City of Sherwood Oregon

Home of the Tualatin River National Wildlife Refuge

ORDINANCE 2014-012

AMENDING CHAPTER 6 OF THE SHERWOOD COMPREHENSIVE PLAN (PART 2), AMENDING THE TRANSPORTATION STREET FUNCTIONAL CLASSIFICATION MAP, ADOPTING A NEW TRANSPORTATION SYSTEM PLAN, ESTABLISHING AN EFFECTIVE DATE, AND REPEALING ORDINANCE 2000-1104 ESTABLISHING THE CAPACITY ALLOCATION PROGRAM (CAP)

WHEREAS, the City of Sherwood (City) Transportation System Plan (TSP) that was adopted in 2006 by Ordinance 2005-006 has become outdated and an updated Transportation System Plan is needed to meet requirements of the State Transportation Planning Rule (OAR 660-012), Regional Transportation Plan policies, Metro Urban Growth Management Functional Plan standards, and to manage development expected in the next twenty years; and

WHEREAS, the City application (File No. PA 14-01) proposes amending Chapter 6 of the Sherwood Comprehensive Plan (Part 2) and the Transportation Street Functional Classification Map, and adopting a new TSP in order to update the public facility element for planned transportation facilities to be consistent with recent and projected growth; and

WHEREAS, the City applied for and obtained a State Transportation Growth Management (TGM) grant for updating the existing TSP; and

WHEREAS, the Sherwood Planning Commission held public work sessions on December 12, 2013 and February 13, 2014, and conducted a public hearing on May 27, 2014, at which time the Commission approved a recommendation that the City Council approve PA 14-01; and

WHEREAS, the Sherwood City Council conducted a public hearing on the proposed plan map and text amendment on June 17, 2014; and

WHEREAS, the Community Development and Zoning Code Sections 16.080.010 through 16.080.030 set forth the approval criteria for a Comprehensive Plan Map and Text amendment; and

WHEREAS, the Planning Commission reviewed whether to continue the Capacity Allocation Program (CAP) in light of the TSP amendments and the City Engineering Design and Standard Details Manual and recommended that the CAP be discontinued; and

WHEREAS, by repealing the CAP the City Council intends that any condition or requirement in an earlier land use decision or City ordinance shall no longer be effective and the property relieved of compliance with the condition or requirement

NOW, THEREFORE, THE CITY OF SHERWOOD ORDAINS AS FOLLOWS:

Section 1 - Planning Commission Review & Public Hearings: File No. PA 14-01 amending the Transportation Street Functional Classification Map and Chapter 6 of the Comprehensive Plan (Part 2), and proposing a new Transportation System Plan (Volumes 1 and 2) as a technical appendix to the Comprehensive Plan (Part 2), was subject to full and proper review, including public hearings before the Planning Commission on May 27, 2014, and the City Council on June 17, 2014.

Section 2. – Findings: That after full and due consideration of the application, the evidence and testimony in the record, and the proposed findings, the Council finds that the proposed plan map and text amendments and TSP comply with the applicable criteria as described in Exhibit 1 (Planning Commission Recommendation to City Council with Exhibits A-J) to this Ordinance.

Section 3 – Decision: The Transportation Street Functional Classification Map Amendment, the Comprehensive Plan Text Amendments and TSP in File No. PA 14-01 are hereby APPROVED as described in Exhibit 1, and such amendments constitute changes to Chapter 6, Volume II of the Comprehensive Plan and applicable sections of Volume III (Sherwood Zoning and Community Development Code) of the Comprehensive Plan (Attachments B and C to Exhibit 1), Transportation Street Functional Classification Map (Exhibit 2), and Transportation System Plan, Volumes 1 and 2, dated May 2014 (Attachments E and F to Exhibit 1), as attached to this Ordinance.

Section 4 – Repeal of the Capacity Allocation Program (CAP): Ordinance 2000-1104, establishing the Capacity Allocation Program, is repealed and any condition or requirements in a prior land use decision or City ordinance that implements or relies on the CAP shall not have any force or effect.

Section 5 – Manager Authorized: The Planning Manager is hereby directed to take such action as may be necessary to document this amendment.

Section 6 – Effective Date: This Ordinance becomes effective 30 days from the date of its adoption by the City Council.

Duly passed by the City Council this 17th day of June 2014.

Bill Middleton, Mayor

Attest:

Sylvia Murphy, MMC, City Recorder

	AYE	NAY
Clark	✓	
Langer	✓	
Butterfield	✓	
Folsom	✓	
Grant	Absent	
Henderson	✓	
Middleton	✓	

CITY OF SHERWOOD **Date: June 6, 2014**

Planning Commission Recommendation to the City Council
PA 14-01 –Transportation System Plan Update

To: The Sherwood City Council

From: The Planning Department

Brad Kilby, AICP – Planning Manager

On May 27, 2014, the Planning Commission considered amendments to the City of Sherwood Transportation System Plan, proposed by staff. After considering the materials, public testimony, and the findings in the staff report, the Planning Commission voted unanimously to recommend approval of the request to the Sherwood City Council. Their decision is based on the findings of fact in this recommendation.

Proposal overview: Staff is proposing to update the City's Transportation System Plan (TSP) to address community needs and regional requirements. The TSP provides a framework for the long-term vision of Sherwood's transportation system and includes strategies and planned improvement projects for a variety of travel modes (pedestrian, bike, auto, and transit). In addition to addressing local needs, the proposal includes updating the plan so that it is consistent with state and regional policies, such as the Oregon Transportation Planning Rule (TPR), Metro's Regional Transportation Plan (RTP), Metro's Regional Transportation Functional Plan (RTFP), and in a manner that complements other local plans, such as the Washington County TSP. There is also a map amendment associated with this request that would remove a trip cap that was applied under City Ordinance 2008-003. We believe that the trip cap is no longer necessary given that the appropriate modeling has been completed through update process and proposed Traffic Impact Analysis (TIA) requirements will help protect the function of Highway 99W.

I. OVERVIEW

A. Applicant: This is a City initiated amendment to the City Transportation System Plan.

B. Location: The City's Transportation System Plan (TSP) is a long term guide for the City's transportation system, and applies city wide.

G. Review Type: The proposed plan amendment requires a Type V review, which involves public hearings before the Planning Commission and City Council. The Planning Commission recommends approval to the City Council who will make the final decision. Any appeal of the City Council decision would go directly to the Oregon Land Use Board of Appeals.

H. Public Notice and Hearing: The project is a legislative amendment. Notice of the first evidentiary hearing was provided to the Department of Land Conservation and Development (DLCD) and Metro on April 11, 2014. Notice of the May 27th Planning Commission hearing was published in the May edition of the Sherwood Gazette, the May edition of the Sherwood Archer, and in the Times on both May 15th, and May 22, 2014.

Notice was also posted in 5 public locations around town and on the web site on May 6, 2014. Notice of the June 17th City Council Hearing was indicated as a tentative date in the Planning Commission notices. Once the agenda for the June 17th hearing was approved (May 29, 2014) notice of was posted in 5 public locations around town and on the web site. Notice of the June 17th hearing was also published in the June 5th and 12th editions of the Times.

I. Review Criteria:
The required findings for the Plan Amendment are identified in Section 16.80.030 of the Sherwood Zoning and Community Development Code (SZCDC). In addition, the amendment must be consistent with Goals 1, 2 and 12 of the Statewide Planning Goals and Chapter 6 of the Comprehensive Plan.

J. Background:
The TSP went through its last major update in 2005. Since that time, there have been eight amendments; four for concept plan areas, one amendment to change the functional classification of Columbia Street (related to Cannery project) from a collector to a local street, one amendment to identify the future classification and designation of SW Cedar Brook Way, one amendment to identify and classify a future extension of SW Baler Way, and one amendment to identify and classify a future extension of SW Langer Farms Parkway north of Highway 99W.

Sherwood has grown significantly and experienced numerous changes since the current Sherwood TSP was adopted in 2005. The updated TSP is intended to address these changes as well plan for conditions and needs over a 20-year planning horizon. The update, funded through a state Transportation and Growth Management grant, will bring the current TSP into compliance with the latest requirements of the Oregon Transportation Planning Rule (TPR), Metro's Regional Transportation Plan (RTP), and Metro's Regional Transportation Functional Plan (RTFP). At the outset of the project, it was determined that the following key questions would be addressed through the process:

- How is the transportation system today? (Existing conditions)
- What needs are present today and in the future? (Needs assessment)
- How do we address the needs? (Project options)
- What changes to our TSP and implementation documents are needed to address local needs and regional requirements?

II. PUBLIC COMMENTS

At the hearing, the Planning Commission considered testimony from 4 citizens in person, and one piece of written testimony. The unapproved minutes of that meeting are attached to this recommendation as Exhibit G, and the written testimony is attached as Exhibit H. It should be noted that there have been several other opportunities for public involvement throughout the past six months including two Planning Commission work sessions, two public open houses, and three meetings with the Citizens Advisory Committee. In addition, the City has maintained a project website with monthly updates in both English and Spanish. The draft version of the Transportation System Plan has been made available to the public since late March 2014. Comments that were received through any of the events listed above have been incorporated into the draft version of the TSP. Community Comment Cards collected during the process have been compiled and are attached as Exhibit A. The comments have been considered and, where the comment could be incorporated with good reasoning, they were.

III. AGENCY/DEPARTMENTAL COMMENTS

The City requested comments from affected agencies. The following information briefly summarizes those comments:

- The Department of Land Conservation and Development (DLCD) provided an e-mail from Anne Debbaut, dated March 13, 2014 indicating that the DLCD transportation staff did not have any concerns at this time, and appreciate the City's efforts to develop a multi-modal approach to identifying transportation solutions.
- Metro, the Oregon Department of Transportation, Washington County Transportation and Land Use, The City of Tigard, the City of Wilsonville, and the City of Tualatin have all been partners in the review and preparation of the Transportation System Plan. To date, no comments were received from these jurisdictional partners, aside from their input on the Technical Advisory Committee.

Clean Water Services, Tualatin Valley Fire and Rescue (TVF&R), Kinder Morgan, Pride Disposal, Bonneville Power Administration, The Sherwood Building Department, Portland General Electric, Northwest Natural Gas, and Raindrops to Refuge were provided the opportunity to comment on this application but did not provide written or verbal comments.

IV. APPLICABLE DEVELOPMENT CODE CRITERA

16.80.030 – Review Criteria
A. Text Amendment
An amendment to the text of the Comprehensive Plan shall be based upon a need for such an amendment as identified by the Council or the Commission. Such an amendment shall be consistent with the intent of the adopted Sherwood Comprehensive Plan, and with all other provisions of the Plan, the Transportation System Plan and this Code, and with any applicable State or City statutes and regulations, including this Section.

The last Transportation System Plan update for Sherwood occurred in 2005. The 2014 update became a priority for the City to address growing transportation needs. This update was funded through an Oregon Department of Transportation -Transportation and Growth Management grant. In addition to addressing local needs, the plan is intended to be consistent with state and regional policies, such as the Oregon Transportation Planning Rule (TPR), Metro's Regional Transportation Plan (RTP) , Metro's Regional Transportation Functional Plan (RTFP), and the Washington County TSP.

Key items that were studied through this process were the existing conditions, an assessment of the community's transportation needs to the year 2035, and identification of projects needed to address those transportation needs. The specific amendments proposed through the proposed language would amend the goals and policies of Chapter 6 in Volume II of the Comprehensive Plan. The proposed amendments to the goals and policies reflect direction provided by regulations such as the RTFP, establish a policy basis for implementing the recommended projects and standards in the updated TSP, and incorporate policies and strategies from planning work adopted since the 2005 TSP, in particular the Town Center Plan. Those amended goals and policies are included in Exhibit B of this report.

The proposed amendments also affect Volume III of the Comprehensive Plan, which is the Development Code. The changes to the language within the Development Code are to Section 16.10 Definitions, 16.80 Plan Amendments; 16.90 Site Planning; 16.94 Off-Street Parking, and 16.106 Transportation Facilities. All of the amendments proposed within these sections are intended to implement the changes to the goals and policies

of Volume II, to comply with regional and state (TPR and RTFP) provisions related to the Development Code, to assist in implementing the improvements recommended in the updated TSP, and to provide consistency in references and standards between the TSP, the Engineering Design Manual, and the Development Code. The proposed Code amendments are included in Exhibit C of this report.

FINDING: The proposed amendments are needed to address the City's transportation needs based on forecasted growth in the region, and to be consistent with state and regional policies. Findings of compliance with the RTFP and TPR are provided in the TSP, Volume II, Section H (Exhibit F).

B. Map Amendment

An amendment to the City Zoning Map may be granted, provided that the proposal satisfies all applicable requirements of the adopted Sherwood Comprehensive Plan, the Transportation System Plan and this Code, and that:

1. **The proposed amendment is consistent with the goals and policies of the Comprehensive Plan and the Transportation System Plan.**
2. **There is an existing and demonstrable need for the particular uses and zoning proposed, taking into account the importance of such uses to the economy of the City, the existing market demand for any goods or services which such uses will provide, the presence or absence and location of other such uses or similar uses in the area, and the general public good.**
3. **The proposed amendment is timely, considering the pattern of development in the area, surrounding land uses, any changes which may have occurred in the neighborhood or community to warrant the proposed amendment, and the availability of utilities and services to serve all potential uses in the proposed zoning district.**
4. **Other lands in the City already zoned for the proposed uses are either unavailable or unsuitable for immediate development due to location, size or other factors.**

The proposed map amendment would affect the zoning map as it applies to WCTM 2S130D, tax lot 001200 also addressed as 21305 SW Pacific Highway. In 2008, the zoning of the property was changed from Medium Density Residential Low to Retail Commercial (Ord. 2008-003) with a finding that stated that the rezone would not be consistent with the TPR without a condition that would limit development on the site to no more than 460 vehicular trips per day until the City's Plan was amended consistent with Statewide Planning Goals to provide otherwise. The modeling that was completed with the proposed amendment to the TSP considered traffic that could be generated by developing this property as zoned Retail Commercial, and identifies mitigation measures within the project list to offset potential impacts of redevelopment of the property under that designation.

FINDING: Provisions of B2 and B4 above are not applicable to the request. Provisions B1 and B3, are addressed through the adoption of the proposed amendments to the Comprehensive Plan. Considering this premise, the proposed map amendment would be consistent with the goals and policies of the applicable plans and is timely considering the future provision of transportation services that would be constructed with any future development allowed under the Retail Commercial Zoning designation. As discussed above the proposed amendment is consistent with the TSP and comprehensive plan elements. Ordinance 2008-003 is attached as Exhibit D to this report. Proposed TSP Volumes I and II include the background data and project list to support the request. See Exhibits E and F to this report.

C. Transportation Planning Rule Consistency

1. Review of plan and text amendment applications for effect on transportation facilities. Proposals shall be reviewed to determine whether it significantly affects a transportation facility, in accordance with OAR 660-12-0060 (the TPR). Review is required when a development application includes a proposed amendment to the Comprehensive Plan or changes to land use regulations.

2. "Significant" means that the transportation facility would change the functional classification of an existing or planned transportation facility, change the standards implementing a functional classification, allow types of land use, allow types or levels of land use that would result in levels of travel or access that are inconsistent with the functional classification of a transportation facility, or would reduce the level of service of the facility below the minimum level identified on the Transportation System Plan.

3. Per OAR 660-12-0060, Amendments to the Comprehensive Plan or changes to land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the Transportation System Plan. This shall be accomplished by one of the following:

- **a. Limiting allowed uses to be consistent with the planned function of the transportation facility.**
- **b. Amending the Transportation System Plan to ensure that existing, improved, or new transportation facilities are adequate to support the proposed land uses.**
- **c. Altering land use designations, densities or design requirements to reduce demand for automobile travel and meet travel needs through other modes.**

The TPR requires that the City inventory the existing system, identify deficiencies that would negatively affect state facilities, and identify alternatives to address those deficiencies. The proposed amendments to the TSP, the Comprehensive Plan, and the Development Code are intended to maintain or improve the safety, mobility, and accessibility of the overall transportation system based on forecasted growth and traffic patterns. For these reasons noted, this amendment is consistent with the TPR.

The City sent notice of the proposed updated TSP and associated amendments to the Comprehensive Plan and Development Code to the State Department of Land Conservation and Development (DLCD), the Oregon Department of Transportation (ODOT) and Washington County. Since the notice was sent, revisions to the proposed updated TSP have been made to classify Brookman Road as an arterial and to identifyies Brookman Road and the adjacent Concept Plan area as an area for further refinement. Through the City's TSP update process and the concurrent County TSP update, the City has coordinated with Washington County and will continue to coordinate with the County for future planning efforts regarding the function and classification of Brookman Road and the surrounding road network.

FINDING: As noted above, the proposed amendments would change the transportation system in a manner that improves the existing transportation system plan through identified mitigation measures. These measures address identified existing and future transportation system needs through the TSP horizon (year 2035). The Plan indicates that the identified mitigation projects would improve the overall transportation system and reports that system measures would meet or make progress towards regional targets for safety, congestion, freight delay, motor vehicle travel per capita, and non-single occupant vehicle (SOV) use. These benefits demonstrated by these measures indicate that the transportation system would be improved through this amendment.

V. APPLICABLE COMPREHENSIVE PLAN POLICIES

B. GOALS, POLICIES, AND STRATEGIES

Goal 1: Provide a supportive transportation network to the land use plan that provides opportunities for transportation choices and the use of alternative modes serving all neighborhoods and businesses.

Goal 2: 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 3: 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 4: Develop complementary infrastructure for bicycles and pedestrian facilities to provide a diverse range of transportation choices for city residents.

Goal 5: Provide reliable convenient transit service to Sherwood residents and businesses as well as special transit options for the city's elderly and disabled residents.

Goal 6: Provide a convenient and safe transportation network within and between the Sherwood Old Town (Town Center) and Six Corners area that enables mixed use development and provides multi-modal access to area businesses and residents.

Goal 7: Ensure that efficient and effective freight transportation infrastructure is developed and maintained to support local and regional economic expansion and diversification consistent with City economic plans and policies.

Goal 8: The Sherwood City's transportation network will be managed in a manner that ensures the plan is implemented in a timely fashion and is kept up to date with respect to local and regional priorities.

FINDING: The existing goals will remain intact. The proposed amendments to Chapter 6 of the Comprehensive Plan reflect the findings and recommendations of the updated TSP. The proposed amendments are intended to provide a supportive policy basis for the updated TSP that is based on the City's forecasted needs into the next 20 years. The development of a comprehensive TSP that reflects the Comprehensive Plan, including special area plans that were created between this revision and 2005, as well as any applicable state, local, and regional regulations. The proposed amendments would be implemented through the Sherwood Zoning and Community Development Code, which provides clear and objective standards to achieve the desired results called for in the TSP. Finally, the proposed amendments remove conflicts within the existing TSP and all applicable state, local, and regional transportation planning documents. See Exhibit B, Draft Proposed Transportation Goals and Policies, for the specific language amendments being proposed.

VI. APPLICABLE STATEWIDE PLANNING GOALS

Goal 1 (Citizen Involvement)

FINDING: Staff utilized the public notice requirements of the Code to notify the public of this proposed plan amendment. The City's public notice requirements have been found to comply with Goal 1 and, therefore, this proposal meets Goal 1. In addition, the City hosted an open house prior to beginning the formal plan amendment process to get input and feedback on potential amendments and held a work session with the Planning Commission on June 26, 2012 for further discussion. At the work session, the Planning Commission allowed the public to speak on the potential amendments prior to providing staff with feedback on proceeding with the public notice for the amendment.

Goal 2 (Land Use Planning)

FINDING: The proposed amendments, as demonstrated in this report were subject to a robust citizen outreach program, and the proposed amendments are being processed in compliance with the local, regional and state requirements. There have been several opportunities for public involvement throughout the past six months including two Planning Commission work sessions, two public open houses, and three meetings with a citizens advisory committee. In addition, the City has maintained a project website with monthly updates in both English and Spanish. The draft version of the Transportation System Plan has been made available to the public since late March. Public comments that were received through any of the events listed above have been considered and incorporated into the draft version of the TSP, and approval of the proposed amendments are subject to further public review including hearings before both the Planning Commission and the City Council.

Goal 3 (Agricultural Lands)
Goal 4 (Forest Lands)
Goal 5 (Natural Resources, Scenic and Historic Areas and Open Spaces)
Goal 6 (Air, Water and Land Resources Quality)
Goal 7 (Areas Subject to Natural Hazards)
Goal 8 (Recreational Needs)

FINDING: The Statewide Planning Goals 3-8 do not specifically apply to the proposed plan amendments. Arguably, the proposed amendments will improve upon the intent of these goals, by providing a more orderly and efficient transportation system. In any event, there is no evidence to suggest that the proposal is in conflict with these goals.

Goal 9 (Economic Development)

FINDING: The TSP and its implementation help to support local and regional economic development goals and plans by the provision of efficient and predictable transportation routes. In addition, it ensures orderly and efficient access to planned commercial and employment uses throughout the City.

Goal 10 (Housing)

FINDING: The TSP was developed to account for future residential trips. The implementation of the TSP benefits all of the citizens of Sherwood by ensuring that jobs, services, and residences are accessible through a coordinated transportation system. Further, the TSP identifies needed improvements within the project list to assist the community in prioritizing where and how existing and future development is to be served by the transportation system.

Goal 11 (Public Facilities and Services)

FINDING: The transportation system is inherently one of the community's primary public facilities. The TSP documents existing conditions and future needs for the transportation system within the City, and allows proposed improvements and implementation measures to be tailored to meet those future needs. The TSP, the revised Comprehensive goals and policies, and the implementation measures all assist the City in complying with state and regional rules for the orderly and efficient provision of transportation facilities and services for the community and region.

Goal 12 (Transportation)

As discussed throughout this report, and the supporting documents, the proposed amendments are being proposed to ensure consistency with the TPR, which implements Goal 12. The TPR requires that the City inventory the existing system, identify deficiencies that would negatively affect state facilities, and identify alternatives to address those deficiencies. Section OAR 660-12-0045 of the TPR relates to implementation of the TSP through land use and development regulations. Amendments to the Development Code that are proposed to comply with Section 660-12-0045 are presented in Exhibit C.

FINDING: The proposed amendments to the TSP, the Comprehensive Plan, and the Development Code are designed to maintain or improve the safety, mobility, and accessibility of the overall

transportation system based on forecasted growth and traffic patterns. For these reasons noted, this amendment is consistent with the TPR. Specific findings of Development Code compliance with TPR Section 660-12-0045 are provided in the TSP, Volume II, Section H (Exhibit F).

Goal 13 (Energy Conservation)
Goal 14 (Urbanization)
Goal 15 (Willamette River Greenway)
Goal 16 (Estuarine Resources)
Goal 17 (Coastal Shorelands)
Goal 18 (Beaches and Dunes)
Goal 19 (Ocean Resources)

FINDING: The Statewide Planning Goals 13-19 do not specifically apply to these proposed plan amendment; nor do the proposed amendments conflict with the stated goals.

VII. RECOMMENDATION

After considering the materials, public testimony, and the findings in the staff report, the Planning Commission recommends **APPROVAL** of PA 14-01 City of Sherwood Transportation System Plan with the edits identified in Exhibit I to this report.

VIII. ATTACHMENTS

A. Public Comments
   i. Open House #1 Summary
   ii. Open House #2 Summary
   iii. Open House #2 comment cards received
   iv. March 10th e-mail from Brent Ahrend, P.E. – RE: Pfeiffer Property/Sherwood Blvd.
   v. March 28th letter from Brent Ahrend, P.E. – RE: Pfeiffer Property
   vi. April 16th letter from Brent Ahrend, P.E. – RE: Pfeiffer Property
   vii. April 8th Work Session Meeting Minutes with the Planning Commission
B. Proposed Transportation Goals and Policies – Comprehensive Plan Chapter 6 *(Also found in Section G of Volume II of the proposed TSP)*
C. Draft Proposed Implementation Language (May 14th Revision) *(Also found in Section G of Volume II of the proposed TSP)*
D. Ordinance 2008-003 – An Ordinance Amending the Comprehensive Plan and Zoning Map to Redesignate a Parcel From Medium Density Residential Low to Retail Commercial
E. Volume I Draft Sherwood Transportation Plan
F. Volume II Draft Sherwood Transportation Plan *(Appendix)*
G. Proposed Street Design Cross Sections for all streets in Sherwood
H. Unapproved Minutes from the May 27th Planning Commission Hearing
I. Written testimony received from Wade Anderson, dated May 27, 2014
J. Planning Commission Proposed Edits to the Final Draft of the TSP

End of Report

ATTACMENT A

SHERWOOD TSP UPDATE

OPEN HOUSE #1 SUMMARY

720 SW Washington St.
Suite 500
Portland, OR 97205
503.243.3500
www.dksassociates.com

Date: Thursday, December 12, 2013

Time: 6:00 p.m. to 8:00 p.m.

Location: Sherwood Police Station, 20495 SW Borchers Drive

Purpose: To review and collect comments on the existing and future transportation needs of Sherwood.

Comments

Sherwood Comprehensive Plan Transportation Goals

- Make sure improvements benefit the majority
- Maintain the small town character

Future Year Congestion Locations

- Congestion causes cut-though in neighborhood west of Borchers.
- Consider a couplet of Tualatin-Sherwood Road and new extension of Cipole to Langer Farms Parkway.

Motor Vehicle Facilities (Functional Classification Map)

- Realign Oregon Street to intersect Murdock at Tonquin.
- If an additional roundabout is added at Oregon/Tonquin, consider prohibiting southbound left turn and use the pair of roundabouts to execute a u-turn.
- Cut through issues exist in neighborhood west of Borchers.
- Non-conforming use is causing traffic issues at Home Depot.
- Is a relief route feasible to fill collector gap #3 (Roy Rogers Road to Edy Road)?
- An important path connection would tie Cedarbrook Way to the north and south.
- Realistic cost estimates are needed for Cedarbrook Way. Need to coordinate with ODOT on erosion issue. May need to revise development conditions. The right of way may cause litigation issues. There is a dedication issue and creek crossing.
- There is an issue with access and cost of reservation of rights in the vicinity of the Cedarbrook Way extension.

Pedestrian Facilities

- Make local roads downtown walking only.
- Speeding issues on Oregon Street entering Old Town.

- Complete sidewalks on Lincoln Street.
- Need timing adjustments at Langer Farms Parkway and Oregon Street traffic signal so it isn't so responsive. It gaps out too quickly.
- Need general enforcement of stop-signs and speeding. Maybe an education program.
- Support Ice Age Tonquin Trail.
- Need trail guide signing and information maps around Stella Olson Park.

Transit Facilities

- WES extension to Newberg along existing rail.
- Need Tualatin transit connection.

Bike Facilities

- Need more bike lanes!
- Could be wider sidewalks
- Buffer bike lanes on busy roads.
- Require license for cycling.
- Rails to Trails program.
- Show the path that is located west of Ladd Hill and connects Lodgepole Terrace to Brookman Road.

SHERWOOD TSP UPDATE

OPEN HOUSE #2 SUMMARY

720 SW Washington St.
Suite 500
Portland, OR 97205
503.243.3500
www.dksassociates.com

Date: Thursday, February 13, 2014

Time: 6:00 p.m. to 8:00 p.m.

Location: Sherwood City Hall, 22560 SW Pine Street

Purpose: To review and collect comments on the project evaluation, project options, and draft project list.

Comments

Comment Forms

- Would like to see improvements along Edy & 99. Also at Sunset & 99. Option D23 support Option C.
- Project D10/D11 should be identified as a 3-lane collector.
- Any opportunity to remove trip cap on Pfeiffer Property through the current TSP process and amendments.
- Project D16. Analysis provided for a potential retail project shows benefit of maintaining split phase and restriping Sherwood Boulevard approach for left/left-through/through-right. This requires a second receiving lane on Edy, which could end as a right turn lane at Borchers.

Comment Form

Thank you for taking the time to attend the Transportation System Plan (TSP) Update Project Open House to learn about Sherwood's efforts to meet the future transportation needs of our community.

Please provide comments below.

Would like to see improvements along Edy & 99 -
Also at Sunset & 99
Option D.23 support Option C

Name: Cheryl Parker (property owner) Organization (optional) _____
Address: 9350 SE Nicholas Dr
City: Happy Valley State: OR Zip: 97086
Email: _____ (to receive project web updates as they are posted)
Kraun3038@comcast.net

Comment Form

Thank you for taking the time to attend the Transportation System Plan (TSP) Update Project Open House to learn about Sherwood's efforts to meet the future transportation needs of our community.
Please provide comments below.

D10/D11 Collector 3-Lane

Name: _____ Organization (optional) _____
Address: _____
City: _____ State: _____ Zip: _____
Email: _____ (to receive project web updates as they are posted)

Comment Form

Thank you for taking the time to attend the Transportation System Plan (TSP) Update Project Open House to learn about Sherwood's efforts to meet the future transportation needs of our community.

Please provide comments below.

Any opportunity to remove trip cap on Pfeiffer Property through the ~~Process~~ Current TSP Process and Amendments

Name: Brent / Makenzie Organization (optional) Pfeiffer Family

Address:

City: State: Zip:

Email: (to receive project web updates as they are posted)

SEE Sign in Sheet for contact Info.

Comment Form

Thank you for taking the time to attend the Transportation System Plan (TSP) Update Project Open House to learn about Sherwood's efforts to meet the future transportation needs of our community.

Please provide comments below.

Project D16. Analysis provided for a potential retail project shows benefit of maintaining split phase and restriping Sherwood Blvd approach for left/left+through/through+right. this requires a second receiving lane on Edy, which could end as a right turn lane at Borchers.

Name: Brent Ahrend Organization (optional) Mackenzie

Address: 1515 SE Water Ave Suite 100

City: Portland State: OR Zip: 97214

Email: bahrend@mcknze.com (to receive project web updates as they are posted)

Bradley Kilby

From: Garth Appanaitis <gaa@dksassociates.com>
Sent: Thursday, May 15, 2014 5:56 PM
To: Bradley Kilby
Subject: Fwd: 99W - Edy Rd Analysis

FYI

---------- Forwarded message ----------
From: **Brent Ahrend** <BAhrend@mcknze.com>
Date: Mon, Mar 10, 2014 at 4:27 PM
Subject: RE: 99W - Edy Rd Analysis
To: Garth Appanaitis <gaa@dksassociates.com>
Cc: Christine McKelvey <CMcKelvey@mcknze.com>, Justin Belk <JBelk@mcknze.com>

Garth,

See the attached email from Justin in our office. Essentially, we recommended restriping the Sherwood Blvd approach to make the right turn lane a shared through/right. This would require a second receiving lane, which we anticipated would just be an extension of the right turn lane from Edy to Borchers.

I spoke to Brad Kilby about a week ago and he said they were asking for legal advice on lifting the trip cap on the Pfeifer property through the TSP update process.

Let us know if you have any questions or have any updates on the TSP process.

Thanks,

Brent T. Ahrend, PE

Senior Associate | Asst Department Head – Transportation Planning

MACKENZIE.
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From: Garth Appanaitis [mailto:gaa@dksassociates.com]
Sent: Thursday, March 06, 2014 2:51 PM
To: Brent Ahrend
Subject: 99W - Edy Rd Analysis

Hi Brent -

Thanks for attending the Sherwood TSP Open House and providing comments. Could you pass along the analysis you mentioned with the alternate lane configuration at 99W/Edy?

Thanks,
Garth

--

Garth Appanaitis, P.E. - Transportation Engineer

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March 28, 2014

City of Sherwood
Attention: Bob Galati, PE, City Engineer
22560 SW Pine Street
Sherwood, OR 97140

Re: **Pfeifer Property Trip Cap**
TSP Update Request
Project Number 2140027.01

Dear Mr. Galati:

On behalf of Don Pfeifer, Mackenzie is requesting the City of Sherwood remove the existing trip cap condition on Lot 1200 through the current Transportation System Plan (TSP) update.

A zone change was approved for the parcel in 2008 (Ordinance 2008-003) from residential to commercial with a condition that limited trip generation to that of the prior residential zone of 460 trips per day. This condition severely limits the ability to develop the parcel in a manner consistent with the commercial zone. Further, removing the trip cap would require a Plan Amendment with a Transportation Planning Rule (TPR) analysis.

In 2012 Mackenzie reviewed the impacts of such a Plan Amendment and identified several potential mitigation measures to address the TPR requirements where removing the trip cap could have a "significant effect". These measures included improvements at intersections along Highway 99W at Edy Road/Sherwood Road, Tualatin-Sherwood Road, and Elwert Road/Sunset Boulevard, plus improvements at the Edy Road/Borchers Drive intersection.

It is our understanding the proposed TSP update may address these same intersections, identifying long term improvement needs, and would therefore also address the impacts of removing the parcel's trip cap. We believe the City's TSP update can include the trips from the full commercial zone on Lot 1200 such that the trip potential is adequately addressed through the improvements identified at this intersection.

We will be in attendance at the meeting on Tuesday, April 8, 2014 to provide support to the City's TSP update process and answer any questions you may have regarding our request. In the meantime, please contact us if you have any questions or need any additional information from us.

Sincerely,

Brent Ahrend, PE
Senior Associate | Traffic Engineer

c: Don Pfeifer
Christine McKelvey – Mackenzie
Garth Appanaitis – DKS
Brad Kilby –City of Sherwood

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April 16, 2014

City of Sherwood
Attention: Bob Galati, PE, City Engineer
22560 SW Pine Street
Sherwood, OR 97140

Re: **Pfeifer Property Trip Cap**
Project Number 2140027.01

Dear Mr. Galati:

On behalf of Don Pfeifer (property owner), we appreciate the opportunity to participate in the Planning Commission's Public Work Session on Tuesday, April 8, regarding the Transportation System Plan (TSP) update and to discuss the removal of both the City-wide trip cap and the trip cap specific to Mr. Pfeifer's Lot 1200.

Our understanding is the City intends to remove both citywide and site specific trip caps noted above through an ordinance adopting the new TSP later this year, and that no additional ordinance or action by the owner and/or City Council would be needed. For reference, the original Ordinance 2008-003 changed the zoning and imposed the site specific trip cap.

Initial schedules noted the TSP update could be completed as early as July of this year. Can you confirm, or provide us with an update with regards to this schedule?

Based on our discussion at the Planning Commission, please confirm there is nothing more the City needs from Mr. Pfeifer's team related to removal of the trip cap at this time. Please let us know should you need additional information or analysis, or how we can continue to support the TSP update process.

Thank you for your assistance.

Sincerely,

Brent Ahrend, PE
Senior Associate | Traffic Engineer

c: Don Pfeifer, Kevin Pfiefer
Garth Appanaitis – DKS
Brad Kilby –City of Sherwood
Christine McKelvey – Mackenzie

City of Sherwood, Oregon
Planning Commission
Work Session Meeting Minutes
April 8, 2014

Planning Commission Members Present:	**Staff Present:**
Chair Jean Simson	Julia Hajduk, Community Development Director
Commissioner John Clifford	Brad Kilby, Planning Manager
Commissioner Beth Cooke	Bob Galati, city Engineer
Commissioner Lisa Walker	Kirsten Allen, Planning Dept. Program Coordinator
Planning Commission Members Absent:	**Legal Counsel:**
Vice Chair James Copfer	None
Council Members Present:	**Others Present:**
Councilor Robyn Folsom	Chris Maciejewski, DKS Associates
	Darci Rudzinski, Angelo Planning Group

Note: The term for Commissioners Russell Griffin and Michael Cary expired on March 31, 2014. Commissioner Griffin attended the meeting. Commissioner Cary did not.

Planning Commission Work Session

1. Transportation System Plan Update Overview

Brad Kilby, Planning Manager, started the meeting at 6:10 pm with an introduction of Chris Maciejewski from DKS Associates and Darci Rudzinski from Angelo Planning Group; the consultants for the City's Transportation System Plan (TSP) Update. Mr. Maciejewski gave a presentation (see record, Exhibit 1) and said it contained a high level overview of the Transportation System Plan of the update process. He said the update looks twenty years out to the year 2035 and is intended to be more user friendly. A draft of the update is available online at http://www.sherwoodoregon.gov/engineering/project/transportation-system-plan-tsp-update-project and comments will be received through April 9, 2014 and a public hearing with the Planning Commission is tentatively scheduled for May 27, 2014.

Public Work Session

Brad Kilby, Planning Manager began the work session at 7:05 pm. Members of the community, Planning Commissioners, Staff and Consultants split up into four table groups. Groups discussed three topics: Medical Marijuana, The Transportation System Plan, and the Development Code. Each table was provided information about the topics (see record, Exhibit 2). After the roundtable each group gave a summary of the ideas and concerns expressed in the dialogue.

Sherwood Transportation System Plan Update – Bob Galati

- Time was used to inform the public of proposed changes to the Transportation System Plan.
- Main concern is Safety
- Brookman Road will need to be addressed
- General support for the removal of the Capacity Allocation Program
- Keep Sherwood open on all sides
- Use and modify transportation system best and most affordable ways possible

- Hwy 99 crossing should improve pedestrian safety and balance with traffic movement
- Concerns about using the Target and Albertsons parking lots as cut through areas

Development Code Issues (Code Clean up) – Julia Hajduk

- The Conditional Use process can be cumbersome and expensive
    - Possible staff level process with reduced fee structure
- Ideas for Multi-Family Development include:
    - Having an architectural variety on the front facade
    - Providing Open space
    - Should be proportionate to adjacent properties
    - Incentives for courtyards
    - Parking concerns
    - Process for converting existing buildings into multi-family
- Density increases should happen in the Sherwood Town Center area
  Old Town Standards
  Buildings should have cohesive architectural features similar to existing buildings
  Different development process for buildings without significant changes within the overlay
  Pedestrian only streets at center
  Thematic areas

Medical Marijuana Dispensaries– Brad Kilby

- City has a moratorium through May 2015
- There are just over 4000 Medical Marijuana card holders in the Washington County
- Dispensaries should be 1000 feet from parks, residential areas, and daycare facilities
- Utilize the Conditional Use Process
- Use should be treated similar to liquor stores
- Similar to adult regulated businesses
- Locations should be out in the open, not hidden
- Not allowed in Neighborhood Commercial zones

Before adjourning, Brad reminded the public that there would be other opportunities to be involved in the processes as each of the topics discussed will need to go through the public hearing process with the Planning Commission and the City Council.

3. Adjourn
The meeting adjourned the meeting at 9:13 pm.

Submitted by:
Kirsten Allen
Kirsten Allen
Planning Department Program Coordinator

Approval Date: May 27, 2014

PROPOSED TRANSPORTATION GOALS AND POLICIES

The tables below focus on proposed amendments to the City's adopted transportation goals, policies and strategies that implement the updated Transportation System Plan (TSP). Identical transportation policy language is found in both Chapter 2 of the adopted TSP from 2005 and Chapter 6 of the Comprehensive Plan (Transportation). Language recommended for addition to Chapter 6 of the Comprehensive Plan is underlined and language recommended for removal is struck through. The tables in which the amendments are presented include a commentary column explaining the background and rationale for the proposed amendment.

Note that, in addition to goals, policies, and strategies (Section B, pp. 1-11), Comprehensive Plan Chapter 6 includes an introduction (Section A, p. 1) and a section addressing roadway functional classification and the transportation improvement program projects from the 2005 TSP (Section C, pp. 11-17). Proposed amendments to these sections are presented in order, in Tables 1, 2, and 3 respectively.

Table 1: Draft Proposed Amendments to SECTION A - Introduction

Existing and Proposed Text	***Commentary***
The purpose of the Transportation element of the Comprehensive Plan is to describe a multi-modal system which will serve the future transportation needs of Sherwood. The plan for the future transportation system should be capable of effective implementation, responsive to changing conditions and be consistent with plans of adjoining jurisdictions. The Plan seeks to foresee specific transportation needs and to respond to those needs as growth occurs. The original Transportation Network Plan was created in 1979. The original transportation policy element was created in 1980 as part of the first Comprehensive Plan acknowledged by the Oregon Department of Land Conservation and Development. The plan policies were updated in 1989 and a ~~new~~ Transportation Plan Update was completed in 1991. The ~~most recent~~ Transportation element ~~has been~~ was revised substantially to reflect updates ~~changes~~ in the~~an updated new~~ Transportation System Plan (TSP), ~~begun in 2003 and completed~~ in ~~March~~ 2005 and 2014. The current adopted ~~newest~~ TSP is attached as an appendix and technical reference to this Comprehensive Plan, including an analysis of the existing transportation system, changes to the functional classification of streets, an update of various inventory and plan maps, and changes to the street design standards. NOTE: The following types of capital facilities are not present within the City: 1)	*References to the TSP are updated.*

Existing and **Proposed** Text	*Commentary*
air transportation, and 2) water transportation. Therefore, they are not addressed in this plan.	

