Developer Exactions</td>
</tr>
<tr>
<td>River Mill Rd. Extension</td>
<td>Extend River Mill Rd. to Cemetery Rd.</td>
<td>$700,000</td>
<td>$1,700,000</td>
<td>City, Developer Exactions</td>
</tr>
<tr>
<td>New Roadway</td>
<td>New roadway connecting OR 224 to Cemetery Rd.</td>
<td>$320,000</td>
<td>$2,270,000</td>
<td>City, Developer Exactions</td>
</tr>
<tr>
<td>Cemetery Rd. Extension</td>
<td>Extend Cemetery Rd. to Duus Rd.</td>
<td>$290,000</td>
<td>$2,050,000</td>
<td>City, Developer Exactions</td>
</tr>
<tr>
<td>Shafford Ave. Improvement</td>
<td>Upgrade Shafford Ave. from S. 4 Ave. N. 6th Ave.</td>
<td>$390,000</td>
<td>$390,000</td>
<td>City</td>
</tr>
</tbody>
</table>

Total: $6,151,000 $19,130,000

* 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 2007 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 (TSP 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.1

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.

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1 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](http://www.oregon.gov/Aviation/landuseguidebook.shtml)
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 programs, the City of Estacada anticipated in 2007 collecting approximately $445,000 for street construction and repair each year, which would total to approximately $10.2 million over 23 years. The costs outlined in the Transportation System Plan to implement all projects identified in the Motor Vehicle, Bicycle, and Pedestrian Master Plans totaled $25.6 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 have been responsible for to implement these projects was estimated at only $9.5 million.

In addition, it was determined 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 $17.0 million, as shown in Figure 1-1.

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2 This revenue level annualizes the expected growth over 23 years, and is a higher amount than expected for the next fiscal year.
The estimated $17.0 million in City costs for capital projects and other expenditures including maintenance were determined to exceed the expected 23-year revenue estimate of $10.2 million by approximately $6.8 million. To fund all projects in the Transportation Master Plan and CIP, SDC rates would need to be set at 123% higher than the existing rate, or approximately $472 per ELNDT (e.g. approximately $4,520 per household). This provides an additional $6.0 million in projected funding for capital projects in addition to the existing revenue projections.

While it was determined the increased SDC rate described above 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 revenue that would now be diverted to capital projects. To fund these programs, it was 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 of the 2007 TSP.

The City adopted an Active Transportation Plan in 2018, which includes estimated costs for newly recommended active transportation projects, new estimates of City transportation revenues and expenses, and updated plans for financing. Any newer figures and financing plans in the Active Transportation Plan supersede those determined more than a decade before in the 2007 TSP update effort.
2. Plans, Goals, and Policies

Overview

The original transportation-related goals and objectives established by the 1999 TSP were incorporated into the 2007 TSP to guide the development and evaluation of transportation alternatives, select a preferred transportation plan, and prioritize improvements for the City from 2007 onward. The 2007 TSP also reflected changes to state transportation plan policies and regulations made after the initial 1999 TSP was drafted.

This Chapter of the City’s current TSP lists the transportation goals and policies of the City of Estacada today, which are based on the 2007 TSP but which have been updated with the 2011 Downtown and Riverside Area Plan, 2016 Street Tree Design Plan, and 2018 Active Transportation Plan.

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) to walking, bicycling, wheelchair use, and access to transit with the use of appropriate improvements.

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, connected, attractive, 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).

Policy f. The City shall coordinate with the Estacada School District to implement any transportation system improvement on streets adjacent to School District Property.

Action: The City shall work together with the School District to determine how planned improvements in the City’s Active Transportation Plan, including those along NE 6th Avenue, might impact parking for events on School District property. The City shall also work with the School District to identify potential event parking solutions or alternative bicycle lane routes on School District property.

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 minimize trip distance by providing connectivity and limiting out-of-direction travel, without creating streets that discourage walking, wheelchair use, or biking or which encourage speeding or cut-through traffic. Local streets shall be designed to improve connectivity to activity centers such as schools, parks, community centers, and Downtown and to prioritize opportunities for pedestrian and bicycle route connections to such activity centers and places of employment. Wherever necessary, new streets built to provide connectivity shall incorporate traffic management design elements, particularly those which inhibit speeding, such as signage, pavement markings, intersection gardens, or wider sidewalks. New or improved local streets should comply with adopted street spacing standards.

Policy e. Encourage safe, accessible, attractive, and direct pedestrian and bicycle routes between homes, businesses, parks, schools, and other activity centers in Estacada and the wider area, consistent with the City’s Active Transportation Plan.

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

Policy a. Encourage the use of public transportation services and identify improvements to further promote transit in the community, all with particular concern for usable pedestrian and bicycle connections to existing and planned transit stops and facilities.

Policy b. Develop a comprehensive system of pedestrian and bicycle routes that link major activity centers (e.g. schools, parks, community centers, Downtown) and transit stops and facilities, consistent with the City’s Active Transportation Plan, through partnerships with relevant stakeholders.

Policy c. Consistent with the Clackamas County Active Transportation Plan, bicycle ways should be constructed on arterials and collectors within Estacada (with construction or reconstruction projects). All schools, parks, public facilities, transit stops, regional trails, employment centers, 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.

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 motorists, bicyclists, transit users, and pedestrians with designated and sufficiently-wide bicycle lanes, sidewalks, crossings, transit shelters, and curb ramps and with clear signage.

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. Curb ramps shall be designed to meet ADA standards, crossing signals shall include signal chirpers, and connections to transit shall be equally usable to people with limited mobility.

Policy b. Provide transportation options for the transportation disadvantaged.

Policy c. Provide transportation options that do not discourage those with reasonable noise, safety, and security concerns from walking, biking, or taking transit.

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 improvements benefiting not just motorists, but also pedestrians, bicyclists, and transit users.

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 when sensible, and/or to contribute funds that allow the City to construct such improvements jointly with future 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, pedestrian, and transit facility improvements. The City shall work with ODOT and Clackamas County to determine right-of-way requirements for their respective facilities.

Policy f. 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 g. 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 2007 City of Estacada Transportation System Plan (TSP) update, existing transportation conditions were assessed, including those conditions related to pedestrians, bicycles, transit, motor vehicles, freight, water, air, and pipelines. An inventory was conducted in Spring 2006 to establish base year conditions for the 2007 TSP Update. That data, and more recent data collected for the 2011 Downtown and Riverside Area and 2018 Active Transportation Plans, provide a benchmark (basis of comparison) for future assessment of transportation performance in Estacada relative to existing and proposed policies.

In 2007, 20 intersections within a specific “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 in this document describe the characteristics, usage, and performance of the existing transportation system in the City of Estacada based on that 2007 data.