Table 2: Draft Proposed Amendments to SECTION B - Goals, Policies, and Strategies

Existing and <u>Proposed</u> Text	*Commentary*
Goal 1: Provide a supportive transportation network to the land use plan that provides opportunities for transportation choices and the use of alternative modes serving all neighborhoods and businesses.	*This is an existing goal.*
Policy 1 – The City will ensure that public roads and streets are planned to provide safe, convenient, efficient and economic movement of persons, goods and services between and within the major land use activities. ~~Existing rights-of-way shall be classified and improved and new streets built based on the type, origin, destination and volume of current and future traffic.~~	*Deleted text has been moved to Strategies.*
Policy 2 – Through traffic shall be provided with routes that do not congest local streets and impact residential areas. Outside traffic destined for Sherwood business and industrial areas shall have convenient and efficient access to commercial and industrial areas without the need to use residential streets.	*This is an existing policy.*
Policy 3 – Local traffic routes within Sherwood shall be planned to provide convenient circulation between home, school, work, recreation and shopping. Convenient access to major out-of-town routes shall be provided from all areas of the city.	*This is an existing policy.*
Policy 4 – The City shall encourage the use of more energy-efficient and environmentally sound alternatives to the automobile by: • The designation and construction of bike paths and pedestrian ways; • The scheduling and routing of existing mass transit systems and the development of new systems to meet local resident needs; and	*This is an existing policy.*

Existing and Proposed Text	***Commentary***
• Encouraging the development of self-contained neighborhoods, providing a wide range of land use activities within a single area.	
Policy 6 – The City shall work to ensure the transportation system is developed in a manner consistent with state and federal standards for the protection of air, land and water quality, including the State Implementation Plan for complying with the Clean Air Act and the Clean Water Act.	*This is an existing policy.*
Policy 7 – The City ~~of Sherwood~~ shall foster transportation services to the transportation disadvantaged including the young, elderly, handicapped, and poor.	*This proposed change reflects a recommendation to make all references to the City [of Sherwood] consistent throughout this section.*
Policy 8 – The City ~~of Sherwood~~ shall consider infrastructure improvements with the least impact to the environment.	*This is an existing policy.*
Policy 9 – The City ~~of Sherwood~~ shall ~~develop a transportation demand management program to complement investments in infrastructure (supply).~~ manage the transportation system to improve reliability and maximize efficient use of existing facilities.	*The proposed modification provides a more general policy and minimizes redundancy with (existing) Strategy 6.*
Strategies	
1. Establish and maintain design standards for public rights of way in accordance with the Functional Street Classification System.	*Modified language is based on existing Policy 1.*
~~1.~~2. Make traffic safety a continuing effort through effective law enforcement and educational programs.	*This is an existing strategy.*
~~2.~~ 3. Design and manage the city street system to meet ~~Adopt~~ an acceptable ~~level of service~~ mobility standard for the roadway network that is consistent with regional transportation policies.	*The proposed change reflects the City's interest in having both level of service and volume to capacity (v/c) as measures by which to evaluate mobility and provide better context for decision making. The mobility standards will be in the adopted TSP*

Existing and Proposed Text	*Commentary*
	and implemented through development review and the traffic impact analysis requirements.
~~3.~~ 4. ~~Develop~~ Plan for an array of transportation assets and services to meet the needs of the transportation-disadvantaged.	*The proposed modification narrows the intent of this strategy to a system-level planning effort on the part of the City. Note that more specific policies regarding providing for the transportation disadvantaged can be found under Goal 5.*
~~4.~~ 5. Evaluate, identify, and map existing and future neighborhoods for potential small scale commercial businesses to primarily serve local residents.	*This existing strategy to integrate small-scale, neighborhood commercial uses into existing neighborhoods is related to Policy 4. Note that this existing strategy does not specify the level of analysis or proposed approach to implement such a study. This strategy should be reevaluated to ensure that it continues to be relevant and match the City's priorities.*
~~5.~~ 6. Adopt a strategy for reducing impacts of impervious surfaces to stormwater management.	*This is an existing strategy.*
~~6.~~ 7. Identify and adopt a transportation demand management strategy and program to provide incentives to employers who develop transportation options for employees.	*This addition is consistent with modified Policy 9.*
8. Seek strategic opportunities to improve connectivity in the city, including measures such as mid-block crossings connecting to commercial areas.	*This language is based on comments from the Citizen Advisory Committee.*

Existing and Proposed Text	*Commentary*
Goal 2: 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.	*This is an existing goal.*
Policy 1 – The City shall implement the transportation plan based on the functional classification of streets shown in ~~Table 8-1~~ Figure 16 of the TSP.	*This is existing policy with amendments proposed for updating a TSP reference.*
Policy 2 – The City shall maintain a transportation plan map that shows the functional classification of all streets within the Sherwood urban growth area. Changes to the functional classification of streets must be approved through an amendment to the Sherwood Comprehensive Plan, Part 2, Chapter 6 - Transportation Element.	*This is an existing policy.*
Policy 3 – The Sherwood transportation system plan shall be consistent with the ~~c~~City's adopted land use plan and coordinated with transportation plans and policies of other local jurisdictions, especially Washington County, Clackamas County, the City of Wilsonville, and the City of Tualatin.	*This is an existing policy with a proposed modification that indicates that City plans do not have to mirror neighboring jurisdictions' plans, but should not be inconsistent with these plans.*
Policy 4 – The City will coordinate with Metro regarding implementation of the Regional Transportation Plan and ~~related transportation sections of~~ the Metro Regional Transportation Functional Plan.	*These edits are proposed for consistency with regional plans.*
Policy 5 – The City shall adopt and maintain a street classification system that is compatible with the Washington County Functional Classification System for areas inside the Washington County Urban Area Plan and with the Washington County 2020 Transportation Plan (Ordinance 588).	*The proposed edit signifies the City's ongoing commitment to coordination with Washington County.*
Policy 6 — The City will work with Metro and other regional transportation partners to implement regional transportation system ~~demand~~ management and operations programs where appropriate.	*The proposed modifications broaden the scope of this policy to transportation system management and operations (TSMO) programs, of which transportation demand*

Existing and Proposed Text	***Commentary***
	management (TDM) is a part.
Policy 7 — The City shall work cooperatively with the Port of Portland and local governments in the region to ensure sufficient air and marine passenger access for Sherwood residents.	*This is an existing policy.*
Policy 8 – The City shall work to develop more transportation options within city limits to increase opportunities for walking, biking, and taking transit and to reduce single occupancy vehicle (SOV) trips. ~~Establish local non-Single Occupant Vehicle (SOV) modal targets, subject to new data and methodology made available to local governments, for all relevant design types identified in the RTP. Targets must meet or exceed the regional modal targets for the 2040 Growth Concept land use design types as illustrated in the following table:~~ ~~2040 Regional Modal Targets~~ ~~Non-single Occupancy Vehicles~~	*Proposed amendments reflect a recommendation to replace the existing policy with a more general statement that commits the City to reduce SOV trips.*
Strategies	
1. Develop and maintain an intergovernmental agreement between Sherwood, Washington County and the City of Tualatin, consistent with ORS 195.065, to establish urban service boundaries and responsibilities for transportation facilities within and adjacent to the City of Sherwood.	*This is an existing strategy with amendments proposed for clarity only.*
2. Work cooperatively with ODOT, Washington County, and Metro to ~~develop an interchange area management plan for the Pacific Highway 99-W and Tualatin-Sherwood Highway intersection.~~ improve regional mobility through such efforts as the Westside Solution Study and the I-5 to 99W Connector project.	*Proposed language reflects the City's interests in regional transportation planning and the fact that planning for a grade-separated interchange is not an identified transportation need.*
3. Work cooperatively with ODOT, Metro, Washington	*Proposed language reflects the*

Existing and Proposed Text	*Commentary*
County, and Tualatin to develop a corridor management plan for Pacific Highway 99W and Tualatin-Sherwood Road ~~to preserve~~ that ▫ maintains access to the highway ~~for~~ from the ~~c~~City's arterial and collector streets and ▫ improves pedestrian and bicycle mobility, connectivity and safety in the vicinity of, and crossing, the highway.	*community's focus on Highway 99W and desire for enhancements related to non-motorized modes of transportation.*
4. Participate in regional planning efforts, including the development of the Regional Transportation Plan (RTP), to secure funding for safety and capacity improvements to the City of Sherwood's arterial and collector street system that are necessary to maintain acceptable levels of service for local and through traffic.	*This is an existing strategy.*
5. Define transportation corridors in advance through long range planning efforts.	*This is an existing strategy.*
6. Coordinate ~~the~~ local transportation network planning and improvements with adjacent governmental agencies, such as Washington County, Metro, and the State. Coordinate with ODOT in implementing their Six-Year Plan and the State Highway Improvement Program.	*This is an existing strategy with amendments proposed for clarity only.*
7. Adopt performance measures that are consistent with regional modal targets for non-single occupancy vehicles and track the City's progress with meeting adopted goals and policies each successive TSP update.	*This proposed new policy acknowledges regional targets, which are reflected in the performance measures in TSP.*
8. Accommodate car-sharing programs in the city.	*This adopted strategy from the Sherwood Town Center Plan (Strategy 9.4) has been modified to apply citywide.*
9. Promote development of transportation demand management programs by employers in the city. Focus on employers with 100 employees or less that are not	*The first part of this strategy is adopted Strategy 9.5 in the Sherwood Town Center Plan. The strategy has*

Existing and <u>Proposed</u> Text	***Commentary***
<u>subject to the Oregon Department of Environmental Quality's Employee Commute Options program requirements.</u>	*been modified to apply citywide. Additional language is based on comments from the Citizen Advisory Committee.*
<u>10. Support projects that remove regional through traffic from the local transportation system or allow through traffic to bypass Sherwood.</u>	*This proposed new strategy reflects a Citizen Advisory Committee recommendation.*

Existing and Proposed Text	***Commentary***
Goal 3: 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.	***This is an existing goal.***
Policy 1 – The City ~~of Sherwood~~ shall ~~adopt~~ requir~~ements~~ that proposed ~~for~~ land developments ~~that~~ mitigate ~~the~~ adverse traffic impacts and ensure that all new development contributes a fair and proportionate share toward on-site and off-site transportation system improvement remedies.	*This is an existing policy with amendments proposed for clarity only.*
Policy 2 – The City ~~of Sherwood~~ shall require dedication of land for future streets when development is approved. The property developer shall be required to make full street improvements for their portion of the street commensurate with the proportional benefit that the improvement provides the development.	*This is an existing policy.*
Policy 3 – The City ~~of Sherwood~~ shall require applicable developments (as defined in the development code), to prepare a traffic impact analysis.	*This is an existing policy.*
Policy 4 – The City ~~of Sherwood~~ shall adopt and maintain a uniform set of design guidelines that provide one or more typical cross section associated with each functional street classification. For example, the City may allow for a standard roadway cross-section and a boulevard cross section for arterial and collector streets.	*This is an existing policy with amendments proposed to reflect existing city practices.*
Policy 5 – The City shall adopt and maintain roadway design guidelines and standards that ensure sufficient right-of-way is provided for necessary roadway, bikeway, and pedestrian improvements.	*This is an existing policy with amendments proposed to reflect existing city practices.*
Policy 6 – The City shall adopt and maintain roadway design guidelines and standards that ensure sidewalks and bikeways be provided on all arterial and collector streets for the safe and efficient movement of pedestrians and	*This is an existing policy with amendments proposed to reflect existing city practices.*

Existing and Proposed Text	***Commentary***
bicyclists between residential areas, schools, employment, commercial and recreational areas.	
Policy 7 – The City ~~of Sherwood~~ will generally favor granting property access from the street with the lowest functional classification, including alleys. Additional access to arterials and collectors for single family units shall be prohibited. ~~and~~ Residential uses should be encouraged to use access from frontage roads and local streets. Frontage roads shall be designed as local streets.	*This is an existing policy with amendments proposed for clarity only.*
Policy 8: – The City will adopt and maintain access control and spacing standards for all arterial and collector streets to improve safety and promote efficient through street movement. Access control measures shall be generally consistent with Washington County access guidelines to ensure consistency on city and county roads.	*This is an existing policy with amendments proposed to reflect city practices.*
Policy 9 – The City will establish and maintain guidelines and standards for the use of medians and islands for regulating access and providing pedestrian refuge on arterial and collector streets.	*This is an existing policy with amendments proposed to reflect city practices.*
Policy 10 – The City ~~of Sherwood~~ will establish and maintain a set of guidelines and standards for traffic calming measures to retrofit existing streets and as part of land use review.	*This is an existing policy with amendments proposed to reflect city practices.*
Policy 11 – The City will develop and maintain uniform traffic control device standards (signs, signals, and pavement markings) and uniformly apply them throughout the city.	*This is an existing policy with amendments proposed to reflect city practices.*
Policy 12 – ~~The City of Sherwood will adopt parking control regulations for streets as needed. On-street parking shall not be permitted on any street designated as an arterial, unless allowed by special provision within the Town Center (Old Town) area or through the road modifications process outlined in the Sherwood Development Code.~~ The City will support actions that provide sufficient parking for	*Proposed amendments reflect a recommendation to replace this policy with adopted Policy 9 from the Town Center Plan and the more specific Strategies from this plan (see proposed Strategies 11-18).*

Existing and Proposed Text	***Commentary***
businesses and residents, while maximizing the efficiency of parking areas.	
Policy 13 – The City ~~of Sherwood~~ shall ~~adopt new development codes~~ explore and adopt regulatory and financing tools to fill in gaps in existing sidewalks to achieve a consistent pedestrian system.	*These modifications reflect the fact that the City needs to first have a policy discussion regarding viable funding options before development requirements would be modified to be consistent with the preferred/adopted funding methods.*
Policy 14 – The City will implement transportation system improvements and standards that increase access between residences and civic, employment, and commercial uses within the Town Center boundary and that improve safety for all modes of transportation for people traveling to, within and adjacent to the Town Center.	*This is adopted Policy 7 in the Sherwood Town Center Plan.*
Policy 15 – The City will balance the need for vehicular mobility within and adjacent to the Town Center with the other transportation and land use goals and priorities identified in the Town Center Plan.	*This is adopted Policy 8 in the Sherwood Town Center Plan.*
Strategies	
1. Ensure consistency between the Transportation System Plan, development code requirements, and the ~~Incorporate typical street cross section~~ guidelines in the City's ~~public works~~ engineering design standards ~~that address~~ regarding street cross sections and other standards related to vehicular, bicycle, pedestrian, and transit needs.	*The existing strategy is a "one time" action; proposed modifications address the ongoing need to ensure consistency between City plans and codes.*
2. ~~Include a Road Modification Process~~ Maintain a process in the ~~Sherwood D~~development ~~C~~code ~~to provide a procedure for~~ that allows the City to grant~~ing~~ variances from street design standards for parking, pedestrian facilities, signals, and other roadway features.	*The proposed modification is consistent with existing Code language and City procedures.*

Existing and Proposed Text	*Commentary*
3. Consider the ~~Metro 2040~~ Regional Transportation Plan Regional System ~~Street~~ Design Concepts ~~Elements~~ when planning for improvements to City transportation facilities, including those built by ODOT or TriMet.	*The proposed modifications are consistent with the terms used in the RTP.*
4. ~~Incorporate~~ Continue to implement guidelines in the City's development code that establish when a local street refinement plan must be prepared and the process for preparing such a plan.	*The proposed modification is consistent with existing Code language and City procedures.*
5. Periodically review the development code, and ~~A~~amend ~~the city development code~~ as necessary, to ensure that ~~regulate~~ vehicular access, spacing, circulation, and parking continues to be regulated consistent with plan policies.	*The proposed modifications are consistent with the intent of the existing policy.*
~~6. Amend the city development code as necessary to include specific guidelines for determining the proportional benefit contribution associated with requirements for street dedication and the construction of off-site transportation improvements.~~	*Proposed code amendments include a new section addressing rough proportionality, so this strategy is no longer needed.*
~~7. Amend the development code to include standards and procedures for a transportation impact analysis (TIA). Refer to Appendix for example.~~	*Proposed code amendments include a new section addressing TIA thresholds and requirements, so this strategy is no longer needed.*
~~8.~~ 6. Develop a list to prioritize refinement plan needs, such as corridor plans and interchange area management plans.	*This is an existing strategy.*
~~9.~~ 7. ~~Amend development code to include provisions for implementing traffic calming mechanisms.~~ Allow for the implementation of traffic calming mechanisms through provisions in the development code.	*The proposed modification reflects existing code language.*
~~10.~~ 8. Create a map that identifies locations targeted for on-street parking, such as in neighborhood commercial areas and the town center that support multi-modal	*This is an existing strategy.*

Existing and Proposed Text	*Commentary*
options.	
~~11.~~ 9. Regularly review, and update as necessary, the development code to ensure consistency with regional parking requirements.	*This is an existing strategy; modification reflect city practices.*
~~12.~~ 10. Develop a "conceptual new streets plan" map for all contiguous areas of vacant and redevelopable parcels of 5 (five) or more acres planned or zoned for residential or mixed-use development, and adopt the map as part of the TSP.	*This is an existing strategy.*
11. Implement the parking strategies in the Sherwood Town Center Plan, including: ▫ Evaluate and monitor parking supply and demand in Old Town. ▫ Evaluate the parking needs for townhome developments in the Town Center. ▫ Evaluate the needs of commercial uses in the Langer Drive Commercial District.	*This proposed strategy incorporates and abbreviates adopted Strategies 9.1, 9.2, 9.3 and 9.6 from the Sherwood Town Center Plan.*
~~13.~~ 12. ~~Consider a "mixed-use" overlay zone in the development code that will apply to the Six Corners area. Include design standards that will encourage a vibrant, pedestrian friendly environment through the implementation of boulevards, medians, mixed-use development and site design.~~ Support public or private development of the bicycle and pedestrian improvements shown on Map 2 of the Town Center Plan.	*The proposed amendment reflects a recommendation to replace existing Strategy 13 with adopted Strategies in the Town Center Plan. Underlined text is adopted Strategy 7.1 in the Sherwood Town Center Plan.*
13. Enhance Sherwood Boulevard for bicycle and pedestrian travel consistent with the key changes identified for this roadway in the Town Center Plan.	*This is adopted Strategy 7.2 in the Sherwood Town Center Plan.*
14. Enhance Langer Drive for pedestrian and bicycle travel to create a complete street that supports a	*This is adopted Strategy 7.3 in the*

Existing and Proposed Text	*Commentary*
vibrant mixed use district, consistent with the key changes identified for this roadway in the Town Center Plan.	*Sherwood Town Center Plan.*
15. Work with ODOT to provide safe pedestrian crossing movements for all directions at 99W intersections.	*This is adopted Strategy 7.4 in the Sherwood Town Center Plan.*
16. Identify and consider all funding sources appropriate and available to work with property owners to fill gaps in sidewalk system along neighborhood streets.	*This is adopted Strategy 7.5 in the Sherwood Town Center Plan.*
17. The City will support collaborative solutions that enhance access and improve safety for pedestrians and all other modes of transportation within, adjacent to and into the Town Center.	*This is adopted Strategy 7.6 in the Sherwood Town Center Plan.*
18. The City will work with the County, ODOT, and local stakeholders to enhance vehicular and pedestrian access from the Town Center to developments adjacent to the Town Center.	*This is adopted Strategy 8.4 in the Sherwood Town Center Plan; Strategies 8.2 and 8.3 included direction for the current TSP update process and have been addressed.*
19. The City will reexamine local street standards and will explore appropriate locations within the city and circumstances under which a narrower street standard may be permitted as part of new development.	*Reducing pavement width is a Transportation Planning Rule requirement. Benefits include minimizing impervious surface, diminishing run-off/pollution, freeing land for other uses, etc. The proposed strategy acknowledges that there may be situations where the City's existing local street width standard could be reduced in order to minimize impervious surface, diminish run-off/pollution, free land for other uses, etc. Because of issues regarding restricting parking and parking enforcement, among others, the City*

Existing and Proposed Text	Commentary
	needs more community discussion before a narrower local standard can be implemented; this policy commits the City to having this community conversation.

Existing and Proposed Text	***Commentary***
Goal 4: Develop complementary infrastructure for bicycles and pedestrian facilities to provide a diverse range of transportation choices for city residents.	***This is an existing goal.***
Policy 1 – The City ~~of Sherwood~~ shall provide a supportive transportation network to the land use plan that provides opportunities for transportation choices and the use of alternative modes.	*This is an existing policy.*
Policy 2 – Sidewalks and bikeways shall be provided on all arterial and collector streets for the safe and efficient movement of pedestrians and bicyclists between residential areas, schools, employment, commercial and recreational areas.	*This is an existing policy.*
Policy 3 – The City ~~of Sherwood~~ will pursue development of local and regional pedestrian trail facilities, especially a trail system connection between the city and the Tualatin National Wildlife Refuge.	*This is an existing policy.*
Policy 4—The City ~~of Sherwood~~ shall provide design standards for roadway ~~traffic calming~~ features ~~such as traffic circles, curb extensions, bulb-outs, and speed humps~~ that make roadways safer for walking and biking.	*This is an existing policy, with minor amendments proposed to broaden applicability; more specific action is in Strategy 8.*
Policy 5 – The City ~~of Sherwood~~ shall ~~include~~ require~~ments for the provision of~~ short-term and long-term bicycle parking ~~on large~~ be included as part of commercial, industrial, institutional, and multi-family residential projects.	*The TPR, RTP, and RTFP require bicycle parking for these uses in general, not just "large" projects.*
Policy 6 – The City ~~of Sherwood~~ will coordinate the bikeway system with adjacent jurisdictions, especially Tualatin, Wilsonville, Clackamas and Washington County.	*This is an existing policy.*
Policy 7 – The City will work to eliminate architectural barriers from buildings and public improvements, which limit elderly and handicapped use of the transportation system.	*This is an existing policy.*

Existing and Proposed Text	***Commentary***
Policy 8 – The City will require new development to accommodate bicyclists and pedestrians, and to provide non-motorized transportation facilities consistent with the proposed use and pursuant to applicable code requirements.	*This proposed new policy acknowledges private development's role in providing bicycle and pedestrian facilities.*
Strategies	
1. Include pedestrian and bike projects in the capital improvement plan to ensure investment in alternative modes~~;~~.	*This is an existing strategy.*
2. Use intergovernmental agreements with Tualatin and Washington County for the coordination of urban services per ORS 196.065 to coordinate the bikeway system and trail system~~;~~.	*This is an existing strategy.*
3. Include design standards for sidewalk and bikeway facilities in the ~~c~~City's roadway design guidelines~~;~~.	*This is an existing strategy.*
4. Include provisions for planning the location of pedestrian and bike routes for connecting residential, school, commercial, employment and recreational areas in the development code guidelines for preparing local street refinement plans~~;~~.	*This is an existing strategy.*
5. Include a system of bikeways along collector and arterial roadways ~~as illustrated on the Transportation Plan Map;~~.	*This is existing strategy with minor amendments proposed for accuracy. (The Transportation Plan Map shows recommended projects rather than bikeways along all collectors and arterials.)*
6. Include requirements in the development code for private development to provide bike and pedestrian facilities as are related and proportional to the projected impacts of the proposed development and that are consistent with ~~indicated on~~ the Transportation Plan Map in TSP Figures 12, 13, and 14~~;~~.	*These changes include updated references to the TSP.*

Existing and Proposed Text	*Commentary*
7. Include design standards for sidewalks and bicycle facilities in the City's roadway design guidelines~~;~~.	*This is an existing strategy.*
8. Pursue traffic calming techniques, such as traffic circles, curb extensions and speed humps, for neighborhood and local streets so as to provide safe passage for pedestrians and bicyclists, and a more pleasant neighborhood environment for residents.	*This is an existing strategy with proposed additions for clarity.*
9. Construct and install infrastructure, including storm drain inlets, which are pedestrian and bicycle-friendly.	*This is an existing strategy.*

Existing and Proposed Text	*Commentary*
Goal 5: Provide reliable convenient transit service to Sherwood residents and businesses as well as special transit options for the ~~e~~City's elderly and disabled residents.	*This is an existing goal.*
Policy 1 – The City shall support and encourage p~~P~~ublic transportation ~~shall be provided~~ as ~~an alternative~~ viable means of transportation in Sherwood.	*The policy has been re-written to reflect the City's supporting role in providing public transportation.*
Policy 2 – The City ~~of Sherwood~~ will work with Tri-Met to expand transit services to all parts of the City through additional routes, more frequent service, and transit oriented street improvements.	*This is an existing policy.*
Policy 3 – Park-and-ride facilities should be located with convenient access to the arterial system to facilitate rider transfer to transit and car pools.	*This is an existing policy.*
Policy 4 – The City will ~~E~~encourage the construction of bus shelters and park-n-ride lots in the vicinity of planned transit corridors.	*This is an existing policy.*
Policy 5 – The City ~~of Sherwood~~ will support the establishment of a "feeder" transit route from downtown Sherwood to Tualatin employment centers.	*This is an existing policy.*
Policy 6 – The City ~~of Sherwood~~ will support park and ride facilities that are sited for the maximum convenience of commuters and transit riders.	*This is an existing policy.*
Policy 7—The City ~~of Sherwood~~ will support regional efforts for the preservation and development of appropriate rail rights-of-way for passenger rail service, in particular for serving local and regional commuter rail needs in Washington County, Clackamas County, and Yamhill County.	*Review for consistency with the updated TSP recommendations. Note that this policy is related to new Strategy 5 (adopted Strategy 6.3 in the Sherwood Town Center Plan).*
Policy 8 – The City ~~of Sherwood~~ will encourage the provision of special transportation services (i.e., van pools, or car pools, dial-a-ride, etc.) to transportation disadvantaged by Tri-Met and community-based service	*This is an existing policy.*

Existing and Proposed Text	***Commentary***
providers.	
Policy 9 – ~~Fully integrate the City into the regional transit system by expanding hours and destinations served by transit providers.~~ The City supports transit service that serves the needs of the residents and businesses in and adjacent to the Town Center, including maintaining a robust local transit service network and planning for future local and high capacity transit service to neighboring cities.	*Deleted policy is somewhat redundant to Policy 2 and suggests that the City has authority to expand transit hours of service and routes. Proposed language is adopted Policy 6 in the Town Center Plan.*
Policy 10 – The City will meet RTP goals of providing a safe and convenient pedestrian circulation system.	*This is an existing policy.*
Policy 11 – The City will participate in and will support regional efforts that seek to improve multi-modal transportation options that benefit the residents and business in Sherwood.	*The proposed policy recognizes the City's participation in regional transportation projects such as the Southwest Corridor and Tonquin Trail projects.*
Policy 12 – The City will support providing and improving transit connections between Sherwood, Tualatin, and other communities in the region, particularly for work-related trips.	*This proposed policy language is based on comments from the Citizen Advisory Committee.*
Strategies	
1. In consultation with TriMet and consistent with their guidelines, ~~D~~develop and maintain design standards ~~to separate~~ for bus pullouts and stops on ~~buses from the~~ arterial roadways ~~while~~ to facilitate safe and efficient ~~transferring~~ passengers transfers. ~~Establish a bus turnout design for stops on arterial streets.~~	*Proposed modifications defer to TriMet regarding the preferred design for bus pullouts and stops.*
2. ~~Update development code to include design guidelines that require transit stops to be accessible to transit riders, especially the elderly and handicapped.~~ Ensure new development and redevelopment provide connections to transit streets and facilities, providing protected street crossings and bus stop amenities, if	*Existing Strategy is a "one time" action; proposed language is consistent with existing code requirements for new development in the vicinity of a transit stop.*

Existing and Proposed Text	*Commentary*
needed.	
~~3. Amend development code to require development on sites at major transit stops(defined by the City of Sherwood) to do the following:~~ ~~▫ Locate within 20 feet of (or provide a pedestrian plaza) at the major transit stop;~~ ~~▫ Provide reasonably direct pedestrian connections between the transit stop and building entrances on the site;~~ ~~▫ Provide a transit service passenger landing pad accessible to disabled persons;~~ ~~▫ Provide an easement or right-of-way dedication for a passenger shelter and underground utility connection from the new development to the transit amenity if requested by the public transit provider; and~~ ~~▫ Improve public safety by providing lighting at transit stops.~~	*Strategy is reflected in existing code requirements for new development in the vicinity of a transit stop and is no longer needed.*
~~4. Work with Tri-Met and Metro to extend transit options to Sherwood, which may include:~~ ~~▫ High capacity transit service along 99W terminating near Six Corners;~~ ~~▫ Potential extension of commuter rail line from Lake Oswego to Sherwood on the existing rail line with service to Newberg or McMinnville; and~~ ~~▫ Other regional transit service connections, such as frequent bus, interurban bus, as appropriate.~~ 3. Identify the ongoing transit needs within the community and work with Tri-Met and other transit providers to enhance services to address short and	*This existing strategy has been updated; language proposed here is Strategy 6.1 in the Town Center Plan.*

Existing and Proposed Text	Commentary
long-term transit needs in the community.	
4. Work with Metro, as well as the cities of Tualatin and Tigard, to explore feasible modes and locations to provide high-capacity transit service to the Town Center and adjacent areas.	*This is adopted Strategy 6.2 in the Sherwood Town Center Plan.*
5. Periodically evaluate the feasibility of passenger service along the existing rail lines as the Town Center grows.	*This is adopted Strategy 6.3 in the Sherwood Town Center Plan.*
6. Continue to explore opportunities to achieve long-term transit supportive densities in the Town Center in order to increase the viability of high-capacity transit.	*This is adopted Strategy 6.4 in the Sherwood Town Center Plan.*

Existing and <u>Proposed</u> Text	***Commentary***
Goal 6: Provide a convenient and safe transportation network within and between the Sherwood Old Town ~~(Town Center)~~ and Six Corners area that enables mixed use development and provides multi-modal access to area businesses and residents.	*This goal and its policies and strategies are consistent with the adopted Town Center Plan, but it is proposed that references to the Town Center be removed because the Town Center now applies to an area larger than Old Town.*
Policy 1 – The City ~~of Sherwood~~ shall continue to refine and develop existing and new design guidelines and special standards for the Old Town and Six Corners areas to facilitate more pedestrian and transit friendly development.	*This is an existing policy.*
Policy 2 – The City ~~of Sherwood~~ shall work to provide connectivity, via the off-street trail system and public right-of-way acquisitions and dedications, to better achieve street spacing and connectivity standards.	*This is an existing policy.*
Strategies	
1. Provide handicap ramps at all intersections with landings connected to sidewalk improvements, especially within Six Corners and Old Town areas.	*This is an existing strategy.*
2. <u>Work with transit service providers to</u> ~~D~~<u>d</u>esign transit stops in- to meet ADA requirements for transit accessibility.	*This is an existing strategy with minor amendments proposed acknowledge the relationship with transit service providers in designing transit stops.*
3. Adopt design and development guidelines for the Old Town areas that facilitate pedestrian use and a mix of commercial and residential development.	*This is an existing strategy.*
~~4. Adopt parking guidelines for the Old Town areas that are compatible with the parking guidelines established in Title 2 of the Metro Urban Growth Management Functional Plan.~~	*It is recommended to replace this strategy with proposed Goal 3, Strategy 11, language that was developed as part of the Town Center Plan and reflects the need for a parking study*

Existing and Proposed Text	Commentary
	and strategy for Old Town.

Existing and Proposed Text	*Commentary*
Goal 7: Ensure that efficient and effective freight transportation infrastructure is developed and maintained to support local and regional economic expansion and diversification consistent with City economic plans and policies.	*This is an existing goal.*
Policy 1 — The City ~~of Sherwood~~ will collaborate with federal, state and neighboring local governments and private business to ensure the investment in transportation infrastructure and services deemed necessary by the City to meet current and future demand for industrial and commercial freight movement.	*This is an existing policy.*
Policy 2 — The City ~~of Sherwood~~ will adopt implementing regulations that provide for safe and convenient access to industrial and commercial areas for commercial vehicles, including freight loading and transfer facilities.	*This is an existing policy.*
Policy 3 — The City ~~of Sherwood~~ will work cooperatively with local, regional and state agencies to protect the viability of truck and freight service routes within, through, and around the City of Sherwood, especially for Pacific Highway 99-W, the Tualatin-Sherwood Highway, and the ~~planned~~multi-corridor I-5/Hwy 99-W Connector corridor strategy.	*This is an existing policy with minor amendments to acknowledge that multiple facilities will be involved in the I-5/Highway 99-W Connector.*
Policy 4 — The City ~~of Sherwood~~ will work cooperatively with local, regional and state governments to ensure there is adequate air transportation infrastructure to serve local needs at regional airport facilities, including the Hillsboro Airport and Portland International airport.	*This is an existing policy.*
Policy 5 — The City ~~of Sherwood~~ will strongly encourage the preservation of rail rights-of-way for future rail uses, and will work with appropriate agencies to ensure the availability of rail services to its industrial lands.	*This is an existing policy.*
Policy 6 — The City ~~of Sherwood~~ will cooperate with local, regional and state governments to provide for regional marine freight infrastructure sufficient to serve local needs.	*This is an existing policy.*

Existing and Proposed Text	***Commentary***
Policy 7 — The City ~~of Sherwood~~ will cooperate with the Portland Development Commission, Port of Portland, Washington County, and other economic development agencies to ensure the availability of inter-modal connectivity facilities deemed necessary to facilitate seamless freight transfer between all transport modes.	*This is an existing policy.*
Strategies	
1. Revise the ~~Sherwood~~ ~~D~~development ~~C~~code as necessary to include clear and objective standards for the provision of freight loading and handling facilities, such as restricted on-street parking, loading docks, truck access ways, and rail spurs, in all industrial and commercial development districts.	*Note that proposed development code revisions include provisions for on-street loading. [Proposed new Subsection C in Section 16.94.030 (Off-Street Loading Standards).]*
2. Participate in regional economic development planning efforts related to inter-modal transportation facilities.	*This is an existing strategy.*
3. Adopt appropriate standards to ensure the preservation of rail access corridors to ~~Sherwood~~ the City's industrial land base.	*This is an existing strategy.*

Existing and Proposed Text	***Commentary***
Goal 8: The ~~Sherwood~~ City's transportation network will be managed in a manner that ensures the plan is implemented in a timely fashion and is kept up to date with respect to local and regional priorities.	*This is an existing goal.*
Policy 1 – The City ~~of Sherwood~~ shall develop and pursue a systematic approach to implementing the transportation network.	*This is an existing policy with amendments proposed to reflect existing city practices.*
Policy 2 – The City ~~of Sherwood~~ shall pursue a diversified funding strategy to implement the transportation system plan including private, public and regional sources.	*This is an existing policy.*
Policy 3 – The City ~~of Sherwood~~ shall use its adopted capital improvement plan to prioritize and schedule transportation projects based upon need as shown in the Transportation System Plan. Incorporate the transportation system priorities from the TSP into the cCity's capital improvement planning process.	*This is an existing policy.*
Policy 4 – Project scheduling shall be performed in a systematic manner based on the priority rating process outlined in the Transportation System Plan and available financial resources.	*This is an existing policy.*
Policy 5 – The Transportation System Plan shall be periodically updated, preferably on a five-year cycle, to assure consistency with changing ideas, philosophies, and related policies.	*This is an existing policy.*
Strategies	
1. Participate in MPAC, JPACT and other Metro advisory bodies to promote ~~Sherwood~~ the City's transportation system improvements.	*This is an existing strategy.*
2. Local private financing resources will include right of way dedication and developer contributions to street improvements, and local improvement districts. Public resources will include local system development	*This is an existing strategy.*

Existing and Proposed Text	*Commentary*
charges and bonding authority. Regional sources will include Washington County Traffic Impact Fees (TIF) and projects bonded through the County MSTIP program. Regional sources will also include Metro Transportation Improvement Plan (MTIP) resources and other state and federal grant assistance programs.	
~~3. Adopt a comprehensive local system development charge (SDC) ordinance to either augment or replace CAPand collector street SDC.~~	*A SDC ordinance has been adopted, so this strategy is no longer needed.*
34. Develop a method for scheduling improvement projects based on priority and funding sources.	*This is an existing strategy.*
45. Assign ~~c~~City staff and elected officials to participate in regional transportation planning processes.	*This is an existing strategy.*
5~~6~~. Secure intergovernmental agreements between ~~Sherwood~~ the City and adjoining communities and regional service providers that outline cooperative measures for coordinating transportation investment and regulation per ORS 195.065.	*This is an existing strategy.*
6. Continue to collaborate with Washington County and other regional partners on refinement planning related to Brookman Road, and update the Sherwood Transportation Plan to incorporate the agreed upon classification and design of this roadway.	*This is a new Strategy acknowledging the outstanding issues surrounding Brookman Road and articulating the need for a future amendment to the TSP.*

Table 3: Draft Proposed Amendments to SECTION C - The Transportation System Plan

Existing and Proposed Text	***Commentary***
The Transportation System Plan stresses the improvement of the existing system of transportation facilities through transportation system management before new facilities are built. Existing conditions have been analyzed in the Study Area (lands within UGB) and are contained in ~~Chapter 3 of~~ the TSP Appendix (Existing Conditions Report). Transportation analysis zones were created for each part of the city based on types of land use in the Comprehensive Plan Map. Future traffic volumes were projected based on expected ~~build out~~ development of those zones and surrounding areas consistent with Metro's land use projections. ~~Future traffic volumes with trip origins or destinations in the Study Area were then calculated for selected subareas or zones in this case. Future locally generated traffic volumes were then distributed onto the street system based on assumption as to major directional movements. From this process future locally generated traffic volumes were calculated for major roads. Future traffic volumes within the Study Area represent only locally generated traffic. Reduction in traffic volumes over time on certain major streets assumes the progressive improvement of alternative major street routes, which have the effect of shifting traffic from existing to improved routes in satisfying major directional movements. To determine total volumes on major streets with significant through traffic (i.e. Highway 99W) locally generated volumes should be added to through traffic volumes determined by Washington County, Metro or ODOT.~~ ~~The above a~~Analysis of projected future traffic conditions taken together with the application of the goals, objectives and policies described in Section B were used in the development of Transportation System Plan. A map for each existing and planned transportation system is included in the TSP. ~~Each m~~Maps, ~~several~~ street classifications, and the above policies are~~were~~ updated as part of TSP updates~~as well~~. The TSP ~~(2005)~~ is a technical reference to the Transportation element of the Comprehensive Plan. ~~The following information is included in the TSP and is included below for reference. Table 1 is a list of functional classifications and definitions for each street followed by Figure 1 Transportation Plan Map that illustrates the location and functional classification of each street. Table 2 is a list of major transportation improvements planned for the next twenty years based on the transportation system analysis of expected traffic levels, a performance standard Level of Service "D", and projected costs. Generally, most of the improvements are upgrades and connections to existing streets while some improvements are proposed new streets.~~	*Specific references to the TSP are replaced with general references. It is recommended to remove functional classification maps and project lists from this section and generally simplify this section.*

Angelo planning group LAND USE PLANNING • TRANSPORTATION PLANNING • PROJECT MANAGEMENT

Memorandum

Date: May 6, 2014 ***Last revised May 14, 2014***

To: Brad Kilby, AICP, City of Sherwood

From: Darci Rudzinski and Shayna Rehberg, Angelo Planning Group

cc: Bob Galati, PE, City of Sherwood; Garth Appanaitis, DKS Associates

Re: Draft Proposed Implementation Language (Task 5.2)

This memorandum presents draft proposed amendments to the City of Sherwood Zoning and Community Development Code ("development code"), pursuant to Task 5.2.

Proposed policy and code amendments will be reviewed and considered for adoption in conjunction with the updated TSP, as they include amendments that implement recommendations from the updated City of Sherwood Transportation System Plan (TSP), create consistency between the TSP and other adopted local documents, and comply with state and regional transportation planning regulations. Proposed policy amendments are presented in a separate memorandum and proposed code amendments are presented below.

Proposed Development Code Amendments

Draft code amendments presented in this memorandum were developed according to findings of compliance with the Transportation Planning Rule (TPR) and Regional Transportation Functional Plan (RTFP).[1] Recommendations for potential code amendments to better address compliance with TPR and RTFP requirements were summarized in Table 6 of the Needs, Opportunities, Constraints and Tools Technical Report (Task 3.2). These recommendations were discussed with City staff in order to determine which issues would be pursued and developed into draft code amendments.

For reference, that summary table is included in this memorandum as Table A-1 in Attachment A, and includes commentary indicating which recommendations have been developed into proposed code amendments.

[1] Detailed and updated findings of compliance will be included in the City's staff report (Task 5.6).

Proposed code amendment text is presented in adoption-ready format in this memorandum. New language that is proposed to be added is underlined and proposed deletions are ~~struck through~~. The draft amendments are numbered consistent with the structure of the City development code, and are presented in the order of issues included in Table A-1.

Note: In addition to the amendments proposed in this memorandum, the entire development code should be checked to amend all references to the updated TSP, as needed.

Consistency of transportation facility standards (Recommendation DC-2 in Table A-1)

CHAPTER 16.106 TRANSPORTATION FACILITIES

16.106.010 Generally

A. Creation

Public streets shall be created in accordance with provisions of this Chapter. Except as otherwise provided, all street improvements and rights-of-way shall conform to standards for the City's functional street classification, as shown on the TSP Map (Figure 15) ~~and in Figure 1, of Chapter 6 of the Community Development Plan,~~ and other applicable City standards. The following table depicts the guidelines for the street characteristics.

[...]

16.106.040 Design

Standard cross sections showing street design and pavement dimensions are located in the ~~City of Sherwood Transportation System Plan, and~~ City of Sherwood's Engineering Design Manual.

Definitions of access way and shared-use path (Recommendation DC-3 in Table A-1)

CHAPTER 16.10 DEFINITIONS

16.10.020 SPECIFICALLY

[...]

Access: The way or means by which pedestrians and vehicles enter and leave property.

Access way: A pathway providing a connection for pedestrians and bicyclists between two streets, between two lots, or between a development and a public right-of-way. An access way is intended to provide access between a development and adjacent residential uses, commercial uses, public use such as schools, parks, and adjacent collector and arterial streets where transit stops or bike lanes are provided or designated. An access way may be a pathway for pedestrians and bicyclists (with no vehicle access), a pathway on public or private property (i.e., with a public access easement), and/or a facility designed to accommodate emergency vehicles.

Accessory Building/Use: A subordinate building or use which is customarily incidental to that of the principal use or building located on the same property.

[...]

Setback: The minimum horizontal distance between a public street right-of-way line, or side and rear property lines, to the front, side and rear lines of a building or structure located on a lot.

Shared-use path: A facility for non-motorized access conforming to City standards and separated from the roadway, either in the roadway right-of-way, independent public right-of-way, or a public access easement. It is designed and constructed to allow for safe walking, biking, and other human-powered travel modes.

Sidewalk: A pedestrian walkway with hard surfacing.

[...]

Traffic Impact Analysis (TIA) and rough proportionality requirements (Recommendation DC-4 in Table A-1)

CHAPTER 16.90 SITE PLANNING

16.90.030 Site Plan Modifications and Revocation

[...]

D. Required Findings

No site plan approval shall be granted unless each of the following is found:

[...]

6. ~~For developments that are likely to generate more than 400 average daily trips (ADTs)~~Pursuant to Section 16.106.080, or at the discretion of the City Engineer, the applicant shall provide adequate information, such as a traffic impact analysis (TIA) or traffic counts, to demonstrate the level of impact to the surrounding ~~street~~ transportation system. The developer shall be required to mitigate for impacts attributable to the project, pursuant to TIA requirements in Section 16.106.080 and rough proportionality requirements in Section 16.106.090. The determination of impact or effect and the scope of the impact study shall be coordinated with the provider of the affected transportation facility.

[...]

CHAPTER 16.106 TRANSPORTATION FACILITIES

16.106.020 Required Improvements

[...]

D. Extent of Improvements

1. Streets required pursuant to this Chapter shall be dedicated and improved consistent with Chapter 6 of the Community Development Plan, the TSP and applicable City specifications included in the City of Sherwood Construction Standards. Streets shall include curbs, sidewalks, catch basins, street lights, and street trees. Improvements shall also include any bikeways designated on the Transportation System Plan map. Applicant may be required to dedicate land for required public improvements only when the exaction is directly related to and roughly proportional to the impact of the development, pursuant to Section 16.106.090.

[...]

16.106.040 Design

[...]

K. Traffic Controls

1. ~~An application for a proposed residential development that will generate more than an estimated 200 average daily vehicle trips (ADT) must include a traffic impact analysis to determine the number and types of traffic controls necessary to accommodate anticipated traffic flow.~~

2. ~~For all other proposed developments including commercial, industrial or institutional uses with over an estimated 400 ADT~~Pursuant to Section 16.106.080, or as otherwise required by the City Engineer, ~~the~~ an application must include a traffic impact analysis to determine the number and types of traffic controls necessary to accommodate anticipated traffic flow.

[...]

16.106.080 Traffic Impact Analysis (TIA)

A. Purpose. The purpose of this section is to implement Sections 660-012-0045(2)(b) and -0045(2)(e) of the State Transportation Planning Rule (TPR), which require the City to adopt performance standards and a process to apply conditions to land use proposals in order to minimize impacts on

and protect transportation facilities. This section establishes requirements for when a traffic impact analysis (TIA) must be prepared and submitted; the analysis methods and content involved in a TIA; criteria used to review the TIA; and authority to attach conditions of approval to minimize the impacts of the proposal on transportation facilities.

This section refers to the TSP for performance standards for transportation facilities as well as for projects that may need to be constructed as mitigation measures for a proposal's projected impacts. This section also relies on the City of Sherwood's Engineering Design Manual to provide street design standards and construction specifications for improvements and projects that may be constructed as part of the proposal and/or mitigation measures approved for the proposal.

B. Applicability. A traffic impact analysis (TIA) shall be required to be submitted to the City with a land use application at the request of the City Engineer or if the proposal is expected to involve one or more of the following:

1. An amendment to the Sherwood Comprehensive Plan or zoning map.

2. A new direct property approach road to Highway 99W is proposed.

3. The proposed development generates 50 or more PM peak-hour trips on Highway 99W, or 100 PM peak-hour trips on the local transportation system.

4. An increase in use of any adjacent street or direct property approach road to Highway 99W by 10 vehicles or more per day that exceed the 20,000 pound gross vehicle weight.

5. The location of an existing or proposed access driveway does not meet minimum spacing or sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles are likely to queue or hesitate at an approach or access connection, thereby creating a safety hazard.

6. A change in internal traffic patterns that may cause safety problems, such as back up onto the highway or traffic crashes in the approach area.

C. Requirements. The following are typical requirements that may be modified in coordination with Engineering Staff based on the specific application.

1. Pre-application Conference. The applicant shall meet with the City Engineer prior to submitting an application that requires a TIA. This meeting will be coordinated with Washington County and ODOT when an approach road to a County road or Highway 99W serves the property, so that the TIA will meet the requirements of all relevant agencies.

2. Preparation. The TIA shall be prepared by an Oregon Registered Professional Engineer qualified to perform traffic engineering analysis and will be paid for by the applicant.

3. Typical Average Daily Trips and Peak Hour Trips. The latest edition of the Trip Generation Manual, published by the Institute of Transportation Engineers (ITE), shall be used to gauge PM peak hour vehicle trips, unless a specific trip generation study that is approved by the City Engineer indicates an alternative trip generation rate is appropriate.

4. Intersection-level Analysis. Intersection-level analysis shall occur at every intersection where the analysis shows that 50 or more peak hour vehicle trips can be expected to result from the development.

5. Transportation Planning Rule Compliance. The requirements of OAR 660-012-0060 shall apply to those land use actions that significantly affect the transportation system, as defined by the Transportation Planning Rule.

D. Study Area. The following facilities shall be included in the study area for all TIAs:

1. All site-access points and intersections (signalized and unsignalized) adjacent to the proposed development site. If the site fronts an arterial or collector street, the analysis shall address all intersections and driveways along the site frontage and within the access spacing distances extending out from the boundary of the site frontage.

2. Roads and streets through and adjacent to the site.

3. All intersections needed for signal progression analysis.

4. In addition to these requirements, the City Engineer may require analysis of any additional intersections or roadway links that may be adversely affected as a result of the proposed development.

E. Analysis Periods. To adequately assess the impacts of a proposed land use action, the following study periods, or horizon years, should be addressed in the transportation impact analysis where applicable:

1. Existing Year.

2. Background Conditions in Project Completion Year. The conditions in the year in which the proposed land use action will be completed and occupied, but without the expected traffic from the proposed land use action. This analysis should account for all City-approved developments that are expected to be fully built out in the proposed land use action horizon year, as well as all planned transportation system improvements.

3. Full Buildout Conditions in Project Completion Year. The background condition plus traffic from the proposed land use action assuming full build-out and occupancy.

4. Phased Years of Completion. If the project involves construction or occupancy in phases, the applicant shall assess the expected roadway and intersection conditions resulting from major development phases. Phased years of analysis will be determined in coordination with City staff.

5. 20-Year or TSP Horizon Year. For planned unit developments, comprehensive plan amendments or zoning map amendments, the applicant shall assess the expected future roadway, intersection, and land use conditions as compared to approved comprehensive planning documents.

F. Approval Criteria. When a TIA is required, a proposal is subject to the following criteria, in addition to all criteria otherwise applicable to the underlying land use proposal:

1. The analysis complies with the requirements of 16.106.080.C;

2. The analysis demonstrates that adequate transportation facilities exist to serve the proposed development or identifies mitigation measures that resolve identified traffic safety problems in a manner that is satisfactory to the City Engineer and, when County or State highway facilities are affected, to Washington County and ODOT;

3. For affected non-highway facilities, the TIA demonstrates that mobility and other applicable performance standards established in the adopted City TSP have been met; and

4. Proposed public improvements are designed and will be constructed to the street standards specified in Section 16.106.010 and the Engineering Design Manual, and to the access standards in Section 16.106.040.

5. Proposed public improvements and mitigation measures will provide safe connections across adjacent right-of-way (e.g., protected crossings) when pedestrian or bicycle facilities are present or planned on the far side of the right-of-way.

G. Conditions of Approval. The City may deny, approve, or approve a development proposal with conditions needed to meet operations and safety standards and provide the necessary right-of-way and improvements to ensure consistency with the future planned transportation system. Improvements required as a condition of development approval, when not voluntarily provided by the applicant, shall be roughly proportional to the impact of the development on transportation facilities, pursuant to Section 16.106.090. Findings in the development approval shall indicate how the required improvements are directly related to and are roughly proportional to the impact of development.

16.106.090 Rough Proportionality

The purpose of this section is to ensure that required transportation facility improvements are roughly proportional to the potential impacts of the proposed development. The rough proportionality requirements of this section apply to both frontage and non-frontage improvements. A proportionality analysis will be conducted by the City Engineer for any proposed development that triggers transportation facility improvements pursuant to this chapter. The City Engineer will take into consideration any benefits that are estimated to accrue to the development property as a result of any required transportation facility improvements. A proportionality determination can be appealed pursuant to Section 16.76. The following general provisions apply whenever a proportionality analysis is conducted.

A. Mitigation of impacts due to increased demand for transportation facilities associated with the proposed development shall be provided in rough proportion to the transportation impacts of the proposed development. When applicable, anticipated impacts will be determined by the TIA in accordance with Section 16.106.080. When no TIA is required, anticipated impacts will be determined by the City Engineer.

B. The following shall be considered when determining proportional improvements:

1. Condition and capacity of existing facilities within the impact area in relation to City standards. The impact area is generally defined as the area within a one-half (1/2) mile radius of the proposed development. If a TIA is required, the impact area is the TIA study area.

2. Existing vehicle, bicycle, pedestrian, and transit use within the impact area.

3. The effect of increased demand on transportation facilities and other approved, but not yet constructed, development projects within the impact area that is associated with the proposed development.

4. Applicable TSP goals, policies, and plans.

5. Whether any route affected by increased transportation demand within the impact area is listed in any City program including school trip safety; neighborhood traffic management; capital improvement; system development improvement, or others.

6. Accident history within the impact area.

7. Potential increased safety risks to transportation facility users, including pedestrians and cyclists.

8. Potential benefit the development property will receive as a result of the construction of any required transportation facility improvements.

9. Other considerations as may be identified in the review process pursuant to Chapter 16.72.

Preferential carpool and vanpool parking (Recommendation DC-6 in Table A-1)

CHAPTER 16.94 OFF-STREET PARKING AND LOADING

16.94.010 General Requirements

[...]

E. Location

3. Vehicle parking is allowed only on improved parking shoulders that meet City standards for public streets, within garages, carports and other structures, or on driveways or parking lots that have been developed in conformance with this code. Specific locations and types of spaces (car pool, compact, etc.) for parking shall be indicated on submitted plans and located to the side or rear of buildings where feasible.

a. All new development with twenty (20) employees or more shall include preferential spaces for ~~either~~ car-pool ~~and~~/vanpool designation. Carpool and vanpool parking spaces shall be located closer to the main employee entrance than all other parking spaces with the exception of ADA parking spaces. Carpool/vanpool spaces shall be clearly marked as reserved for carpool/vanpool only.

Exemptions for structured parking and on-street parking (Recommendation DC-8 in Table A-1)

16.94.010 General Requirements

[...]

K. Structured parking and on-street parking are exempt from the parking space maximums in Section 16.94.020.A.

"Housekeeping" amendments, parking standards table footnotes (Recommendation DC-9 in Table A-1)

Section 16.94.020, Parking Standards Table

[1] Parking Zone A reflects the maximum number of permitted vehicle parking spaces allowed for each listed land use. Parking Zone A areas include those parcels that are located within one-quarter (¼) mile walking distance of bus transit stops, one-half (½) mile walking distance of light rail station platforms, or both, or that have a greater than 20 minute peak hour transit service.

[2] ~~Parking Zone B.~~ Parking Zone B reflects the maximum number of permitted vehicle parking spaces allowed for each listed land use. ~~Parking Zone B areas include those parcels that are located within one-quarter ¼ mile walking distance of bus transit stops, one-half ½ mile walking distance of light rail station platforms, or both, or that have a greater than 20 minute peak hour transit service.~~ Parking Zone B areas ~~also~~ include those parcels that are located at a distance greater than one-quarter (¼) mile walking distance of bus transit stops, one-half (½) mile walking distance of light rail station platforms, or both.

Transportation Planning Rule consistency requirements (Recommendation DC-11 in Table A-1)

CHAPTER 16.80 PLAN AMENDMENTS

16.80.030 Review Criteria

[...]

C. Transportation Planning Rule Consistency

1. The applicant shall demonstrate consistency with the Transportation Planning Rule, specifically by addressing whether the proposed amendment creates a significant effect on the transportation system pursuant to OAR 660-012-0060. If required, a Traffic Impact Analysis (TIA) shall be prepared pursuant to Section 16.106.080.

   ~~Review of plan and text amendment applications for effect on transportation facilities. Proposals shall be reviewed to determine whether it significantly affects a transportation facility, in accordance with OAR 660-12-0060 (the TPR). Review is required when a development application includes a proposed amendment to the Comprehensive Plan or changes to land use regulations.~~

2. ~~"Significant" means that the transportation facility would change the functional classification of an existing or planned transportation facility, change the standards implementing a functional classification, allow types of land use, allow types or levels of land use that would result in levels of travel or access that are inconsistent with the functional classification of a transportation~~

~~facility, or would reduce the level of service of the facility below the minimum level identified on the Transportation System Plan.~~

~~3. Per OAR 660-12-0060, Amendments to the Comprehensive Plan or changes to land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the Transportation System Plan. This shall be accomplished by one of the following:~~

~~a. Limiting allowed uses to be consistent with the planned function of the transportation facility.~~

~~b. Amending the Transportation System Plan to ensure that existing, improved, or new transportation facilities are adequate to support the proposed land uses.~~

~~c. Altering land use designations, densities or design requirements to reduce demand for automobile travel and meet travel needs through other modes.~~

Major driveway connectivity requirements (Recommendation DC-13 in Table A-1)

CHAPTER 16.90 SITE PLANNING

16.90.030 Site Plan Modifications and Revocation

[...]

D. Required Findings

No site plan approval shall be granted unless each of the following is found:

[...]

9. Driveways that are more than 24 feet in width shall align with existing streets or planned streets as shown in the Local Street Connectivity Map in the adopted Transportation System Plan (Figure 17), except where prevented by topography, rail lines, freeways, pre-existing development, or leases, easements, or covenants.

CHAPTER 16.106 TRANSPORTATION FACILTIIES

16.106.030 Location

[...]

B. Street Connectivity and Future Street Systems

[...]

2. Connectivity Map Required. New residential, commercial, and mixed use development involving the construction of new streets shall be submitted with a site plan that implements, responds to and expands on the Local Street Connectivity map contained in the TSP.

[...]

d. Driveways that are more than 24 feet in width shall align with existing streets or planned streets as shown in the Local Street Connectivity Map in the adopted Transportation System Plan (Figure 17), except where prevented by topography, rail lines, freeways, pre-existing development, or leases, easements, or covenants.

On-street loading (Recommendation DC-14 in Table A-1)

CHAPTER 16.94 OFF-STREET PARKING AND LOADING

16.94.030 Off-Street Loading Standards

[...]

C. Exceptions and Adjustments. The review authority, through Site Plan Review, may approve loading areas within a street right-of-way in the Old Town Overlay District when all of the following conditions are met:

1. Short in duration (i.e., less than one hour);

2. Infrequent (less than three operations occur daily between 5:00 a.m. and 12:00 a.m. or all operations occur between 12:00 a.m. and 5:00 a.m. at a location that is not adjacent to a residential zone);

3. Does not unreasonably obstruct traffic; [or] Does not obstruct traffic during peak traffic hours;

4. Does not obstruct a primary emergency response route; and

5. Is acceptable to the applicable roadway authority.

Bicycle parking (Recommendation DC-15 in Table A-1)

CHAPTER 16.94 OFF-STREET PARKING AND LOADING

16.94.020 Off-Street Parking Standards

[...]

C. Bicycle Parking Facilities

~~1. Location and Design~~

~~a. Bicycle parking shall be conveniently located with respect to both the street right-of-way and at least one (1) building entrance (e.g., no farther away than the closest parking space). Bike parking may be located inside the main building or near the main entrance.~~

~~b. Bicycle parking in the Old Town Overlay District can be located on the sidewalk within the right-of-way. A standard inverted "U-shaped" design is appropriate. Alternative, creative designs are strongly encouraged.~~

~~2. Visibility and Security. Bicycle parking shall be visible to cyclists from street sidewalks or building entrances, so that it provides sufficient security from theft and damage.~~

~~3. Options for Storage. Bicycle parking requirements for long-term and employee parking can be met by providing a bicycle storage room, bicycle lockers, racks, or other secure storage space inside or outside of the building.~~

~~4. Lighting. Bicycle parking shall be at least as well lit as vehicle parking for security.~~

~~5. Reserved Areas. Areas set aside for bicycle parking shall be clearly marked and reserved for bicycle parking only.~~

~~6. Hazards. Bicycle parking shall not impede or create a hazard to pedestrians. Parking areas shall be located so as to not conflict with vision clearance standards.~~

1. General Provisions

a. Applicability. Bicycle parking spaces shall be provided for new development, changes of use, and major renovations, defined as construction valued at 25% or more of the assessed value of the existing structure.

b. Types of Spaces. Bicycle parking facilities shall be provided in terms of short-term bicycle parking and long-term bicycle parking. Short-term bicycle parking is intended to encourage customers and other visitors to use bicycles by providing a convenient and readily accessible place to park bicycles. Long-term bicycle parking provides employees, students, residents, commuters, and others who generally stay at a site for at least several hours a weather-protected place to park bicycles.

c. Minimum Number of Spaces. The required total minimum number of bicycle parking spaces for each use category is shown in Table 4, Minimum Required Bicycle Parking Spaces. *[Note: Tables in Chapter 16.94 are not currently numbered, so it is recommended that the previous tables in the chapter be numbered Tables 1, 2, and 3.]*

d. Minimum Number of Long-term Spaces. At least 50% of the required bicycle parking spaces in Table 4 shall be provided as long-term bicycle parking, with a minimum of one long-term bicycle parking space.

e. Multiple Uses. When there are two or more primary uses on a site, the required bicycle parking for the site is the sum of the required bicycle parking for the individual primary uses.

2. Location and Design.

a. General Provisions

(1) Each space must be at least 2 feet by 6 feet in area, be accessible without moving another bicycle, and provide enough space between the rack and any obstructions to use the space properly.

(2) There must be an aisle at least 5 feet wide behind all required bicycle parking to allow room for bicycle maneuvering. Where the bicycle parking is adjacent to a sidewalk, the maneuvering area may extend into the right-of-way.

(3) Lighting. Bicycle parking shall be at least as well lit as vehicle parking for security.

(4) Reserved Areas. Areas set aside for bicycle parking shall be clearly marked and reserved for bicycle parking only.

(5) Bicycle parking in the Old Town Overlay District can be located on the sidewalk within the right- of-way. A standard inverted "U shaped" or staple design is appropriate. Alternative, creative designs are strongly encouraged.

(6) Hazards. Bicycle parking shall not impede or create a hazard to pedestrians. Parking areas shall be located so as to not conflict with vision clearance standards.

b. Short-term Bicycle Parking

(1) Provide lockers or racks that meet the standards of this section.

(2) Locate inside or outside the building within 30 feet of the main entrance to the building or at least as close as the nearest vehicle parking space, whichever is closer.

c. Long-term Bicycle Parking

(1) Provide racks, storage rooms, or lockers in areas that are secure or monitored (e.g., visible to employees or customers or monitored by security guards).

(2) Locate the space within 100 feet of the entrance that will be accessed by the intended users.

(3) All of the spaces shall be covered.

d. Covered Parking (Weather Protection)

(1) When required, covered bicycle parking shall be provided in one of the following ways: inside buildings, under roof overhangs or awnings, in bicycle lockers, or within or under other structures.

(2) Where required covered bicycle parking is not within a building or locker, the cover must be permanent and designed to protect the bicycle from rainfall and provide seven (7) foot minimum overhead clearance.

(3) Where required bicycle parking is provided in lockers, the lockers shall be securely anchored.

Table 4: Minimum Required Bicycle Parking Spaces

Use Categories	Minimum Required Spaces
Residential Categories	
Household living	Multi-dwelling — 2 or 1 per 10 auto spaces All other residential structure types — None
Group living	1 per 20 auto spaces
Commercial Categories	
Retail sales/service office	2 or 1 per 20 auto spaces, whichever is greater
Drive-up vehicle servicing	None
Vehicle repair	None
Commercial parking facilities commercial outdoor recreation major event entertainment	4 or 1 per 20 auto spaces, whichever is greater
Self-service storage	None
Industrial Categories/Service Categories	
Basic utilities	2 or 1 per 40 spaces, whichever is greater
Park and ride facilities	2 or 1 per 20 auto spaces
Community service essential service providers parks and open areas	2 or 1 per 20 auto spaces, whichever is greater
Schools	High schools — 4 per classroom
	Middle schools — 2 per classroom
	Grade schools — 2 per 4th & 5th grade classroom
Colleges, medical centers, religious institutions, daycare uses	2 or 1 per 20 auto spaces whichever is greater

Map references (Recommendation DC-17 in Table A-1)

CHAPTER 16.106 TRANSPORTATION FACILITIES

16.106.020 Required Improvements

A. Generally

Except as otherwise provided, all developments containing or abutting an existing or proposed street, that is either unimproved or substandard in right-of-way width or improvement, shall dedicate the necessary right-of-way prior to the issuance of building permits and/or complete acceptable improvements prior to issuance of occupancy permits. ~~The following figure provides the depiction of the~~ Right-of-way requirements are based on functional classification of the street network as ~~found~~ established in the Transportation System Plan, Figure ~~8-1~~15.

[Delete following figure]

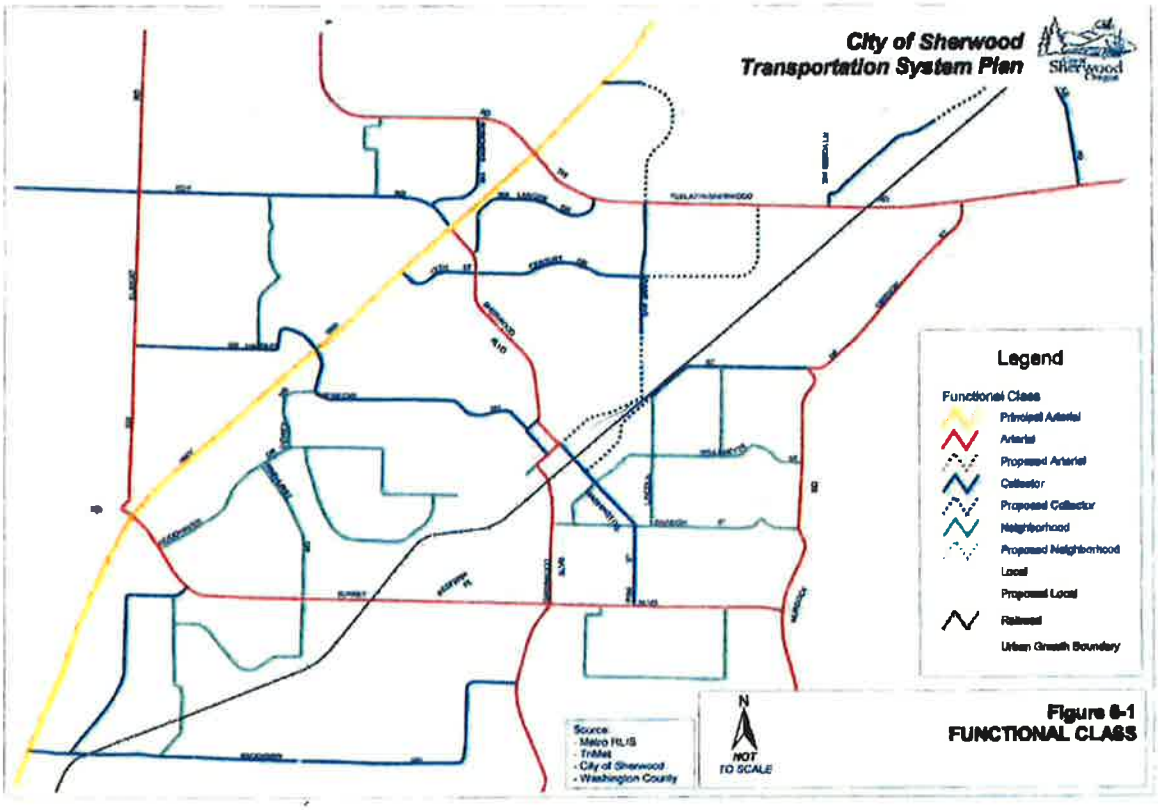


Figure 8-1
FUNCTIONAL CLASS

[...]

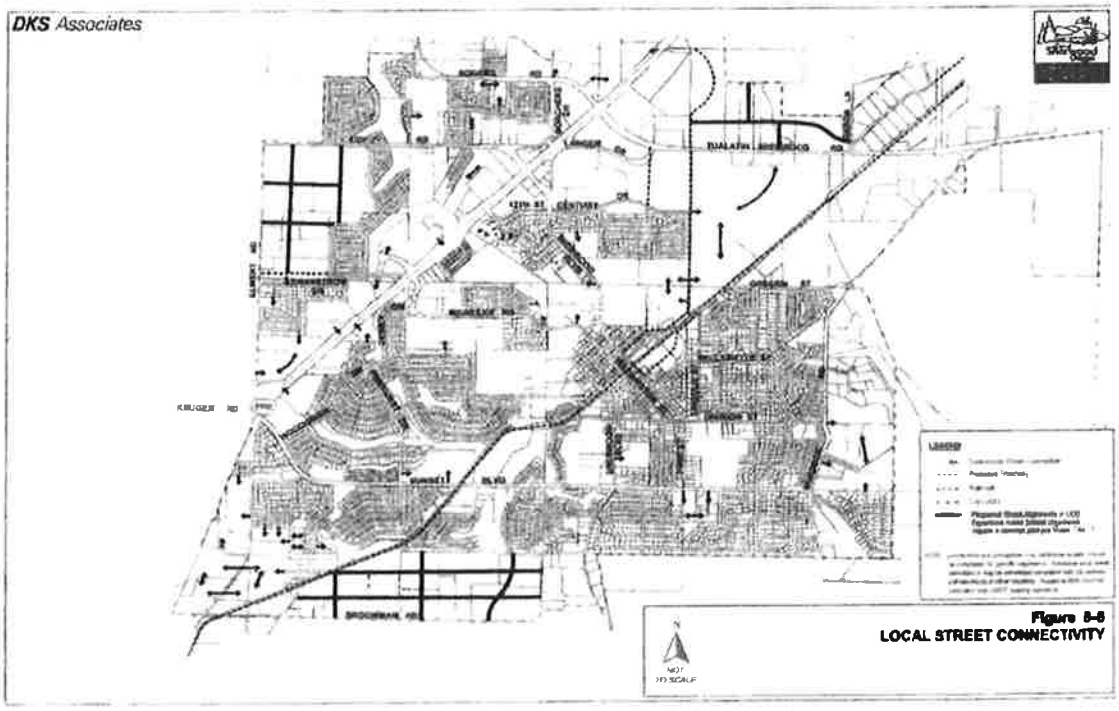
16.106.030 Location

[...]

B. Street Connectivity and Future Street Systems

1. Future Street Systems. The arrangement of public streets shall provide for the continuation and establishment of future street systems as shown on the Local Street Connectivity Map contained in the adopted Transportation System Plan (Figure ~~8-8~~16).

[Delete following figure]



CAP program discontinuation (Recommendation DC-18 in Table A-1)

CHAPTER 16.106 TRANSPORTATION FACILITIES

~~16.106.070 Hwy. 99W Capacity Allocation Program (CAP)~~

~~A. Purpose - The purpose of the Highway 99W Capacity Allocation Program is to:~~

~~1. Prevent failure of Highway 99W through Sherwood.~~

~~2. Preserve capacity on Highway 99W over the next 20 years for new development within Sherwood.~~

~~3. Preserve land values in Sherwood by preventing failure of one of the City's key transportation links.~~

~~4. Insure improvements to Highway 99W and adjacent primary roadways are constructed at the time development occurs.~~

~~5. Minimize the regulatory burden on developments that have minimal impact on Highway 99W.~~

~~B. Exclusions~~

~~The following types of projects and activities are specifically excluded from the provisions of this program:~~

~~1. Churches.~~

~~2. Elementary, middle, and high schools.~~

~~3. Changes in use that do not increase the number of trips generated by the current use.~~

~~C. Definitions~~

~~1. "Base Application" means the site plan or conditional use application which invokes the provisions of this chapter.~~

~~2. "Capacity" means the maximum number of peak hour vehicle trips that Highway 99W through Sherwood may accommodate at the Level of Service Standard assuming full build-out of all land zoned for residential and industrial development in Sherwood.~~

~~3. "Full Access Intersections" means the following intersections on Highway 99W in Sherwood:~~

~~Sunset, Meinecke, Edy/N. Sherwood, Tualatin-Sherwood/Scholls-Sherwood (Roy Rogers Road, and Home Depot (Adams Street).~~

~~4. "ITE Manual" means the latest edition of the public titled "Trip Generation" by the Institute of Transportation Engineers.~~

~~5. "Level of Service (LOS) Standard" means the lowest acceptable level of service on a transportation corridor within Sherwood as stated in the Standard Requirements Section.~~

~~6. "Mitigation" means improvements to the transportation system that increase or enhance capacity.~~

~~7. "Net Trips" means the number of trips generated by a regulated activity during the PM Peak Hours. Net trips equal new trips, diverted trips, and trips from existing activities on a site that will remain. Net trips do not include: Pass-by trips, Internal trips, trips from existing facilities that will be removed, and Trips Reduced due to implementation of transportation demand strategies.~~

~~8. "Peak Hour" means a consecutive sixty (60) minute period during the twelve (12) PM hours of an average day, which experience the highest sum of traffic volumes on a roadway.~~

~~9. "Regulated Activity" means project(s) or activities proposed in the base application.~~

~~10. "Site Trip Limit" means the trip limit multiplied by the acreage of the site containing the regulated activity.~~

~~11. "Trip Allocation Certificate" means a certificate or letter from the City Engineer specifying that a regulated activity meets the trip limit and specifying any required mitigation.~~

~~12. "Trip Analysis" means a study or report that specifies the net trips from a regulated activity and analyzes the trip distribution and assignment from the activity.~~

~~13. "Trip Limit" means the maximum number of trips per acre from regulated activities that can be accommodated without violating the LOS Standard.~~

~~D. Standard Requirements~~

~~1. All regulated activities shall acquire a Trip Allocation Certificate prior to approval of their base application. Lack of a Trip Allocation Certificate shall be the basis for denial of a base application.~~

~~2. A Trip Analysis is required for all regulated activities prior to being considered for a Trip Allocation Certificate.~~

~~3. The Level of Service Standard for Highway 99W through Sherwood through the year 2020 is "E".~~

~~4. The trip limit for a regulated activity shall be forty three (43) net trips per acre.~~

~~5. Mitigation to comply with the CAP shall not be required for regulated activities occurring on land zoned General Industrial (GI) or Light Industrial (LI) when the activity produces less than eight (8) net trips per acre.~~

~~E. Trip Analysis~~

~~1. Purpose~~

~~The first step in the process of seeking a Trip Allocation Certificate is preparation of a Trip Analysis by the applicant for the regulated activity. The purpose of the Trip Analysis is to evaluate whether the net trips from a regulated activity exceed the site trip limit.~~

~~2. Timing~~

~~The Trip Analysis shall be submitted with the relevant base application. Base applications without a Trip Analysis shall be deemed incomplete.~~

~~3. Format~~

~~At a minimum, the Trip Analysis shall contain all the following information:~~

~~a. The type and location of the regulated activity.~~

~~b. A tax map clearly identifying the parcel(s) involved in the Trip Analysis.~~

~~c. Square footage used to estimate trips, in accordance with methods outlined in the ITE Manual.~~

~~d. Description of the type of activity, especially as it corresponds to activities described in the ITE Manual.~~

~~e. Copy of the ITE Manual page used to estimate trips.~~

f. Acreage of the site containing the regulated activity calculated to two (2) decimal points.

g. Trip distributions and assignments from the regulated activity to all full access intersections impacted by ten (10) or more trips from the regulated activity with identification of the method used to distribute trips from the site.

h. Copies of any other studies utilized in the Trip Analysis.

i. Summary of the net trips generated by the regulated activity in comparison to the site trip limit.

j. Signature and stamp of a professional engineer, registered in the State of Oregon, with expertise in traffic or transportation engineering, who prepared the analysis.

4. Methods

a. The Trip Analysis and trip generation for an activity shall be based on the ITE Manual.

b. If a trip generation for the proposed use is not available in the ITE Manual or the applicant wishes to dispute the findings in the ITE Manual, the trip generation calculation may be based on an analysis of trips from five (5) sites with the same type of activity as that proposed.

5. Modification of Trip Analysis Requirements

The City Engineer may waive, in writing, some of the requirements of the Trip Analysis if:

a. The proposed regulated activity is part of a previously approved Trip Allocation Certificate that meets the requirements of this chapter and the applicant demonstrates, to the satisfaction of the City Engineer, that the applicable provisions of the previously approved Trip Allocation Certificate shall be met; or

b. The City Engineer determines, upon receipt of a letter of request from the applicant, that less information is required to accomplish the purposes of this chapter.

F. Trip Allocation Certificate

1. General

a. Trip Allocation Certificates shall be issued by the City Engineer.

b. Trip Allocation Certificates shall be valid for the same period as the land use or other city approval for the regulated activity.

c. The City Engineer may invalidate a Trip Allocation Certificate when, in the City Engineer's judgment, the Trip Analysis that formed the basis for award of the Trip Allocation Certificate no longer accurately reflects the activity proposed under the base application.

~~2. Approval Criteria~~

~~a. Upon receipt of a Trip Analysis, the City Engineer shall review the analysis. The Trip Analysis shall meet both of the following criteria to justify issuance of a Trip Allocation Certificate for the regulated activity:~~

~~(1) Adequacy of analysis; and~~

~~(2) Projected net trips less than the site trip limit.~~

~~b. Adequacy of Analysis~~

~~The City Engineer shall judge this criterion based on the following factors:~~

~~(1) Adherence to the Trip Analysis format and methods described in this chapter.~~

~~(2) Appropriate use of data and assumptions; and~~

~~(3) Completeness of the Trip Analysis.~~

~~3. Mitigation~~

~~a. The Trip Allocation Certificate shall specify required mitigation measures for the regulated activity.~~

~~b. Mitigation measures shall include improvements to Highway 99W and nearby transportation corridors that, in the judgment of the City Engineer, are needed to meet the LOS Standard and provide capacity for the regulated activity.~~

~~c. Engineering construction plans for required mitigation measures shall be submitted and approved in conjunction with other required construction plans for the regulated activity.~~

~~d. Mitigation measures shall be implemented in tandem with work associated with the regulated activity.~~

~~e. Failure to implement required mitigation measures shall be grounds for revoking the regulated activity's base application approval.~~

~~G. Other Provisions~~

~~1. Acreage Calculation for a Regulated Activity~~

~~a. Acreage calculations used to calculate net trips per acre in the Trip Analysis must use the entire area of the tax lot(s) containing the regulated activity, less 100-year floodplain area, in accordance with FIRM map for Sherwood.~~

~~b. If the site contains existing uses, the net trips generated by these uses shall be included in the calculation of net trips generated from the site.~~

~~2. Partial Development of a Site~~

~~a. If a regulated activity utilizes a portion of a vacant tax lot, such that the site could be further developed in the future, the applicant shall identify the potential uses for the vacant portion and reserve trips for that portion of the site in accordance with the uses identified. These reserve trips shall be included in the calculation of the net trips generated from the site.~~

~~b. The Trip Allocation Certificate shall not be issued if the proposed future uses of the vacant area and the reserve trips are unrealistic in the opinion of the City Engineer.~~

Bike path section update (Recommendation DC-19 in Table A-1)

16.106.07~~8~~0 Bike ~~Paths~~Lanes

If shown in ~~on the~~ Figure ~~6-1~~13 of the Transportation System Plan, bicycle ~~paths~~lanes shall be installed in public rights-of-way, in accordance with City specifications. Bike lanes shall be installed on both sides of designated roads, should be separated from the road by a twelve (12) inch stripe or other means approved by Engineering Staff~~, not a curb~~, and should be a minimum of five (5) feet wide. ~~Bike paths should not be combined with a sidewalk.~~

Attachment A

Table A-1: Summary of Recommended Potential Development Code Amendments and Corresponding Transportation Planning Rule (TPR) and Regional Transportation Functional Plan (RTFP) Requirements

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
DC-1	Identify and update all references to the TSP in the code.		This has been made into a note in the introductory text of this memorandum.
DC-2	Ensure that code requirements in Chapter 16.96 (On-site Circulation) and Chapter 16.106 (Transportation Facilities) related to access spacing/management and design of streets, bikeways, sidewalks, and accessways/paths are consistent with the standards established in the updated TSP.	• TPR Section -0045(2)(a) Access Control • TPR Section -0045(3)(b) On-site Pedestrian and Bicycle Circulation and Connections • TPR Section -0045(7) Minimizing Roadway Width • RTFP Section 3.08.110B Street System Design for Pedestrian and Bicycle Access	No amendments are needed to Chapter 16.96 and Chapter 16.106 related to access management and spacing standards; existing development code and the Draft TSP are consistent. The updated TSP does not include or otherwise modify existing street design standards in this chapter. Minor amendments are needed to Chapter 16.106 related to street design. Amendments proposed to Section .010 reflect deletions proposed for Chapter 6 of the Comprehensive Plan. Amendments proposed to Section .040 remove a reference to cross-sections in the TSP, which the updated TSP does not include. **Proposed code amendments to:** **Chapter 16.106**

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			Transportation Facilities, Section.010 Generally **Chapter 16.106 Transportation Facilities, Section.040 Design**
DC-3	Define the following terms and ensure consistency between the TSP, Development Code, and Engineering Design Manual: access way and shared-use path. *Note: The City Engineering Design Manual includes a reference to pedestrian and bicycle access ways that can be provided at a maximum spacing of 330 feet in lieu of a street in some cases.*	• TPR Section -0045(3)(b) On-site Pedestrian and Bicycle Circulation and Connections • RTFP Sections 3.08.110 B & E Street System Design	**Proposed code amendments to:** **Chapter 16.10 Definitions, Section .020 Specifically**
DC-4	Provide additional guidance regarding the applicability and preparation of traffic impact analyses (TIAs), including rough proportionality provisions.	TPR Section -0045(2)(b) Standards to Protect Roadways	**Proposed code amendments to:** • **Chapter 16.90 Site Planning, Section .030.D Required Findings** • **Chapter 16.106 Transportation Facilities, Section .020.D Extent of Improvements** • **Chapter 16.106 Transportation Facilities, Section .040.K Traffic Controls** • **Chapter 16.106 Transportation Facilities, Section .080**

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			Traffic Impact Analysis [new section] • **Chapter 16.106 Transportation Facilities, Section .090 Rough Proportionality** [new section]
DC-5	Given TPR requirements for coordinated review, consider whether inviting transportation facility and service providers to pre-application conferences would be helpful to the review process and thus would be language to include in the code (Section 16.70.010).	TPR Section -0045(2)(d) Coordinated Review of Land Use Decisions	The City already allows for this level of coordinated review, so code amendments are not necessary.
DC-6	Provide more direction about "preferential" carpool and vanpool parking spaces.	TPR Section -0045(4)(d) Employee Parking	**Proposed code amendments to:** **Chapter 16.94 Off-Street Parking and Loading, Section .010.E Location**
DC-7	Consider code changes if there are TDM program elements developed for the updated TSP that lend themselves to implementation in code.	TPR Section -0045(5)(b) Transportation Demand Management (TDM) Programs	TDM program elements in the Draft TSP will be reviewed. However, it is not anticipated that these will result in proposed code amendments.
DC-8	Allow exemptions from maximum parking space standards for structured parking and on-street parking.	TPR Section -0045(5)(d) Parking Management	**Proposed code amendments to:** **Chapter 16.94 Off-Street Parking and Loading, Section .010.K General Requirements** [new

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			subsection]
DC-9	Administrative/housekeeping amendments: Address typos and inconsistencies in the footnotes for the parking standards table.	TPR Section -0045(5)(d) Parking Management	**Proposed code amendments to:** **Chapter 16.94 Off-Street Parking and Loading, Section .020 Off-Street Parking Standards**
DC-10	Consider the feasibility of allowing a local street cross-section of 20-28 feet and under what conditions.	TPR Section -0045(7) Minimizing Roadway Width	This recommendation will be developed into proposed policy language.
DC-11	Modify the code provisions for plan and land use regulation amendments to make simpler reference to TPR Section -0060.	TPR Section -0060 Plan and Land Use Regulations Amendments	**Proposed code amendments to:** **Chapter 16.80 Plan Amendments, Section .030.C Transportation Planning Rule Consistency**
DC-12	Provide a variance process in Chapter 16.84 (Variances and Adjustments) and/or Chapter 16.94 (Off-Street Parking and Loading) that allows maximum parking standards to be exceeded.	RTFP Section 3.08.410 Parking Management	Section 16.94.010.A (Off-Street Parking Required) already refers to procedures in Chapter 16.84 for varying from minimum or maximum parking standards. No amendments are proposed.
DC-13	Require that major driveways that are proposed for mixed-use and residential developments align with existing and/or planned streets.	RTFP Section 3.08.410 Parking Management	**Proposed code amendments to:** • **Chapter 16.90 Site Planning, Section .030.D Required Findings** • **Chapter 16.106**

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			Transportation Facilities, Section .030.B.2.d Connectivity Map Required [new subsection]
DC-14	Add on-street loading provisions in an appropriate location such as Old Town, including specific conditions for when on-street loading would be permitted.	RTFP Section 3.08.410 Parking Management	**Proposed code amendments to:** **Chapter 16.94 Off-Street Parking and Loading, Section .030.C Off-Street Loading Standards** [new subsection]
DC-15	Provide more requirements and guidance regarding short-term and long-term bicycle parking.	RTFP Section 3.08.410 Parking Management	**Proposed code amendments to:** **Chapter 16.94 Off-Street Parking and Loading, Section 16.94.020.C Bicycle Parking Facilities**
DC-16	Consider whether having a hierarchy of management to capacity strategies (RTFP Section 3.08.220A) would be effective as part of traffic impact analysis and legislative decision conditions of approval.	RTFP Sections 3.08.510 A & B Comprehensive Plan and TSP Amendments	This was determined to not be an effective or necessary set of potential code amendments.
DC-17	Replace maps in the development code with references to the maps in the updated TSP.		Replacing maps with references can help avoid inconsistencies between the development code and TSP and make updates easier in the future. **Proposed code**

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			amendments to: • **Chapter 16.106 Transportation Facilities, Section .020 Required Improvements** • **Chapter 16.106 Transportation Facilities, Section .030 Location**
DC-18	Remove CAP program.		The CAP program is being discontinued given TIA requirements and mobility standards proposed for adoption as part of this TSP update. **Proposed code amendments to:** • **Chapter 16.106 Transportation Facilities, Section .070 Highway 99W Capacity Allocation Program (CAP)**
DC-19	Re-number the following section (Bike Paths) and update a reference to the TSP. Update the bike path section to address bike lanes.		The section on bike paths is updated to address bike lanes because bike path is are not a term that is used in the updated TSP or elsewhere in the code. **Proposed code amendments to:** • **Chapter 16.106**

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			Transportation Facilities, Section .080 Bike Paths

City of Sherwood Oregon
Home of the Tualatin River National Wildlife Refuge

ORDINANCE 2008-003

AN ORDINANCE AMENDING THE COMPREHENSIVE PLAN AND ZONING MAP TO REDESIGNATE A PARCEL FROM MEDIUM DENSITY RESIDENTIAL LOW TO RETAIL COMMERCIAL.

WHEREAS, the owners of a certain parcel of land, located at 21305 SW Pacific Highway (tax lot 2S130D001200) (the "Property"), applied for a comprehensive plan amendment and zone change on the parcel; and

WHEREAS, the owners of the Property seek a plan amendment and zone change from Medium Density Residential Low ("MDRL") to Retail Commercial ("RC"); and

WHEREAS, the Planning Commission and City Council held duly noticed public hearings to consider the application.

NOW, THEREFORE, THE CITY OF SHERWOOD ORDAINS AS FOLLOWS:

Section 1. The City Council approves the application and changes the Property's comprehensive plan and zoning designations from MDRL to RC.

Section 2. This approval is supported by the findings and subject to the conditions contained in Exhibit A, attached and incorporated by reference.

Section 3. Effective Date. This Ordinance shall become effective 30 days from its adoption.

Duly passed by the City Council this 4th day of March 2008.

Keith S. Mays, Mayor

ATTEST:

Sylvia Murphy, City Recorder

	AYE	NAY
Weislogel	✓	
Luman	✓	
King	✓	
Henderson	✓	
Heironimus	Absent	
Grant	✓	
Mays	✓	

Ordinance 2008-003
March 4, 2008
Page 1 of 1, Exhibit A (10 pgs)

Ordinance 2008-003
Exhibit A

SHERWOOD CITY COUNCIL FINDINGS
FOR COMPREHENSIVE PLAN AMENDMENT AND ZONE CHANGE

Nature of the Proposal:
The applicant requested a comprehensive plan and zone map amendment to change the designations from Medium Density Residential Low (MDRL) to Retail Commercial (RC) (hereinafter referred to as the "redesignation." The property was a former mobile home park which has since been vacated. Based on the findings below, the Council concludes that the application has satisfied all applicable criteria and approves the requested redesignation with conditions.

I. BACKGROUND

A. Applicant/Owner:
Donald and Virginia Pfeifer
2011 NE 164th Place
Portland, OR 97230

Representatives:
Ed Sullivan, Esq.
Garvey, Schubert Barer
121 SW Morrison, Suite 1100
Portland, OR 97204

Leslie Ann Hauer, AICP
6100 Collins Road
West Richland, WA 99353

Todd Mobley
Lancaster Engineering
321 SW 5th Avenue, Suite 400
Portland, OR 97204

Eric Hovee
E. D. Hovee & Company, LLC
2408 Main St.
P.O. Box 225
Vancouver, WA 98666

B. Location: The site is located at 21305 SW Pacific Highway; tax lot 1200 on Washington County Tax Assessor's map 2S130D0.

C. Parcel Size: The parcel is 5.74 acres.

D. Existing Development and Site Characteristics: The site was originally developed in 1964 as a mobile home park with 41 single-wide spaces. Currently there are no mobile homes on site; a single family home exists on the site that was used as a residence and office for the park manager, which remains vacant.

E. Zoning Classification and Comprehensive Plan Designation: The existing plan and zone designation is Medium Density Residential Low (MDRL). Section 16.16 of the Sherwood Zoning and Community Development Code (SZCDC) lists the permitted uses in this zone. The proposed designation is Retail Commercial (RC). Compliance with the permitted uses in the RC zone is identified in Section 16.28 of the SZCDC.

F. Adjacent Zoning and Land Use: Properties to the northeast along Pacific Highway are zoned predominantly Retail Commercial (RC) to the intersection of Tualatin-Sherwood Road/Edy Road. The adjacent property to the southwest is General Commercial (GC) for another ¾ mile,

with a sizeable High Density Residential (HDR) parcel further down Pacific Highway and to the northwest. Across Pacific Highway, properties are a mix of GC, RC, and HDR.

Property immediately adjacent to the northeast is zoned RC, currently used as a retail and storage. The abutting property to the southwest is zoned GC and is approved to be built with a hotel. The property to the northwest is zoned HDR and is currently developed with attached housing units.

G. Review Type: The proposed Plan Amendment requires a Type V review, which involves public hearings before the Planning Commission and City Council. On November 13 and December 11, 2007, the Planning Commission held public hearings to consider this matter and recommended denial of the proposed redesignation to the City Council. On February 5 and February 19, 2008, the City Council held a public hearing and voted to approve the application with conditions. Any appeal of this decision would go directly to the Land Use Board of Appeals.

H. Public Notice and Hearing: Notice of the November 13, 2007 Planning Commission hearing on the proposed application was published in the *Tigard-Tualatin Times* on November 1st and 8th and posted on-site and mailed to property owners within 100 feet of the site on October 17th in accordance with Section 16.72.020 and 16.72.030 of the SZCDC. The notice was a revised notice from a previously scheduled hearing, therefore notice was provided more than 20 days in advance of the November 13th hearing to ensure the revised notice was received before the first originally scheduled meeting date. Notice of the February 5th hearing was also duly published in accordance with state law and City requirements.

I. Review Criteria:
The required findings for the Plan Amendment are identified in Section 4.203.02 of the Sherwood Zoning and Community Development Code (SZCDC); Applicable standards are: Comprehensive Plan, Part II, Chapter 4, Section E (residential), Section H (Economic Development Policies and Strategies), and Section I (Commercial); Metro Functional Plan Title 1; and Statewide Planning Goal 9, 10 and Goal 12.

II. PUBLIC COMMENTS

Public comments were received at the Planning Commission hearing and are identified as Exhibits G and H in the record. In addition to the two written comments, public testimony was received at the first Planning Commission meeting from Susan Claus. No other verbal or written public testimony was received by anyone not associated with the applicant at the Planning Commission or City Council hearings.

III. AGENCY COMMENTS

Staff e-mailed notice to affected agencies on September 6, 2007. The following is a summary of comments received.

The Sherwood City Manager has provided comments recommending denial because he believed a more appropriate use would be for office commercial as opposed to retail commercial.

Kinder Morgan Energy indicated that they have no concerns with the proposal.

Pride Disposal Co. has reviewed the request and had no comment.

Washington County Department of Land Use and Transportation Planning reviewed the request and offered the following comment:

> For all of the major intersections which will have potential traffic impacts from this request, ODOT has jurisdiction. The county therefore will rely on ODOT's review of the traffic impacts on these intersections, some of which involve county facilities.
>
> For the other intersections that are considered in the report which involve county/county roadways, these are stop-controlled rather than signalized intersections and do not have associated performance criteria in the county's Transportation Plan. The county therefore does not have any specific comments regarding the proposal.

Metro has reviewed the request and offered the following comments:

> Title 1 of the Urban Growth Management Functional Plan (Metro Code 3.07.140) allows a local jurisdiction to rezone an area as long as the jurisdiction continues to provide at least the overall capacity for housing specified in Table 3.07-1. In reviewing the application, it appears that the City of Sherwood can maintain its current dwelling unit capacity even with the reduction of 41-63 dwelling units.
>
> The analysis provided by the applicant indicates that previous subdivisions approved by the City are developing at close to maximum density, which is higher than the capacity assumed in Table 3.07-1. If the City agrees with the applicant's analysis, the City has capacity available to rezone the former Driftwood Mobile Home Park without reducing its overall dwelling unit capacity. In addition, residential development is permitted in the RC zone, giving the City another way to meet required dwelling unit capacity.

Portland General Electric had no objection to this proposal. They have indicated that they do have both distribution line (12,500V) and sub-transmission line (115,00V) on the same side of the HWY 99W as the proposed change to Retail Commercial. PGE can underground the distribution, but under grounding the sub- Transmission is not economical or physically feasible to underground.

Tualatin Valley Fire and Rescue did not endorse or disapprove of this proposal.

ODOT Outdoor Advertising Sign Program reviewed the proposal and indicated that zone changes from residential to commercial, for the sake of qualifying for an outdoor advertising sign, is not recognized as legitimate commercial zoning. No plan for an outdoor advertising sign is indicated. Otherwise, no comment.

ODOT Rail Division indicated that they have no concerns with the proposal.

ODOT Region 1 provided comments. In summary, they have concerns with the applicant's transportation analysis in relation to Transportation Planning Rule (TPR) compliance and recommend either denial the zone change be limited in a way that caps the number of trips on site to the maximum trips under the current zoning at "worst-case" build-out. The ODOT comments are included as Attachment 1, Exhibit F and Attachment 4 of the record.

DLCD was notified of the request on August 10, 2007 and provided no comments or objections.

IV. PLAN AMENDMENT REQUIRED FINDINGS

16.80.030 - Map Amendment

This section states that an amendment to the City Zoning Map may be granted, provided that the proposal satisfies all applicable requirements of the adopted Sherwood Comprehensive Plan, the Transportation System Plan and this Code, and A-D below.

The applicable Comprehensive Plan policies are discussed under Section V. below. Section 16.02.080 requires that all development adhere to all applicable regional, State and Federal regulations. Applicable Regional regulations are discussed under Section VI. and applicable State regulations are discussed under Section VII.

FINDING: This is discussed in detail below.

A. The proposed amendment is consistent with the goals and policies of the Comprehensive Plan and the Transportation System Plan.

FINDING: This is discussed in detail below under Section V.