Note, however, that existing conditions specifically related to the Downtown and Riverside areas, and to modes of active transportation, were updated in 2011 and 2018 respectively and are now addressed separate from this document in the Downtown and Riverside Area Plan and the Active Transportation Plan.

The 2007 study area is, nonetheless, shown in Figure 3-1. 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.
Findings

This section of the City’s TSP highlights specific transportation issues observed under 2006-2007 conditions, as part of the 2007 TSP update effort described earlier. Existing conditions analyses include 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.
**Pedestrians**

To assess the adequacy of the pedestrian facilities in Estacada, an inventory of sidewalks and crosswalks was obtained between 2006 and 2007 along all arterials, collectors, and most residential streets and compared to the locations of existing activity generators. In Estacada, these activity generators were parks, schools, City Hall, the city library, the Estacada Community Center, and the downtown central business district. The observations made during this study period informed the 2007 TSP update.

New pedestrian information was collected in 2017-2018 as part of the City’s active transportation planning effort. The existing conditions of the City’s transportation system related to pedestrians is now addressed separately in the Active Transportation Plan, but adopted here by reference.

**Bicycles**

The City’s 2007 TSP included a section detailing the existing conditions related to bicycle transportation, as it did for pedestrians. However, the City completed its Active Transportation Plan in 2018, which provided a more current evaluation of existing bicycle-related transportation system conditions. Bicycle related conditions are, therefore, now outlined in the City’s separate Active Transportation Plan, but adopted herein by reference.

**Transit (as of 2007)**

Transit service is provided to Estacada by the Tri-County Metropolitan District of Oregon (TriMet) and the Sandy Area Metro (SAM). Figure 3-2 shows bus routes serving Estacada as of 2007, which includes TriMet route 31 and the SAM Estacada route.

As of 2007, TriMet Route 31 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 3-1 lists the average routes headways and corresponding level of service (based on the Highway Capacity Manual methodology\(^3\)) for each of the routes serving Estacada, as of 2007.

<table>
<thead>
<tr>
<th>Route</th>
<th>Average Headways (minutes)</th>
<th>Level of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>Midday</td>
</tr>
<tr>
<td>TriMet #31 Estacada</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>SAM Estacada</td>
<td>180</td>
<td>240</td>
</tr>
</tbody>
</table>

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.

Figure 3-2 shows 2007 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\(^4\). 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, as of 2007, 171 boardings occur on an average weekday in Estacada\(^5\). 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\(^6\).

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 dependent 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 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.

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\(^3\) 2000 Highway Capacity Manual, Transportation Research Board, 2000, Chapter 27.  
\(^4\) Design Criteria, TriMet, August 2002.  
\(^5\) TriMet Passenger Census – Fall 2005, Route 31, TriMet Transportation Planning  
Issues identified in 2007 to be Addressed

- The existing transit service headways could be reduced to encourage ridership.
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 as of 2007, and is followed by a more detailed review of how it has been used and operated since then.

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 3-3. 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 3-27.

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7 Clackamas County Comprehensive Plan, Chapter 5
### Table 3-2: 2007 Clackamas County Functional Classification Description

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway/Expressway</td>
<td>Serves interregional and intraregional trips. Carries heavy volume at high speed.</td>
</tr>
<tr>
<td>Major Arterial</td>
<td>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.</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>Connects collectors to higher order roadways. Carries moderate volume at moderate speed.</td>
</tr>
<tr>
<td>Collector</td>
<td>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.</td>
</tr>
<tr>
<td>Connector</td>
<td>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.</td>
</tr>
<tr>
<td>Local</td>
<td>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.</td>
</tr>
<tr>
<td>Alley</td>
<td>May be public or private, to provide access to the rear of property. Alleys should intersect local roads or connectors. Not for through traffic.</td>
</tr>
</tbody>
</table>

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 as of 2007 is identified in Figure 3-3, though more current depictions are included in the City’s Active Transportation Plan. 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.
Figure 3-3

Legend

City of Estacada
Transportation System Plan
2007 Road Functional Classifications

Functional Classification
- arterial/highway
- arterial/highway, 4 lanes
- major collector
- minor collector

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

*all others two lanes.
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 3-3. 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 3-4.

<table>
<thead>
<tr>
<th>Facility</th>
<th>55 or greater</th>
<th>50</th>
<th>40,45</th>
<th>30,35</th>
<th>20 or less</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Highway</td>
<td>700</td>
<td>550</td>
<td>500</td>
<td>350</td>
<td>350</td>
</tr>
</tbody>
</table>

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

Table 3-4: City Intersection Spacing Standards

<table>
<thead>
<tr>
<th>Facility</th>
<th>Public Street (feet)</th>
<th>Private Access Drive (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>1320</td>
<td>500</td>
</tr>
<tr>
<td>Major Collector</td>
<td>600</td>
<td>150</td>
</tr>
<tr>
<td>Minor Collector</td>
<td>300</td>
<td>100</td>
</tr>
<tr>
<td>Local</td>
<td>150</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: City of Estacada TSP (1999)

Roadway Characteristics
Field inventories were conducted to determine characteristics of major roadways in the 2007 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 3-4 shows a limited inventory of the posted speeds in Estacada, as of 2007. 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 3-4 shows the number of lanes on each roadway in Estacada, as of 2007. 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 3-4 shows the location of marked parking along major collector streets in Estacada.
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\(^8\) 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, unless otherwise prescribed by the City’s Active Transportation Plan.

Pavement Conditions

Pavement conditions in the City of Estacada vary and include some unpaved gravel surfaces within the city limits. 2007 pavement conditions are illustrated in Figure 3-5. The 2007 evaluation of pavement conditions was 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.

**2006-2007 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\(^9\) 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 counts previously conducted in 2005\(^10\) 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

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\(^8\) Conversation with Fred Hertel, Deputy Chief, Estacada Rural Fire District, April, 2006.
\(^9\) Provided by the City of Estacada staff.
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 3-6 shows the average daily two-way existing traffic volumes on roadways in the Estacada area, as of 2007. Daily traffic volumes are based on 2007 daily traffic count data and extrapolations of PM peak hour intersection counts. 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, as of 2007, 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\(^1\) 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 3-5 lists the approximate percentage of trucks traveling along key corridors (arterials and major collectors) in Estacada.

\(^{1}\) 1999 Oregon Highway Plan, The Oregon Department of Transportation, May 1999.
2017 Activity Levels
Estimates of average daily traffic volumes for specific transportation routes in the City were updated in the City’s 2018 Active Transportation Plan. Those updated figures are adopted here by reference.