B. There is an existing and demonstrable need for the particular uses and zoning proposed, taking into account the importance of such uses to the economy of the City, the existing market demand for any goods or services which such uses will provide, the presence or absence and location of other such uses or similar uses in the area, and the general public good.

The applicant analyzed need in two ways: (1) by looking at the City's Economic Opportunities Analysis ("EOA") and (2) by providing an analysis of those findings by E.D. Hovee, a professional economist. According to the EOA the City of Sherwood has only 13 acres of vacant commercial land left, including just 6 lots designated RC. The EOA concluded that Sherwood would need to add 27 additional acres to its UGB for new commercial development, under the preferred "medium growth scenario."

E. D. Hovee reviewed the inclusion of the Pfeifer site in the City's retail commercial inventory. They found, and this Council agrees, that, under any methodology, there is a need to include the Pfeifer site from the following perspectives:

- The City's Economic Opportunities Analysis
- A review of loss of retail commercial sales from Sherwood consumers to other areas because of insufficient retail commercial sites (i.e., sales leakage)
- A demographic forecasting of retail commercial space demands compared with existing available retail commercial lands
- Whether Sherwood growth justifies use of a high growth figure in the Economic Opportunities Analysis
- The suitability of the Pfeifer property for retail commercial development, given other potential sites

The Council agrees with the conclusion of the Hovee analysis, that the proposal is consistent under Goal 9, Economy of the State, and the City's Plan. Given both the City's EOA and the additional information available, redesignation of this 5.74 acre parcel to retail commercial, with the conditions provided below, the same designation as those properties to the north and south of this site, is justified.

Regarding the commercial policies identified in the EOA, this Council agrees with the applicant's proposed findings, as follows:

- **Policy 1. Commercial activities will be located so as to most conveniently service customers.**

Finding: *The subject site is associated with the large, established: Six Corners commercial area, making it very convenient to the customers who already use the area, as well as the large volume of traffic that passes through this area.*

- **Policy 2. Commercial uses will be developed so as to complement rather than detract from adjoining uses.**

Finding: *Development of a commercial use on this site would better complement the adjacent commercial land and uses than a mobile home park or the single-family / duplex uses allowed under the current MDRL zoning.*

- **Policy 3. Highway 99W is an appropriate location for commercial development at the highway's intersections with City arterial and major collector roadways.**

Finding: *The site is located along Highway 99W, near several major intersections.*

- **Policy 4. The 1983 "Sherwood Old Town Revitalization Plan" and its guidelines and strategies are adopted as a part of the Sherwood Comprehensive Plan.**

Finding: *The site is not part of Old Town, and the Revitalization Plan is not applicable.*

Conclusion: Based on the analysis above, the Council finds that the City's EOA in combination with the supplemental information provided in the Hovee reports (Attachment 1, Exhibit J and Attachment 3) has demonstrated a need for the requested redesignation in order to accomplish the City's goal of providing "Economic Opportunities". By addressing the policies of the EOA, the applicant further solidifies compliance of the above standard. In addition, the redesignation of property within the City potentially lessens the need for UGB expansions. This standard has been satisfied.

C. The proposed amendment is timely, considering the pattern of development in the area, surrounding land uses, any changes which may have occurred in the neighborhood or community to warrant the proposed amendment, and the availability of utilities and services to serve all potential uses in the proposed zoning district.

The Council agrees with the applicant that the mobile home park use was originally developed before Sherwood's Comprehensive Plan was adopted, at a time when there was comparatively very little commercial development in the Six Corners area, and no development on adjacent properties. Now, the site is an unused former mobile home park redesignated for medium density residential, between two commercial parcels. Because the mobile home park has been closed, it is timely to consider a redesignation before the property develops inconsistent with locational criteria in the comprehensive plan (discussed further in this report). The proposed amendment is both timely and consistent with the area's land use pattern.

FINDING: Based on the information provided and considering the pattern of development along SW Pacific Highway, this Council believes that the Retail Commercial designation is the most suitable designation for the area. Therefore, this standard has been satisfied.

D. Other lands in the City already zoned for the proposed uses are either unavailable or unsuitable for immediate development due to location, size or other factors.

The applicant refers back to the City of Sherwood's EOA which indicates a demonstrated need for additional commercial land. The subject site is the only property designated MDRL along Pacific Highway between Tualatin-Sherwood Road and Meineke Parkway. Staff questioned why the applicant chose to request a redesignation to retail commercial as opposed to another commercial designation that was also supported by the EOA. The applicant responded that the RC designation was requested after considering the existing land use designations surrounding the subject site. RC was chosen because it was less "permissive" than the general commercial designation.

FINDING: Based on the applicant's analysis and City's EOA, the Council finds that this standard is satisfied.

16.80.030 - Transportation Planning Rule (TPR) Consistency

A. Review of plan and text amendment applications for effect on transportation facilities. Proposals shall be reviewed to determine whether it significantly affects a transportation facility, in accordance with OAR 660-12-0060 (the TPR). Review is required when a development application includes a proposed amendment to the Comprehensive Plan or changes to land use regulations.

B. "Significant" means that the transportation facility would change the functional classification of an existing or planned transportation facility, change the standards implementing a functional classification, allow types of land use, allow types or levels of land use that would result in levels of travel or access that are inconsistent with the functional classification of a transportation facility, or would reduce the level of service of the facility below the minimum level identified on the Transportation System Plan

C. Per OAR 660-12-0060, Amendments to the Comprehensive Plan or changes to land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the Transportation System Plan.

Chris Maciejewski of DKS has reviewed the traffic impact study material submitted for the proposed zone change. The reviewed materials included the original submission from July 2007 as well as addendums dated September 28, 2007 and October 19, 2007 that were in response to comments and request for additional information dated September 13, 2007. This review focused on determining if the City of Sherwood and OAR 660-012-0060 requirements were met.

The memo from Mr. Maciejewski was submitted to the City on October 29, 2007. The memo identifies that "The traffic impact study concludes that the proposed mitigation measures are adequate to mitigate the impacts of the proposed rezone. The mitigation measures listed in the October 19, 2007 addendum to the report include:

- Add a left turn lane to the Sunset Boulevard approach at Highway 99W/Elwert Road
- Add a left turn lane to the Sherwood Boulevard approach at Highway 99W/Edy Road and implement protected phasing.

- Add a southbound right turn lane on Highway 99W at Highway 99W/Tualatin Sherwood Road
- Add an eastbound right turn lane on Roy Rogers Road at Roy Rogers Road/Borchers Drive.

The following mitigation measures were not listed in the report but may be needed:

- A southbound right turn lane on Highway 99W at the site access was assumed in the capacity analysis but was not indicated in the list of improvements. This improvement may not be feasible due to the lane drop on Highway 99W in the access vicinity.

- Additional or revised mitigation may be required based on updating the analysis to address the items mentioned in the Capacity Analysis and Queuing Analysis section."

After extensive consideration by the City's traffic consultant, ODOT, and the applicant's traffic consultant, a condition of approval that would limit trip generation from the site under the RC Zone to the maximum number of trips permissible under the MDLR Zone without additional review. The Planning Commission and ODOT provided specific recommendations on the wording of potential conditions. The Council considered the recommended conditions as well as analysis by staff demonstrating that it is possible to develop some uses on the site even with the trip limit.

FINDING: Based on the traffic analysis of a professional traffic engineer the City consulted, the proposed redesignation, if allowed without conditions, is not consistent with the Transportation Planning Rule. However, Staff met with the applicant to discuss the findings of the traffic engineer, considered ODOT recommendations, Planning Commission recommendations and staff analysis and Council concludes that it is possible to place conditions on the property to ensure compliance with the TPR. Therefore, if the applicant satisfies the following condition of approval, this section will be met.

CONDITION:

1. A condition of this zone change is that the site is limited to 460 trips per day. If the applicant or future property owners wish to allow for more trips, a Plan Amendment with TPR analysis will be necessary to remove the trip limit.

2. Prior to this redesignation becoming final, the applicant shall provide a written agreement, recorded with the property and binding on all future owners that all development on this parcel shall be subject to the City's site plan approval process and that requires the site plan approval shall not be granted for uses that, taken cumulatively, exceed the trip generation of 460 trips per day unless and until:

1) Transportation improvements to allow for the additional trips have been funded and installed; or

2) The City's Plan is amended consistent with the Statewide Planning Goals to provide otherwise.

V. APPLICABLE COMPREHENSIVE PLAN POLICIES

The applicable portions of the Comprehensive Plan include Chapter 4, Land Use, Section E – Residential; and Section H - Economic Development, Section I - Commercial.

Chapter 4, Section E - Residential Land Use

Policy 1 Residential areas will be developed in a manner which will insure that the integrity of the community is preserved and strengthened.

Policy 2 The City will insure that an adequate distribution of housing styles and tenures are available.

Policy 3 The City will insure the availability of affordable housing and locational choice for all income groups.

Policy 4 The City shall provide housing and special care opportunities for the elderly, disadvantaged and children.

Policy 5 The City shall encourage government assisted housing for low to moderate income families.

Policy 6 The City will create, designate and administer five residential zones specifying the purpose and standards of each consistent with the need for a balance in housing densities, styles, prices and tenures.

The proposed redesignation is from Medium Density Residential (MDRL) to Retail Commercial (RC). There is no residential component associated with this request. However, the RC designation does allow for mixed use projects, which could include a residential element.

FINDING: Based on the analysis above, the Council finds that while residential is a potential component of an RC development, the proposed change does not include a residential element.

Chapter 4, Section H – applicable Economic Development Policies and Strategies

Policy 2 The City will encourage economic growth that is consistent with the management and use of its environmental resources.

Policy 5 The City will seek to diversify and expand commercial and industrial development in order to provide nearby job opportunities, and expand the tax base.

The subject site was developed in 1964 as a mobile home park and has never been identified with environmental resources. Changing the designation to Retail Commercial, the site will be able to provide job opportunities to the community while increasing the tax base of the City.

FINDING: The Council believes that the proposed redesignation is consistent with the above policies and supports economic development within the City.

Chapter 4, Section I – applicable Commercial Policies

FINDING: The Council notes that the commercial policies have been addressed earlier in this document, under section 16.80.030 of the Map Amendment criteria.

VI. APPLICABLE REGIONAL (METRO) STANDARDS

The only applicable Urban Growth Management Functional Plan criteria are found in Title 1 – Housing. The City of Sherwood is currently in compliance with the Functional Plan and any amendment to the Sherwood Plan & Zone Map must show that the community continues to comply. Table 3.01-7 of this Title indicates that Sherwood's dwelling unit capacity is 5,216 and the job capacity is 9,518. The proposed amendment will provide greater job opportunity while allowing mixed use projects which would allow residential and will not result in the loss of jobs. The applicant has provided adequate documentation that enabled Metro to provide comments confirming that "The City of Sherwood can maintain its current dwelling unit capacity even with the reduction of 41-63 dwelling units."

FINDING: Based on staff's analysis, applicant's submission, and comments form Metro, the Council finds that the proposed redesignation is consistent with the Metro Functional Plan criteria and the City would continue to be in compliance if the redesignation were approved.

VII. APPLICABLE STATE STANDARDS

The applicable Statewide Planning Goals include: Goal 9, 10 and Goal 12.

Goal 9 – ECONOMIC DEVELOPMENT
To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.

Oregon Administrative Rule 660-009 (Economic Development) implements Goal 9. OAR 660-009 requires that Cities and Counties prepare Economic Opportunities Analysis in accordance with the directions in the Rule. It also requires that Cities provide an adequate supply of land to meet identified employment needs.

As discussed above, Sherwood adopted an EOA earlier this year which was implemented through amendments to the goals and policies of the comprehensive plan. The proposed plan amendment helps meet some of the commercial land needs identified in the EOA, as shown by the Hovee testimony. The proposed redesignation meets economic goals and policies found in the EOA, the City's Comprehensive Plan, and the City's Economic Development Strategy.

FINDING: The Council finds that the proposed plan amendment is consistent with the requirements of Goal 9 and its Administrative Rule.

Goal 10 - HOUSING
This goal specifies that each city must plan for and accommodate needed housing types, such as multifamily and manufactured housing. It requires each city to inventory its buildable residential lands, project future needs for such lands, and plan and zone enough buildable land to meet those needs. It also prohibits local plans from discriminating against needed housing types.

Statewide Planning Goal 10 is implemented by the comprehensive plan and in the Metro region by OAR 660-007 (Metropolitan Housing). OAR 660-007 provides density standards and methodology for land need and supply comparisons. Metro Title 1 responds to the requirements of the Metropolitan Housing Rule. By complying with Metro Title 1, Sherwood complies with OAR 660-007 as well as Statewide Planning Goal 10. The Council concurs with Metro's analysis.

FINDING: Based on the analysis above, Council believes that this Goal has been satisfied.

Goal 12 - TRANSPORTATION

The goal aims to provide "a safe, convenient and economic transportation system." It asks for communities to address the needs of the "transportation disadvantaged."

Goal 12 is implemented by OAR 660-012-0000. Compliance with this Goal and the OAR was discussed above.

FINDING: The Council believes that the proposed redesignation is generally consistent with State standards, which have been met as conditioned previously.

VIII. CONDITION OF APPROVAL

1. A condition of this zone change is that the site is limited to 460 trips per day. If the applicant or future property owners wish to allow for more trips, a Plan Amendment with TPR analysis will be necessary to remove the trip limit.

2. Prior to this redesignation becoming final, the applicant shall provide a written agreement, recorded with the property and binding on all future owners that all development on this parcel shall be subject to the City's site plan approval process and that requires the site plan approval shall not be granted for uses that, taken cumulatively, exceed the trip generation of 460 trips per day unless and until:

   1) Transportation Improvements to allow for the additional trips have been funded and installed; or

   2) The City's Plan is amended consistent with the Statewide Planning Goals to provide otherwise.

3. Prior to this redesignation becoming final, the applicant shall provide a written agreement, recorded with the property and binding on all future owners that all development on this parcel shall be additionally restricted as follows:

   a. Any new use shall not involve outdoor storage or outdoor sales of products or outdoor display of products for sale, except that an outdoor seating area for a restaurant or café or small scale seasonal display is permitted and

   b. No "fast food" type restaurant with drive through window shall be allowed.

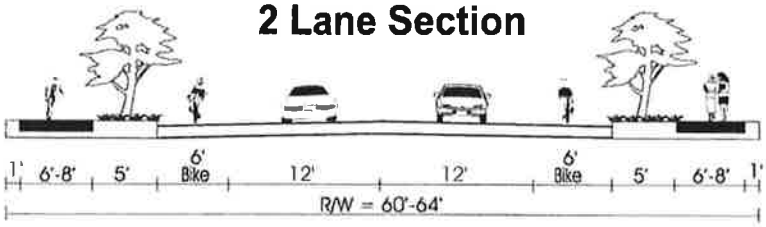
IX. ATTACHMENTS incorporated by reference

Attachment 1 – November 6, 2007 staff report (with Exhibits A-I)
Attachment 2 – December 4, 2007 addendum staff report with Exhibit J
Attachment 3 – applicant additional submittal dated 1/25/08 including: letter from Ed Sullivan (3 pgs), Memo from Todd Mobley (4 pgs) and letter from Eric Hovee.(7 pgs)
Attachment 4 – February 4, 2008 memo from ODOT distributed at 2-5-08 hearing
Attachment 5 – Staff Executive Summary to Council dated 2-19-08 with Attachment 1

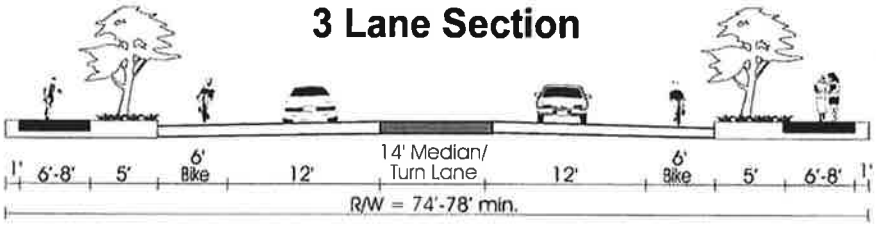
DKS Associates
TRANSPORTATION SOLUTIONS

City of Sherwood Oregon
Transportation System Plan

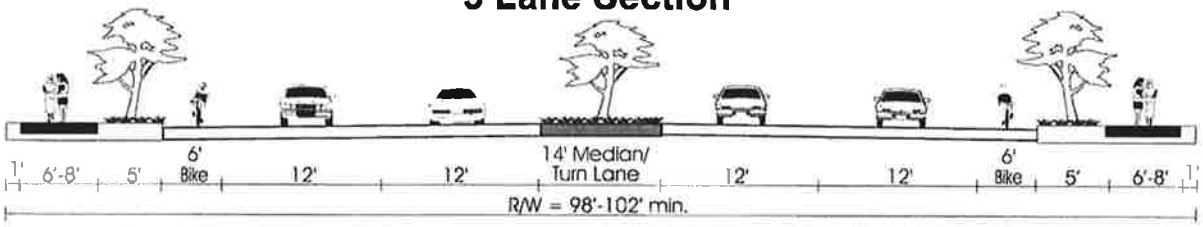
2 Lane Section



3 Lane Section

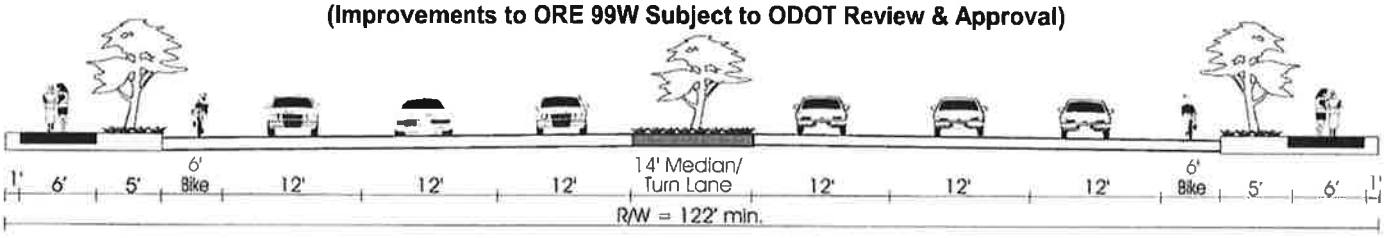


5 Lane Section



7 Lane Section

(Improvements to ORE 99W Subject to ODOT Review & Approval)



Arterial Street Design Characteristics

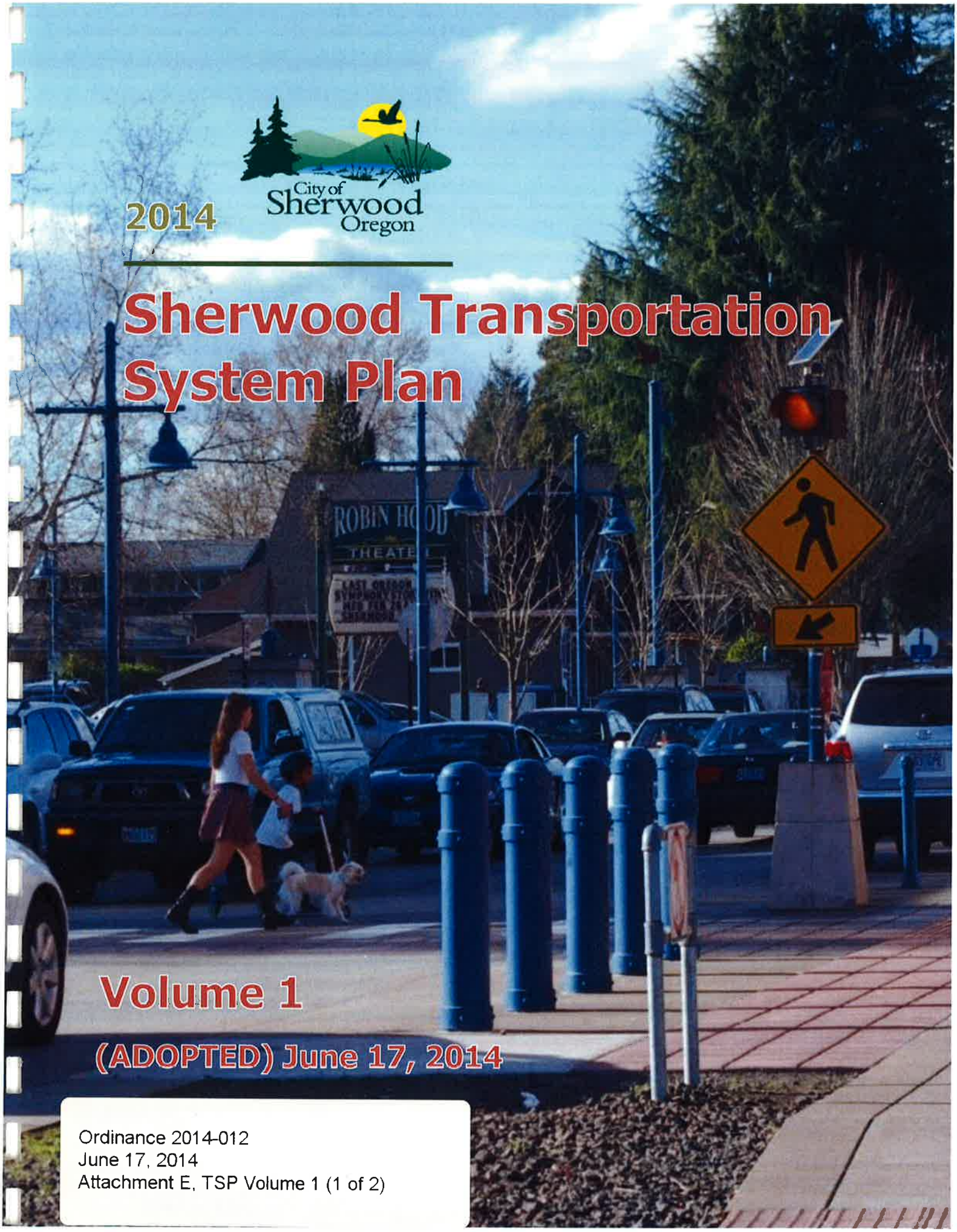
Characteristic	Arterials
Vehicle Lane Widths (Turn Lane - 12-14 ft.)	12 ft.
On-Street Parking	Only in (i.e. downtown) (8 ft.)
Bicycle Lanes (minimums)	6 ft.
Sidewalks (minimums)	6-8 ft. *1
Landscape Strips	Required
Raised Medians	Required
Neighborhood Traffic Management (NTM)	Prohibited
Transit	Appropriate
Turn Lanes	When Warranted *2
Access Control	See Later Discussion

A variance requires demonstration of hardship or other exceptional circumstances resulting from conditions of the property. Variances must meet Sherwood Development Code and TPR criteria.

Notes:

1. *8 feet for residential streets, 6 feet in commercial/industrial areas.*
2. *Turn lane warrants should be reviewed using Highway Research Record No. 211, NCHRP Report No. 279 or other updated/superseding reference.*

Figure 8-2
ARTERIAL STREETS
SHERWOOD
STREET CROSS SECTIONS


City of Sherwood Oregon
2014
Sherwood Transportation System Plan
Volume 1
(ADOPTED) June 17, 2014
Ordinance 2014-012
June 17, 2014
Attachment E, TSP Volume 1 (1 of 2)

Project Team

City of Sherwood

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Angelo Planning Group

Darci Rudzinski
Shayna Rehberg

Acknowledgements

The 2014 Sherwood Transportation System Plan was a collaborative process among various public agencies, key stakeholders and the community. Input, assistance and outreach by the following helped make the Plan possible:

- *Citizen Advisory Team*
- *Technical Advisory Team*

A special acknowledgement goes out to all the Sherwood residents, business owners, and visitors who attended community meetings or submitted comments. Your input helped make this Plan possible.

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The contents of this document do not necessarily reflect views or policies of the State of Oregon.

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Acronyms

Note: Definitions for these and other key terms are provided in the Appendix (Volume II) Section K

CAC: Community Advisory Committee

CAP: Capacity Allocation Program

HCT: High Capacity Transit

LOS: Level of Service

MSTIP: Major Streets Transportation Improvement Program

ODOT: Oregon Department of Transportation

RTFP: Regional Transportation Functional Plan

RTP: Regional Transportation Plan

SOV: Single Occupant Vehicle

TAC: Technical Advisory Committee

TDM: Transportation Demand Management

TGM: Transportation Growth and Management

TIA: Traffic Impact Analysis

TSM: Transportation System Management

TSMO: Transportation System Management and Operations

TSP: Transportation System Plan

TVFR: Tualatin Valley Fire and Rescue

UGB: Urban Growth Boundary

V/C: Volume-to Capacity

VHD: Vehicle-Hours of Delay

VMT: Vehicle-Miles Travelled

How to use this Document

The Transportation System Plan (TSP) serves the following general purposes:

- Identifies general vision and strategies
- Identifies future improvements
- Provides an overview of standards.

Project List

The prioritized project list identifies improvements that the City is anticipated to pursue through year 2035 given the projected revenue. The inclusion of projects does not commit the City to funding or constructing these projects. Rather, the list is a guide for determining how the City of Sherwood is generally assumed to allocate its funding towards transportation investments. New development, the likelihood for atypical funding opportunities, and the potential for unforeseen circumstances, may shift identified transportation improvement priority.

The project list includes conceptual street alignments at a system planning-level. Before construction of any of the projects can begin, more detailed surveys will need to be undertaken to identify hydrological, topographical, or other geological constraints that could hinder the alignment of the planned streets.

Transportation Standards

The standards documented in the TSP are for guiding new improvements to the transportation system and for identifying deficiencies in the current system. These apply to city facilities; facilities owned by other jurisdictions will have their own standards to follow.

Street Cross-Sections: New streets shall meet the design requirements in Sherwood's TSP per the functional class in the TSP. In constrained situations, a design exception may be allowed through a design exception process.

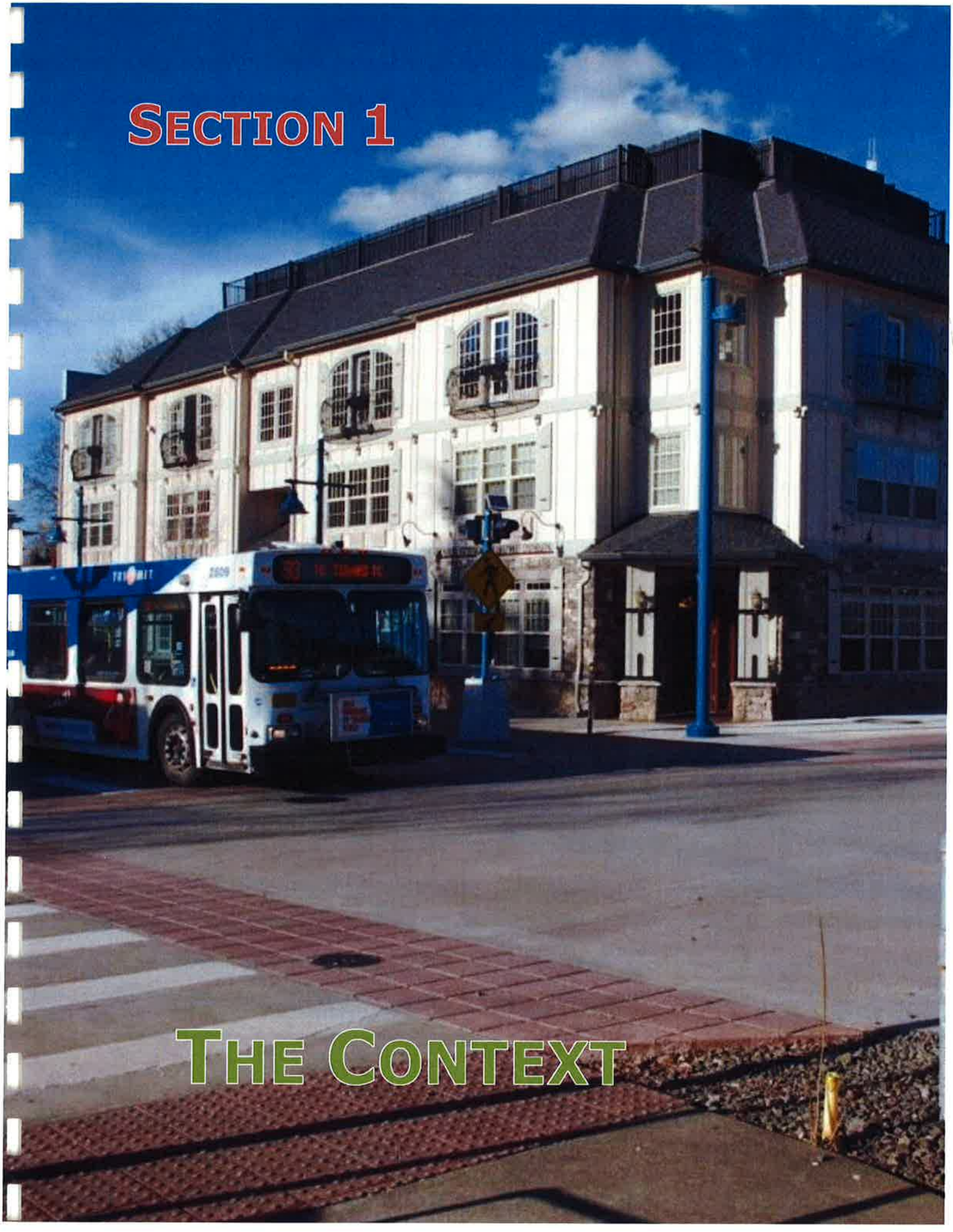
Access Spacing: New street connections shall meet the access spacing standards in the TSP. In constrained situations, a design exception may be allowed through design exception process. Generally, existing facilities are not required to be modified to meet these standards. However, if a site redevelops, or a street is upgraded, access to the site may be subject to redesign to achieve or work towards achieving access spacing standards.

Traffic Calming: After determining the need for traffic calming along a facility, the appropriate technique shall be determined using engineering judgment by the Sherwood Community Development Department. A toolbox of potential traffic calming techniques and their typical application is provided in Volume 2 of the TSP.

Local Connectivity: Figure 18 indicates the general location where new local streets could potentially be installed, and is not a comprehensive map of all potential future local connections. Connections shown on the figure do not necessarily incorporate topographic, environmental or manmade constraints. All future local connections must go through City review—whether or not the connection is shown on the figure—to determine the appropriate location.

Mobility Targets: For all Traffic Impact Analysis (TIA) studies conducted in Sherwood, the TIA shall evaluate its impact on the transportation system using the mobility targets in the TSP. Additional requirements are provided in the City's Development Code.

Truck Routes: If an improvement is proposed along a truck route shown on Figure 19, it must comply with the special design standards for truck routes set by the facility owner. Reductions to vehicle-carrying capacity are not often allowed along truck routes.



SECTION 1

THE CONTEXT

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THE CONTEXT

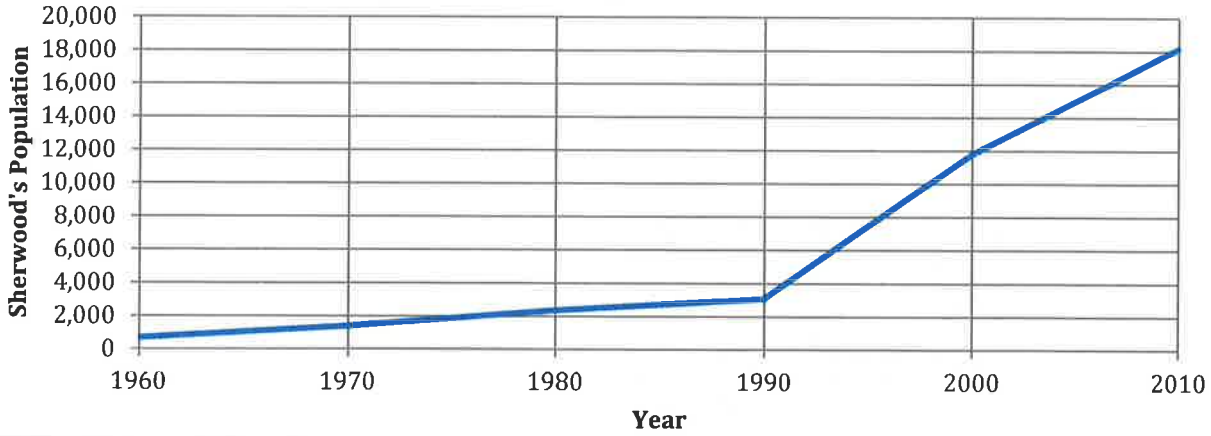
The City of Sherwood lies in southwest Washington County, only fourteen miles from downtown Portland. The lush landscape led to the establishment of the farming community in the late 1800's, and agriculture and manufacturing have dominated the economy of Sherwood until recent decades.

Sherwood is now roughly four square miles, and home to approximately 18,575 residents.[2] The city has a downtown grid (Old Town) where the town was originally platted around the Portland and Willamette Valley Railway. Beyond the historic downtown, the city has commercial retail areas, manufacturing and industrial parks, as well as suburban neighborhoods mixed with green space, recreational trails, and is adjacent to the Tualatin River National Wildlife Refuge.

The City of Sherwood has grown rapidly since 1990, as shown in Figure 1, from a population of 3,093 to 18,194 in 2010.[3] The population is younger and wealthier on average than typical residents of Washington County or Oregon. The average household size is 2.8 persons compared to 2.5 statewide, and 20% of Sherwood residents are under 10 years old compared to less than 14% for Washington County and 13% statewide. The prevalence of young families translates to specific transportation needs to serve children who are likely to walk or bike to get around.



Figure 1: Historical Population Growth in Sherwood



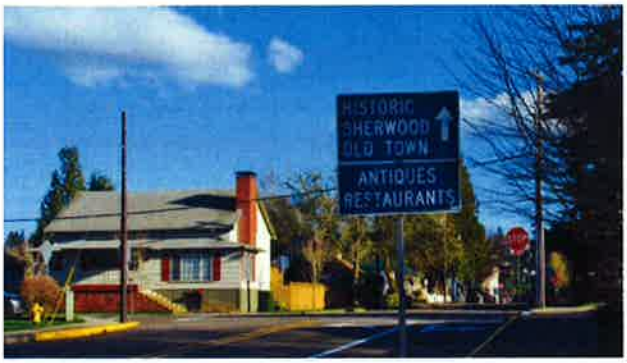
[2] 2013 Portland State Population Research Center population projection.

[3] United States Census Bureau.

While the growth in population has been accommodated through increases in housing, it has created a housing and jobs imbalance in the community. Currently, with the higher than average income levels, 70% of employed residents commute outside of the city for work to seek higher wage jobs. To help remedy this, a concept plan for a 300 acre "employment land" area to the east of the city (Tonquin Employment Area) has been adopted to guide development. In addition, there are 70 acres of smaller, vacant parcels throughout the city that are available for non-residential development. These planned areas may have capacity needs for moving freight, or multimodal needs for accessing smaller sites in town.

The Challenge

Sherwood, like many jurisdictions, faces the challenge of accommodating population and employment growth while maintaining acceptable service levels on its transportation network. With major regional facilities (e.g., Highway 99W, Tualatin-Sherwood Road) dividing the city, trying to meet acceptable levels of service for motor vehicles is likely to come at a cost to other modes—therefore, achieving a balanced, multi-modal transportation system through a series of system improvements is difficult. Furthermore, the City must balance its investments to ensure that the existing and future transportation system adequately serves all members of the community and is well maintained.



The Transportation System Plan

The Transportation System Plan (TSP) is intended to prepare for and accommodate the future growth through year 2035 in the most efficient manner possible. Without the big picture that the TSP provides, maintaining acceptable transportation network performance could not be achieved in an efficient manner. This Plan updates Sherwood's original TSP, which was adopted in the year 2005 for a horizon year of 2020.

What is a TSP?

The TSP provides a long term guide for city transportation investments by incorporating the vision of the community into an equitable and efficient transportation system.

The plan evaluates the current transportation system and outlines strategies and projects that are important to protecting and enhancing the quality of life in Sherwood through 2035. The TSP also provides a foundation from which to evaluate and determine what improvements could or should be required as part of private development projects. Plan elements can be implemented by the City, private developers, and state or federal agencies.

A TSP is required by the State of Oregon to help integrate the City's transportation investment plans into the statewide transportation system. The plan balances the needs of walking, bicycling, driving, transit and freight into an equitable and efficient transportation system.



SECTION 2

THE PROCESS

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THE PROCESS

The Sherwood TSP Update was a collaborative process among various public agencies, key stakeholders and the community. Throughout this project, the project team took time to understand multiple points of view, obtain fresh ideas and resources, and encourage participation from the community.

Project staff conducted technical group meetings (referred to as the TAC), hosted citizen advisory group meetings (referred to as the CAC), held meetings with decision makers, and conversed informally with members of the community.

The process (shown in Figure 2) was broken into four manageable pieces:

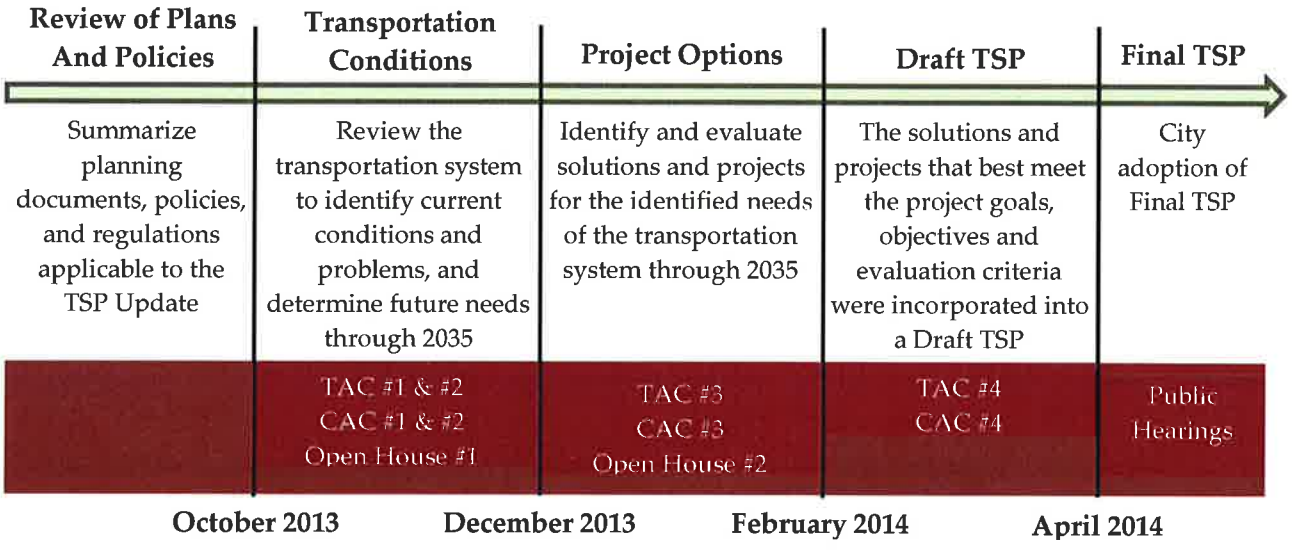
- Plan and Policy Summary Report
- Existing Conditions Technical Report
- Needs, Opportunities, Constraints and Tools Technical Report
- Project Options Technical Report

Each report was posted to the project website (which presented an email address for the public to submit comments and concerns) and presented at an open house, giving residents an opportunity to provide feedback and keep up-to-date with the project.

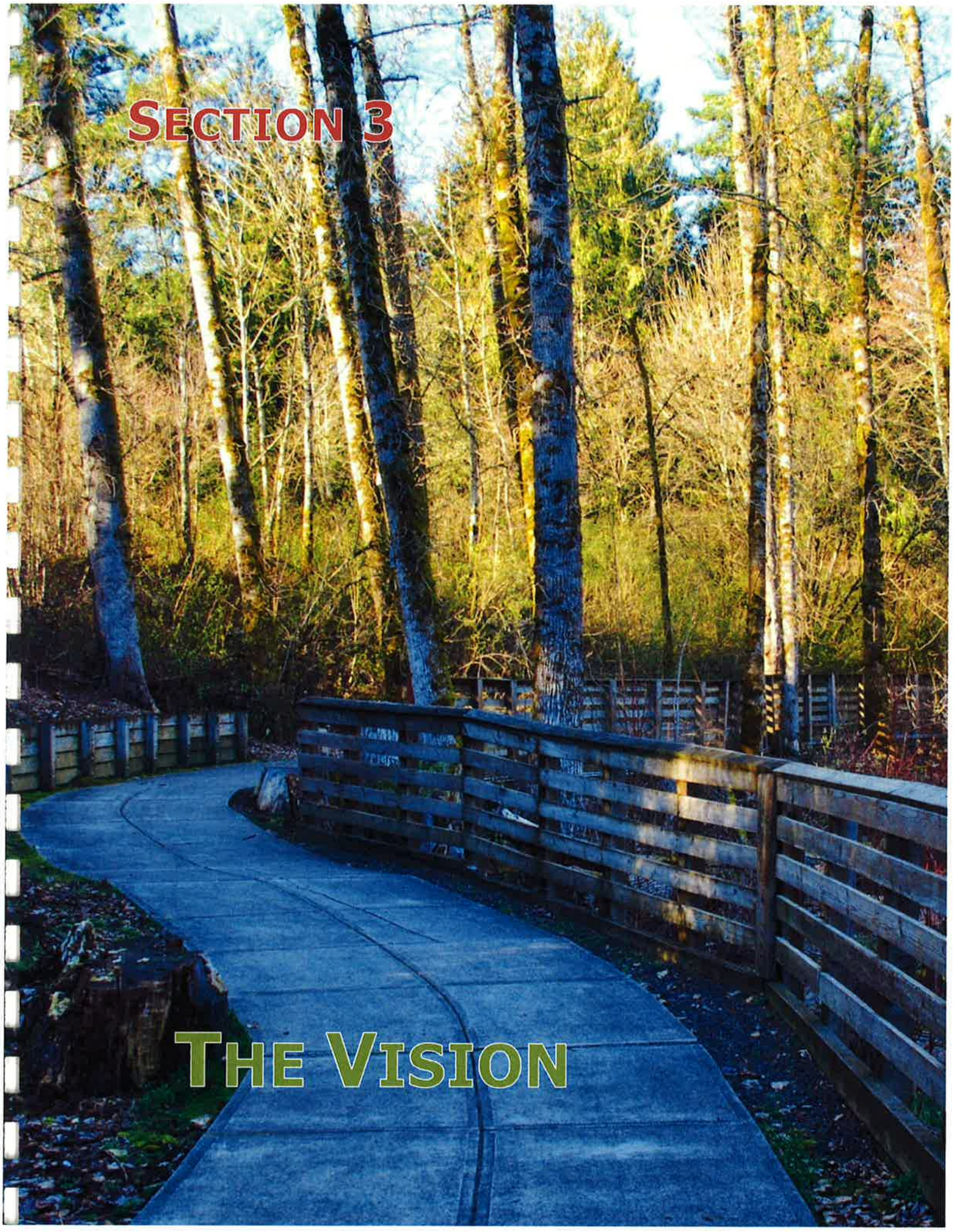
The project team then revised the draft reports based on feedback received from the TAC, CAC, decision makers, and the public. The revised documents were reposted to the TSP website. Material from these reports was ultimately used to create the Draft TSP.

Subsequent public hearings with the Planning Commission and City Council on the Draft TSP ultimately led to adoption of the 2014 Sherwood Transportation System Plan.

Figure 2: TSP Update Process



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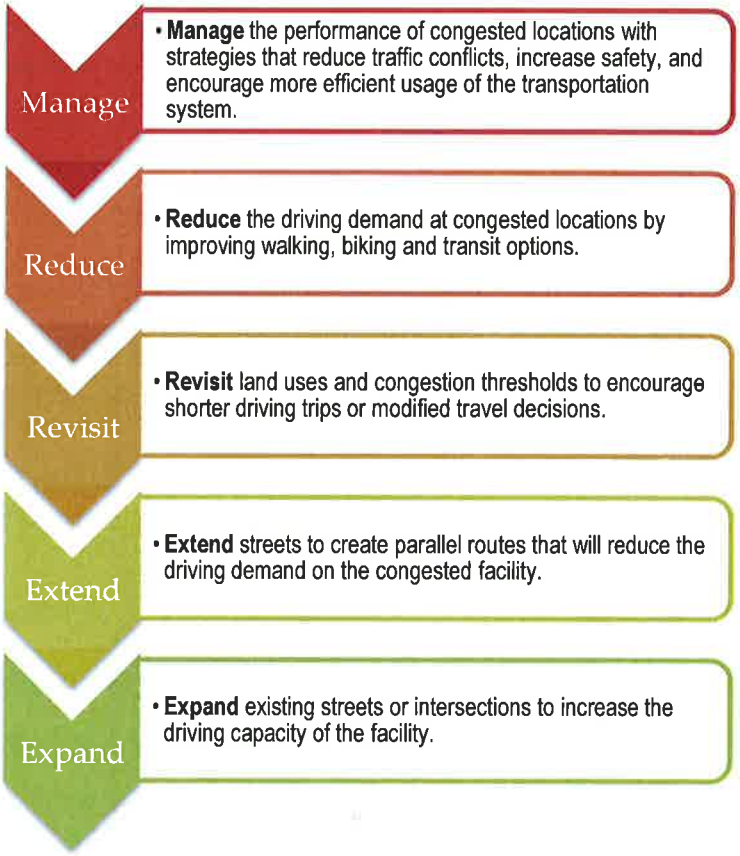

SECTION 3
THE VISION

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In the past, a typical response to congestion from communities in the region was to expand streets to add additional travel lanes. This practice created significant barriers to walking and biking and detracted from the livability, health, safety, and fiscal wellbeing of the community.