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\(^{12}\) 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\(^{13}\) 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 3-6.

<table>
<thead>
<tr>
<th>Posted Speed (MPH)</th>
<th>&gt;=45</th>
<th>40</th>
<th>&lt;=35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume to Capacity Ratio (v/c)</td>
<td>0.80</td>
<td>0.85</td>
<td>0.90</td>
</tr>
</tbody>
</table>

As of 2007, 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.

\(^{12}\) Provided by the City of Estacada staff.

\(^{13}\) *1999 Oregon Highway Plan - Amendment*, The Oregon Department of Transportation, July 2005.
2007 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\(^\text{14}\). Traffic counts and level of service calculation sheets can be found in Appendix B. Table 3-7 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 3-7: 2007 Existing Weekday PM Peak Hour Intersection Level of Service

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Level of Service</th>
<th>Average Delay (Sec)</th>
<th>Volume / Capacity</th>
<th>Standard Met?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Signalized Intersection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hwy 211/224 @ Broadway/Beech</td>
<td>B</td>
<td>12.6</td>
<td>0.28</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Unsignalized Intersections</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hwy 211/224 @ Heiple Rd.</td>
<td>A / C</td>
<td>1.3</td>
<td>0.02 / 0.10</td>
<td>Yes</td>
</tr>
<tr>
<td>Hwy 211/224 @ Ely Rd.</td>
<td>A / C</td>
<td>0.1</td>
<td>0.00 / 0.02</td>
<td>Yes</td>
</tr>
<tr>
<td>Hwy 211/224 @ Park Ave.</td>
<td>A / C</td>
<td>0.2</td>
<td>0.00 / 0.03</td>
<td>Yes</td>
</tr>
<tr>
<td>Hwy 211/224 @ River Mill Road</td>
<td>A / B</td>
<td>1.9</td>
<td>0.07 / 0.11</td>
<td>Yes</td>
</tr>
<tr>
<td>Hwy 211/224 @ Evergreen Ave</td>
<td>A / B</td>
<td>1.3</td>
<td>0.02 / 0.12</td>
<td>Yes</td>
</tr>
<tr>
<td>Hwy 211/224 @ SW 2(^{nd}) Ave.</td>
<td>A / B</td>
<td>2.6</td>
<td>0.10 / 0.17</td>
<td>Yes</td>
</tr>
<tr>
<td>Hwy 211/224 @ Wade St. / Elm St.</td>
<td>A / B</td>
<td>2.7</td>
<td>0.03 / 0.16</td>
<td>Yes</td>
</tr>
<tr>
<td>Hwy 211/224 @ Main St.</td>
<td>A / C</td>
<td>4.5</td>
<td>0.08 / 0.49</td>
<td>Yes</td>
</tr>
<tr>
<td>Hwy 224 @ Hwy 211</td>
<td>A / C</td>
<td>5.9</td>
<td>0.02 / 0.54</td>
<td>Yes</td>
</tr>
<tr>
<td>Eagle Creek Rd. @ Duus Rd.</td>
<td>A / A</td>
<td>1.5</td>
<td>—</td>
<td>Yes</td>
</tr>
<tr>
<td>Eagle Creek Rd. @ River Mill Rd.</td>
<td>A / B</td>
<td>2.9</td>
<td>—</td>
<td>Yes</td>
</tr>
<tr>
<td>Broadway @ N. 6(^{th}) Ave.</td>
<td>A / C</td>
<td>4.5</td>
<td>—</td>
<td>Yes</td>
</tr>
<tr>
<td>Main St. @ N. 6(^{th}) Ave.*</td>
<td>B</td>
<td>10.0</td>
<td>0.30</td>
<td>Yes</td>
</tr>
<tr>
<td>Shafford Ave. @ N. 6(^{th}) Ave.</td>
<td>A / B</td>
<td>2.1</td>
<td>—</td>
<td>Yes</td>
</tr>
<tr>
<td>Cemetery Rd. @ Coupland Rd.</td>
<td>A / A</td>
<td>2.6</td>
<td>—</td>
<td>Yes</td>
</tr>
<tr>
<td>Main St. @ SW 4(^{th}) Ave.</td>
<td>A / B</td>
<td>3.2</td>
<td>—</td>
<td>Yes</td>
</tr>
<tr>
<td>Main St. @ NW 2(^{nd}) Ave.</td>
<td>A / B</td>
<td>2.1</td>
<td>—</td>
<td>Yes</td>
</tr>
<tr>
<td>Broadway @ SW 2(^{nd}) Ave.</td>
<td>A / B</td>
<td>6.1</td>
<td>—</td>
<td>Yes</td>
</tr>
<tr>
<td>Shafford Ave. @ SE 4(^{th}) Ave.</td>
<td>A / A</td>
<td>3.2</td>
<td>—</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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:

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

* All-Way Stop Intersection

2007 Traffic Safety

Crash data from 2000 to 2004 was obtained from ODOT and used to identify any high collision areas within Estacada for the 2007 TSP update. The analysis of crash data was separated into reviews of past highway performance and past city street performance. Within the three-mile 2007 TSP study area between Heiple Road and the Highway 224/211 intersection, Clackamas Highway experienced 29 crashes over the 2000-2004 period. 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 3-8 lists the total number of crashes experienced at 2007 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>
<thead>
<tr>
<th>Intersection on Clackamas Highway</th>
<th>Total Crashes</th>
<th>Crash Rate (MEV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heiple Road</td>
<td>6</td>
<td>0.36</td>
</tr>
<tr>
<td>Park Avenue</td>
<td>2</td>
<td>0.13</td>
</tr>
<tr>
<td>River Mill Road</td>
<td>2</td>
<td>0.12</td>
</tr>
<tr>
<td>Wade Street</td>
<td>5</td>
<td>0.37</td>
</tr>
<tr>
<td>Broadway Street</td>
<td>3</td>
<td>0.18</td>
</tr>
<tr>
<td>Main Street</td>
<td>2</td>
<td>0.10</td>
</tr>
<tr>
<td>Currin Street</td>
<td>1</td>
<td>0.06</td>
</tr>
<tr>
<td>Highway 211</td>
<td>2</td>
<td>0.11</td>
</tr>
</tbody>
</table>

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.15

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 3-10 displays the crash rates calculated for this 2 1/2 -mile segment over the 2000-2004 period 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 years was well below the statewide average crash rate for similar facilities.

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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 2007 TSP study area, it was found that SPIS ratings are relatively low, with no locations in the top 10% of hazardous locations.

The five-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 3-10 (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 3-9: Highway Segment Crash Rates (MVM) for 2007 TSP

<table>
<thead>
<tr>
<th>Facility</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clackamas Highway</td>
<td>0.25</td>
<td>0.38</td>
<td>0.48</td>
<td>1.07</td>
<td>0.24</td>
</tr>
<tr>
<td>Statewide Average</td>
<td>1.40</td>
<td>1.48</td>
<td>1.23</td>
<td>1.40</td>
<td>1.11</td>
</tr>
</tbody>
</table>

(for Non-freeways in Rural Cities)
2015 Traffic Safety

More current crash history data was collected for the 2018 Active Transportation Plan and is incorporated here by reference.

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 2007 transportation planning process counted the airport as having 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 and Needs

Travel Demand and Land Use

The 2007 Estacada Transportation System Plan (TSP) Update, and subsequent updates with the Downtown and Riverside Area Plan, Street Tree Design Plan, and Active Transportation plan, addresses existing system needs and additional facilities that are required to serve future growth. A forecast model for the year 2030 was developed for the 2007 TSP to determine future traffic volumes in the City of Estacada. This model was based on then-current traffic counts, Metro regional model housing and employment projections, Estacada land use, ODOT forecasting methodology, 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 2007 existing land use as well as the 2007 Comprehensive Plan Map designations and allowed densities.

2007 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 and Metro’s land use assumptions for the year 2030. 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 included 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.

16 2030 Transportation Analysis Zone Forecast Allocations, Metro.
17 Analysis Procedures Manual, ODOT Transportation Development Division, Planning Section, April 2006.
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>
<thead>
<tr>
<th>Land Use</th>
<th>2005</th>
<th>2030</th>
<th>Increase</th>
<th>Percent Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households</td>
<td>2841</td>
<td>3618</td>
<td>777</td>
<td>27%</td>
</tr>
<tr>
<td>Service Employees</td>
<td>167</td>
<td>283</td>
<td>116</td>
<td>69%</td>
</tr>
<tr>
<td>Retail Employees</td>
<td>377</td>
<td>757</td>
<td>380</td>
<td>101%</td>
</tr>
<tr>
<td>Other Employees</td>
<td>1006</td>
<td>1682</td>
<td>676</td>
<td>67%</td>
</tr>
<tr>
<td>Total Employees</td>
<td>1550</td>
<td>2722</td>
<td>1172</td>
<td>76%</td>
</tr>
</tbody>
</table>

At the existing level of land development, the transportation system generally operates without significant deficiencies in the 2007 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. 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 1,100 jobs) is expected in Estacada in the decades after 2007. 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.

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18 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.
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 in Estacada based on Metro land use forecasts. External trips are based on ODOT forecasted growth on Clackamas Highway.\(^{19}\) External-external and internal-internal trips are 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.\(^{20}\) Table 4-2 provides a listing of PM peak hour trip rates used in this analysis.

<table>
<thead>
<tr>
<th>Growth Segment</th>
<th>Land Use Description</th>
<th>ITE Code</th>
<th>Vehicle Trips Per Land Use Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households</td>
<td>Single Family Detached Housing Dwelling Units</td>
<td>210</td>
<td>1.01</td>
</tr>
<tr>
<td>Retail Employment</td>
<td>Specialty Retail Center Employees</td>
<td>814</td>
<td>1.34(^{21})</td>
</tr>
<tr>
<td>Service Employment</td>
<td>Specialty Retail Center Employees</td>
<td>814</td>
<td>1.34(^{21})</td>
</tr>
<tr>
<td>Other Employment</td>
<td>General Light Industrial</td>
<td>110</td>
<td>0.42</td>
</tr>
</tbody>
</table>

\(^{19}\) [2024 Secondary Highway Future Volume Table](http://www.oregon.gov/ODOT/TD/TP/TADR.shtml). Retrieved June 2006, from ODOT Web site:


\(^{21}\) 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 ration of daily to PM peak hour trip generation rates of square footage-based trip generation rates.

\(^{22}\) (See Footnote 21)
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. 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>
<thead>
<tr>
<th>Growth Segment</th>
<th>TAZ 816 Northwest Estacada /Clackamas County</th>
<th>TAZ 876 Estacada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households</td>
<td>-</td>
<td>785</td>
</tr>
<tr>
<td>Retail Employment</td>
<td>66</td>
<td>444</td>
</tr>
<tr>
<td>Service Employment</td>
<td>43</td>
<td>113</td>
</tr>
<tr>
<td>Other Employment</td>
<td>34</td>
<td>250</td>
</tr>
<tr>
<td>TOTAL</td>
<td>143</td>
<td>1592</td>
</tr>
</tbody>
</table>

This 2007 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, 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. The projected growth on Clackamas Highway at each external location is illustrated in Table 4-4.

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\textsuperscript{24} 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>
<thead>
<tr>
<th>Location</th>
<th>Direction</th>
<th>Total Projected Growth</th>
<th>External-External Trip Probability</th>
<th>2030 External-External Trip Growth</th>
<th>2030 External/Internal / Internal-External Trip Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hwy 224</td>
<td>Enter</td>
<td>219</td>
<td>0.17</td>
<td>37</td>
<td>182</td>
</tr>
<tr>
<td>North of Heiple Rd.</td>
<td>Exit</td>
<td>138</td>
<td>0.09</td>
<td>12</td>
<td>126</td>
</tr>
<tr>
<td>Hwy 224</td>
<td>Enter</td>
<td>55</td>
<td>0.06</td>
<td>3</td>
<td>52</td>
</tr>
<tr>
<td>East of Hwy 211</td>
<td>Exit</td>
<td>82</td>
<td>0.16</td>
<td>13</td>
<td>69</td>
</tr>
<tr>
<td>Hwy 211</td>
<td>Enter</td>
<td>139</td>
<td>0.06</td>
<td>8</td>
<td>131</td>
</tr>
<tr>
<td>South of Hwy 224</td>
<td>Exit</td>
<td>148</td>
<td>0.16</td>
<td>24</td>
<td>124</td>
</tr>
</tbody>
</table>

\textbf{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.\textsuperscript{25} 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) 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. The allocation of trips between zones is described in detail in the Appendix (Revised Forecast Trip Growth in Estacada).

\textsuperscript{24} Analysis Procedures Manual, Oregon Dept. of Transportation: Transportation Development Division, April 2006, p. 4-21.

\textsuperscript{25} City of Estacada – 2004 Comprehensive Plan Update
The total trips added from each Metro TAZ and project TAZ land use allocation are summarized in Table 4-6.