Sherwood's approach to developing the TSP placed more value on investments in smaller cost-effective solutions for the transportation system rather than larger, more costly solutions. Consistent with statewide planning policies and the Metro Regional Transportation Functional Plan, the approach emphasized a multi-modal network-wide approach to identifying transportation system solutions. As shown in Figure 3, this approach followed a five-step process that considered solutions from top to bottom until a viable solution was identified. This enables more cost-effective solutions to improve transportation system operations and will help to encourage multiple travel options, increase street connectivity, and promote a more sustainable transportation system.

Figure 3: Transportation Solutions Identification Process





How do we reflect Sherwood's Vision in the Plan?

Sherwood's Comprehensive Plan (Chapter 6 Section B) includes eight transportation goals with several strategies to achieve each goal. As shown in Figure 4, these strategies were grouped and condensed into evaluation criteria that project stakeholders felt to be most important to the community to measure how well the transportation solutions addressed Sherwood's existing goals. The following strategies for each goal[4] were applied as project evaluation criteria:

Goal 1: Provide a supportive transportation network to the land use plan that provides opportunities for transportation choices and the use of alternative modes serving all neighborhoods and businesses

Circulation: Improves mobility through separation of local and through traffic

Goal 2: 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

Compatibility: Compatible with other jurisdiction's plans and policies (including adjacent cities, counties, Metro, or ODOT)

Agency Standards: Consistent with the standards of the city, region, and state as a whole

Figure 4: Reflecting our Vision in the Plan



Goal 3: 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

Land Development Standards: Promotes standardized processes for developers to access and accommodate transportation impacts from development

[4] Note that minor wording amendments to the transportation goals are being made through the TSP update. However, these amendments will not change the overall intent of the goals and have no resulting impact on the evaluation criteria that were used.

Goal 4: Develop complementary infrastructure for bicycles and pedestrian facilities to provide a diverse range of transportation choices for city residents

Pedestrian and Bicycle Facilities: Adds bikeway and walkways that fill in system gaps, improve system connectivity, and are accessible to all users

Goal 5: Provide reliable convenient transit service to Sherwood residents and businesses as well as special transit options for the city's elderly and disabled residents

Expands Transit Service: Adds hours, additional routes, stops, or special ride services

Transit Supportive Infrastructure: Improves transit supportive infrastructure and facilities

Goal 6: Provide a convenient and safe transportation network within and between the Sherwood Old Town (Town Center) and Six Corners area that enables mixed use development and provides multi-modal access to area businesses and residents

Design Standards: Develops or refines special standards to facilitate pedestrian and transit friendly development in Old Town and Six Corners

Corridor Connectivity: Improves connectivity through acquisitions and dedications to achieve better street spacing and enhance off-street trail system

Goal 7: Ensure that efficient and effective freight transportation infrastructure is developed and maintained to support local and regional economic expansion and diversification consistent with City economic plans and policies

Freight Mobility: Invests in infrastructure and services needed to meet current and future demand

Freight Access: Regulates and improves access, including loading and transfer facilities

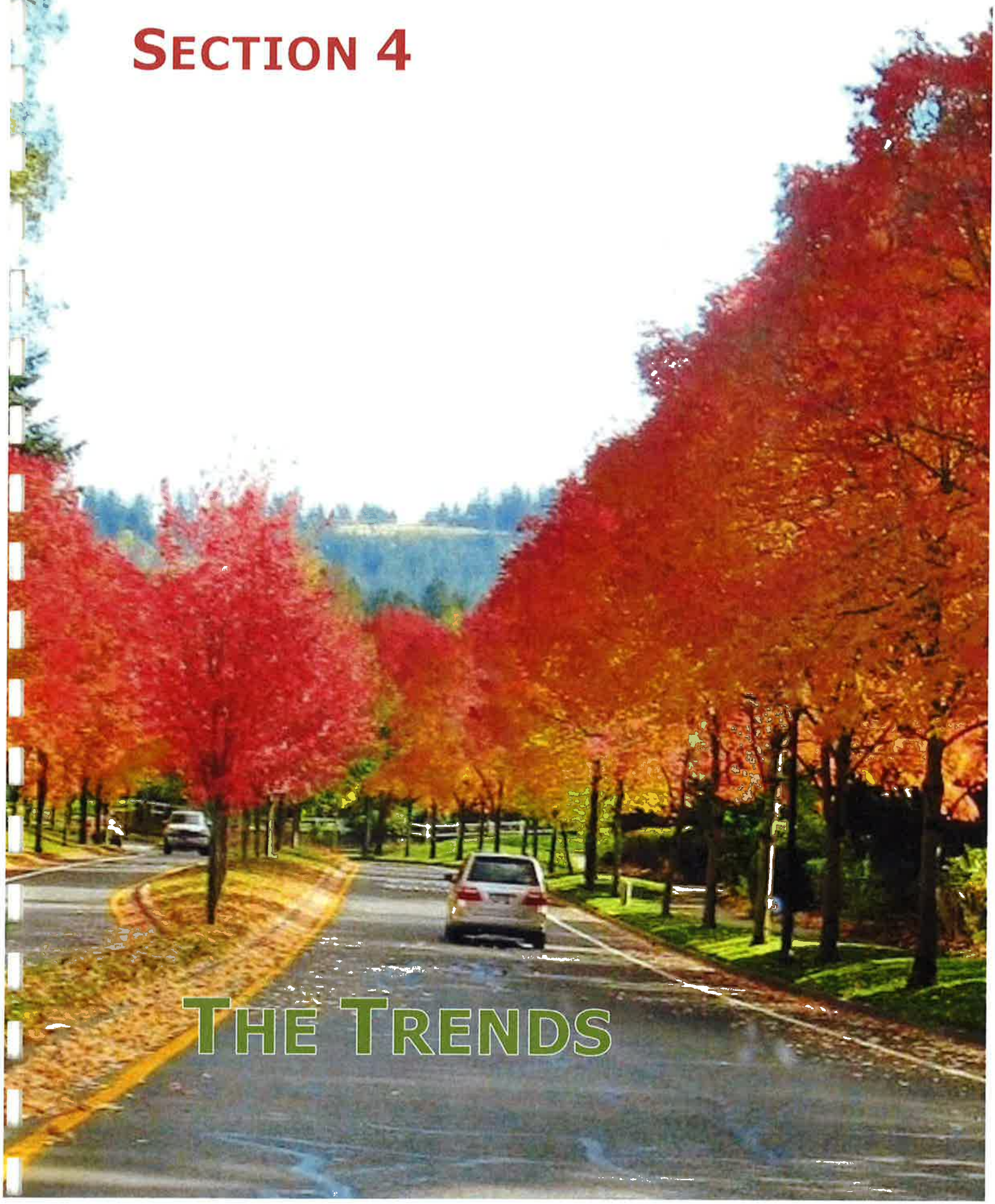
Goal 8: The Sherwood transportation network will be managed in a manner that ensures the plan is implemented in a timely fashion and is kept up to date with respect to local and regional priorities

Funding: Leverages local, regional, state, federal, or private funds



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Section 4



The Trends

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THE TRENDS

The current travel conditions were reviewed and future growth and travel trends were forecasted through the year 2035 to determine what investments are needed for Sherwood's transportation system. For this assessment of needs, it was assumed that only the transportation projects with committed funding would be built and that no further investments would be made in order to prioritize and plan projects that are not currently funded. The following sections explain where growth is expected, how the transportation system will perform, and where solutions will be needed.

Snapshot of Sherwood in 2035



Today, the Sherwood area (both land within the existing city limits as well as outlying rural area) is home to 7,500 households and accounts for over 8,800 jobs. Based on Metro's regional growth projections[5] for the Sherwood area, between now and year 2035 employment is expected to increase nearly 5.0 percent a year, slightly outpacing household growth over the same period (4.5 percent). By 2035, based on regional growth forecasts, the Sherwood area (including the urban reserves) is expected to be home to almost 16,000 households and over 19,800 jobs, a 113 and 124 percent increase respectively from 2010.[6] With more people and more jobs in Sherwood, the transportation network will face increased demands.

More People, More Jobs

As shown in Figure 5, much of the population and employment growth is expected to occur around the undeveloped edges of Sherwood.

Employment growth is expected to be highest in the following areas:

- The Tonquin Employment Area, including the area bound by Tualatin-Sherwood Road to the north, Oregon Street to the South, Langer Farms Parkway to the west, and the 124th Avenue alignment to the east
- North of Tualatin-Sherwood Road between Highway 99W and Cipole Road
- The urban reserves west of the city
- The areas adjacent to Brookman Road
- The areas adjacent to Tonquin Road
- The area bound by Highway 99W, Elwert Road, and Edy Road

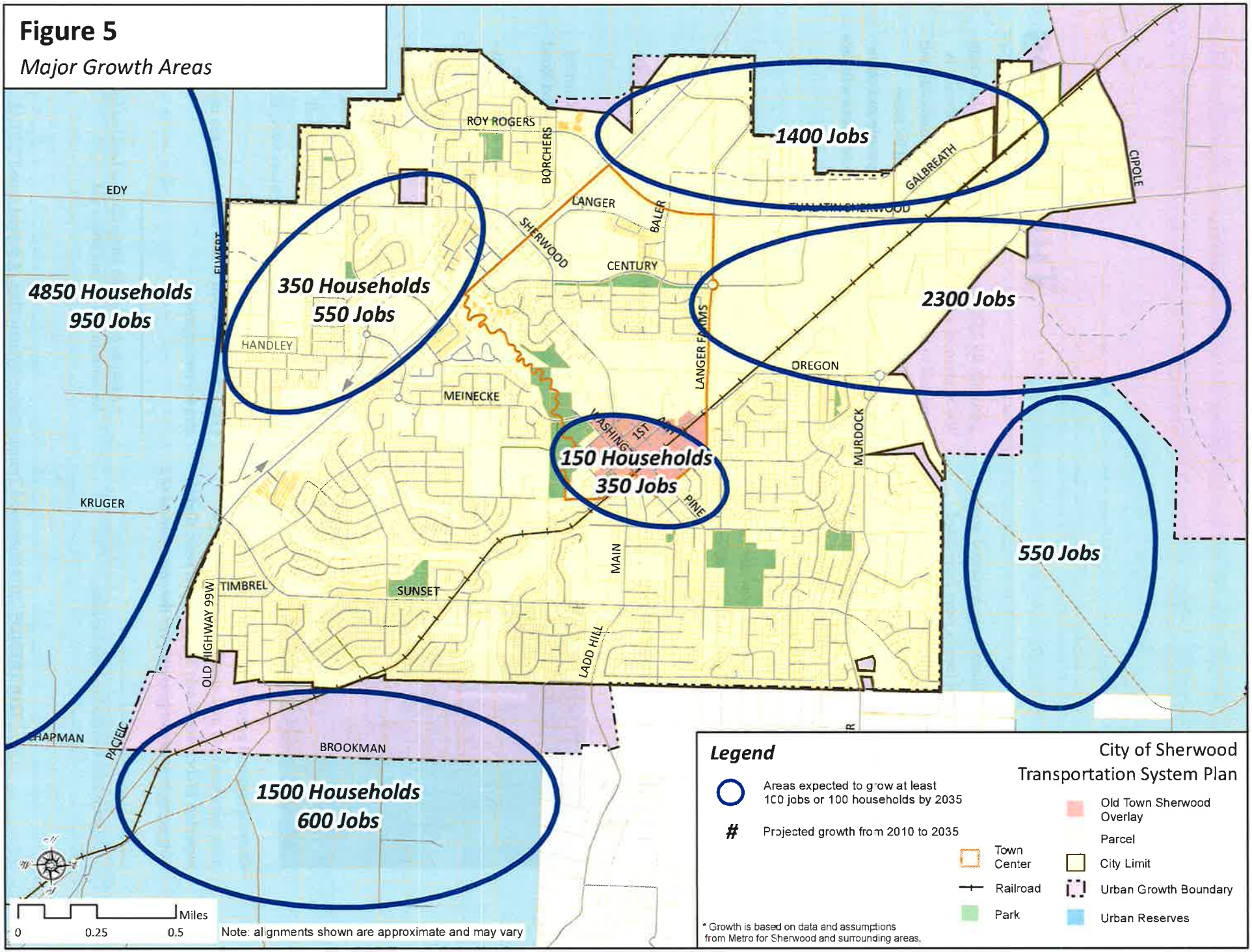
Old Town Sherwood is also expected to see moderate employment growth.

[5] Metro 2035 Gamma land use forecasts.

[6] Analysis is based on Metro Gamma land use forecasts for zones in and around Sherwood.

Figure 5

Major Growth Areas



By the year 2035, household growth is expected to be highest in the following areas:

- The urban reserves west of the city
- The areas adjacent to Brookman Road

Old Town Sherwood and the area bound by Highway 99W-Elwert Road-Edy Road are also expected to see moderate household growth.

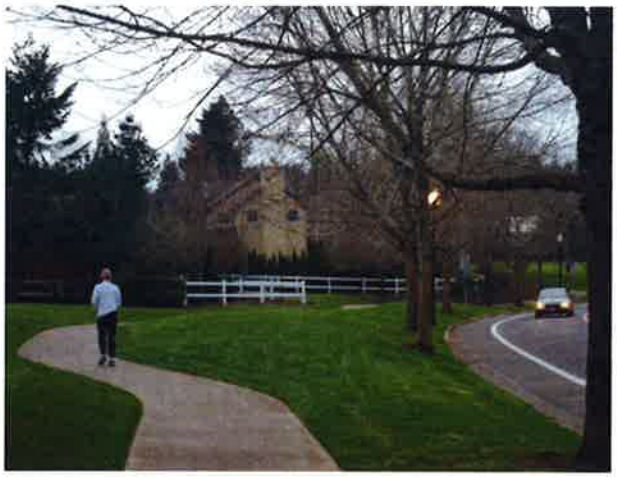
More Driving

The projected growth in housing and employment is likely to lead to increased activity and person-trips in Sherwood. Even with enhancements to pedestrian and bicycle opportunities, and an increase in jobs near residential areas, and progress towards non-driving trips, there is projected to be an increase of approximately 65% weekday peak hour vehicle trips in the Sherwood area by 2035. Along with this growth, the total vehicle distance travelled in Sherwood is projected to increase, even though the distance travelled per person (average distance) is projected to decrease[7]. This increased overall vehicle travel will place additional strain on Sherwood's streets.

More Congestion

More travel means more congestion. Evening peak hour motor vehicle trips beginning or ending in Sherwood are expected to increase by 63 percent through 2035. Through travel, or trips that do not begin or end in Sherwood, is also expected to increase through 2035 and is generally representative of growth in the region, including surrounding cities such as Tualatin and Newberg. Figure 6 indicates the general amount of traffic projected to use streets in the Sherwood area (based on the width of the color) and the general level of congestion (noted by warmer colors). The following road segments were identified as locations that are projected to be congested during evening peak hour conditions and may require additional capacity improvements or management strategies by the year 2035:

- Highway 99W north of SW Tualatin-Sherwood Road
- SW Roy Rogers Road west of Highway 99W
- SW Tualatin Sherwood Road east of Highway 99W
- SW Edy Road west of Highway 99W
- Highway 99W south of SW Edy Road
- SW Oregon Street east of SW Murdock Road
- SW Sunset Boulevard between SW Pinehurst Drive and SW Murdock Road
- SW Langer Farms Parkway south of SW Century Drive



[7] The projected increase in vehicle trips (65%) is less than the projected increase in land use (approximately 115% and 125% growth in households and jobs, respectively). As a result, the average distance travelled per person is projected to decrease. Section 9 (The Outcome) includes additional information.

More Walking, Biking, and Transit Use

Old Town and other areas of the Town Center (an area defined as south of Highway 99W and Tualatin-Sherwood Road, east of Cedar Creek, and west of Langer Farms Parkway) continue to develop in ways that will support multimodal activity. Amenities such as Cannery Square and the Cedar Creek Trail will attract activity and the amount of pedestrian, bicycle, and transit use in the area is expected to grow.

The future needs for walking, biking, and transit in Sherwood were determined by reviewing major growth areas of the city and evaluating how they were served by existing facilities. In addition, the areas of the city in close proximity to key destinations (such as schools, transit stops, and shopping) with potential to attract significant walking and biking trips and areas with existing deficiencies were identified and reviewed to determine prioritized walking, biking, or transit investments.

Key routes with bike and/or pedestrian deficiencies include:

- 12th Street
- Borchers Drive
- Highway 99W
- Langer Drive
- Main Street
- Oregon Street
- Pine Street
- Sherwood Boulevard
- Sunset Boulevard
- Washington Street

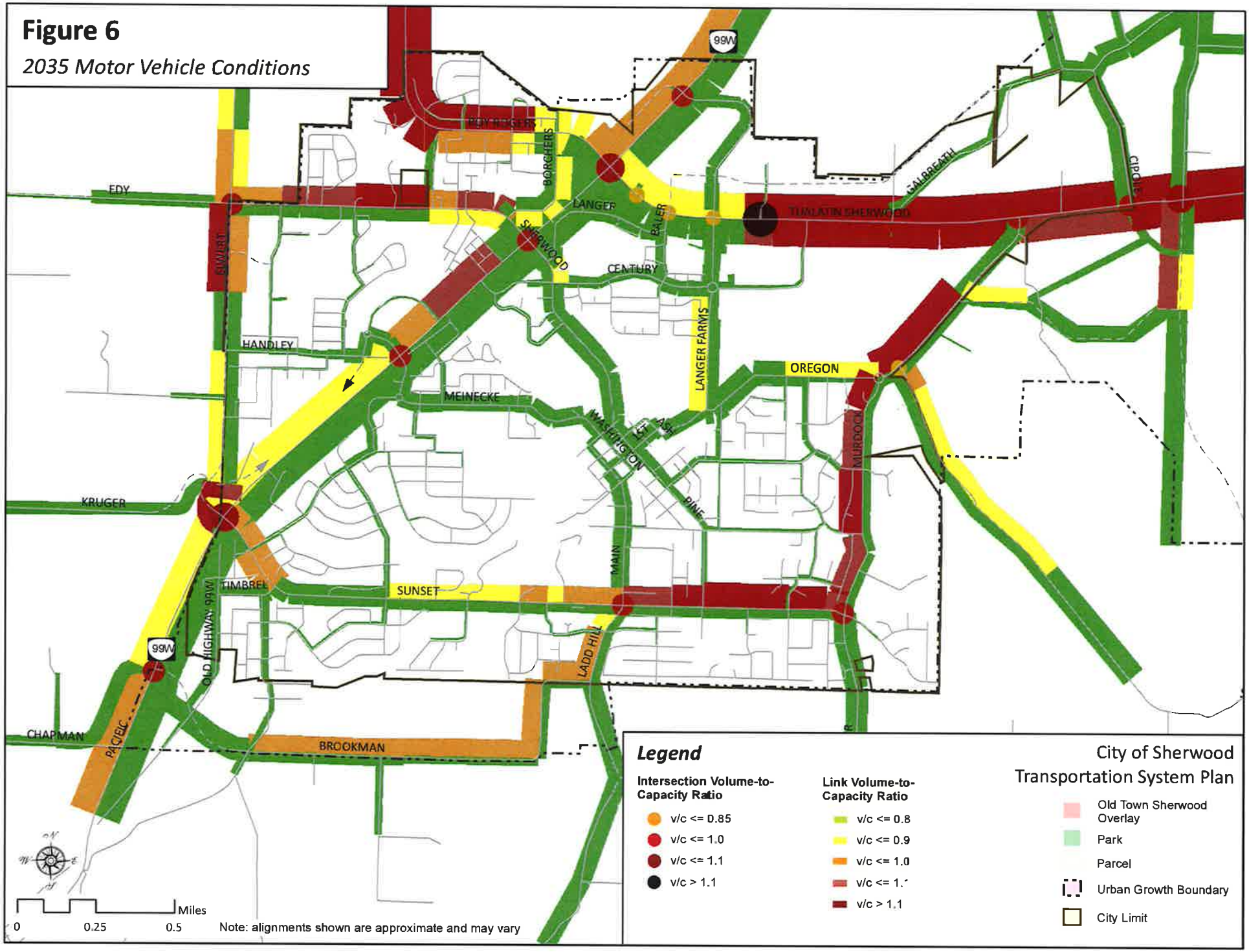
Key transit deficiencies in Sherwood include:

- Limited regional connections
- Lack of a local circulation route
- Limited transit stop amenities
- Incomplete pedestrian and bicycle connections to transit stops

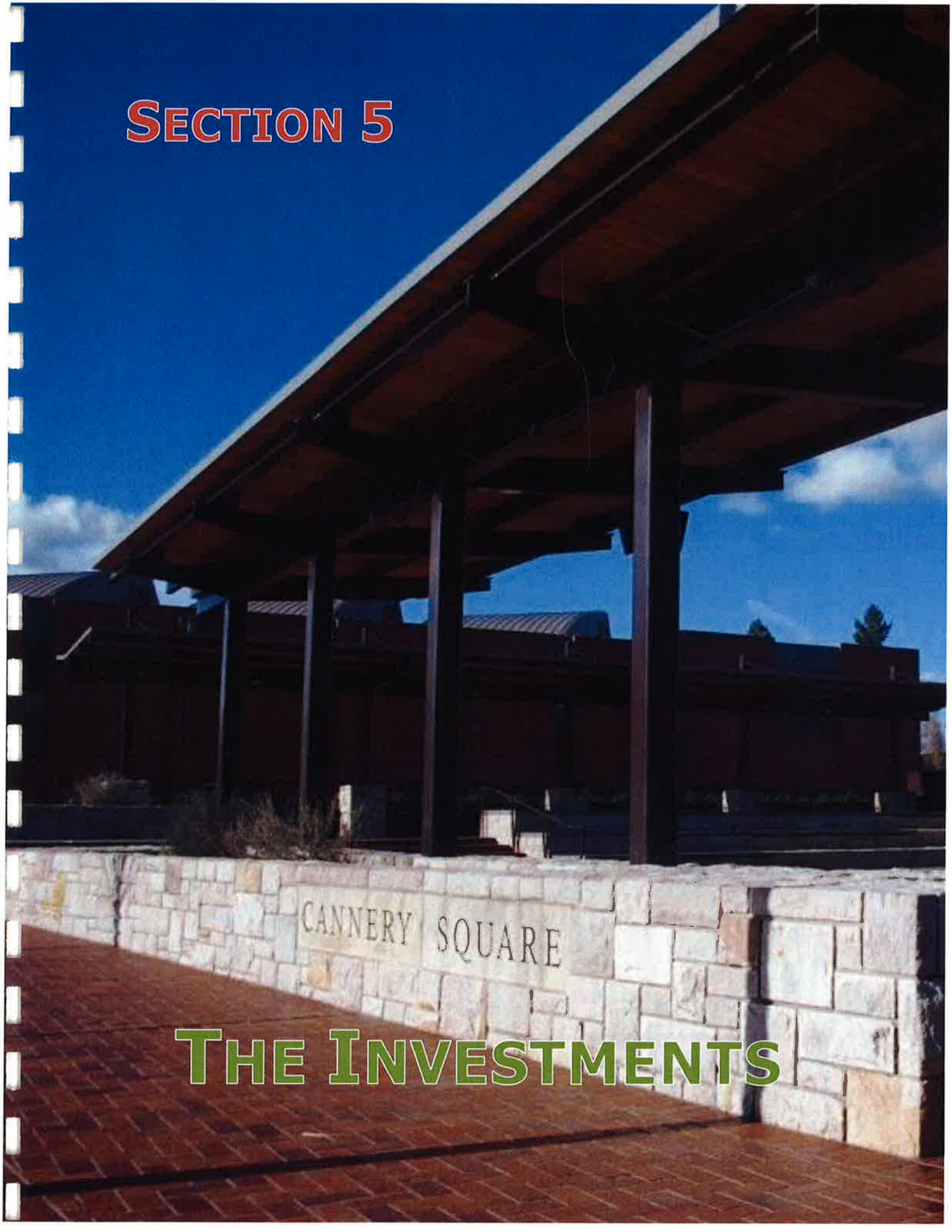


Figure 6

2035 Motor Vehicle Conditions



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SECTION 5

THE INVESTMENTS

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THE INVESTMENTS

The Sherwood approach to developing transportation solutions placed more value on investments in smaller cost-effective solutions for the transportation system rather than larger, more costly ones as the City and regional partners will have a limited amount of funding to spend on these solutions through 2035. The approach helped to encourage multiple travel options, increase street connectivity and promote a more sustainable transportation system.

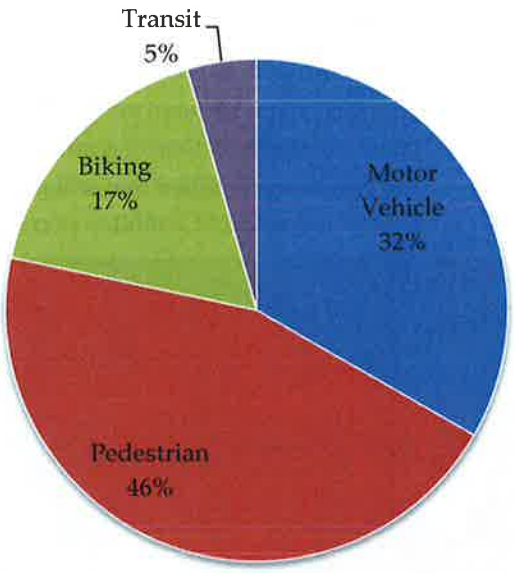
Taking the network approach to transportation system improvements, the projects in this plan—listed in Table A1 of Volume 2, Section E—are grouped into several modal categories. The following categories list the number of projects and their costs (which are in 2013 dollar amounts, and are the City's estimated share of the total cost) for each mode:

- **Motor vehicle** projects to improve connectivity, safety, and mobility throughout the city. Sherwood identified 36 projects to improve driving conditions and will cost the City an estimated $87.8 million to complete.
- **Pedestrian** projects for sidewalk infill, local and regional trails, and shared-use paths to provide seamless connections for pedestrians throughout the city. Sherwood identified 51 sidewalk projects that will cost the City an estimated $15.9 million to complete.
- **Biking** projects including an integrated network of bicycle lanes, marked on-street routes, and shared-use paths to facilitate convenient travel citywide. Sherwood identified 19 biking projects that will cost the City an estimated $6.7 million to complete.
- **Transit** projects to provide wider coverage, more frequent service, and more better amenities. A total of 6 transit projects were identified that will cost the City an estimated $1.2 million to complete.

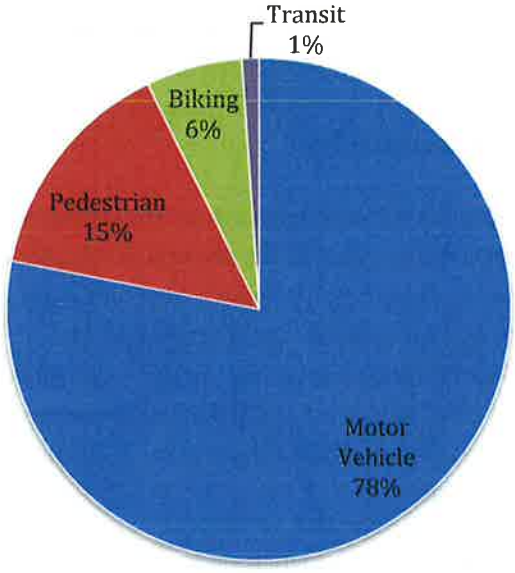


Overall, Sherwood identified 112 transportation solutions, totaling an estimated $350 million worth of investments—$112 million of which is assumed to be city funded. The remainder is the assumed share for the county and state for projects not on city owned facilities. As shown in Figure 7, only about 32 percent of the improvements in the Plan are motor vehicle projects, yet these projects account for nearly 78 percent of the total future project expenses in the Plan.

Figure 7: Breakdown of Projects and Expenses in the Plan



Projects in the TSP by Mode



Projects Expenses in the TSP by Mode





SECTION 6

THE FUNDING

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THE FUNDING

With an estimated $112 million worth of transportation solutions identified to potentially be funded by the City, Sherwood must make investment decisions to develop a set of transportation improvements that are reasonably likely be funded to meet identified needs through 2035. As summarized in the Existing Conditions Technical Report (Section B in the Volume 2), it is estimated that Sherwood would have approximately $11.3 million to spend on capital improvement projects through 2035 based on historical growth that has occurred over the last several years.

However, assuming the level of growth related to urbanization of surrounding areas through 2035, Sherwood's available funds for transportation projects would grow to approximately $60 million. Therefore, both the $11.3 million funding estimate (referred to as "conservative funding") and the $60 million funding estimate (referred to as "projected funding") will be considered as funding scenarios.



Funding Shortfall

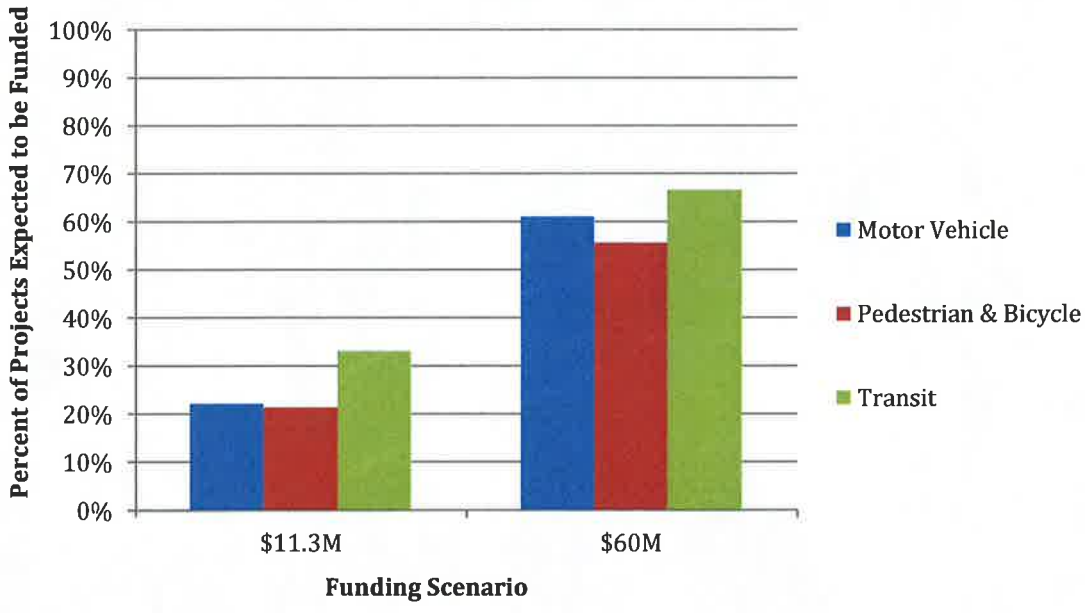
Over $87 million worth of motor vehicle projects, nearly $23 million worth of pedestrian, bicycle, and shared-use path and trail improvements, and about $1 million worth of transit projects were identified for city funding, totaling approximately $111.6 million.

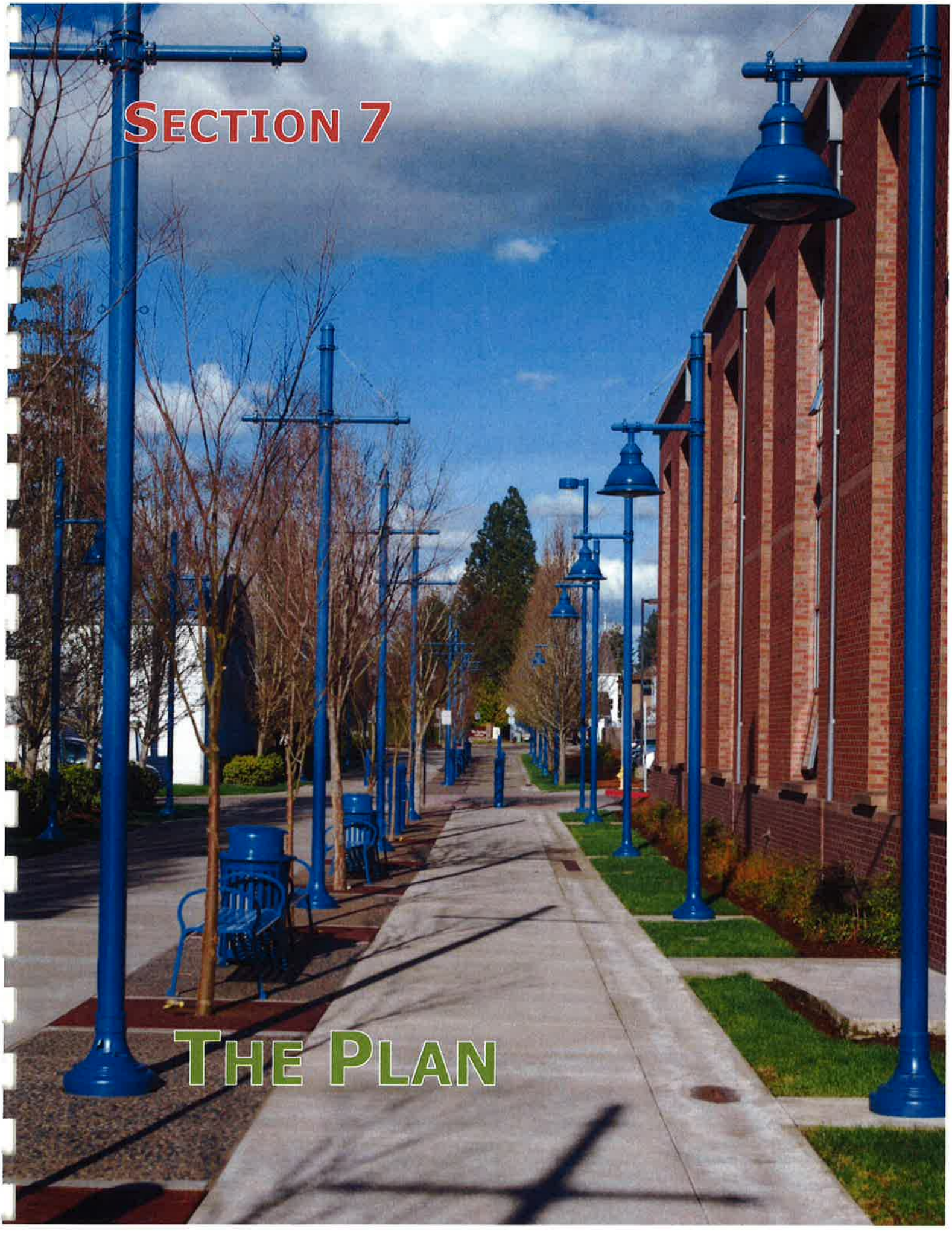
Unless additional funds are developed, Sherwood will be short as much as $100 million to fund desired transportation projects if growth in the city continues as it has over the last few years. If the level of growth in the area is consistent with the regional land use growth projections, the City would be short nearly $52 million to fund transportation projects. However, the funding estimates do not consider developer contributions that would likely apply to a handful of investments shown in the TSP—therefore, the funding gap is likely to be less than $52 million, yet significant nonetheless.

As shown in Figure 8, approximately 22 percent of the motor vehicle projects, 21 percent of the pedestrian and bicycle projects, and 33 percent of the transit projects could be funded under the conservative funding estimate of $11.3 million. Under the projected funding estimate of $60 million, approximately 61 percent of the motor vehicle projects, 56 percent of the pedestrian and bicycle projects, and 67 percent of the transit projects could be funded.

In addition to Sherwood's funding shortfall, state and county funding limitations may further constrain the degree of transportation investments made in the city. Even though Sherwood may dedicate a match to support funding an investment along a state or county facility, it is not guaranteed that the county or state could provide the remaining match to complete the investment.

Figure 8: Evaluation of the Fundable Plans





SECTION 7

THE PLAN

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As detailed in the Funding section, the City is projected to have up to $60 million to cover the $112 million in project costs. Clearly, most of the transportation solutions identified for the city are not reasonably likely to be funded through 2035. For this reason, the transportation solutions were grouped into three categories based on the timing of anticipated implementation:

- The Conservatively Fundable Plan
- The Projected Fundable Plan
- The Aspirational Plan

The highest priority projects that fall within the $11.3 million scenario were included in the Conservatively Fundable Plan, the highest priority projects that fall within the $60 million scenario were included in the Projected Fundable Plan, and the complete projects list—regardless of expected funding—is referred to as the Aspirational Plan.

Determining the Investments that made the Fundable Plans

The complete list of transportation projects (documented in Section E of Volume 2) were prioritized based on a three-tier evaluation process, which included:

- **Tier 1: Screening for Needs**—Projects previously identified in plans prior to the update (e.g., prior transportation plans, concept plans, etc.) were screened to determine if they addressed a specific need identified in the TSP update process. Projects that were previously identified but did not directly address a given need were given a "long-term phasing status (regardless of Tier 2 and Tier 3 evaluation). Additional projects were developed to address the needs that were not otherwise addressed with previously identified projects.
- **Tier 2: Primary Evaluation Criteria**—Evaluation criteria were applied to projects across all modes based on consistency with Sherwood's transportation goals. These criteria provided a means to evaluate very different projects using the broad criteria that was applied to all project types.
- **Tier 3: Secondary Criteria**—In order to further differentiate projects that received the same primary evaluation score within a given mode, sets of secondary criteria were applied. These criteria were different for each mode and were only used to compare projects relative to other projects of the same mode. The criteria were:
  - Pedestrian/Bicycle—Project location and proximity to schools and other activity generators.
  - Motor Vehicle—Hierarchy of projects based on regional strategies (intersection improvements are highest priority and major corridor widening is lowest priority).

Incorporating the funding scenarios with the prioritized list of projects, the solutions were

grouped into the fundable plans. Each transportation solution was then assigned a time frame for the expected investment need, based on a project's contribution to achieving the transportation goals of Sherwood.

Conservatively Fundable Plan

The Conservatively Fundable Plan identifies the highest priority transportation solutions that are anticipated to be funded by 2035, based on historical funding data. Transportation solutions within the Conservatively Fundable Plan were recommended as short-term investments.

Over $11 million worth of investments are included in the Conservatively Fundable Plan. As shown in Figure 9, about 32 percent of these investments are motor vehicle improvements, 36 percent are pedestrian improvements, 24 percent are biking improvements, and about 8 percent of these investments are transit improvements.

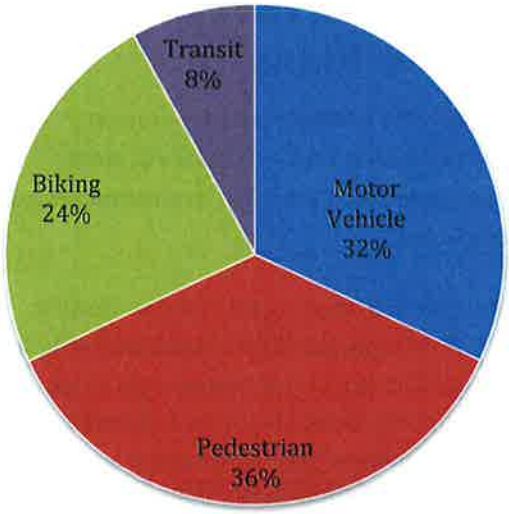
The Conservatively Fundable transportation solutions are highlighted in red in Table 1 and illustrated in Figures 11 to 14. The projects numbered on Figures 11 to 14 correspond with the project numbers in Table 1. The project numbers are denoted as follows:

- Driving ("D")
- Pedestrian ("P")
- Biking ("B")
- Transit ("T")

Planning level cost estimates for the projects can be found in Table A1 of the TSP Volume 2, Section E.



Figure 9: Breakdown of Projects in the Conservatively Fundable Plan



Projected Fundable Plan

The Projected Fundable Plan identifies additional high priority transportation solutions that reasonably could be funded by 2035, assuming the same level of growth related to urbanization of surrounding areas. Transportation solutions within the Projected Fundable Plan that were not included in the Conservatively Fundable Plan were recommended as medium-term investments.

Nearly $60 million worth of investments are included in the Projected Fundable Plan. As shown in Figure 10, about 34 percent of these investments are motor vehicle improvements, 38 percent are pedestrian improvements, 22 percent are biking improvements, and about 6 percent of these investments are transit improvements.

The Projected Fundable transportation solutions are also listed in Table 1 and illustrated in Figures 11 to 14. Planning level cost estimates for the projects can be found in Table A1 of the TSP Volume 2, Section E.

Figure 10: Breakdown of Projects in the Projected Fundable Plan

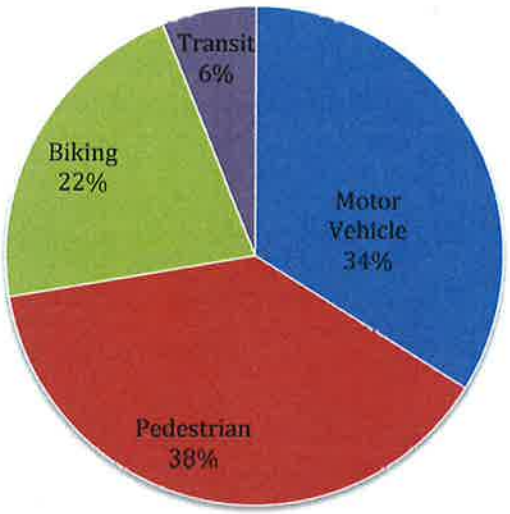




Table 1: The Fundable Transportation System

Project #	Project Name	Project Details	Priority
Projects with Committed Funding			
D13	Tualatin-Sherwood Improvements – Phase 1	Widen Tualatin-Sherwood Road/Roy Rogers Road between Borchers Drive and Baler Way to five lanes. Includes intersection modifications at Highway 99W, the Sherwood Market Center, and at Baler Way.	(Funded Through MSTIP)
D19	124th Avenue Extension	Extend 124th Avenue as an arterial from Tualatin-Sherwood Road to Tonquin Road.	(Funded Through MSTIP)
D22	Kruger/Elwert Intersection Safety Improvement	Realign Elwert Road to provide more storage at Highway 99W, and realign the Kruger Road intersection to the Cedarbrook extension as a single lane roundabout.	(Funded Through MSTIP)
P13	Ice Age Tonquin Trail Segment 8	Implement Tonquin Trail Segment 8 improvements from immediately north of Park Street to immediately south of Highway 99W.	(Funded through Metro regional flex funds)
Motor Vehicle Projects (See Figure 11)			
D3	Oregon Street Intersection Improvements at Murdock and Tonquin	Install a roundabout at the Tonquin Road/Oregon Street intersection with dual westbound through lanes and a single eastbound through/right lane. Consider creating a "Dumbbell Roundabout" with the Oregon/Murdock roundabout by disallowing the west circulating lane at Oregon/Tonquin and disallowing the east circulating lane at Oregon/Murdock. Add a second westbound approach lane to the Murdock Road Oregon Street roundabout for separated westbound left and westbound through lanes. Keep three lanes on the bridge structure.	Short-Term
D4	Elwert Road Improvements	Upgrade Elwert Road (from Highway 99W to Edy Road) to a three lane arterial with bike lanes and sidewalks. This project may be phased with D30 for design and construction purposes.	Medium-Term
D6	Edy Road Improvements	Upgrade Edy Road (from Borchers Drive to City Limits) to a three lane collector with bike lanes and sidewalks.	Medium-Term
D7	Ladd Hill Road Improvements	Upgrade Ladd Hill Road (from Sunset Boulevard to the Urban Growth Boundary) to a three arterial with bike lanes and sidewalks.	Medium-Term
D8	Oregon Street Improvements	Upgrade Oregon Street (from Murdock Road to the railroad crossing) to a three lane collector with sidewalks on south side and a shared-use path on the north side (part of the Ice Age Tonquin Trail).	Medium-Term
D12	Extension of Langer Farms Parkway at 99W	Extend Langer Farms Parkway from 99W west as a collector road.	Medium-Term
D14	Highway 99W/Brookman Traffic Signal and Realignment	Realign Brookman Road to intersect with Highway 99W approximately 1/4 mile north of its existing intersection; This alignment would provide future separation from the Southern Arterial connection at Highway 99W and would improve safety and driver expectancy for the intersection on the highway by moving it within the urbanized context (within future urbanized area of Brookman Concept Plan area). This improvement includes a traffic signal at the realigned intersection with a westbound left and southbound right turn lane, and a grade separated railroad crossing. All traffic signals on the state highway system would need to be approved by the state traffic engineer and design coordination with ODOT would be	Medium-Term

Project #	Project Name	Project Details	Priority
		needed to ensure that the improvements were done in a manner that would improve driver expectancy and safety.	
D15	Sunset Boulevard Improvements	Upgrade Sunset Boulevard (from Aldergrove Avenue to Eucalyptus Terrace) to a three lane arterial with sidewalks and bike lanes. Address vertical crest sight distance issues near Pine Street.	Medium-Term
D16	Edy/Highway 99W Intersection Improvements	Restripe the westbound Sherwood Boulevard approach to have a single left turn lane, a single through lane, and a single right turn lane. Eliminate the split phase timing for the side streets, and maintain the existing green time on Highway 99W for the northbound and southbound through movements. Add the missing crosswalk to the south approach. Consider implementing P3 alongside this project.	Short-Term
D17	Meinecke/Highway 99W Intersection Improvements	Change the eastbound and westbound left turn phasing on Meinecke Road from permitted to permitted/protected and maintaining the existing green time on Highway 99W for the northbound and southbound through movements. Consider implementing P3 alongside this project.	Medium-Term
D18	Langer Drive Improvements	Construct improvements to Langer Drive between Baler Way and Sherwood Boulevard that are consistent with the Sherwood Town Center Plan. Major improvements include: buffered bike lanes, on-street parking, wider sidewalks, narrower travel lanes, removal of the center turn lane, and landscaping.	Short-Term
D24	Sherwood Boulevard Intersection Modifications	Remove the Sherwood Boulevard/Langer Drive traffic signal (allow right-in, right-out, and left-in movements only), and install a traffic signal at the Sherwood Boulevard/Century Drive intersection (add eastbound and westbound left turn lanes).	Medium-Term
D25	Sunset/Pine Improvements	Restripe Sunset Boulevard at Pine Street to add eastbound and westbound left turn lanes.	Medium-Term
D27	Baker Road Improvements	Upgrade Baker Road (from Sunset Boulevard to the urban growth boundary) to a two lane arterial with bike lanes and sidewalks.	Medium-Term
D30	Elwert/Edy Roundabout	Install a single lane roundabout at the Elwert Road/Edy Road intersection. This project may be phased with D4 for design and construction purposes.	Medium-Term
D31	Highway 99W/Sunset Improvements	Add westbound and eastbound left turn lanes at Highway 99W/Sunset Boulevard with protective-permissive phasing. Consider implementing D22 and P3 alongside this project.	Short-Term
D33	Sunset/Murdock Turn Lanes	Add a southbound right turn lane and a northbound left turn lane at the Sunset Boulevard/Murdock Road intersection.	Medium-Term
D34	Brookman/Middleton Traffic Control Enhancements	Move the stop signs to the north and south approaches, and add a southbound left turn lane at the Brookman Road/Middleton Road intersection.	Medium-Term
D35	Area 59 Neighborhood Route	Build a neighborhood roadway, connecting Elwert Road and Copper Terrace as identified in the Area 59 concept plan.	Medium-Term
Pedestrian Projects (See Figure 12)			
P1	Handley Street Sidewalk Infill	Construct sidewalk along the north side of Handley Street from Elwert Road to the existing sidewalk terminus approximately 250 feet east of Elwert Road.	Medium-Term
P2	Highway 99W Sidewalk Infill	Construct sidewalks along both sides of Highway 99W between the north Urban Growth Boundary and the south Urban Growth Boundary.	Medium-Term

Project #	Project Name	Project Details	Priority
P3	Highway 99W Crosswalks	Add missing crosswalks at existing traffic signal locations on Highway 99W between Edy Road and Sunset Boulevard. The crosswalk enhancements may be phased individually with their corresponding intersection improvements (D16, D17, D31).	Medium-Term
P4	Ice Age Tonquin Trail/Highway 99W Connection	Construct a shared use path that connects the proposed Cedar Creek/Tonquin Trail to Highway 99W.	Medium-Term
P5	10th Street Neighborhood Greenway	Add sidewalks and shared lane markings to 10th Street and Gleneagle Drive from Sherwood Boulevard to the planned Cedar Creek/Ice Age Tonquin Trail connection.	Medium-Term
P6	Sherwood Boulevard Improvements	Construct improvements to Sherwood Boulevard between Langer Drive and 3rd Street that are consistent with the Sherwood Town Center Plan. Major improvements include: a shared-use path on the east side, wider sidewalks on the west side, narrower travel lanes, and landscaping.	Short-Term
P12	Ice Age Tonquin Trail Segment 7	Implement Tonquin Trail Segment 7 improvements from immediately west of the Tonquin/Oregon Street intersection to immediately north of Park Street.	Short-Term
P14	Ice Age Tonquin Trail Segment 9	Implement Tonquin Trail Segment 9 improvements from immediately south of Highway 99W to Roy Rogers Road (including Roy Rogers intersection).	Short-Term
P16	Ice Age Tonquin Trail Segment 11	Implement Tonquin Trail Segment 11 improvements from immediately east of the Tonquin Road/Oregon Street intersection to immediately west of Cipole Road.	Medium-Term
P18	Cipole Road Sidewalk Infill	Construct sidewalk along the east side of Cipole Road from approximately 1,250 feet north of Tualatin-Sherwood Road to the existing sidewalk terminus approximately 450 feet north.	Medium-Term
P19	12th Street Sidewalk Infill	Construct sidewalk along the south side of 12th Street from Highway 99W to Sherwood Boulevard.	Short-Term
P20	Division Street Sidewalk Infill	Construct sidewalk along both sides of Division Street from Main Street to Cuthill Place.	Medium-Term
P21	Meinecke Road Sidewalk Infill	Construct sidewalk along the north side of Meinecke Road from Lee Drive to the existing sidewalk terminus to the east (approximately 400 feet).	Medium-Term
P22	Pine Street Sidewalk Infill Segment 1	Construct sidewalk along the west side of Pine Street from Willamette Street to Columbia Street.	Short-Term
P23	Pine Street Sidewalk Infill Segment 2	Construct sidewalk along the east side of Pine Street from Division Street to Sunset Boulevard, and fill the sidewalk gap along the west side of Pine Street just north of Sunset Boulevard.	Short-Term
P26	Highway 99W Grade Separated Crossing	Build a grade-separated crossing of Highway 99W for pedestrians and bicyclists, providing a direct connection for the Ice Age Tonquin Trail east and west of the highway.	Medium-Term
P30	Sunset Boulevard/St Charles Way Crossing Improvements	Install marked crosswalks at the Sunset Boulevard/St Charles Way intersection.	Medium-Term
P31	Sunset Boulevard/Redfern Drive Crossing Improvements	Install enhanced pedestrian crossing at the Sunset Boulevard/Redfern Drive intersection.	Medium-Term

Project #	Project Name	Project Details	Priority
P32	Sunset Boulevard/Galewood Drive Crossing Improvements	Install enhanced pedestrian crossing at the Sunset Boulevard/Galewood Drive intersection.	Medium-Term
P44	Oregon Street Sidewalk Infill	Construct sidewalk along the south side of Oregon Street between Hall Street and Orland Street.	Short-Term
P45	Murdock Road Sidewalk Infill Segment 1	Construct sidewalk along the east side of Murdock Road from Willamette Street to Oregon Street.	Medium-Term
P48	Downtown Streetscapes Master Plan Phases 1 and 2 (Old Town Core)	Complete Phase 1 (Old Town Core) and Phase 2 (Cannery Arterials) of the Downtown Streetscapes Master Plan.	Medium-Term
P49	Downtown Streetscapes Master Plan Phase 3 (Old Town Secondary Streets)	Complete Phase 3 (Old Town Secondary Streets) of the Downtown Streetscapes Master Plan.	Short-Term
P50	Downtown Streetscapes Master Plan Phase 4 (Old Town Residential Neighborhoods)	Complete Phase 4 (Old Town Residential Neighborhoods) of the Downtown Streetscapes Master Plan.	Short-Term
Biking Projects (See Figure 13)			
B1	Murdock Shared-Use Path	Build a shared-use path along the west side of Murdock Road from Oregon Street to Upper Roy Street.	Medium-Term
B2	Meinecke Bike Lanes	Add bike lanes on Meinecke Road from Marshall Street to 3rd Street.	Short-Term
B5	Main Street Shared Lane Markings	Add shared lane markings to Main Street between 1st Street and Sherwood Boulevard.	Medium-Term
B6	Pine Street Shared Lane Markings	Add shared lane markings to Pine Street between 3rd Street and Sherwood Boulevard.	Medium-Term
B7	Borchers Bike Lanes	Build bike lanes on Borchers Road between Edy Road and Roy Rogers Road.	Short-Term
B8	3rd Street Shared Lane Markings	Add shared lane markings on 3rd Street from Washington Street to Sherwood Boulevard.	Medium-Term
B9	1st Street Shared Lane Markings	Add shared lane markings on 1st Street from Main Street to Pine Street.	Medium-Term
B10	Century Drive Shared-Use Path	Widen the sidewalk on the south/east side of Century Drive between Tualatin-Sherwood Road and the existing terminus to provide a shared-use path	Short-Term
B12	Old Highway 99W Shared-Use Path	Widen the sidewalk along the west side of Old Highway 99W between Timbrel Lane and Crooked River Lane to provide a shared-use path	Medium-Term
B13	Old Highway 99W Improvements Segment 2	Upgrade Old Highway 99W (from Crooked River Lane to Brookman Road) to a two lane collector with a shared use path on the west side and sidewalks on the east side.	Short-Term
B16	Baler Way Bike Lanes	Rebuild Baler Way to a collector between Century Drive and Tualatin-Sherwood Road to include bike lanes.	Short-Term
B17	12th Street Bike Lanes	Add bike lanes on 12th Street between Highway 99W and Sherwood Boulevard.	Short-Term

Project #	Project Name	Project Details	Priority
B18	Washington Street Shared Lane Markings	Add shared lane markings on Washington Street between 3rd Street and 1st Street.	Medium-Term
B19	Sunset Boulevard Bike Lanes	Add bike lanes on Sunset Boulevard between Aldergrove Avenue and Murdock Road	Medium-Term
Transit Projects (See Figure 14)			
T1	Provide Transit Amenities at Major Transit Stops	Provide Transit Amenities at Major Transit Stops.	Medium-Term
T2	Improve Pedestrian Connections to Transit Facilities	Improve Pedestrian Connections to Transit Facilities.	Short-Term
T3	Increase Density Adjacent to Transit	Increase Density Adjacent to Transit.	Short-Term
T6	Support Regional Service to Tualatin	Support potential transit connections to Tualatin	Medium-Term

Full project list (including aspiration projects) can be found in Volume 2, Section E
Projects may be constructed through private development

Aspirational Plan

The projects within the fundable plans will significantly improve Sherwood's transportation system. If the City is able to implement a majority of the Projected Fundable Plan, nearly two decades from now Sherwood residents will have access to a safer, more balanced multimodal transportation network.

The Aspirational Plan identifies those transportation solutions that are not reasonably expected to be funded by 2035, but many of which are critically important to the transportation system. Some of the projects will require funding and resources beyond what is available in the time frame of this plan. Others are contingent upon redevelopment that makes it possible to create currently missing infrastructure, such as street connections.

The Aspirational Plan solutions are illustrated in Figures 11 to 14 and summarized in the TSP Volume 2, Section E. The Aspiration Transportation Plan includes about $112 million worth of investments. Planning level cost estimates for the projects can be found in Table A1 of the TSP Volume 2, Section E.

Transportation solutions within the Aspirational Plan, but not in a fundable plan, were recommended as long-term investments.



Figure 11

Motor Vehicle Projects

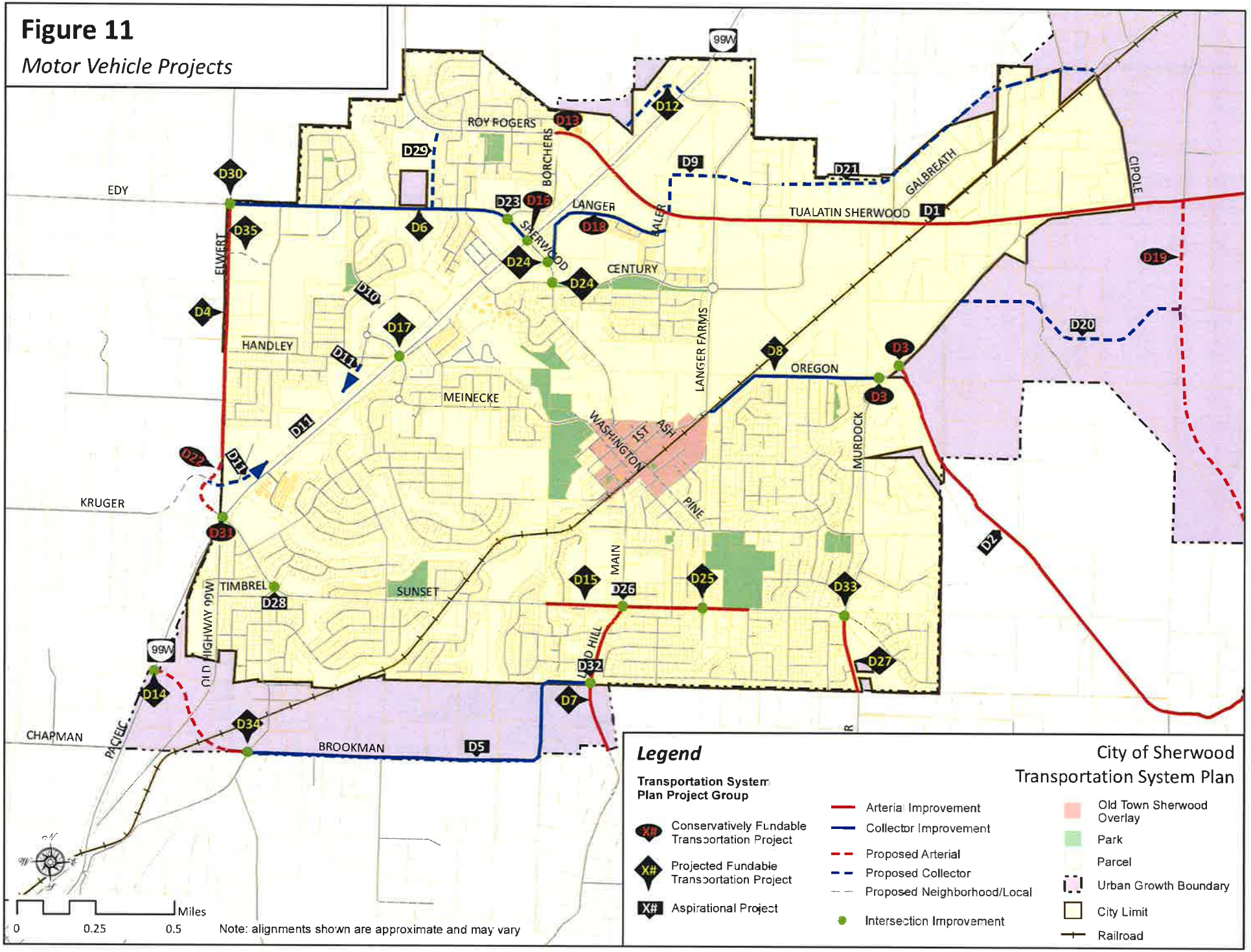


Figure 12

Pedestrian Projects

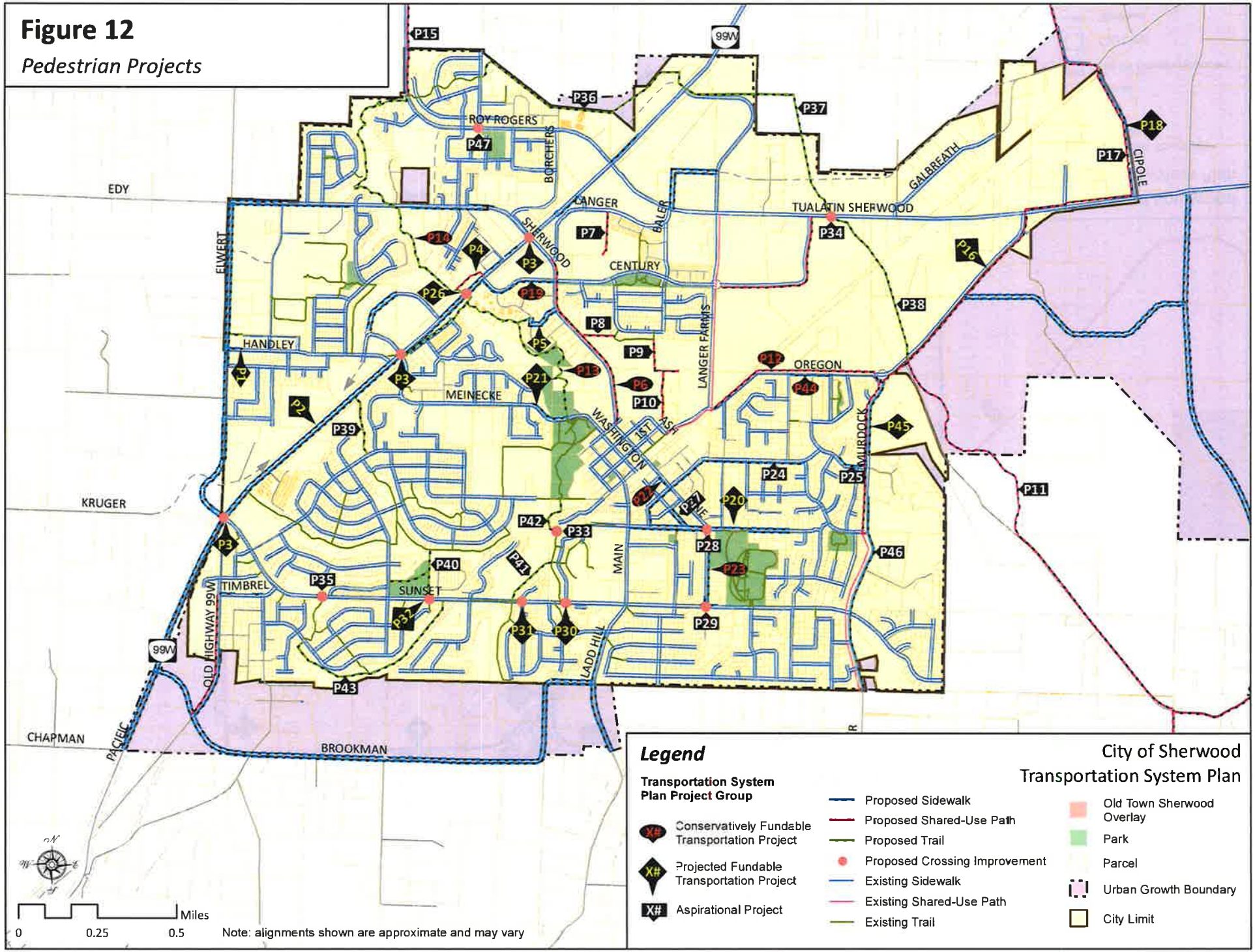


Figure 13

Biking Projects

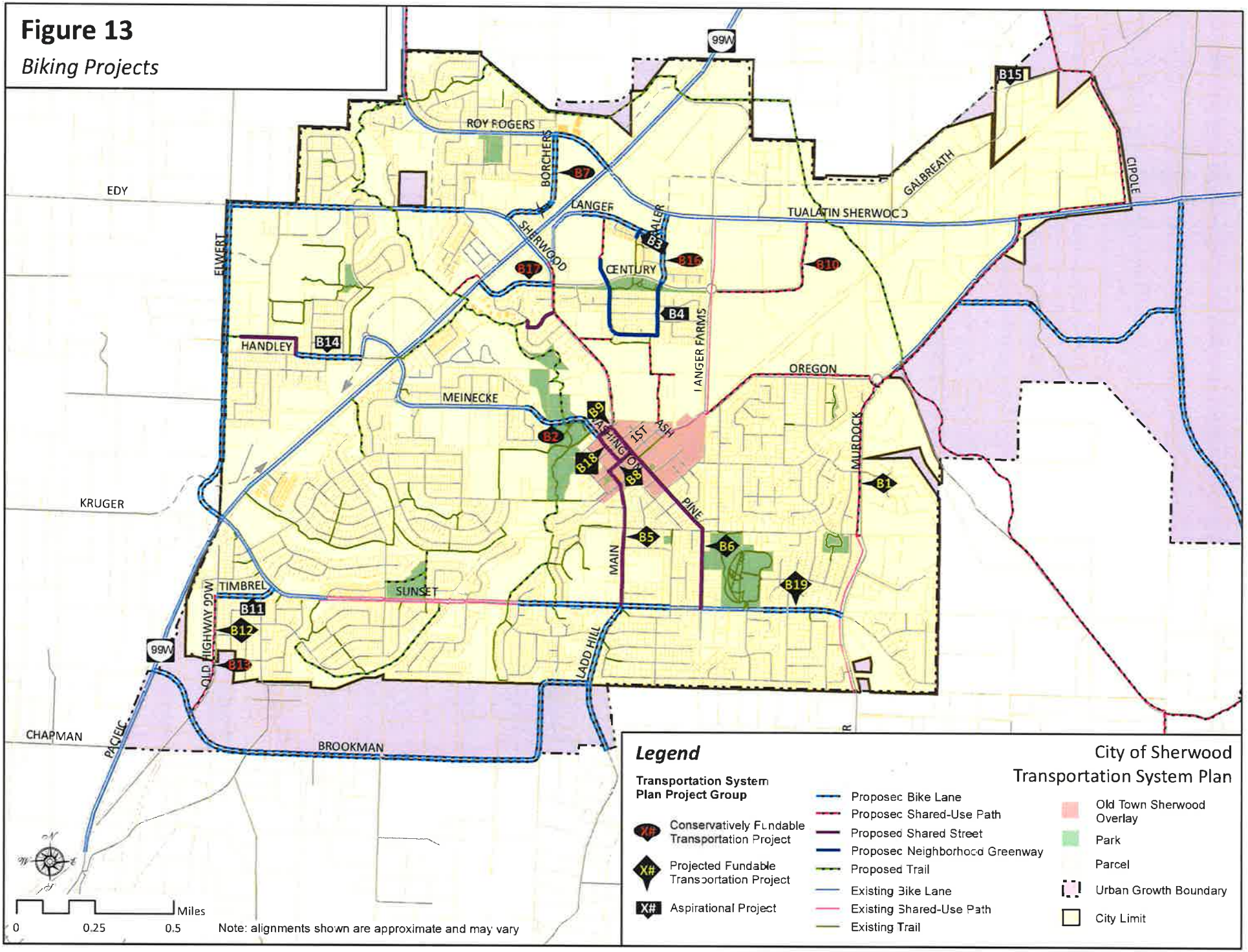
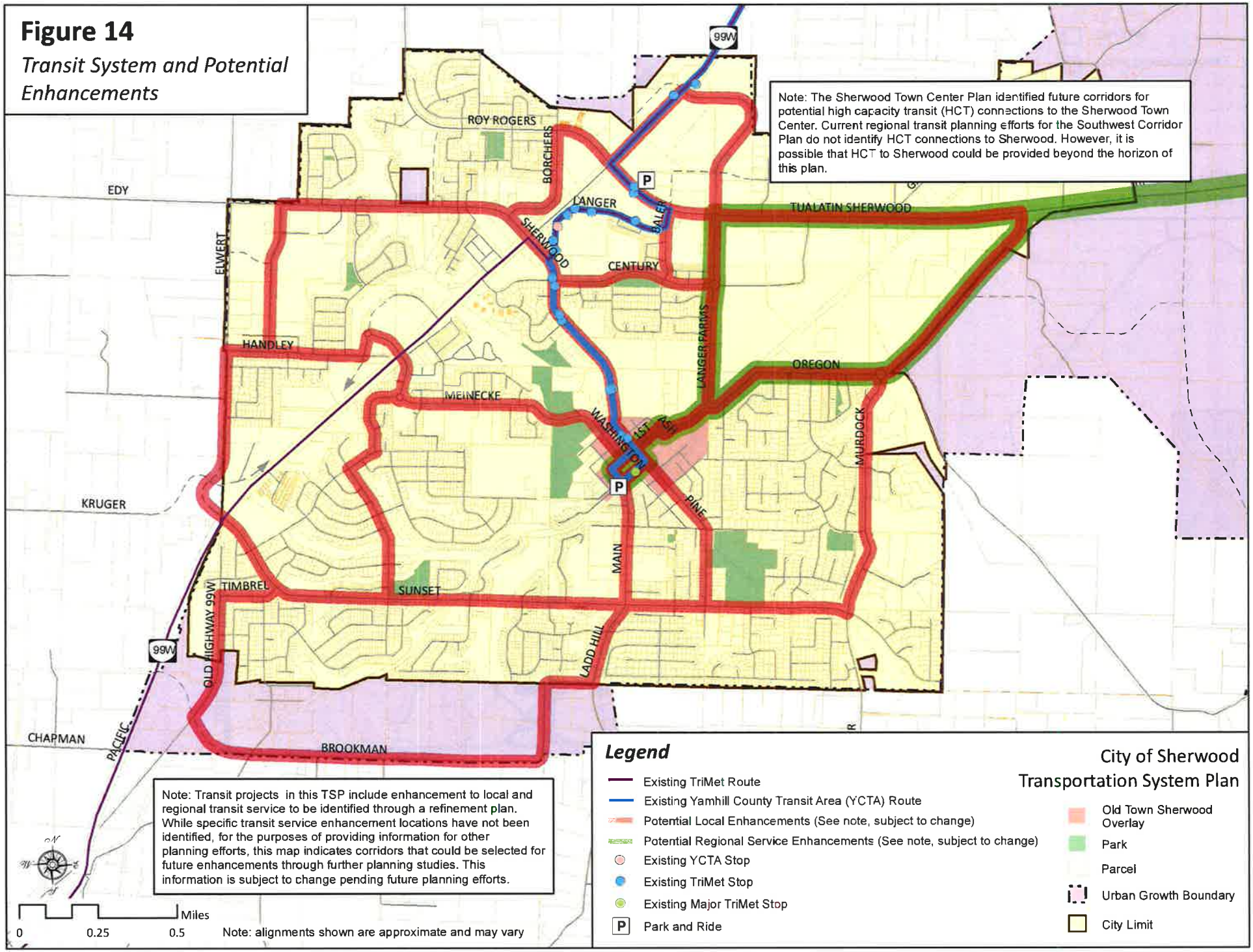
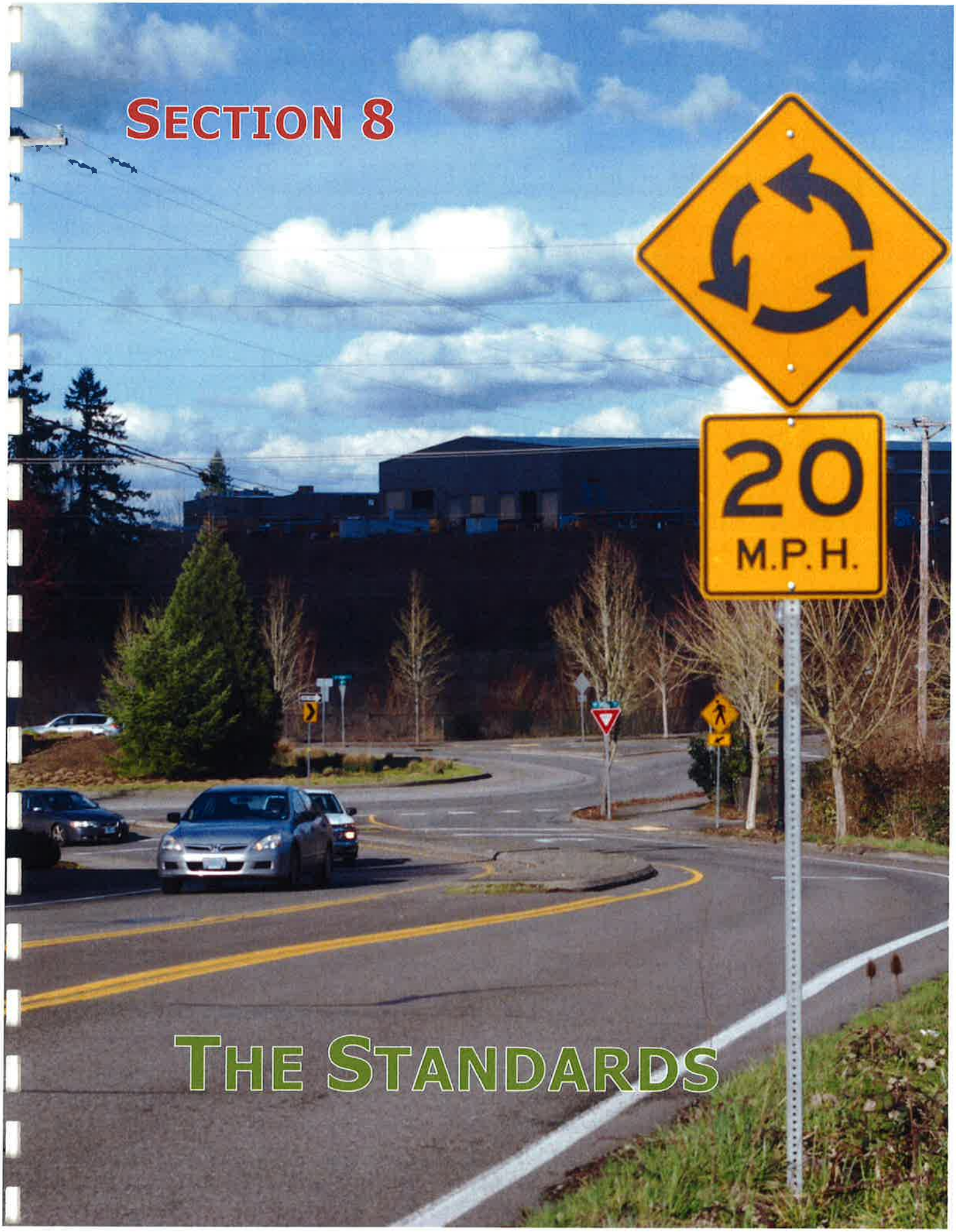


Figure 14

Transit System and Potential Enhancements




SECTION 8
20
M.P.H.
THE STANDARDS

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The standards are intended to ensure that future development in Sherwood is consistent with the City's vision for its transportation system.

Functional Classification for Sherwood Streets

Roadway design typically focuses on the safety and flow of motor vehicle traffic. However some streets have other functions that might take precedent over vehicle mobility, such as ensuring sidewalks or bike facilities are available for vulnerable users like children or the elderly.

While the functional classification system is designed to serve transportation needs within the community, sometimes competing priorities can have opposing effects. For example, as access increases, the facility design dictates slower speeds, narrower travelways, and non-exclusive facilities. The goal of selecting functional classes for particular roadways is to provide a suitable balance between competing objectives, which are depicted in Figure 15.

Figure 15 shows that as street classes progress from local to collector to arterial to freeway (top left corner to bottom right corner) the following occur:

- Mobility Increases
- Integration of Pedestrian and Bicycles Decreases
- Access Decreases
- Facility Design Standards Increase

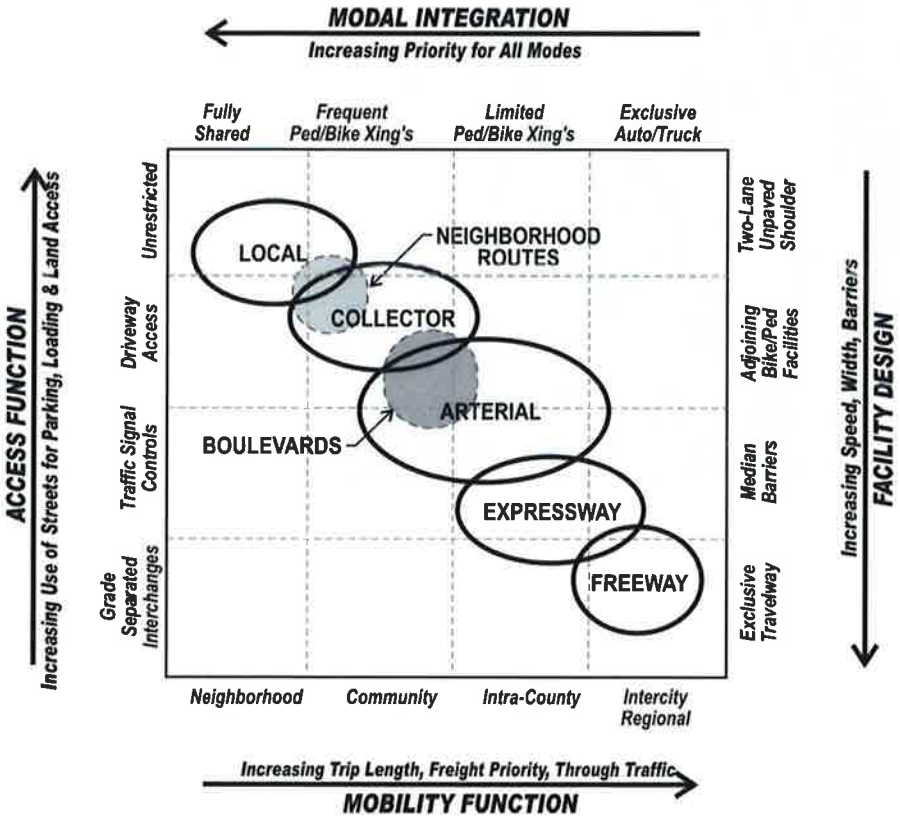


Figure 15: Functional Classification Matrix

The City of Sherwood links functional class to road design standards, and this has enabled the City to construct uniform high-quality improvements that were much needed to support recent growth. However, the City also recognized that relying on this system has limitations. Functional classification has commonly been mistaken as a determinate for traffic volume, road size, urban design land use and various other features which collectively are the elements of a roadway but do not represent function. These factors can be outcomes of function, but do not define the function.



Functional Classification Designations

The types of roadways designated in Sherwood are described below.

Principal Arterials are typically freeways and state highways that are access controlled and provide the highest level of connectivity. These routes connect over the longest distance (sometimes miles long) and are less frequent than other arterials or collectors. These highways generally span several jurisdictions and often have statewide importance (as defined in the State Highway Classification System). In Sherwood, Highway 99W is the only route designated as a Statewide Highway.

Arterial streets serve to interconnect and support the principal arterial highway system. These streets link major commercial, residential, industrial and institutional areas. Arterial streets are typically spaced about one mile apart to assure accessibility and reduce the incidence of traffic using collectors or local streets for through traffic in lieu of a well place arterial route. Arterials are typically multiple miles in length and many connect to cities surrounding Sherwood.

Collector streets provide both access and circulation within and between residential and commercial/ industrial areas. Collectors differ from arterials in that they provide more of a citywide circulation function, do not require as extensive control of access (compared to arterials), and penetrate residential neighborhoods, distributing trips from the neighborhood and local street system. Collectors are typically greater than 0.5 to 1.0 miles in length.

Neighborhood routes are usually long relative to local streets and provide connectivity to collectors or arterials. Because neighborhood routes have greater connectivity, they general have more traffic than local streets and are used by residents in the area to get into and out of the neighborhood, but do not serve citywide/ large area circulation. Traffic from cul-de-sacs and other local streets may drain onto neighborhood routes to gain access to collectors or arterials. Because traffic needs are greater than a local street, certain measures should be considered

to retain neighborhood character and livability of these routes.

Neighborhood traffic management measures are often appropriate (including devices such as speed humps, traffic circles and other devices). However, it should not be construed that neighborhood routes automatically get speed humps or any other measures. While these routes have special needs, neighborhood traffic management is only one means of retaining neighborhood character and vitality.

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

Characteristics of Streets for each Functional Classification

The design characteristics of streets in Sherwood 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 standards.

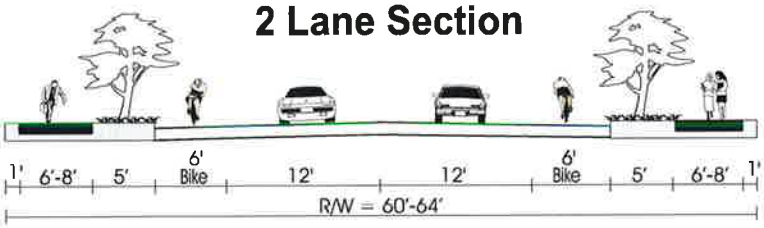
Under some conditions a design exception process to the adopted street cross-section may be requested from the City Engineer. Typical conditions that may warrant consideration of a design exception include—but are not limited to—the following:

- Infill sites
- Innovative designs (such as shared streets known as "woonerfs")
- Severe topographic constraints
- Existing developments and/or buildings that make it extremely difficult or impossible to meet the design standards

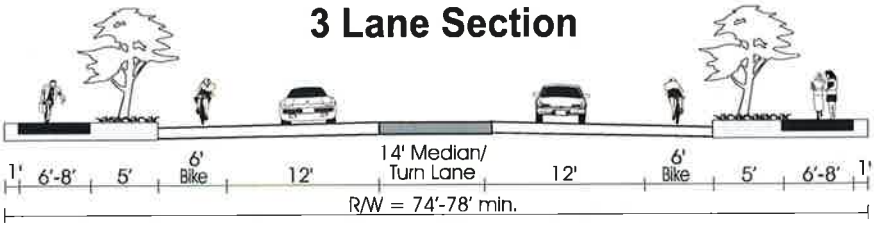
The street cross sections for each facility type in the city can be found in Figures 16A through 16F. Streets under ODOT control (Highway 99W) are subject to the design criteria in the Oregon Highway Plan and Highway Design Manual. Streets under Washington County's control are subject to County design standards.



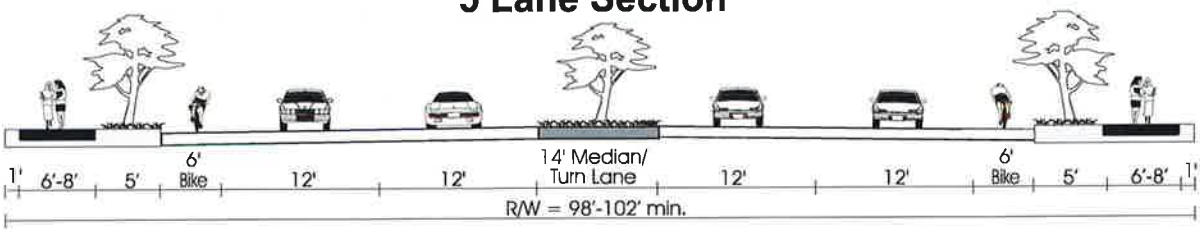
2 Lane Section



3 Lane Section

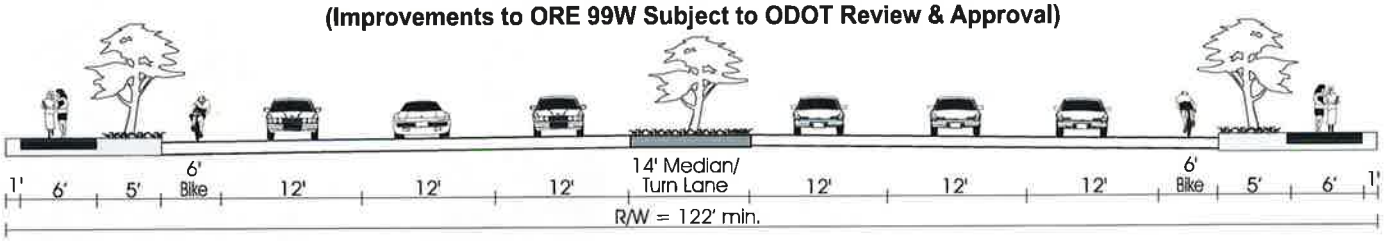


5 Lane Section



7 Lane Section

(Improvements to ORE 99W Subject to ODOT Review & Approval)



A variance requires demonstration of hardship or other exceptional circumstances resulting from conditions of the property. Variances must meet Sherwood Development Code and TPR criteria.

Arterial
Street Design Characteristics

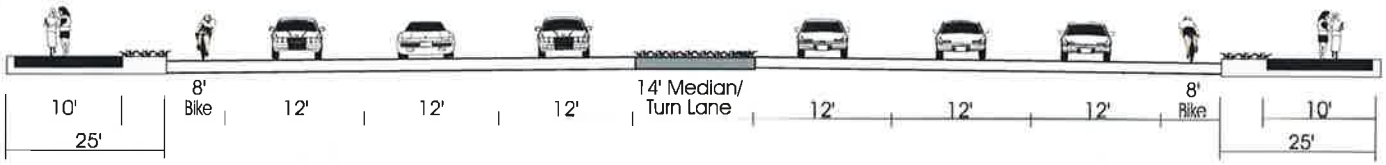
Characteristic	Arterials
Vehicle Lane Widths (Turn Lane - 12-14 ft.)	*12 ft.*
On-Street Parking	*Only in (i.e. downtown) (8 ft.)*
Bicycle Lanes (minimums)	*6 ft.*
Sidewalks (minimums)	*6-8 ft. *1*
Landscape Strips	*Required*
Raised Medians	*Required*
Neighborhood Traffic Management (NTM)	*Prohibited*
Transit	*Appropriate*
Turn Lanes	*When Warranted *2*
Access Control	*See Later Discussion*

Notes:

1. *8 feet for residential streets, 6 feet in commercial/industrial areas.*
2. *Turn lane warrants should be reviewed using Highway Research Record No. 211, NCHRP Report No. 279 or other updated/superseding reference.*

Figure 16A
ARTERIAL STREETS
SHERWOOD
STREET CROSS SECTIONS

7 Lane Section



Notes:

1.) *Highway transitions to five lanes south of Edy Road and north of Roy Rogers Road.*

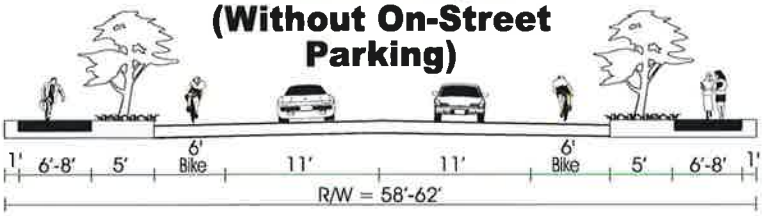
2.) *Median width varies from 16 feet to 60 feet, and includes some grade-separated segments.*

3.) *Right-of-way width varies from 96 feet to 270 feet.*

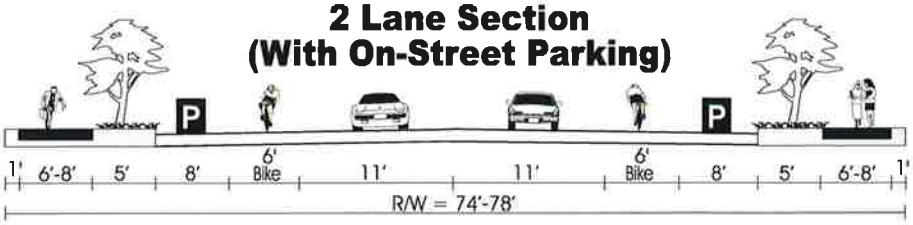
4.) *Where frontage improvements are needed, a 10-foot walkway shall be provided within a 25-foot landscaped strip adjacent to the roadway. The path may include a slight meander as determined case-by-case.*

Figure 16B
ORE99W ODOT STANDARD
STREET CROSS SECTION

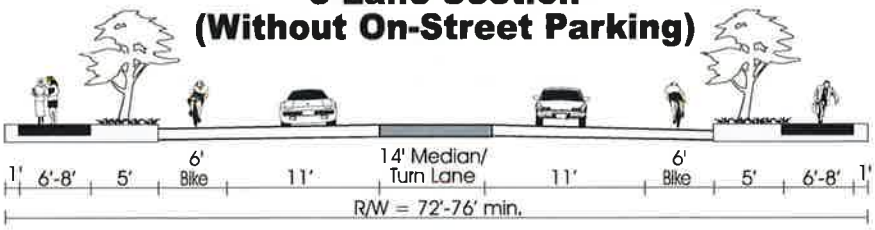
2 Lane Section (Without On-Street Parking)



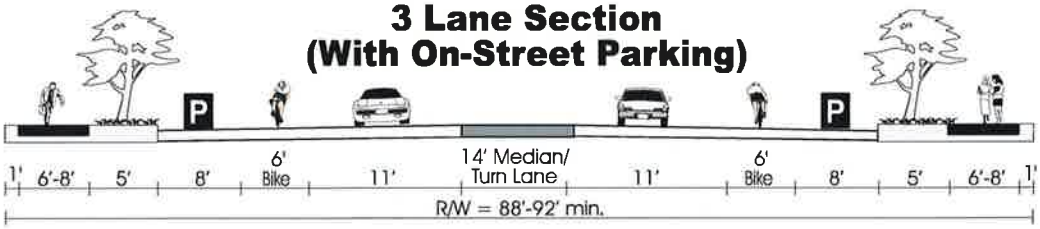
2 Lane Section (With On-Street Parking)



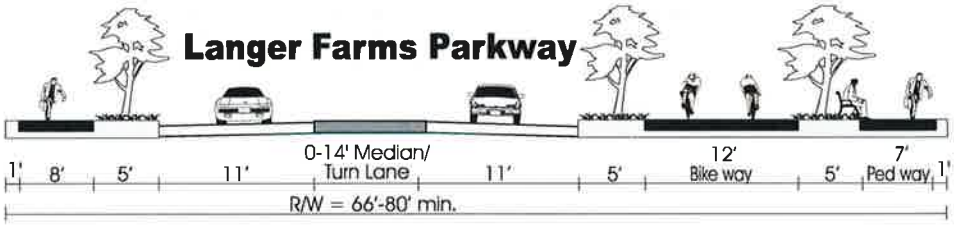
3 Lane Section (Without On-Street Parking)



3 Lane Section (With On-Street Parking)



Langer Farms Parkway



A variance requires demonstration of hardship or other exceptional circumstances resulting from conditions of the property. Variances must meet Sherwood Development Code and TPR criteria.