<table>
<thead>
<tr>
<th>TAZ</th>
<th>Vacant Buildable Land (Acres)</th>
<th>Land Use Designation</th>
<th>Total In/Out Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>97</td>
<td>Industrial</td>
<td>111</td>
</tr>
<tr>
<td>2</td>
<td>188</td>
<td>Industrial</td>
<td>268</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
<td>Commercial</td>
<td>557</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>Industrial</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>778</td>
<td>Residential</td>
<td>639</td>
</tr>
<tr>
<td>6</td>
<td>168</td>
<td>Residential</td>
<td>138</td>
</tr>
<tr>
<td>7</td>
<td>9</td>
<td>Residential</td>
<td>8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1284</td>
<td>-</td>
<td>1734</td>
</tr>
</tbody>
</table>

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.

**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 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 2.3% 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.
2007 Forecast of 2030 Motor Vehicle Operations

Motor Vehicle Operations

The 2007 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 2007 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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>v/c</td>
<td>LOS</td>
<td>v/c</td>
<td>LOS</td>
</tr>
<tr>
<td>State Facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR224 / Heiple</td>
<td>0.10</td>
<td>C</td>
<td>0.23</td>
<td>E</td>
</tr>
<tr>
<td>OR224 / Ely</td>
<td>0.02</td>
<td>C</td>
<td>0.02</td>
<td>C</td>
</tr>
</tbody>
</table>
| OR224 / River Mill          | 0.11 | B   | >1.0 | F   | 0.80 | 2025
| OR224 / Park                | 0.03 | C   | 0.11 | C   | 0.80 |
| OR224 / Evergreen           | 0.12 | B   | 0.75 | F   | 0.80 |
| OR224 / 2nd                 | 0.17 | B   | 0.19 | B   | 0.90 |
| OR224 / Wade                | 0.16 | B   | 0.26 | C   | 0.90 |
| OR224 / Main                | 0.49 | C   | >1.0 | F   | 0.90 | 2015
| OR224 / Broadway            | 0.28 | B   | 0.38 | B   | 0.90 |
| OR224 / OR211               | 0.54 | C   | >1.0 | F   | 0.90 | 2020

Local Facilities

| Eagle Creek / Duus          | 0.03 | A   | 0.09 | B   | -   |
| Eagle Creek / River Mill    | 0.13 | B   | 0.39 | B   | -   |
| 6th / Main                  | 0.39 | B   | 0.72 | C   | -   |
| 6th / Broadway              | 0.14 | C   | 0.55 | D   | -   |
| 6th / Shafford              | 0.06 | B   | 0.18 | C   | -   |
| 6th / Cemetery              | 0.08 | A   | 0.29 | B   | -   |
| 2nd / Main                  | 0.07 | B   | 0.10 | C   | -   |
| 2nd / Broadway              | 0.33 | B   | 0.31 | B   | -   |
| Shafford / Regan Hill       | 0.07 | A   | 0.21 | B   | -   |
| 4th / Main                  | 0.14 | B   | 0.42 | C   | -   |

Note: Bold type indicates failure to meet adopted mobility standard.
As shown, all non-highway study intersections operate well under current conditions and are, as of 2007, projected to continue to operate well in 2030, with all intersections providing a level of service D or better.

On the State system, most intersections on Clackamas Highway are, as of 2007, projected to operate within adopted standards for mobility, with the exception of the intersections at River Mill Road, Main Street, and Highway 211. Assuming traffic will grow at a constant and linear rate, the intersection of Clackamas Highway at Main Street was projected to fail by the year 2015, with the intersections at Highway 211 and River Mill Road failing by 2020 and 2025, respectively. 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.

### 2007 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. As of 2007, the economic indicators of median income and percentage of population below the poverty level was significantly lagging relative to the countywide statistics. Estacada was identified (statewide) as an economically “Distressed City” by the Oregon Economic & Community Development Department.  

<table>
<thead>
<tr>
<th>Location</th>
<th>Median Household Income</th>
<th>Percent of Population Below Poverty Level</th>
<th>Percent of Population over 65</th>
<th>Percent of Population with Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estacada</td>
<td>$39,200</td>
<td>12.9%</td>
<td>11.1%</td>
<td>22.1%</td>
</tr>
<tr>
<td>Clackamas County</td>
<td>$52,080</td>
<td>6.6%</td>
<td>11.1%</td>
<td>16.0%</td>
</tr>
</tbody>
</table>

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, as of 2007. 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

26 Oregon Economic & Community Development Department ([http://www.econ.state.or.us/distlist.htm](http://www.econ.state.or.us/distlist.htm))  
27 U.S. Census Bureau, 2000 Census
limited to lunches and medical appointments when demand exceeded what the available funding and volunteer drivers could provide.

As of 2007, 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\(^\text{28}\) 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 4\(^{th}\) Avenue. LIFT program ridership in Estacada averaged 129 bookings per month for an average of 16 different riders.\(^\text{29}\) 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.

\(^{28}\) 2005 TriMet Passenger Census, Fall 2005
\(^{29}\) Young Park, Manager of Capital Projects, TriMet. Email sent June 2, 2006.
5. Pedestrian Plan

Introduction

This chapter incorporates by reference the details of the existing and future pedestrian needs in the City of Estacada, as outlined in the City’s adopted Downtown and Riverside Area Plan, Street Tree Master Plan, and Active Transportation Plan, and provides specific pedestrian-related transportation policies that shall be followed.

Policies

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, connected, attractive, 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 minimize trip distance by providing connectivity and limiting out-of-direction travel, without creating streets that discourage walking or biking or which encourage speeding or cut-through traffic. Local streets shall be designed to provide connectivity to activity centers such as schools, parks, community centers, and Downtown and to prioritize opportunities for pedestrian connections. Wherever necessary, new streets built to provide connectivity shall incorporate traffic management design elements, particularly those which inhibit speeding, such as signage, pavement markings, intersection gardens, and wider sidewalks. New or improved local streets should comply with adopted street spacing standards.

- Policy 2e: Encourage safe, accessible, and direct pedestrian routes between homes, businesses, parks, schools, and other activity centers in Estacada and the wider area, consistent with the City’s Downtown and Riverside Area Plan and Active Transportation Plan.

- Policy 3b: Develop a comprehensive system of pedestrian routes that link major activity centers and that provide connections between such activity centers (e.g., schools, parks, community centers, Downtown) and transit stops and facilities, consistent with the City’s Downtown and Riverside Area Plan and Active Transportation Plan, through partnerships with relevant stakeholders.

- Policy 4b: Access management standards shall be preserved on all roadways to reduce conflicts between motorists, bicyclists, transit users, and pedestrians with designated and sufficiently wide bicycle lanes, sidewalks, crossings, transit shelters and curb ramps and with clear signage.

- Policy 7a: The City shall evaluate land development projects to determine possible adverse impacts and to ensure that all new development contributes a
fair share toward on-site and off-site transportation system improvements benefiting not just motorists, but also pedestrians.