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

Notes:

1. *In constrained conditions on collectors a minimum width of 10 feet may be considered (i.e. for intersection turn lanes).14-feet is desirable for continuous two-way left turn lanes.*
2. *8 feet for residential streets, 6 feet in commercial/industrial areas.*
3. *Turn lane warrants should be reviewed using Highway Research Record No. 211, NCHRP Report No. 279 or other updated/superseding reference.*

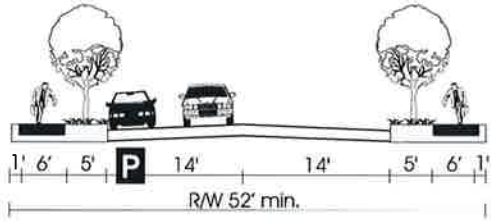
Collector
Street Design Characteristics

Characteristic	Collectors
Vehicle Lane Widths (Turn Lane - 12-14 ft.) *1	11 ft.
On-Street Parking	8 ft.-Optional
Bicycle Lanes (minimums)	6 ft.
Sidewalks (minimums)	6-8 ft. *2
Landscape Strips	Required
Raised Medians	Optional (Required where 3-lane section used)
Neighborhood Traffic Management (NTM)	Under Special Conditions
Transit	Appropriate
Turn Lanes	When Warranted *3
Access Control	See Later Discussion

Figure 16C
COLLECTOR STREETS
SHERWOOD
STREET CROSS SECTIONS

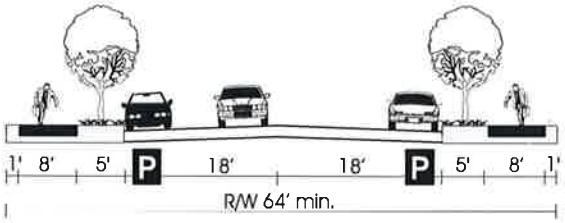
A variance requires demonstration of hardship or other exceptional circumstances resulting from conditions of the property. Variances must meet Sherwood Development Code and TPR criteria.

28' Standard Residential*



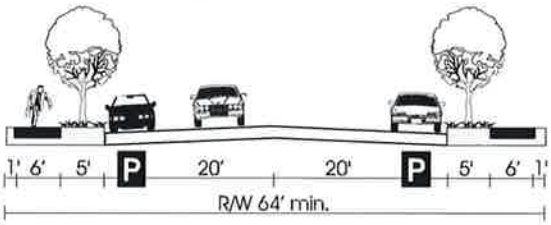
<1,000 vpd

36' Neighborhood Route

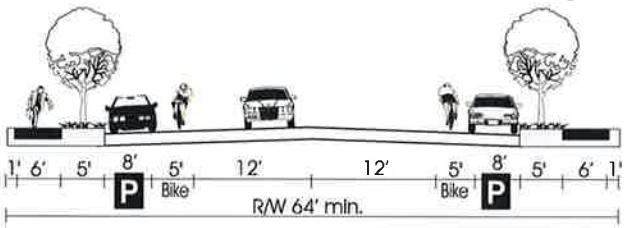


>1,000 vpd

40' Standard Commercial/Industrial Not Exceeding 3,000 Vehicles Per Day



50' Standard Commercial/Industrial Exceeding 3,000 Vehicles Per Day



Local Street Design Characteristics

(typically minimums unless stated otherwise)

Characteristic	Neighborhoods	Locals	Comm/Ind
Vehicle Lane Widths (Bus Route - 11 ft.)	10 ft.	10 ft.	20 ft.*
On-Street Parking	8 ft.		
Sidewalks (minimums)	8 ft.	6 ft.	6 ft.
Landscape Strips	Required	Required	Required
Neighborhood Traffic Management (NTM)	Acceptable	Should Not be Necessary	Acceptable
Transit	Special Circumstances	Not Appropriate	Acceptable

* Combined travel/parking lane.

Legend

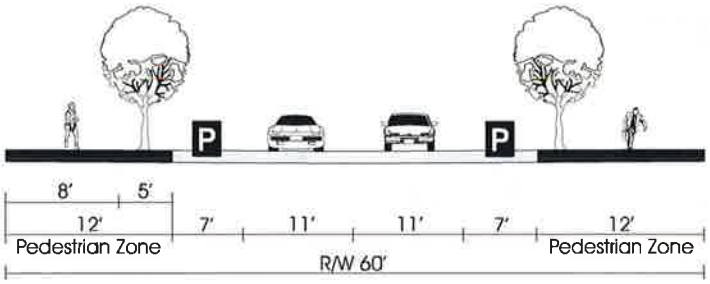
P - On-street Parking Lane

* - Parking can be provided on both sides if it can be demonstrated that curb cuts make up at least 40% of street frontage.

Figure 16D
LOCAL/NEIGHBORHOOD STREETS
SHERWOOD
STREET CROSS SECTIONS

A variance requires demonstration of hardship or other exceptional circumstances resulting from conditions of the property. Variances must meet Sherwood Development Code and TPR criteria.

Pedestrian Streets**



** *No Curbs*

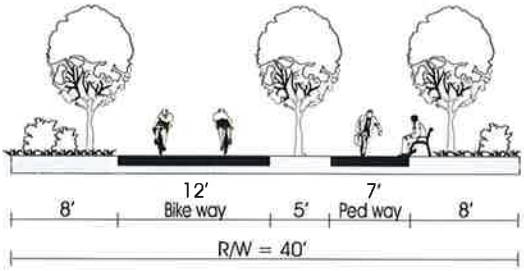
Legend

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

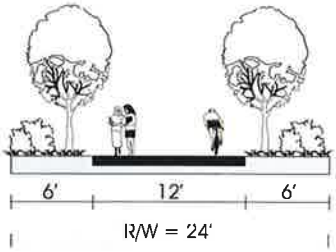
Figure 16E
DOWNTOWN STREET STANDARDS
RESIDENTIAL/PEDESTRIAN

A variance requires demonstration of hardship or other exceptional circumstances resulting from conditions of the property. Variances must meet Sherwood Development Code and TPR criteria.

Pedestrian/Bicycle Greenway



Primary Trail



Feeder Trail

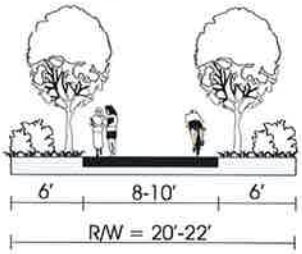


Figure 16F
TRAIL STANDARDS
SHERWOOD
CROSS SECTIONS

Functional Classification Changes

Figure 17 shows the street functional classification system in the city, including the proposed functional classification of roadway extensions. Streets where the functional classification has changed with the adoption of the 2014 TSP are listed in Table 2.

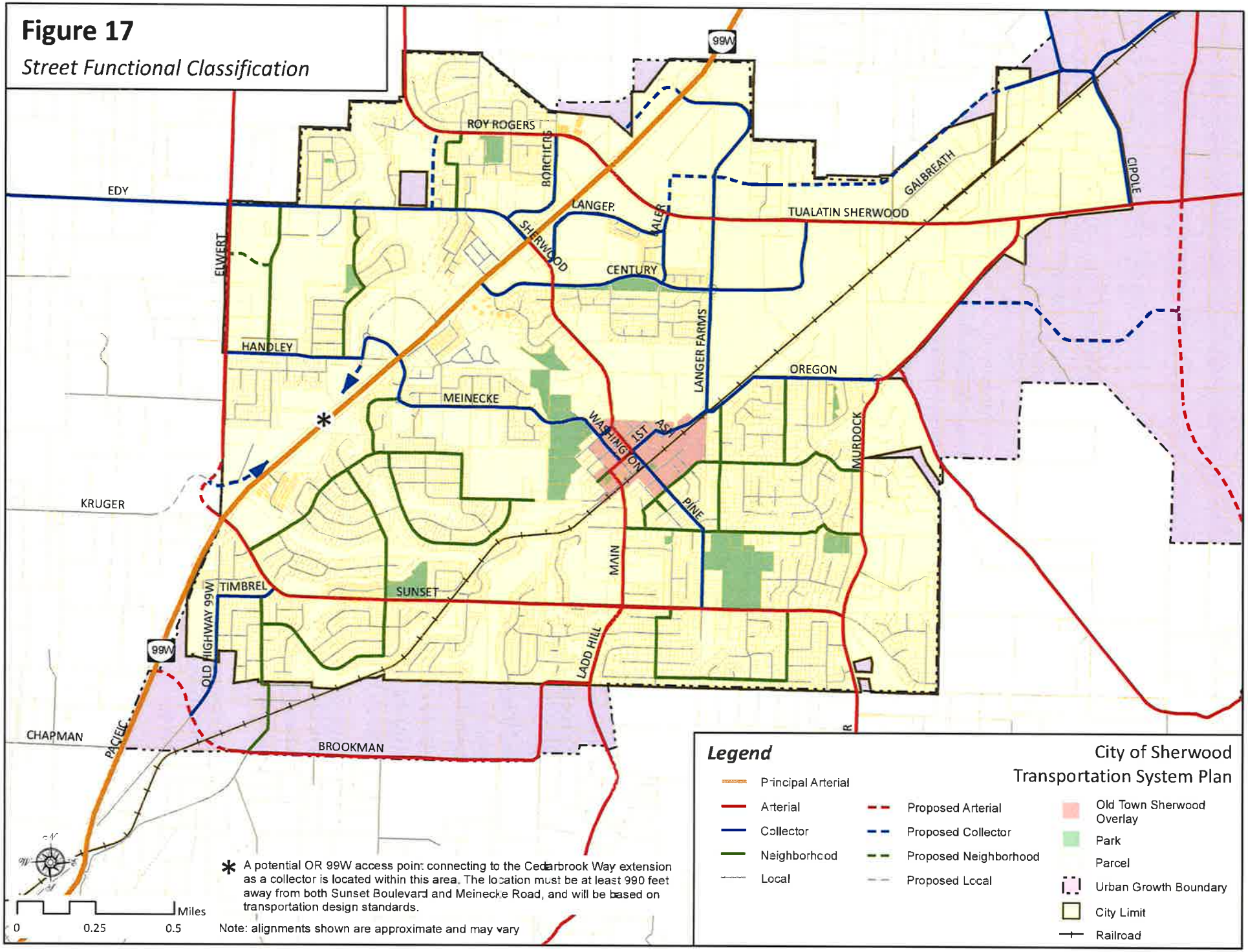


Table 2: Functional Classification Changes

Street	Existing Class	Revised Class	Comment
Gerda Lane	Collector	Local	The future Herman Road extension will replace Gerda Lane/Galbreath Drive as the collector facility in the area
Galbreath Drive	Collector	Local	The future Herman Road extension will replace Gerda Lane/Galbreath Drive as the collector facility in the area
Herman Road	Local	Collector	Herman Road will be rebuilt as a collector and extended west as part of the I-5 to 99W Connector project
Baler Way (between Langer Drive and Century Drive)	Local	Collector	Removal of the signal at Sherwood Boulevard/Langer Drive will shift demand to Century Drive and Baler Way
Brookman Road (Ladd Hill to Hwy 99W)	Collector	Arterial	Brookman Road and the Concept Plan area have been identified as areas for future refinement. Refer to Section 9 (The Outcome) for additional information

Figure 17

Street Functional Classification



Access Spacing Standards

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. ODOT and Washington County have clear access management policies and the supporting documentation to ensure that the highway system is managed as wisely as possible for the traveling public.

Access management is the control or limitation of access on arterial and collector facilities to preserve their functional capacity. Several access management strategies that have been developed in prior plans are noted below to improve access and mobility in Sherwood:

- Provide left turn lanes where warranted for access onto cross streets
- Work with land use development applications to consolidate driveways where feasible
- Meet ODOT and Washington County access requirements on arterials and collectors under their jurisdiction
- For streets under the City's control, implement the spacing standards established in the *City Code*[9]

Sherwood's minimum access spacing standards on locally owned streets are designated in the *City Code*[10] (which takes precedence) and are listed in the TSP for reference purposes only:

- Local streets – 10 feet from the point of curvature or 25 feet if no radius exists
- Neighborhood routes – 50 feet
- Collectors – 100 feet
- Arterials – 600 feet

Access management is not easy to implement and requires long institutional memory of the impacts of short access spacing – increased collisions, reduced capacity, poor sight distance and greater pedestrian exposure to vehicle conflicts. Many of the pre-existing driveways that do not meet access spacing requirements were put in when traffic volumes were substantially lower and no access spacing criteria were mandated. With higher traffic volume in the future, the need for access control on all arterial roadways is critical—the outcome of not managing access properly is inefficient roadways with poor mobility, which leads to building additional wider roadways to compensate for the mobility inefficiency.

Traffic Calming

Traffic calming refers to street design techniques used to create safer, slower residential and mixed-use streets to mitigate the impacts of motor vehicle traffic volume and speed in neighborhoods and business districts where a greater balance between safety and mobility is needed. Traffic calming seeks to influence driver behavior through physical and psychological means, resulting in lower vehicle speeds or through-traffic volumes. Physical traffic calming techniques include:

- Narrowing the street by providing curb extensions or bulbouts, or mid-block pedestrian refuge islands
- Deflecting the vehicle path vertically by installing speed humps, speed tables, or raised intersections

[9] Sherwood Municipal Code, Section 16.106.040.M.2.

[10] Ibid.

- Deflecting the vehicle path horizontally with chicanes, roundabouts, and traffic circles

Narrowing travel lanes and providing visual cues such as placing buildings, street trees, on-street parking, and landscaping next to the street also create a sense of enclosure that prompts drivers to reduce vehicle speeds.

Determining the appropriate traffic calming technique will require careful thought as well as coordination with the Tualatin Valley Fire and Rescue (TVFR) as each situation is unique and there is no standard solution. Section F in Volume 2 of the TSP provides a complete list of traffic calming techniques and their applicability to assist in the decision-making process.

Local Street Connectivity

The aggregate effect of local street design impacts the effectiveness of the regional system when local travel is restricted by a lack of connecting routes, and local trips are forced onto the regional network[11]. Therefore, streets should be designed to keep through motor vehicle trips on arterial streets and provide local trips with alternative routes. Street system connectivity is critical because roadway networks provide the backbone for bicycle and pedestrian travel in the region. Metro's local street connectivity principal encourages communities to develop a connected network of local streets to provide a high level of access, comfort, and convenience for bicyclists and walkers that travel to and among centers.

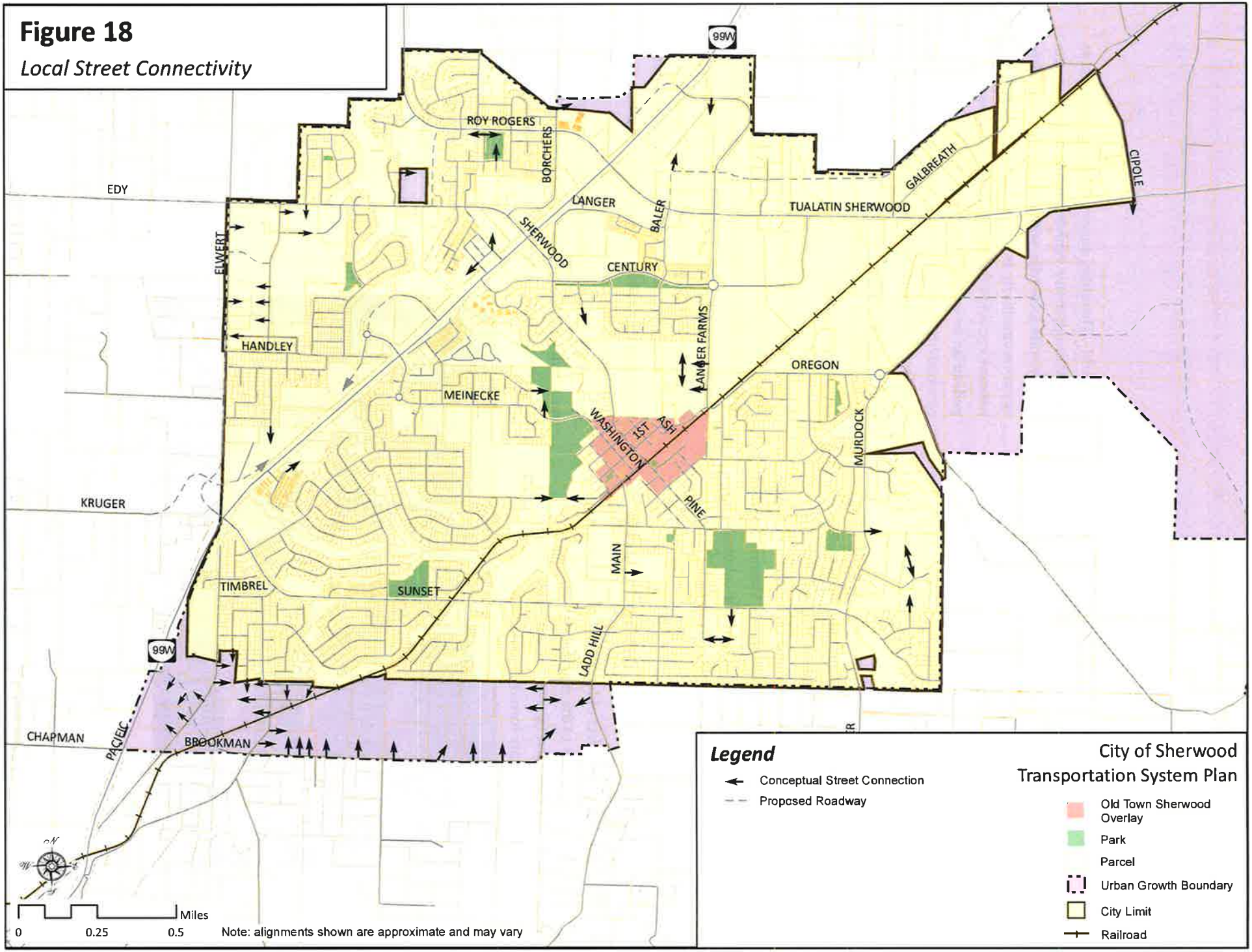
A local connectivity plan for Sherwood is shown in Figure 18. It specifies the general location where new local streets could potentially be installed as nearby areas are developed or as the opportunity arises. The conceptual locations shown consider block length and access spacing requirements but do not necessarily reflect develop-ability due to topographic, environmental or manmade constraints. Locations identified are conceptual and must still go through City review to determine the appropriate location for a local street connection in the vicinity. The purpose of the plan is to ensure that new developments accommodate circulation between adjacent neighborhoods to improve connectivity for all modes of transportation.



[11] Metro 2035 Regional Transportation Plan, Local Street Network Concept.

Figure 18

Local Street Connectivity



Mobility Targets

Establishing new mobility targets for intersections in Sherwood will help encourage a sustainable transportation system by providing a metric to assess the impacts of new development on the existing transportation system. Two mobility targets that are commonly used by agencies include level of service (LOS) or volume-to-capacity (V/C) ratios.

- LOS – A "report card" rating (grade A through F) based on the average vehicle delay
- V/C – A ratio of how much available use or "how much of the pipe" is being used for a roadway or intersection. Values range from 0 to 1.0 in actual conditions but are sometimes expressed over 1.0 for projected conditions (where traffic demand or the amount that wants to use the system exceeds what can really fit in the system)

Metro does not permit agencies to adopt mobility targets that are less restrictive (lower level of service or volume to capacity ratio) than the regional targets on facilities where the regional targets apply. In addition, facilities that are under the jurisdiction of ODOT or Washington County have precedence over the city target. However, for remaining transportation facilities in Sherwood under the City's jurisdiction, the local city targets apply.

The mobility targets are to be applied based on facility type and location in the following manner and precedence:

- Regional—For all streets designated on the Arterial and Throughway Network in the Metro Regional Transportation Plan[12], intersections should comply with the mobility targets included in the Regional Transportation Functional Plan (RTFP)[13].
  - All streets within the Sherwood Town Center boundary (1.1 v/c in the highest p.m. peak hour and 0.99 v/c in the second hour).
  - All streets not in the Town Center, but on the Arterial and Throughway Network (0.99 v/c in both the highest and second hour in the p.m. peak hour). These streets include Tualatin-Sherwood Road, Roy Rogers Road, Tonquin Road, Sunset Boulevard, Murdock Road, Oregon Street (east of Murdock Road), Elwert Road, Main Street, and Ladd Hill Road.



[12] 2035 Regional Transportation Plan, Metro, June 2010.

[13] Regional Transportation Functional Plan, Chapter 3.08, Metro, Effective August 2010.

- Other Agency—For county-owned streets not on the Arterial and Throughway Network and not within the Town Center, intersections should comply with the Washington County TSP[14] (0.99 v/c in the highest hour in the p.m. peak and 0.90 in the second hour). Most county facilities are on the Arterial and Throughway Network, however. ODOT controlled streets (Highway 99W) outside the Town Center should meet the appropriate mobility target designated in the Oregon Highway Plan[15] (currently 0.99 v/c for Highway 99W outside the Town Center in both the highest and second hour in the p.m. peak).
- For city-owned streets not on the Arterial and Throughway Network and not within the Town Center, intersections should comply with Sherwood's target. The city target for signalized, all way stop (AWSC), or roundabout intersections is level of service D or a volume to capacity ratio equal to or less than 0.85. The target for unsignalized two way stop control (TWSC) intersections is level of service E or a volume to capacity ratio equal to or less than 0.90. Mobility should be evaluated by methods approved by the City Engineering Department (e.g., Highway Capacity Manual). These measures shall be assessed and reported for the critical movement for TWSC, for each approach for roundabouts, and for an overall intersection basis for AWSC and signalized intersections. For all intersections, level of service performance would first be assessed and if it is not met the v/c target would be considered. Information for both measures should be provided with traffic studies for the consideration of City staff review.



Truck Routes

Truck routes are designated in Sherwood to ensure trucks can efficiently travel through and access major destinations in the city. 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 maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system.

Truck routes should provide mobility for freight movement and therefor are generally located on facilities that are classified as mobility-focused corridors (collectors and arterials). These facilities

[14] Washington County 2020 Transportation System Plan, Washington County, November 2003.

[15] 1999 Oregon Highway Plan, OHP Policy 1F Revision, ODOT, Adopted December 2011.

typically include design elements (such as managed access and sufficient lane width) to accommodate trucks. Such design elements, as well as signing to identify these routes, will help maintain freight movement and keep through trucks off of the local street system.

Washington County identifies through truck routes in the Sherwood area as Highway 99W and Tualatin-Sherwood Road-Roy Rogers Road, as shown in Figure 19. In addition, ODOT has several designations for Highway 99W (a Statewide facility) related to mobility and goods movement, including:

- National Highway System
- National Network
- Freight Route
- Reduction Review Route

These designations can limit reductions to vehicle-carrying capacity and (under the Reduction Review Route designation) subjects proposed reductions to review (ORS 366.215).

Washington County is currently in the process of updating their TSP, which is proposing the 124th Avenue extension as a truck route. This route would connect Tualatin-Sherwood Road with Tonquin Road and Grahams Ferry Road.

Transportation System Management & Operations

Transportation System Management and Operations (TSMO) is a set of integrated transportation solutions for improving the performance of existing transportation infrastructure through a combination of system and demand management strategies and programs. The Sherwood TSMO plan incorporates planned improvements and strategies detailed in the Metro Regional TSMO Plan[16].

Transportation System Management

Transportation System Management (TSM) focuses on low cost strategies to enhance operational performance of the transportation system. Measures that can optimize performance of the transportation system include signal improvements, intersection channelization, access management (noted in prior section), rapid incident response, and programs that smooth transit operation. The most significant measure that can provide tangible benefits to the public is traffic signal system improvements since these directly address intersection bottleneck locations.

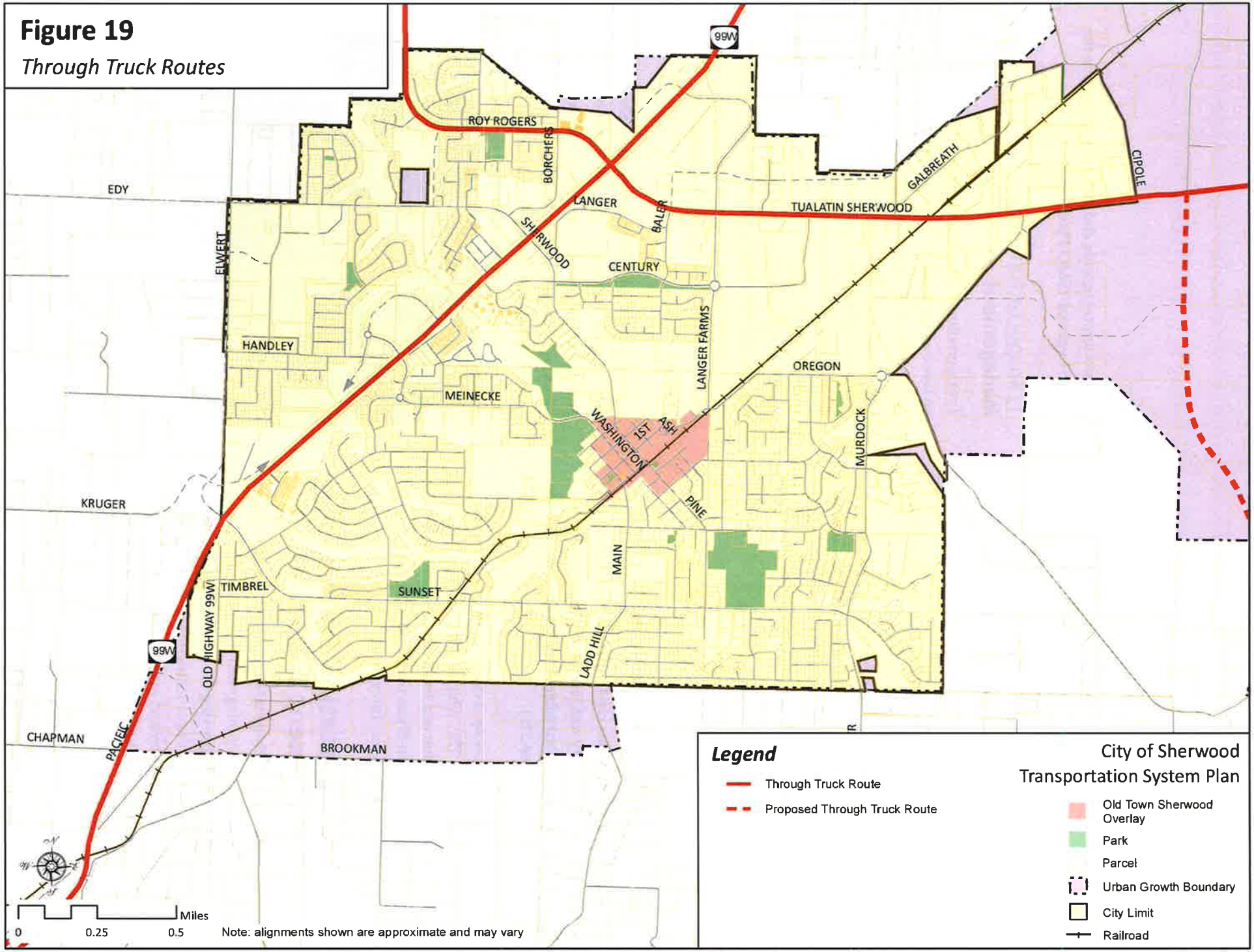
In developing a set of improvements for Sherwood's motor vehicle system, the TSP took a TSM approach, prioritizing low cost improvements that provide significant operational and safety benefits. These projects include traffic signal modifications, traffic control enhancements, or additional turn lanes.



[16] 2010 – 2020 Regional Transportation System Management and Operations Plan, Metro, June 2010.

Figure 19

Through Truck Routes



Transportation Demand Management

Transportation Demand Management (TDM) solutions encourage travelers to choose alternatives to driving alone in their car by providing services, incentives, supportive infrastructure and awareness of travel options. These strategies improve the performance of the existing system by having fewer vehicles on the roadway system.

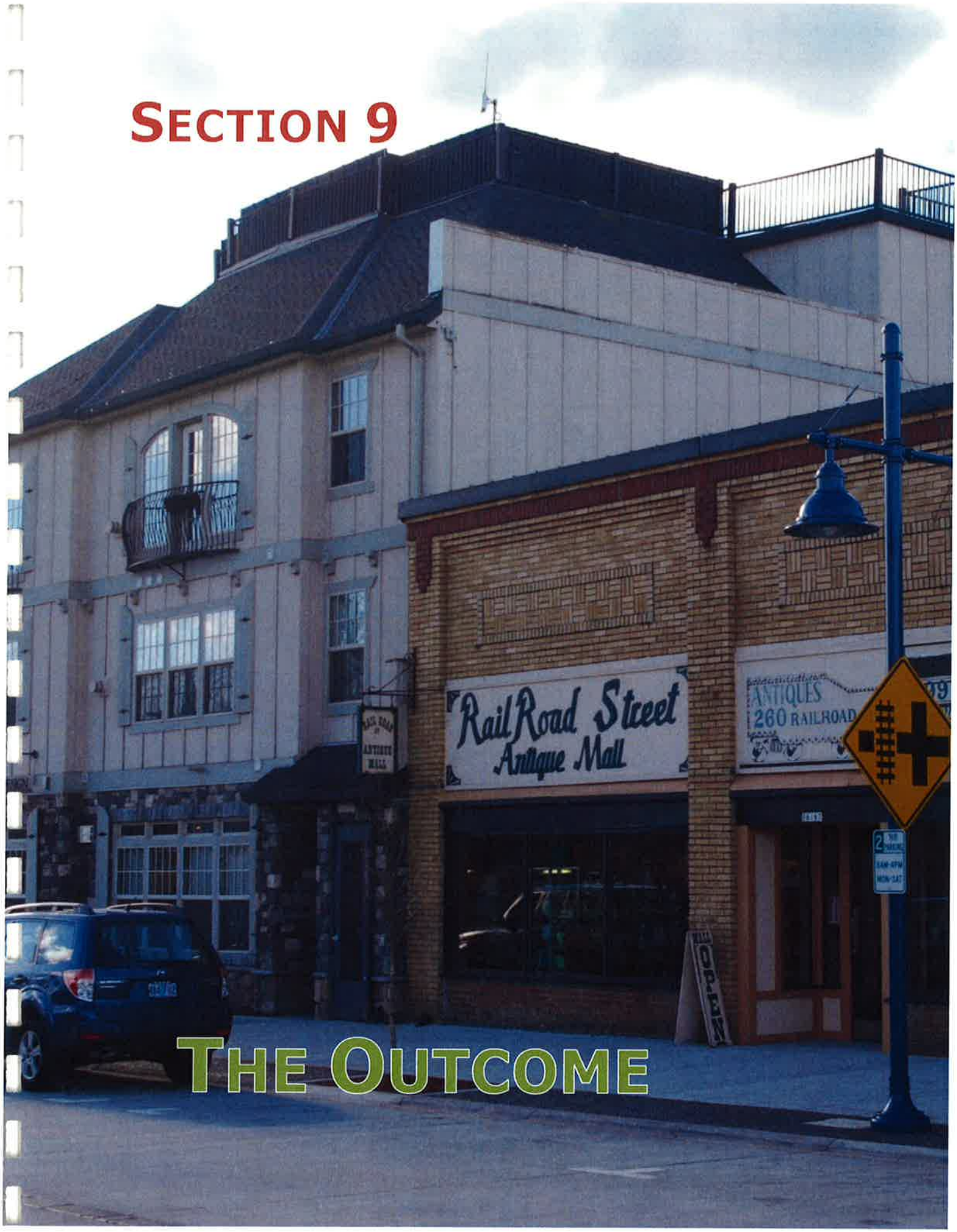
State and regional policy both call for encouraging and promoting transportation demand management. The policy of this plan calls for the City to support TDM. Unlike the motor vehicle, pedestrian, and biking projects, implementation of this policy does not require capital infrastructure. The TDM plan for Sherwood consists of:

- Support efforts by Washington County, Metro and ODOT to develop productive TDM measures that reduce commuter vehicle miles and peak hour trips. The City currently requires preferential carpool parking for new development with at least twenty employees.
- Encourage the development of high speed communication in all parts of the city (e.g., fiber optic). 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. Fiber optic broadband is currently provided through much of the city.
- Encourage developments that effectively mix land uses to reduce vehicle trips. These plans may include development of linkages (particularly non-auto) that support greater use of alternative modes. Mixed land use projects have demonstrated the ability to reduce vehicle trips by capturing internal trips between land use types, encouraging walk/bike trips and producing shorter vehicle trips.



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SECTION 9



THE OUTCOME

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The Sherwood TSP employs a performance based approach, focusing on measurable outcomes of investments to the transportation system. The approach allows the City to measure the degree to which its investments support regional and city-wide priorities. In this manner, the City is able to track how its investment decisions impact a set of performance objectives through 2035. While the performance objectives do not represent the complete picture, they do offer a baseline against which to assess how the policies, investments, and planning decisions made in this plan may affect the future.

Tracking Performance of Transportation System Investments

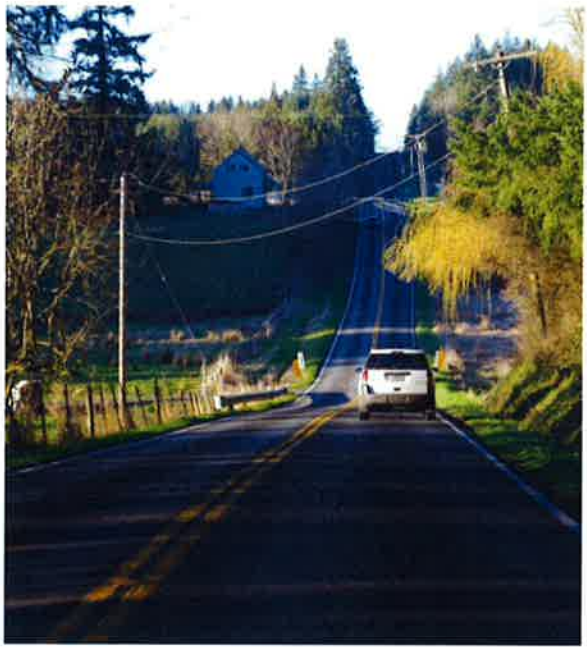
The Metro 2035 Regional Transportation Plan (RTP)[17] identifies performance targets for the Portland Metropolitan region to work towards a multi-modal transportation system that meets the goals and objectives of the regional plan. These measures focus on "high level" area-wide trends based on overall strategies, rather than focusing on minute details of specific locations (such as an individual property or intersection). The intent of these measures is to determine if local agency planning efforts are consistent with making progress towards the overall regional strategies related to transportation and the region's vision for the future. The performance measures include:

Economy

- **Safety:** Reduce fatalities and serious injuries by 50 percent.
- **Congestion:** Reduce vehicle hours of delay (VHD) per person by 10 percent, and work towards meeting intersection mobility targets.
- **Freight Reliability:** Reduce delay for truck trips by 10 percent.

Environment

- **Travel:** Reduce the vehicle miles traveled (VMT) per person by 10 percent.
- **Active Transportation:** Work towards achieving the non-single occupant vehicle (SOV) mode share targets.



[17] 2035 Regional Transportation Plan, Metro, June 2010.

Putting the Plan to the Test

To understand how the investment decisions of the TSP (the projected funding of $60 million worth of projects), improve the performance of the transportation network in Sherwood, the plan's transportation system improvements were evaluated against the performance measures to determine long-term trends through 2035. The results of the individual measures are presented in the following sections.

> *Overall, Sherwood meets or is making progress towards meeting each of the performance requirements of the RTFP and is therefore consistent with regional planning requirements and the RTFP.*

Collision Severity is Expected to Remain Low

Over the past five years of available collision data (between 2008 and 2012), there have been zero fatalities and ten serious injury-collisions within the city, averaging two serious injury-collisions a year. This equates to 1.5% of the collisions involving a serious injury. With investments in improved street crossings, multimodal facilities, and improvements to high collision locations, the severity of collisions in the city is expected to remain low.

Progress is expected to be made towards Mitigating Future Congestion

Regional strategies that focus on low-cost improvements to better manage existing transportation infrastructure will allow a better return on investment for capital expenses. The transportation system management and operations projects (which include intersection traffic control and intersection lane geometry) have relatively lower impact and lower cost than corridor widening projects, yet can provide efficiency benefits by targeting system bottlenecks (which typically are located at intersections).

Vehicle Hours of Delay (VHD): The RTP objective envisions decreasing delay by approximately ten percent through 2035 (measured from an existing year point of 440 VHD in the evening peak hour). However, without transportation improvements beyond those that already have committed funding, the future trend for delay along Sherwood streets during the evening peak hour is expected to increase. The VHD is projected to triple (1,420 VHD) by year 2035 without additional investments to the transportation system, which is largely due to the rapid growth expected in the Sherwood area, including the urban reserves.

With the $60 million worth of planned transportation investments, the total VHD during the evening peak hour would decrease to 1,250 VHD. This reduction would not meet the overall target due to funding limitations, however it would present progress towards the targets and an improvement over the conditions that would exist without the planned projects.

Intersection Mobility: Following a similar trend to the overall system VHD, intersection mobility would make progress towards improvement for year 2035 conditions with the additional investments. The motor vehicle project list focused on improving system efficiency through TSMO projects, which include intersection traffic control and lane channelization at several locations. Intersections that would require additional improvements beyond the projected $60 funding

package are primarily located along Roy Rogers Road and Tualatin Sherwood Road, where intersection management options would be exhausted and additional corridor widening would be needed.

Progress is Expected to be made Towards Reducing Freight Delay

Like the overall system VHD, progress for reducing delay along freight routes is projected to occur with the projected $60 million funding package. Total delay (VHD) in year 2035 along the freight corridors (Highway 99W, Roy Rogers Road, and Tualatin-Sherwood Road) is projected to decrease from 870 VHD with only the committed investments to 780 VHD (a 10% reduction) with the projected funding package. While this is an increase from present levels (estimated at 240 VHD), this represents improved progress towards meeting the target. In addition, widening the Tualatin-Sherwood Road and Roy Rogers Road arterial corridors to five lanes would make significant strides in reducing freight delay in Sherwood.



Motor Vehicle Travel is Expected to Outperform the Travel Target

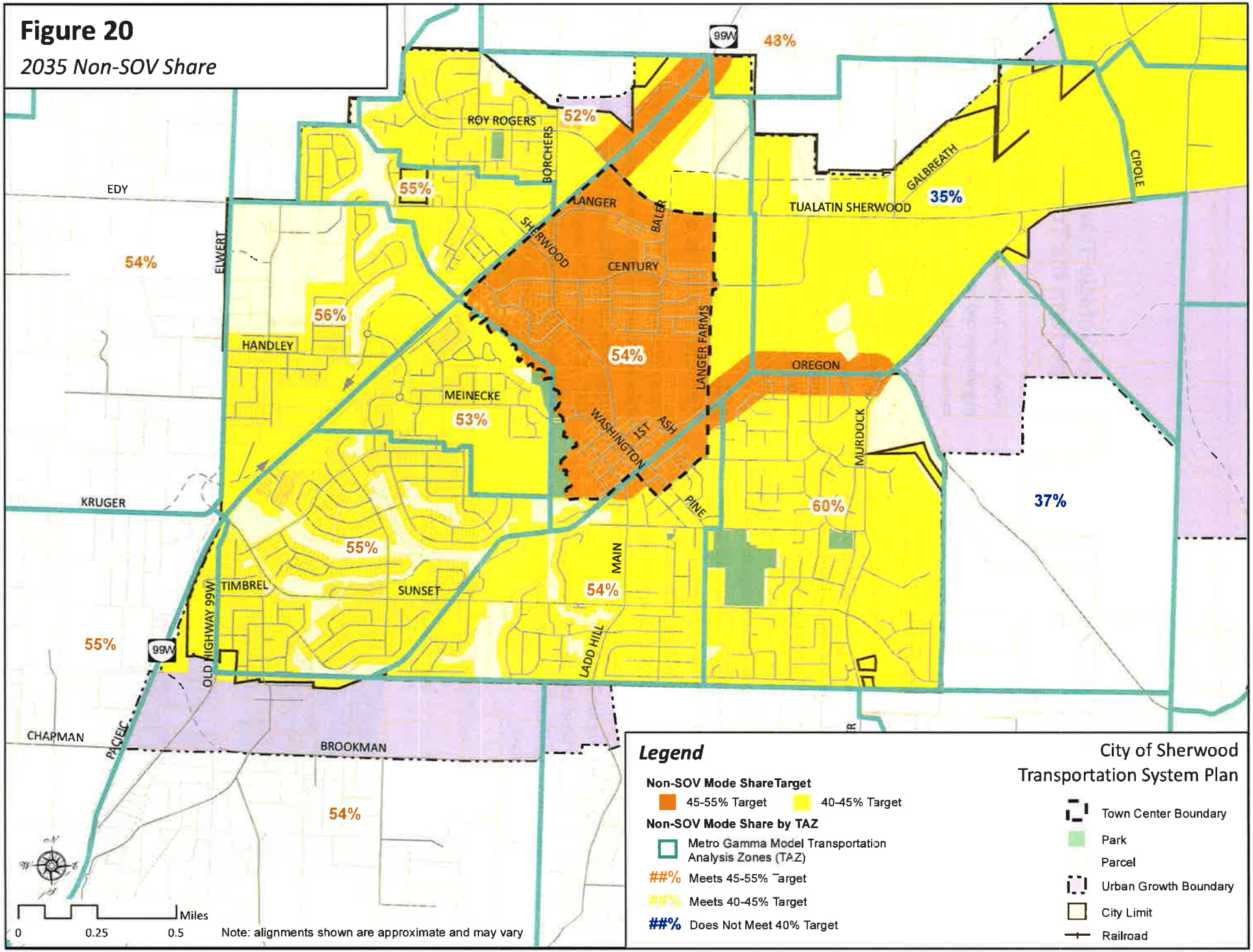
While the overall distance traveled by vehicles is projected to increase in the future along with future population and employment growth, the average motor vehicle distance traveled per person in Sherwood is projected to decrease from 1.4 vehicle miles traveled (VMT) / capita to 1.3 VMT/capita in year 2035. This decrease represents a reduction of seven percent, which nearly meets the ten percent target. In general, this decrease is consistent with Metro's goals related to reducing reliance on the motor vehicle.

A Reduction in Single Occupant Vehicle Travel is expected

Figure 20 summarizes the level of non-SOV mode share estimated for 2035 in comparison to the modal targets set in Metro's Regional Transportation Plan (RTP). These non-SOV targets are aggregated by design type groupings and colored in Figure 20 as orange (45-55% target) and yellow (40-45% target). For each area, the 2035 non-SOV share is listed. The 2035 non-SOV share for each zone is also colored to indicate the highest target that is satisfied (orange for 45-55% target, and yellow for 40-45% target). Based on the model data, it appears that the targets are typically achieved for the western areas but not met for areas east of Langer Farms Parkway. As these areas develop, a continued focus on multimodal amenities and availability of travel options may further reduce the reliance on SOV.

Figure 20

2035 Non-SOV Share



Areas for further Refinement

In addition to the investment decisions of the 2014 Sherwood TSP, several areas have been identified through the TSP Update process that will need to be explored through 2035 and beyond. These items have been identified as requiring more attention and detail beyond the scope of a local TSP effort and/or the greater involvement and coordination with other stakeholders or agencies

Function and Design of Brookman Road and Concept Plan Area Update

Brookman Road is a rural corridor that sits on the southern edge of the Urban Growth Boundary (UGB). Through the Brookman Addition Concept Plan, it was identified that the road was needed to provide access to areas south of Sunset Road. The I-5 to 99W Connector project had conceptually identified the "Southern Arterial" as the primary east-west mobility route through the area, with an alignment along or just south of Brookman Road. Since the time of those planning efforts, additional planning efforts in the Basalt Creek area have refined the eastern portion of the "Southern Arterial". To establish additional clarity about the western portion of the facility, a coordinated multiagency effort is needed to determine the future function and general capacity and design needs for Brookman Road and the Southern Arterial. These efforts will help ensure that appropriate right of way can be reserved as the area is urbanized while providing accessibility to future development.

In the interim, to provide for future flexibility, Brookman Road has been designated by Washington County as an arterial with 5-lanes of right-of-way needed. It is recognized that changing the role and function of Brookman Road would require modifications to the Brookman Addition Concept Plan to determine how future development would occur. During the interim, while refinement planning has not yet completed, access spacing and other requirements will need to be evaluated on a case by case basis at the time of any development application. The long-term intent is to reevaluate the Brookman Addition Concept Plan in the context of the Urban Reserve designation to the south. The evaluation would consider the refinement of both the location Southern Arterial, and a local collector level roadway to provide access to the area. As the issues for the Southern Arterial are resolved (including the long-term alignment) appropriate changes to these interim designations should be considered.