- Policy 7e: The City shall adopt roadway design guidelines and standards that ensure sufficient right-of-way is provided for necessary pedestrian improvements. The City shall work with ODOT and the Clackamas County to determine right-of-way requirements for their respective facilities.
6. Bicycle Plan

Introduction

This chapter incorporates by reference the details of the existing and future facility needs for bicycles in the City of Estacada, as identified in the City’s separate Downtown and Riverside Area Plan, Street Tree Design Plan, and Active Transportation Plan, and lists the City’s bicycle-related transportation policies.

Policies

The City’s bicycle transportation polices are:

- **Policy 2d**: Local streets shall be designed to minimize trip distance by providing connectivity and limiting out-of-direction travel, without creating streets that discourage biking or which encourage speeding or cut-through traffic. Local streets shall be designed to provide connectivity to activity centers such as schools, parks, community centers, and Downtown and to prioritize opportunities for bicycle route connections to such activity centers and places of employment.

- **Policy 2e**: Encourage safe, accessible, and direct bicycle routes between homes, businesses, parks, schools, and other activity centers in Estacada and the wider area, consistent with the City’s Active Transportation Plan.

- **Policy 3b**: Develop a comprehensive system of pedestrian and bicycle routes that link major activity centers (e.g. schools, parks, community centers, Downtown), consistent with the City’s Active Transportation Plan, through partnerships with relevant stakeholders.

- **Policy 3c**: Consistent with the Clackamas County Active Transportation Plan, bicycle ways should be constructed on arterials and collectors within Estacada (with construction or reconstruction projects). All schools, parks, public facilities, transit stops, regional trails, employment centers, 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 motorists, bicyclists, transit users, and pedestrians with sufficiently-wide bicycle lanes, sidewalks, crossings, transit shelters, and curb ramps and with clear signage.

- **Policy 7a**: The City shall evaluate land development projects to determine possible adverse impacts and to ensure that all new development contributes a fair share toward on-site and off-site transportation system improvements benefiting not just motorists, but also pedestrians.

- **Policy 7e**: The City shall adopt roadway design guidelines and standards that ensure sufficient right-of-way is provided for necessary roadway, bikeway, pedestrian, and transit facility improvements. The City shall work with ODOT and Clackamas County to determine right-of-way requirements for their respective facilities.
7. Public Transit Plan

Introduction

This chapter summarizes existing and future public transit needs in the City of Estacada, based on 2007 transportation study findings. The following sections outline the criteria used to evaluate needs, strategies for implementing a transit plan, and the recommended transit plan for Estacada. Wherever such criteria, strategies, and recommendations have been updated or amended by plans adopted by the City after 2007, those more recent criteria, strategies, and recommendations shall apply.

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”\(^{30}\). TriMet’s Transit Investment Plan\(^{31}\) (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 targeted, strategic improvements to the system, with priorities in the following order:

\(^{30}\) City of Sandy Website [http://www.ci.sandy.or.us/cs/transit/transfaq.htm], December, 2006.
• 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\textsuperscript{32} 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 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.

\textsuperscript{32} Thresholds for minimum land use density to support fixed-route transit service are based on definitions in the 2000 \textit{Highway Capacity Manual}, Chapter 27 for transit service analysis methodologies.
• 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 the City’s Downtown and Riverside Area Plan and Active Transportation Plan, 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, as of 2007. When not conflicting with the adopted recommendations of the Downtown and Riverside Area Plan and Active Transportation Plan, 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 of this TSP, 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, as well as the 2011 Downtown and Riverside Area Plan, 2016 Street Tree Design Plan, and 2018 Active Transportation 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) to walking, bicycling, wheelchair use, and access to transit with the use of appropriate improvements.

- 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 minimize trip distance by providing connectivity and limiting out-of-direction travel, without creating streets that discourage walking or biking or encourage speeding or cut-through traffic. Local
streets shall be designed to improve connectivity to activity centers such as schools, parks, community centers, and Downtown and to prioritize opportunities for pedestrian and bicycle route connections to such activity centers and places of employment. 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 motorists, bicyclists, transit user, and pedestrians with designated and sufficiently-wide bicycle lanes, sidewalks, crossings, transit shelters, and curb ramps and with clear signage.

- **Policy 5a:** Construct transportation facilities to meet the requirements of the Americans with Disabilities Act. Curb ramps shall be designed to meet ADA standards, crossing signals shall include signal chirpers, and connections to transit shall be equally usable to people with limited mobility.

- **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 improvements benefiting not just motorists, but also pedestrians, bicyclists, and transit users.

- **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 when sensible, and/or to contribute funds that allow the City to construct such improvements jointly with future 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, pedestrian, and transit facility improvements. The City shall work with ODOT and Clackamas 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:
  o Neighborhood Traffic Management
  o Access Management
  o 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.

**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 2007 TSP 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, and shall be consistent with the City’s Downtown and Riverside Area Plan, Street Tree Design Plan, and Active Transportation Plan.

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 as part of the 2007 TSP update effort 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 8-1 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

<table>
<thead>
<tr>
<th>Functional Classification</th>
<th>Distance between Public Streets</th>
<th>Distance between Private Accesses and other Private Access or Public Streets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>See Table 8-2</td>
<td>See Table 8-2</td>
</tr>
<tr>
<td>Major Collector</td>
<td>300 feet</td>
<td>75 feet</td>
</tr>
<tr>
<td>Minor Collector</td>
<td>300 feet</td>
<td>75 feet</td>
</tr>
<tr>
<td>Neighborhood/Local</td>
<td>150 feet</td>
<td>15 feet</td>
</tr>
</tbody>
</table>

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 8-2 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.

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

<table>
<thead>
<tr>
<th>Posted Speed</th>
<th>Minimum Distance between Accesses (Private or Public)</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 mph or more</td>
<td>700</td>
</tr>
<tr>
<td>50 mph</td>
<td>550</td>
</tr>
<tr>
<td>40-45 mph</td>
<td>500</td>
</tr>
<tr>
<td>30-35 mph</td>
<td>350</td>
</tr>
<tr>
<td>25 mph or less</td>
<td>350</td>
</tr>
</tbody>
</table>

33 Access spacing standards for collectors and neighborhood/local streets do not apply to single-family residential developments.
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, as identified in the Active Transportation Plan. This is most important in the areas where a significant amount of new development is possible. Figure 8-1 shows the 2007 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)
The arrows shown on Figure 8-1 indicate 2007 priority connections only; connection priorities identified in the 2011 Downtown and Riverside Area Plan and the 2018 Active Transportation Plan, wherever conflicting, shall supersede. 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 2007 proposed functional classification was developed following detailed review of the 1999 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.

**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 2007 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. Where proposed street characteristics have been modified by later plans, such as the 2011 Downtown and Riverside Area Plan, 2016 Street Tree Master Plan, and the 2018 Active Transportation Plan, those later proposed characteristics shall apply.

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

34 In constrained conditions on collectors and local routes, a minimum width of 10 feet may be considered.
35 On arterials, on-street parking should be limited to special circumstances.
36 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.
37 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, and by any overriding specific requirements in the Downtown and Riverside Area Plan, Street Tree Design Plan, and Active Transportation Plan. Minor Collectors and Local Streets are similar in design, with both requiring 60 feet of right-of-way, unless otherwise required by later adopted plans. 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, generally requiring right-of-way widths up to 84 feet (unless otherwise prescribed in the Downtown and Riverside Area Plan or the Active Transportation Plan). 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, unless planned for otherwise in the Downtown and Riverside Area Plan or Active Transportation Plan.
City of Estacada
Transportation System Plan
General Street Design Standards

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
(except as recommended by Downtown and Riverside Area Plan and Active Transportation Plan)

- 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
(except as recommended by Downtown and Riverside Area Plan and Active Transportation Plan)

- Optional

OR 224: SW 2nd Avenue to SE Currin Street
(except as recommended by Downtown and Riverside Area Plan and Active Transportation Plan)

- 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.

City of Estacada
Transportation System Plan
General State Highway Cross-Sections
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 2007 preliminary design and is expected to be further refined through the project development process. Newer design recommendations for specific highway improvements in the City’s Downtown and Riverside Area Plan, Street Tree Design Plan, or Active Transportation Plan are adopted here by reference.

**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. 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.

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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 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:

Table 8-4: 2007 Transportation Demand Management Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
<th>Potential Trip Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telecommuting</td>
<td>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.</td>
<td>82-91% (Full Time)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14-36% (1-2 day/wk)</td>
</tr>
<tr>
<td>Compressed Work Week</td>
<td>Schedule where employees work their regular scheduled number of hours in fewer days per week.</td>
<td>7-9% (9 day/80 hr)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16-18% (4 day/40 hr)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32-36% (3 day/36 hr)</td>
</tr>
<tr>
<td>Alternative Mode Subsidy</td>
<td>For employees that commute to work by modes other than driving alone, the employer provides a monetary bonus to the employee.</td>
<td>21-34% (full subsidy of cost, high alternative modes)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-4% (half subsidy of cost, medium alternative modes)</td>
</tr>
<tr>
<td>Bicycle Program</td>
<td>Provides support services to those employees that bicycle to work. Examples include: safe/secure bicycle storage, shower facilities and subsidy of commute bicycle purchase.</td>
<td>0-10%</td>
</tr>
<tr>
<td>On-site Rideshare Matching for HOVs</td>
<td>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.</td>
<td>1-2%</td>
</tr>
<tr>
<td>Provide Vanpools</td>
<td>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.</td>
<td>15-25% (company provided van with fee)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30-40% (subsidized van)</td>
</tr>
<tr>
<td>Gift/Awards for Alternative Mode Use</td>
<td>Employees are offered the opportunity to receive a gift or an award for using modes other than driving alone.</td>
<td>0-3%</td>
</tr>
<tr>
<td>Walking Program</td>
<td>Provide support services for those who walk to work. This could include buying walking shoes or providing lockers and showers.</td>
<td>0-3%</td>
</tr>
<tr>
<td>Company Cars for Business Travel</td>
<td>Employees are allowed to use company cars for business-related travel during the day</td>
<td>0-1%</td>
</tr>
<tr>
<td>Guaranteed Ride Home Program</td>
<td>A company owned or leased vehicle is provided in the case of an emergency for employees that use alternative modes.</td>
<td>1-3%</td>
</tr>
<tr>
<td>Time off with Pay for Alternative Mode Use</td>
<td>Employees are offered time off with pay as an incentive to use alternative modes.</td>
<td>1-2%</td>
</tr>
</tbody>
</table>

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

2007 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 2007 Motor Vehicle Master Plan. The 2007 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 2007 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, as was done with the 2018 Active Transportation Plan. 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, based on 2007 transportation information and priorities.

The improvements identified in the 2007 Master Plan combine both those identified in prior plans (1999 Estacada TSP) and those determined from the outcome of the 2007 TSP update analysis. Projects that were identified in the 1999 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. Wherever the 2007 Motor Vehicle Master Plan conflicts with the Downtown and Riverside Area Plan, Street Tree Master Plan, or the Active Transportation Plan, the most current plan shall apply.
<table>
<thead>
<tr>
<th>Project Number</th>
<th>Project</th>
<th>Improvement</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OR 224 / River Mill Rd. Intersection</td>
<td>Add left turn lane on westbound approach</td>
<td>$550,000</td>
</tr>
<tr>
<td>2</td>
<td>Main St. Realignment at OR 211 / OR 224 Intersection</td>
<td>Realign Main St. to intersect at north approach of OR 211/ OR 224 Intersection. Add left turn lane on eastbound and southbound approaches.</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>3</td>
<td>*Main St. / OR 211 / OR 224 Intersection</td>
<td>Construct traffic signal at reconfigured intersection.</td>
<td>$300,000</td>
</tr>
<tr>
<td>4</td>
<td>OR 224 / New Collector Roadway (between Evergreen Ave. and River Mill Rd.)</td>
<td>Add right turn lane on northbound approach, left turn lane on southbound approach, and construct traffic signal.</td>
<td>$2,700,000</td>
</tr>
<tr>
<td>5</td>
<td>Eagle Creek Rd. / River Mill Rd.</td>
<td>Add left turn lane on northbound approach.</td>
<td>$85,000</td>
</tr>
<tr>
<td>6</td>
<td>N. 6th Ave. / Cemetery Rd.</td>
<td>Add left turn lane on eastbound approach.</td>
<td>$265,000</td>
</tr>
<tr>
<td>7</td>
<td>*N. 6th Ave. Extension</td>
<td>From Eagle Creek Rd. to OR 224 at Evergreen Ave.</td>
<td>$670,000</td>
</tr>
<tr>
<td>8</td>
<td>*Industrial Way Extension</td>
<td>From Evergreen Rd. to River Mill Rd.</td>
<td>$1,020,000</td>
</tr>
<tr>
<td>9</td>
<td>*New Roadway</td>
<td>Connecting Coupland Rd. to Cemetery Rd.</td>
<td>$4,130,000</td>
</tr>
<tr>
<td>10</td>
<td>River Mill Rd. Extension</td>
<td>Extend River Mill Rd. to Cemetery Rd.</td>
<td>$1,700,000</td>
</tr>
<tr>
<td>11</td>
<td>New Roadway</td>
<td>Connecting OR 224 to Cemetery Rd.</td>
<td>$2,270,000</td>
</tr>
<tr>
<td>12</td>
<td>Cemetery Rd. Extension</td>
<td>Extend Cemetery Rd. to Duus Rd.</td>
<td>$2,050,000</td>
</tr>
<tr>
<td>13</td>
<td>Shafford Ave. Improvement</td>
<td>Upgrade Shafford Ave. from S. 4th Ave. N. 6th Ave.</td>
<td>$390,000</td>
</tr>
</tbody>
</table>

* Project identified in current Estacada TSP.
2007 Capacity Needs

The motor vehicle capacity needs in Estacada were determined for future conditions through the year 2030 as part of the City’s 2007 TSP update effort. The analysis procedures employed during that update, 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 of this document. Year 2030 traffic volume forecasts were analyzed to identify locations where peak hour performance will drop below minimum desirable levels, focusing on the 20 specific 2007 TSP 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 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 the 2007 TSP update analysis. Table 8-6 shows the 2030 forecasted motor vehicle operations at study intersections in the Estacada relevant 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, based on 2007 information and priorities.

Under No-Build conditions in 2030, the three intersections on OR 224 at River Mill Road, Main Street, and OR 211 would, according to the 2007 study, not meet adopted performance standards. However, with the improvement projects identified in the Master Plan, including the addition of a westbound left turn lane on River Mill Road, the realignment of Main Street, and the signalization/reconfiguration of the OR 224/ Main St./ OR 211 intersection, performance can be mitigated back to within acceptable limits. 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.

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

The City re-analyzed its existing transportation system capacity with its Active Transportation Plan. In any such case where intersection capacity figures and improvement needs differ between the 2007 TSP and other transportation-related plans adopted by the City, those more recent figures shall be assumed and those more recently-determined improvement needs shall apply.
### Table 8-6: 2030 Intersection Traffic Operations, per 2007 TSP

<table>
<thead>
<tr>
<th>Intersection</th>
<th>No-Build Conditions (2030)</th>
<th>Master Plan Conditions (2030)</th>
<th>Mobility Standard v/c</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>v/c</td>
<td>LOS</td>
<td>v/c</td>
</tr>
<tr>
<td>State Facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR 224 / Heiple Rd</td>
<td>0.23</td>
<td>E</td>
<td>0.21</td>
</tr>
<tr>
<td>OR 224 / Ely Rd</td>
<td>0.02</td>
<td>C</td>
<td>0.03</td>
</tr>
<tr>
<td>OR 224 / Park Ave</td>
<td>0.11</td>
<td>C</td>
<td>0.11</td>
</tr>
<tr>
<td>OR 224 / River Mill Rd</td>
<td>&gt;1.0</td>
<td>F</td>
<td>0.64</td>
</tr>
<tr>
<td>OR 224 / New Collector</td>
<td>-</td>
<td>-</td>
<td>0.40</td>
</tr>
<tr>
<td>OR 224 / Evergreen Ave</td>
<td>0.75</td>
<td>F</td>
<td>0.56</td>
</tr>
<tr>
<td>OR 224 / 2nd Ave</td>
<td>0.19</td>
<td>B</td>
<td>0.19</td>
</tr>
<tr>
<td>OR 224 / Wade St</td>
<td>0.26</td>
<td>C</td>
<td>0.29</td>
</tr>
<tr>
<td>OR 224 / Main St</td>
<td>&gt;1.0</td>
<td>F</td>
<td>-</td>
</tr>
<tr>
<td>OR 224 / Broadway St</td>
<td>0.38</td>
<td>B</td>
<td>0.41</td>
</tr>
<tr>
<td>* OR 224 / OR211</td>
<td>&gt;1.0</td>
<td>F</td>
<td>0.54</td>
</tr>
</tbody>
</table>

| Local Facilities              |     |     |     |     |                          |
|-------------------------------|     |     |     |     |                          |
| Eagle Creek Rd / Duus Rd      | 0.09 | B   | 0.08 | B   |                          |
| Eagle Creek Rd / River        |     |     |     |     |                          |
| Mill Rd                       |     |     |     |     |                          |
| 6th Ave / Main St             | 0.39 | B   | 0.38 | C   |                          |
| 6th Ave / Broadway St         | 0.72 | B   | 0.60 | B   |                          |
| 6th Ave / Shafford Rd         | 0.55 | D   | 0.31 | C   |                          |
| 6th Ave / Cemetery Rd         | 0.18 | C   | 0.18 | C   |                          |
| 2nd Ave / Main St             | 0.29 | B   | 0.24 | B   |                          |
| 2nd Ave / Broadway St         | 0.10 | C   | 0.09 | B   |                          |
| Shafford Rd / Regan Hill Rd   | 0.31 | B   | 0.30 | B   |                          |
| 4th Ave / Main St             | 0.21 | B   | 0.12 | B   |                          |

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.
Preliminary Traffic Signal Warrants
As part of the 2007 TSP update, preliminary signal warrants 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>
<thead>
<tr>
<th>Intersection</th>
<th>Cond. A Met</th>
<th>Cond. B Met</th>
<th>Signal Warrant Met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Street / OR 211 / OR 224</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>New Collector / OR 224</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Based on the preliminary signal warrant analysis findings made with the 2007 TSP update effort, 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. A new signal is also recommended at the intersection of OR 224 and the new collector between River Mill Road and Evergreen Avenue. The traffic signal control at these intersections would improve existing traffic operations and safety for both vehicles and pedestrians.

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39 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.
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 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 River Mill Road
To mitigate the failing conditions forecast on OR 224 at River Mill Road, a number of alternatives were 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 other 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, it was found that the existing intersections at Heiple Road and River Mill Road were capable of serving the forecasted demand in 2030 with minor improvements when the new collector south of River Mill Road is connected to OR 224.

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. However, with the construction of the new collector intersecting OR 224 to the south, the installation of a traffic signal at River Mill Road is no longer required.
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 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 2007 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 lessening as distance from the runway increases.40

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.

40 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

This chapter originally outlined funding strategies and sources that could be used to meet the needs of the transportation system, as those needs were identified in the 2007 TSP, based on 2007 TSP funding availability. The costs for the 2007 recommended transportation improvements were identified and compared to the potential revenue sources in the 2007 TSP.

However, the City took a fresh look at its transportation funding sources and forecast as part of its 2017-2018 active transportation planning effort. Current transportation funding and updated forecasts are now included in the City’s Active Transportation Plan, but also adopted here by reference.