Highway 99W Cross-Sections

The cross section for Highway 99W through Sherwood currently identifies sidewalks and bike lanes for the extent of the highway. Additional refinement to the planned location, width, and elements that comprise the multimodal components would help to address pedestrian and bicycle needs through the area. This process would potentially identify segments where it may be advantageous to provide multimodal facilities with more of a barrier from the highway and would include collaboration with ODOT.

Transit Service Enhancements

Sherwood's location at the edge of the Portland Metropolitan area limits the current availability of transit service as a travel options. Limited route coverage and long headways between buses both challenges ridership. As further development occurs in the Town Center and other areas urbanize, the

need for improving transit connectivity within the city for residents will increase. Placeholder projects have been identified to provide regional connections to Tualatin, and to provide local transit service to enhance regional service.

While it has been determined that High Capacity Transit (HCT) will not be provided from Portland to Sherwood through the current Southwest Corridor planning process, it is possible that HCT to Sherwood may be reconsidered in the long term, but any decision to do so would require a separate public process.

Parking Management Plan

The City should pursue implementation of the parking management plan for the Sherwood Town Center as the opportunity arises. This will help ensure that development within the Town Center aligns with the objectives of the TSP and region as a whole.

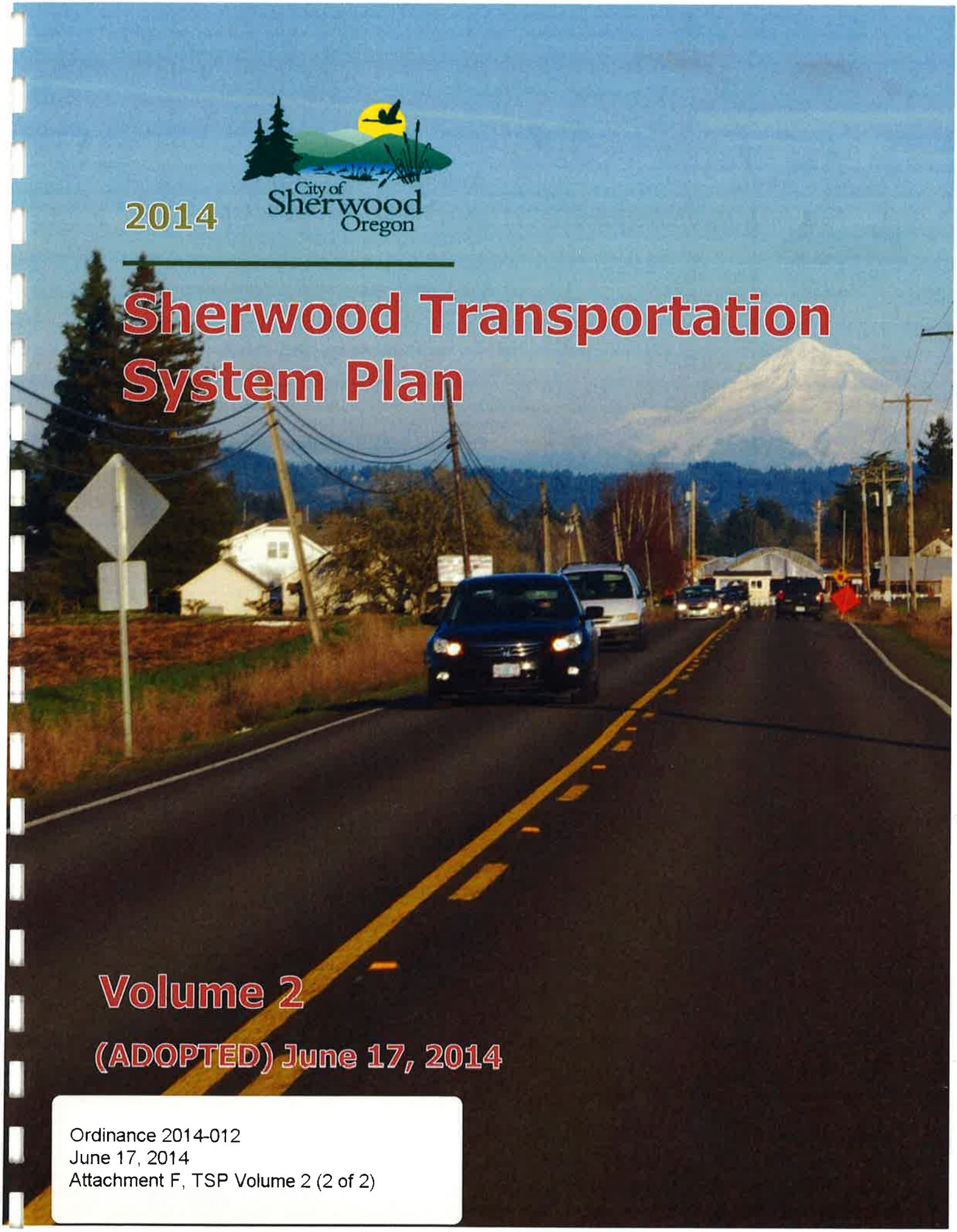
Geological Hazards

All proposed street extensions included in this plan are shown with conceptual alignments. These conceptual street alignments represent a planning-level illustration that street connectivity enhancements are needed in these areas. Before construction of any of the projects can begin, more detailed surveys will need to be undertaken to identify hydrological, topographical, or other geological constraints that could hinder the alignment of the planned streets. Final street alignments will be identified after these surveys have been completed.

Bypass Route Support

The City may consider additional policies to support and explore future options for potential bypass routes that would remove regional through trips from Sherwood. These policies could include continued support and development of previous regional efforts (including I-5 to 99W Connector projects such as the Southern Arterial and northern arterial components including the extension of Herman Road from Cipole Road to Langer Farms Parkway) as well as participation in future endeavors such as Washington County's Westside Solution Study. Due to the regional nature of bypass routes, multi-agency coordination would be needed and it is not anticipated that this effort would be led by Sherwood.





2014

City of Sherwood Oregon

Sherwood Transportation System Plan

Volume 2

(ADOPTED) June 17, 2014

Ordinance 2014-012
June 17, 2014
Attachment F, TSP Volume 2 (2 of 2)

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- *Citizen Advisory Team*
- *Technical Advisory Team*

A special acknowledgement goes out to all the Sherwood residents, business owners, and visitors who attended community meetings or submitted comments. Your input helped make this Plan possible.

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The contents of this document do not necessarily reflect views or policies of the State of Oregon.

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Section D. Project Options Technical Report (DKS, 2014)

Section E. Aspirational Project List

Section F. Traffic Calming Toolbox

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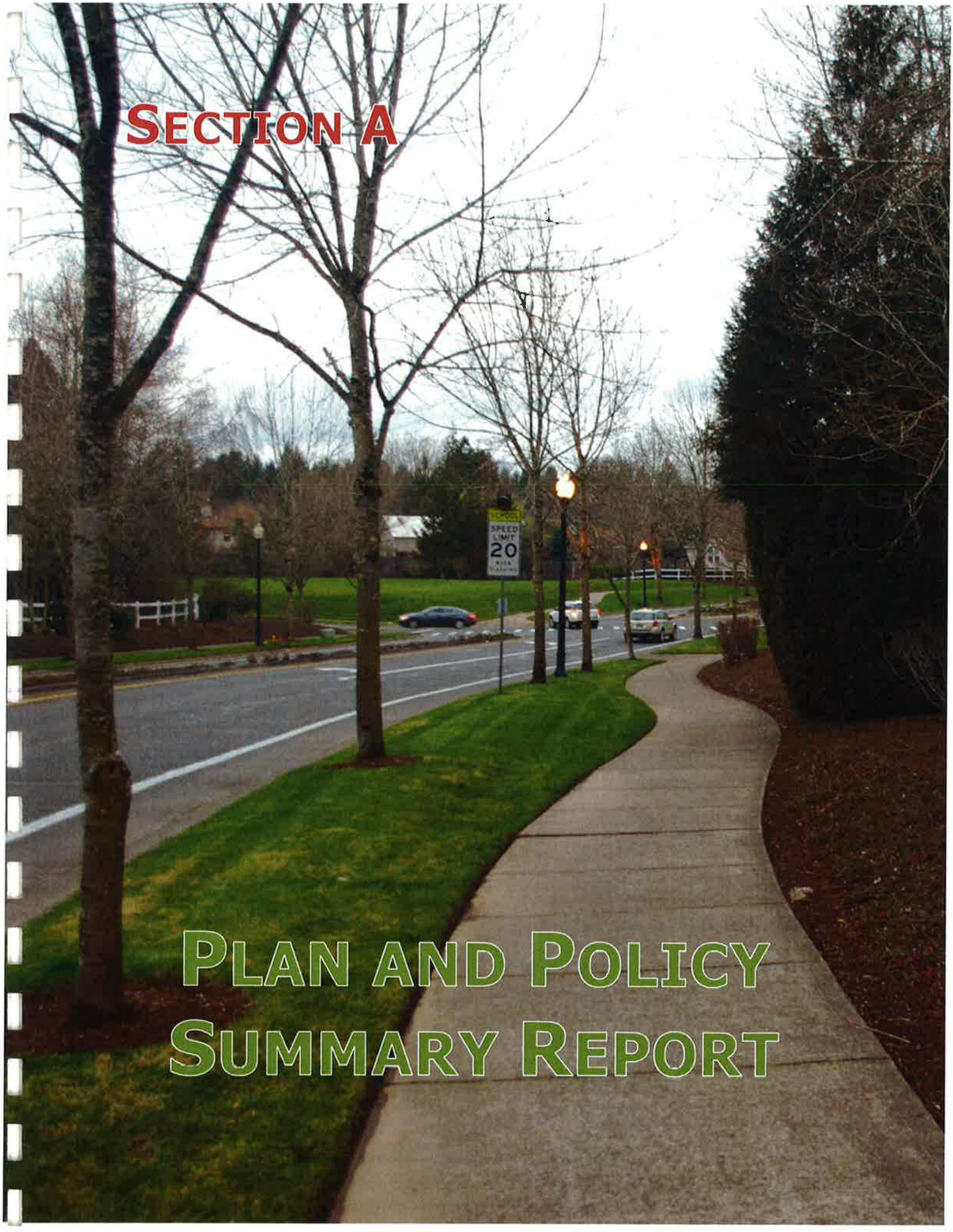
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SECTION A

PLAN AND POLICY SUMMARY REPORT

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This report summarizes the planning documents, policies, and regulations that are applicable to the City of Sherwood Transportation System Plan (TSP) update (see Appendix A for a complete list). The City's current TSP will serve as the foundation for the update process, upon which new information obtained from system analysis and stakeholder input will be applied to address changing transportation needs through the year 2035. Policies and requirements reviewed here will guide the TSP update; new strategies for addressing transportation needs and TSP recommendations will need to be coordinated with, and in some cases comply with, the plans, policies, and regulations described herein.

Transportation System Planning in Oregon

The Oregon Transportation Plan (OTP)[1] establishes goals, policies, strategies and initiatives that address the core challenges and opportunities facing transportation in Oregon. These are further refined in the Oregon Highway Plan (OHP) and implemented through the adopted targets and standards in this plan.[2] In addition, TSPs for cities within metropolitan planning organizations (MPOs) must also comply with the regional transportation plan, which is adopted to meet specific Federal requirements.

Transportation System Planning in Oregon is required by state law as one of the 19 statewide planning goals[3] (Goal 12- Transportation). The Transportation Planning Rule (TPR), OAR 660-012[4], defines how to implement State Planning Goal 12. Specifically, the TPR requires:

- The state to prepare a TSP, referred to as the Oregon Transportation Plan (OTP);
- Metropolitan planning organizations (MPOs) to prepare a Regional Transportation Plan (RTP) that is consistent with the OTP (the Metro RTP[5] applies to the City of Sherwood); and
- Counties and cities to prepare local TSPs that are consistent with the OTP and RTP.

The TPR directs TSPs to integrate comprehensive plan land use with transportation needs and to promote systems that serve statewide, regional and local transportation needs. These requirements aim to improve community livability by encouraging land use patterns and transportation systems that make it more convenient for people to walk, bicycle, use transit and drive less to meet their daily needs. An evaluation of how the existing TSP and implementing code language meet requirements of the TPR and specific recommendations for changes will be included in the Needs, Opportunities, Constrains and Tools Report.

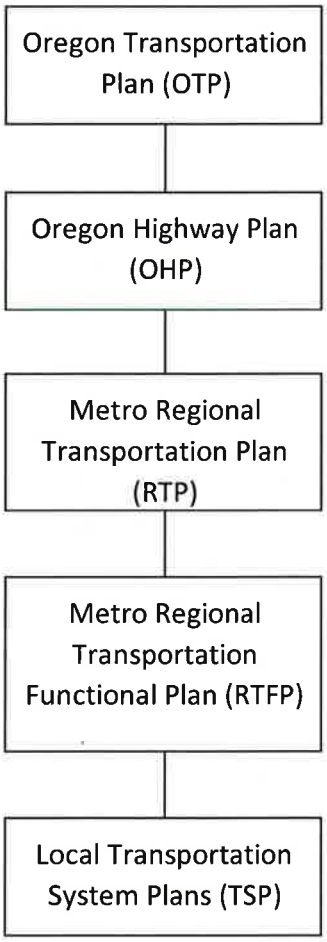
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[1] Oregon Transportation Plan: http://www.oregon.gov/ODOT/TD/TP/ortransplanupdate.shtml
[2] Oregon Highway Plan: http://www.oregon.gov/ODOT/TD/TP/orhwyplan.shtml
[3] Statewide Planning Goals: http://www.oregon.gov/LCD/goals.shtml
[4] Transportation Planning Rule: http://arcweb.sos.state.or.us/rules/OARS_600/OAR_660/660_012.html
[5] Metro Regional Transportation Plan: http://www.oregonmetro.gov/index.cfm/go/by.web/id=25038

Why does the City of Sherwood need an Updated TSP?

The City's current TSP was adopted in 2005. Since then, new requirements have been made in the OTP, OHP and Metro RTP. Several regional planning efforts have also taken place since the TSP was adopted, and several Sherwood plans have also been updated or completed, including the Parks Master Plan, the Town Center Plan and concept plans for areas brought into the Urban Growth Boundary. The last 10+ years of regulatory, land use and transportation system changes will be considered in this TSP update.

ODOT's Transportation System Plan Guidelines[6] direct TSP updates to address recent policy and regulatory changes, and calls out changes to the OTP, OHP, TPR, and federal changes implemented into the RTP. Since adoption of the 2005 City of Sherwood TSP, the OTP was updated (2006) to emphasize maintaining assets in place, optimizing existing system performance through technology and better system integration, creating sustainable funding, and investing in strategic capacity enhancements. Policy 1F (Mobility Standards) of the OHP was amended in 2011 to recognize and emphasize opportunities for developing alternative mobility targets where such a tool better identifies transportation needs and solutions and better balances state and local community needs and objectives. OHP Goal 3, Access Management, and its associated policies and standards were also modified in 2011, with text changes touching on balancing local economic development and state mobility needs, jurisdictional transfer agreements, and medians.



Metro's Regional Transportation Functional Plan[7] **(RTFP)** directs how the City of Sherwood should implement the RTP through the TSP and land use regulations. The RTFP codifies existing and new requirements that local plans must comply with to be consistent with the RTP. If a TSP is consistent with the RTFP, Metro will find it to be consistent with the RTP.

The RTFP provides guidance on several areas including transportation design for various modal facilities, system plans, regional parking management plans and amendments to comprehensive plans. The following directives specifically pertain to updating local TSPs:

[6] ODOT Transportation System Plan Guidelines: http://www.oregon.gov/ODOT/TD/TP/pages/plans.aspx
[7] Metro Regional Transportation Functional Plan: http://www.oregonmetro.gov/index.cfm/go/by.web/id=274

- Include regional and state transportation needs identified in the 2035 RTP along with local needs
- Local needs must be consistent with RTP in terms of land use, system maps and non-SOV modal targets (portion of trips that are not "drive alone" in a single occupant vehicle)
- When developing solutions, local jurisdictions shall consider a variety of strategies, in the following order:
    - TSMO (Transportation System Management Operations)
    - Transit, bicycle and pedestrian improvements
    - Traffic calming
    - Land use strategies in OAR 660-012-0035(2)[8]
    - Connectivity, including pedestrian and bicycle facilities
    - Motor vehicle capacity improvements
- Local jurisdictions can propose regional projects as part of RTP process
- Local jurisdictions can propose alternate performance and mobility standards, however, changes must be consistent with regional and statewide planning goals
- Local parking regulations shall be consistent with the RTFP

[8] As part of the TSP update effort, general strategies that have the potential to impact land use designations, densities, and design standards will be considered to meet local and regional transportation needs.

How is the Transportation System Defined?

The following sections summarize the state highway classifications and regional land use designations for areas in the City of Sherwood. This information ultimately determines the adopted standards and regulations that apply to state highways in the city.

ODOT State Highway Classifications

OHP Policy 1A (State Highway Classification System) categorizes state highways for planning and management decisions. In Sherwood, OR 99W (Highway 99W) is classified as a Statewide Highway, National Highway System (NHS), National Network, Freight Route, and Reduction Review Route. It is intended to provide mobility, safe and efficient, high-speed, continuous-flow operation, and connections between and within cities and regions in the state, including connections to larger urban areas and areas that are not directly served by Interstate Highways. The designations can limit reductions to vehicle-carrying capacity and (under the Reduction Review Route designation) subjects proposed reductions to review.

State Highway Freight System: OHP Policy 1C addresses the need to balance the movement of goods and services with other uses. It states that the timeliness of freight movements should be considered when developing and implementing plans and projects on freight routes. OR 99W is a classified Freight Route and Truck Route.

Updates to the TSP will support the existing OR 99W state classifications and will enhance the ability of the highway to serve in their defined functions.

Metro Land Use Designations

Metro's 2040 Growth Concept[9] in the RTP applies land use designations to the Portland region. The 2040 Growth Concept is the region's long range plan for managing growth by integrating land use and transportation. The concept concentrates mixed use and higher density development in areas of the region designated as "Centers," "Station Communities," and "Main Streets." The 2040 Growth Concept land uses are arranged in a hierarchy, with the primary and secondary land uses, referred to as 2040 Target Areas, as the focus of RTP investments. The hierarchy also serves as a framework for prioritizing RTP investments.

Primary land uses in Sherwood include:

- Tualatin-Sherwood Industrial Area[10]

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[9] Metro 2040 Growth Concept: http://www.oregonmetro.gov/index.cfm/go/by.web/id=29882

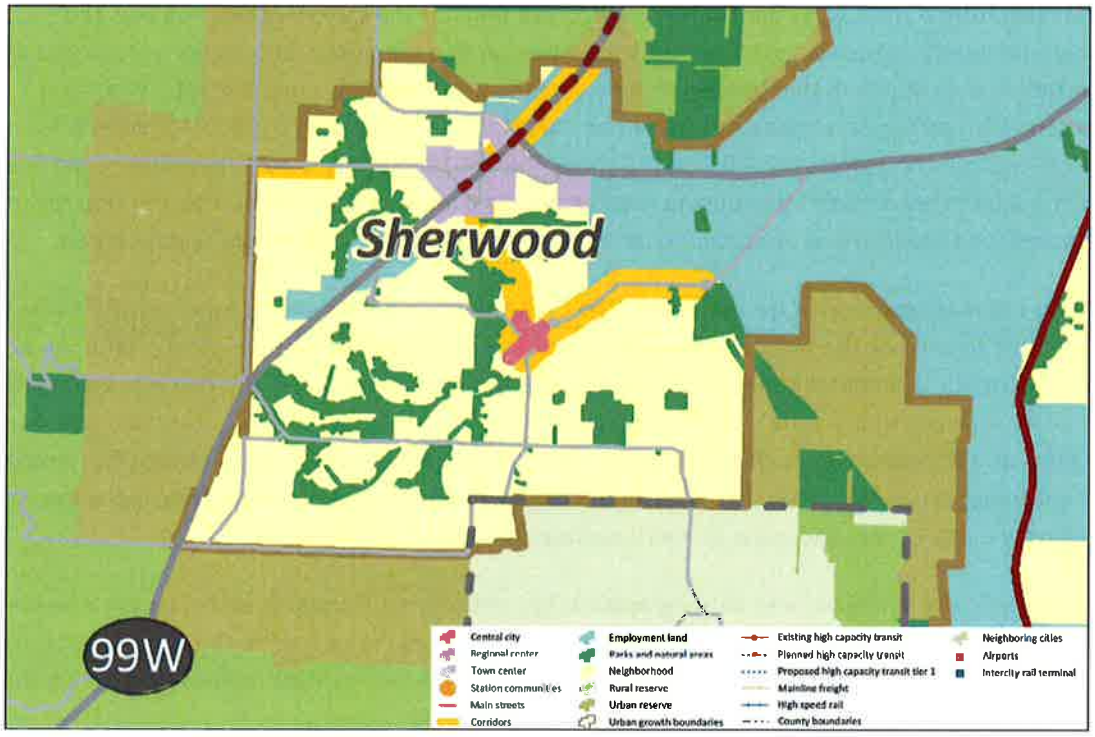
[10] This area is shown on Metro's 2040 Growth Concept Map along the SW Tualatin-=Sherwood Road corridor.

Secondary land uses in Sherwood include:

- The Sherwood Town Center.[11]
- The "Main Streets" along SW Pine Street and SW 1st Street in Old Town.
- The "Barbur Boulevard/Highway 99W/I-5 Corridor," generally running down Highway 99W from the northeast, turning south down Sherwood Boulevard to Old Town, and then moving back to the northeast along Railroad Street and turning east on Oregon.[12]
- "Employment Land," generally located west of Langer Farms Parkway and north of Tualatin-Sherwood Road, as well as an area along Highway 99W west of Cedar Brook Way.

The remaining areas of Sherwood are designated as Neighborhood land uses. These areas have the lowest priority for RTP investments.

Figure 1: Excerpt of the 2040 Metro Growth Concept Map, Land Use in the City of Sherwood, OR



[11] As noted later in this document, the Sherwood Town Center designation and accompanying plan is currently being considered for local adoption.

[12] Note that this corridor designation generally follows the Southwest Corridor Plan study area, reviewed later in this document.

How is the Transportation System Managed?

State Highway Mobility Targets: OHP Policy 1F sets mobility targets for ensuring a reliable and acceptable level of mobility on the highway system. The following targets are applicable to OR 99W in Sherwood (pursuant to Policy 1F, Table 7). These targets relate to the "peak first hour" (hour of the day with the most traffic) as well as the "peak second hour" (hour with the second most traffic during the day):

- In the designated **Town Center** the mobility target indicates that the highway should operate at or below a volume to capacity (v/c) ratio of 1.1 during the peak first hour, and 0.99 during the peak second hour.
- Outside of the Town Center, the target for OR 99W is to operate at or below a volume to capacity (v/c) ratio of 0.99 during the peak first and second hours.

City and County Mobility Standards: The City of Sherwood Transportation System Plan (TSP)[13] identifies level of service (LOS) as the primary indicator of performance, measured by letter grade (ranging from A through F), similar to a report card rating. The City identifies LOS D as the minimum performance standard for both signalized and unsignalized intersections under the city's jurisdiction. In addition, the Roadway Element of the Washington County TSP sets target and acceptable performance measures (based on volume-to-capacity or V/C ratios) for different locations following Metro's 2040 Design Types. The V/C ratio performance measures range from 0.9 to 0.99 depending on location and first/second peak hour of congestion. These standards are applied for signalized and unsignalized intersections on roadways under county jurisdiction.

Access Management on State Highways: The Oregon Access Management Rule[14] (OAR 734-051) attempts to balance the safety and mobility needs of travelers along state highways with the access and economic development needs of property and business owners. ODOT's rule sets guidelines for managing access to the state's highway facilities in order to maintain highway function, operations, safety, and the preservation of public investment consistent with the policies of the OHP. Access management rules allow ODOT to control the issuing of permits for access to state highways, state highway rights of way and other properties under the State's jurisdiction

In addition, the ability to close existing approaches, set spacing standards and establish a formal appeals process in relation to access issues is identified. These rules enable the State to set policy and direct location and spacing of intersections and approaches on state highways, ensuring the

[13] Sherwood TSP, p. 3-22, Adopted March 2005.

[14] Access Management Rule:
http://arcweb.sos.state.or.us/rules/OARS_700/OAR_734/734_051.html

relevance of the functional classification system and preserving the efficient operation of state routes.[15]

OHP Policy 3A sets access spacing standards for driveways and approaches to the state highway system.[16] The standards are based on state highway classification and posted speed.

Access Management on Local Roadways: The adopted City of Sherwood TSP identifies minimum intersection and driveway spacing standards for public roadways under the city's jurisdiction.[17] Washington County also provides minimum access spacing requirements for County facilities.[18] Access spacing guidelines for both jurisdictions are shown in Table 1.

Table 1: City of Sherwood and Washington County Intersection Spacing Standards

Street Facility	Maximum Spacing of Roadways and Driveways	Minimum Spacing of Roadways and Driveways
City of Sherwood, [Washington County]		
Arterial	1,000 feet	600 [600]* feet
Collector	400 feet	100 [100] feet
All roads	Require an access report stating that the driveway/ roadway is safe as designed meeting adequate stacking, sight distance and deceleration requirements as set by ODOT, Washington County and AASHTO.	

Note: * Direct access to County arterials shall be from collector or other arterial streets.

[15] Amendments to OAR 734-051 were adopted in early 2012 based on passage of Senate Bill 1024 and Senate Bill 264 in the 2010 and 2011 Oregon Legislature respectively. The amendments were intended to allow more consideration for economic development when developing and implementing access management rules, and involved changes to how ODOT deals with approach road spacing, highway improvements requirements with development, and traffic impact analyses requirements for approach road permits. Senate Bill 408, which passed in the 2013 legislative session and becomes effective January 1, 2014, is expected to result in further rulemaking. This bill provides new requirements for development of facility plans and directs ODOT to develop an access management strategy for each highway modernization or improvement project.

[16] ODOT Access Management Standards (Appendix C):
http://www.oregon.gov/ODOT/TD/TP/orhwyplan.shtml

[17] 2005 City of Sherwood TSP, Table 8-12: Access Spacing Standards for City Street Facilities

[18] Article V: Public Facilities and Services, 501 Public Facilities and Service Requirements.

RTP Performance targets: The Metro RTP established new performance targets (see Table 2) for safety, congestion, freight reliability, climate change, active transportation, sidewalk/trail/transit infrastructure, clean air, travel, affordability, and access to daily needs. The performance targets are regional goals that the updated City of Sherwood TSP should work toward achieving.

Table 2: 2035 RTP Performance Targets

Objective	Target by 2035
Safety	Reduce serious injuries and fatalities in all modes of travel by 50% (vs. 2005)
Congestion*	Reduce vehicle hours of delay (VHD) by 10% per person (vs. 2005)
Freight reliability	Reduce VHD per truck trip by 10% (vs. 2005)
Climate change	Reduce transportation greenhouse gas emissions by 40% (vs. 1990)
Active transportation	Triple walking, biking and transit mode share (vs. 2005)
Basic infrastructure	Increase by 50% access times to sidewalks, trails and transit (vs. 2005)
Clean air	Ensure 0% population exposure to at-risk levels of pollution[19]
Travel	Reduce vehicle miles traveled per person by 10% (vs. 2005)
Affordability	Reduce average household combined cost of housing and transportation by 25% (vs. 2000)
Access to daily needs	Increase by 50% the number of essential destinations within 30 minutes by bike, transit for low-income, minority, disabled pop. (vs. 2005)

[19] The region is expected to meet the target for carbon monoxide and ozone (VOC and NOX) exposure from transportation sources. Carbon monoxide is estimated at 836,484 lbs/day, 29% below the regional motor vehicle emissions budget for 2035; Hydrocarbons (VOC) is estimated at 17 tons/day, 58% below the regional motor vehicle emissions budget for 2035. A regional standard for air toxics is under development. For more information see RTP Table 2.3 and Metro's 2010 Air Quality Conformity Determination http://www.oregonmetro.gov/index.cfm/go/by.web/id=6502.

* Interim volume-to-capacity ratio (v/c) measures still apply

In addition to supporting the performance targets, the TSP will need to incorporate transportation system management and operations (TSMO) into planning. The following RTP policies provide the foundation for TSMO in the region:

- Use advanced technologies, pricing strategies and other tools to actively manage the transportation system
- Provide comprehensive real-time traveler information to people and businesses
- Improve incident detection and clearance times on the region's transit, arterial and throughway networks
- Implement incentives and programs to increase awareness of travel options and incent change

RTP Non-Single Occupancy Vehicle (SOV) Target: The RTP also established regional mode share targets that are intended to be goals for cities and counties to work toward as they implement the 2040 Growth Concept at the local level. Increases in walking, bicycling, ridesharing and transit mode shares will be used to demonstrate compliance with per capita travel reductions required by the state Transportation Planning Rule. The following modal targets apply to RTP land uses in Sherwood:

- Town Centers and Corridors: Non-SOV (non-drive alone) modal target of 45 to 55 percent
- Industrial areas, Employment areas and Neighborhoods: Non-drive alone modal target of 40 to 45 percent

As required by the RTP and the TPR, jurisdictions within the Metro region must adopt policies and actions that encourage a shift towards non-SOV modes. The Metro Non-Single Occupancy Vehicle (SOV) Target Actions Study summarizes the required non-SOV strategy requirements for local jurisdictions to implement:

- Adopt 2040 modal targets in TSP policies
- Adopt street connectivity plans and implementing ordinances
- Adopt maximum parking ratios to implement the parking requirements of Title 2 of the Urban Growth Management Functional Plan
- Adopt transit strategies, including planning for adequate transit facilities and service; pedestrian facility planning and infrastructure that support transit use; location and design of buildings in transit zones that encourages transit use; and adoption of a transit system map, consistent with Metro requirements.

The following measures are additional strategies to be considered in the City of Sherwood TSP update:[20]

- Continue to require transportation-efficient development through efforts to meet density and other land use targets in centers and corridors as part of compliance with Metro's RTFP and related requirements.
- Construct bicycle and pedestrian improvements, consistent with state, federal and local government requirements. Local governments and Metro should prioritize improvements that enhance connectivity of the bicycle and pedestrian system and access to transit.
- Continue to support TriMet and other transit agencies in providing frequent, reliable and comprehensive transit service, and local implementation of pedestrian and bicycle infrastructure to improve access to transit. Credit local jurisdictions with efforts to support transit agencies in these efforts.
- Support and encourage efforts to implement employer-based transportation demand management (TDM) strategies that reduce reliance on single occupant motor vehicles. Coordinate with employers even in areas where the formation of transportation management associations (TMAs) that have organized TDM plans is not required.
- Encourage and assist in implementing parking cash-out programs or other techniques to eliminate employer subsidies for parking. Consider requiring local governments to eliminate free employee parking and provide informational materials and technical assistance to employers interested in implementing such programs.
- Support and coordinate Safe Routes to School programs and projects. Local jurisdictions and Metro should support and help coordinate these efforts through project funding and technical assistance.

Major Improvements: OHP Policy 1G requires maintaining performance and improving safety by improving efficiency and management before adding capacity. The intent of policy 1G and Action 1G.2 is to ensure that major improvement projects to state highway facilities have been through a planning process that involves coordination between state, regional, and local stakeholders and the public, and that there is substantial support for the proposed improvement.

Off-System Improvements: OHP Policy 2B establishes ODOT's interest in improvements on local roads that maintain or improve safety and mobility performance on state roadways, and supports local jurisdictions in adopting land use and access management policies. The TSP development will consider existing and future land use patterns, access management, and implementation measures.

[20] From Metro's 2005 non-SOV Target Actions Study, *Evaluation of Potential Measures for Achieving Modal Targets*.

Traffic Safety: OHP Policy 2F identifies the need for projects in the state to improve safety for all users of the state highway system through engineering, education, enforcement, and emergency services. One component of the TSP is to identify existing crash patterns and rates and to develop strategies to address safety issues. Proposed improvements will aim to reduce the vehicle crash potential and/or improve bicycle and pedestrian safety by providing upgraded facilities that meet current standards.

Alternative Passenger Modes: OHP Policy 4B, Action 4B.4 requires that highway projects encourage the use of alternative passenger modes to reduce local trips. The TSP will develop ways to support and increase the use of alternative passenger modes to reduce trips on highways and other facilities. This will include improvement to bicycle and pedestrian facilities and consideration of transit movement along roadways.

Improvements on State Highways: The Highway Design Manual[21] (HDM) provides uniform standards and procedures for ODOT and is in general agreement with the 2001 American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets*. Some key areas where guidance is provided are the location and design of new construction, major reconstruction, and resurfacing, restoration or rehabilitation (3R) projects. The HDM should be used for all projects on OR 99W to determine design requirements, including the maximum allowable volume to capacity ratios for use in the design of highway projects.

Other Background Information for the TSP Update

The following sections summarize additional background information or guidance documents that will be used in updating the City of Sherwood TSP.

Projects to be considered in Future Transportation Analysis

Several of the documents reviewed identified transportation improvement projects that will be considered in future transportation analysis in Sherwood. The projects are listed below, under the documents in which they are found, and include:

2010-2013 Statewide Transportation Improvement Program[22] (STIP) projects:

- Pavement preservation on OR-99W from Tualatin River Bridge to Sunset Boulevard.
- Traffic Signal Modernization on OR-99W from milepost 14.66 to 19.92.
- Cedar Creek/Tonquin Trail: Roy Rodgers Road, Bicycle trail construction to better accommodate pedestrian access.

[21] ODOT Highway Design Manual: http://www.oregon.gov/ODOT/HWY/ENGSERVICES/hwy_manuals.shtml

[22] ODOT STIP: http://www.oregon.gov/ODOT/HWY/STIP/

- Traffic operation improvements: Upgrade traffic signal systems and install video detection system on various Highways.

Metro RTP: Needed improvements were identified along Metro Mobility Corridor #20, Tigard to Sherwood and Sherwood to Newberg. Investment strategies prioritize the following:

Near-term (1-4 years)

- System and demand management along mobility corridor and parallel facilities for all modes of travel
- Address arterial connectivity and crossings
- Complete mobility corridor refinement plan.
- Complete alternatives analysis for high capacity transit (HCT) corridor. High capacity transit, as defined by Metro is *"any form of public transit that has an exclusive right of way, a non-exclusive right of way or a possible combination of both. High capacity transit vehicles make fewer stops, travel at higher speeds, have more frequent service and carry more people than local service transit such as typical bus lines. High capacity transit includes options such as light rail, commuter rail and bus rapid transit."*[23]
- Complete land use planning of HCT corridor as part of HCT System Expansion Policy.
- Complete gaps and make crossing improvements in the sidewalk and bike network.
- Implement the Tigard OR 99W Corridor Improvement and Management Plan.

Medium-term (5-10 years)

- Complete gaps in the arterial network.
- Intersection improvements, consistent with refinement plan.
- Coordinate TSM/TDM strategies.
- Implement the Tigard OR 99W Corridor Improvement and Management Plan.

Long-term (10-25 years)

- Implement the Tigard OR 99W Corridor Improvement and Management Plan.

TriMet Transit Investment Plan[24] (TIP): Sherwood is served by TriMet bus lines 93 (local service between Sherwood and Tigard via OR 99W) and 94 (weekday service between Sherwood and

[23] Defining high capacity transit, http://www.oregonmetro.gov/index.cfm/go/by.web/id=28462

[24] TriMet Transit Improvement Plan: http://trimet.org/tip/index.htm

Tigard and express service between Tigard and Portland City Center).[25] TriMet's Transit Investment Priorities (TIP) program is the organization's roadmap for investments in bus and rail service, capital projects and customer information, as well as financial stability and partnerships over the next five years. Over the long term, TIP priorities are to:

1. Build the Total Transit System - Safe, secure trips on frequent, reliable and convenient service, easy access to transit, amenities at stops and stations, and clear customer information.
2. Expand high-capacity transit - Invest in MAX Light Rail, Commuter Rail, Bus Rapid Transit and Streetcar service along key corridors to connect Regional Centers.
3. Expand Frequent Service - Add to TriMet's network of bus lines that run every 15 minutes or better, every day.
4. Improve local service - Work with local jurisdictions to improve transit service in specific local areas.

Once existing Frequent Service lines have been restored to a basic level of 15-minute or better service seven days a week, TriMet will work toward expanding the number of bus lines that are included in Frequent Service and extending service on current lines. The extension of Line 12 – Barbur/Sandy from Durham Rd to Sherwood is a Tier 3 Priority for Frequent Service expansion, based upon criteria of ridership productivity, transit/pedestrian friendly streets, density of transit-dependent population, RTP designation, relationship to existing or proposed high-capacity transit, land use connectivity, and transportation demand management.

Tualatin-Sherwood Road Improvements: Tualatin-Sherwood Road between Adams Avenue and Borchers Drive currently experiences heavy traffic congestion, primarily during peak travel hours. In addition, this section of roadway intersects with OR 99W which is also heavily traveled. The Tualatin-Sherwood (Adams to Borchers) project[26] funded by Washington County through Major Streets Transportation Improvement Program (MSTIP) proposes to make needed enhancements to this section of roadway in order to improve traffic circulation in the area, address safety for all modes of transportation and accommodate existing and future capacity needs.

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[25] TriMet service changes became effective September 1, 2013. New Line 93-Tigard/Sherwood runs between Sherwood and the Tigard Transit Center. It serves all stops and run weekdays and weekends. Line 94-Highway 99W/Sherwood runs weekdays between Sherwood and downtown Portland from approximately 5:45 a.m. to 7:30 p.m. The line no longer serves Tigard Transit Center and does not run weekends. http://trimet.org/alerts/service-change/index.htm

[26] Washington County link: http://www.co.washington.or.us/LUT/TransportationProjects/tualatin-sherwood-adams-to-borchers.cfm

In addition to the planned road improvements through the MSTIP project, the county also has plans to implement the second phase of an Intelligent Transportation System (ITS) upgrade on Tualatin-Sherwood Road. ITS helps improve traffic flow by adapting traffic signals in real time as traffic conditions change. Phase 1 upgraded the signals between Teton Avenue and Interstate 5 in 2011. Phase 2 would upgrade the signals between Teton Avenue and Highway 99W beginning in 2013.

Sherwood Capital Improvement Plan: Sherwood's Capital Improvement Plan (CIP) includes planned improvements based on current needs and priorities of the City. The CIP includes planned allocation of funds for projects through year 2018 in transportation, storm, sanitary, water, and general construction. Construction of projects in future years is subject to funding. The following transportation projects and year of planned budget allocation are currently included in the CIP:

- Cedar Brook Way Analysis (2013/2014)
- Adams Avenue North Construction (2013/2014)
- Kruger-Elwert/Hwy 99W Design and Construction (2014/2015, 2015/2016)
- Oregon St/Tonquin Rd (2016/2017)
- Pine St Phase 2 (2014/2015)

Sherwood Town Center Plan: The draft Town Center Plan, once adopted, will update the comprehensive plan and established a vision and implementing strategies for growth and improvement in an area designated as the city's Town Center. The plan includes recommendations for "complete streets" along Langer Drive and Sherwood Boulevard, as well as specific improvements to the bicycle and pedestrian system.[27] The plan also has updated policies and strategies pertaining to parking and transit.

The recommended bicycle and pedestrian improvements are shown on Map 2 of the Town Center Plan and include:

- General bicycle/pedestrian improvements throughout central Old Town Sherwood (#1)
- Neighborhood Greenway improvements on Gleneagle Drive and 10th Street (#11)
- Shared use path on east side of Sherwood Blvd. between Langer Drive and Old Town (#12)
- Shared use path connecting Langer Dr. and Trumpeter Dr. (#13)

[27] http://www.sherwoodoregon.gov/sherwoodtowncenter/page/sherwood-town-center-plan

- Neighborhood Greenway improvements on Holland Lane (#16)
- Neighborhood Greenway improvements on Baler Way (#17)
- Shared use path on north side of Hopkins Elementary School (#18)
- Shared use path on east side of Hopkins Elementary School (#20)
- Shared use path on east side of Sherwood Middle School (#21)
- Neighborhood Greenway improvements on Oregon Street (#22)

The Town Center Plan lays out policies and strategies to guide future planning and development within the town center. Town center goals, policies, and strategies will be incorporated into the City's Comprehensive Plan.

Policy 8 of the Town Center Plan reads: "The City will balance the need for vehicular mobility within and adjacent to the Town Center with the other transportation and land use goals and priorities identified in the Town Center Plan." Strategies relevant to this policy include:

- Through the TSP update, examine changes to the City's OR 99W Capacity Allocation Program (CAP) to ensure that it doesn't restrict future growth that supports and implements the Town Center vision and recommendations. (Strategy 8.1)
- Through the TSP update, identify strategic road capacity improvement projects to address congestion within and adjacent to the Town Center. Necessary transportation improvements will be analyzed and evaluated for how they support a vibrant walkable Town Center. (Strategy 8.2)
- Through the TSP update, establish transportation mobility targets for new development within and adjacent to the Town Center that are appropriate for a Town Center context and capture the community's priorities. (Strategy 8.3)
- The City will work with the County, ODOT, and local stakeholders to enhance vehicular and pedestrian access from the Town Center to developments adjacent to the Town Center. (Strategy 8.4)

Ice Age Tonquin Trail Master Plan (2013): A three pronged network of trails will eventually connect Tualatin, Sherwood and Wilsonville. One section has been completed within Metro's Graham Oaks Nature Park in Clackamas County. The northern prong of the trail connects with the Westside Trail at a proposed ped/bike bridge over the Tualatin River near King City. The western prong passes through the City of Sherwood as the Cedar Creek Trail.

The Trail Master Plan identifies a conceptual alignment alternative, trail type, and recommended improvements and opportunities across several jurisdictions. Recommended improvements and opportunities within the City of Sherwood can be found on Tile Maps 7-13 in the plan; selected items are listed below with reference numbers:

- Trail alignment could follow existing unimproved roadway; final alignment to be determined in coordination with Sherwood's Tonquin Employment Area Concept Plan (which includes a future east-west road in this area) (7D)
- Widen sidewalk on Oregon Street's south side between Tonquin Road and Murdock Road to accommodate trail (8B)
- Widen sidewalk on SW and southeast (SE) sides of roundabout to accommodate trail (8C)
- City of Sherwood to coordinate shared roadway treatments on Railroad Street (including wayfinding) (8L)
- City of Sherwood to conduct further analysis to determine specific trail alignment in this area; trail design to be based on guidance provided in the Ice Age Tonquin Trail Master Plan specific to the Cedar Creek corridor (9E)
- Proposed trail/wildlife undercrossing of Pacific Highway/Oregon 99W (subject to ODOT approval) (9G)
- Potential to create future trail/wildlife undercrossing of Edy Road (10D)
- Potential motorist sight distance issues on horizontal curve of Roy Rogers Road; signalization proposed to provide protected bicyclist/pedestrian crossings (10E)
- Widen existing sidewalk on east side of Roy Rogers Road to accommodate trail (vegetation removal necessary) (11A)
- Widen existing bridge over Chicken Creek to accommodate trail, or construct cantilevered bridge or independent structure immediately east of Roy Rogers Road; retaining walls/bank stabilization necessary immediately north and south of creek crossing (11B)
- Trail alignment to follow Oregon Street's east side between Tonquin Road and Tualatin-Sherwood Road; alignment to be sited immediately east of power line corridor (vegetation removal necessary in several locations); property easements/acquisitions could occur as part of Tonquin Employment Area Concept Plan implementation. (12A)
- Use existing signalized intersection of Tualatin-Sherwood Road and Oregon Street; potential need to relocate existing signal poles and utility boxes on intersection's SE and northeast (NE) corners to accommodate trail (12E)
- Tualatin's Transportation System Plan proposes widening Cipole Road to three vehicle travel lanes, plus bike lanes and sidewalks; trail alignment to follow Cipole Road's west side between Tualatin-Sherwood Road and Pacific Highway/OR 99W; trail should be constructed in lieu of a sidewalk on the roadway's west side (13A)

- Vegetation removal and utility pole/mailbox relocation necessary in several locations to accommodate future Cipole Road widening and trail development between Tualatin-Sherwood Road and Herman Road (13B)
- Use existing at-grade railroad/roadway crossing at Cipole Rd; upgrade crossing treatments on roadway's west side (in tandem with future roadway widening) to accommodate trail (13D)

The Trail Master Plan also describes design guidelines for shared use paths, shared use paths adjacent to roadways, on street facilities, trail-roadway intersections, grade separated crossings, and special design requirements such as Bonneville Power Administration (BPA) requirements for trails within powerline corridors, Westside Express Service (WES) commuter rail, trail features and signage, educational elements, and environmentally sensitive construction. The following table describes plan actions for which Sherwood is responsible.

Table 3: Tonquin Ice Age Trail Plan Actions

Segment	Responsibility	Funding	Operation/ Maintenance	Issues	Actions	Responsibility for Actions
Immediately west of Tonquin Road/OregonStreet intersection to immediately north of Park Street (Old Town Sherwood)	Sherwood	To be determined in coordination with Metro and ODOT.	Sherwood	Sherwood will work with Metro and ODOT to determine if 2014-15 Regional Flex Funds award for Cedar Creek trail will include design and construction of this segment. Need to acquire easement/land for trail from 2 land owners.	Refine cost estimates for Cedar Creek trail project to see if the award amount will cover proposed improvements. Sherwood and Metro to determine acquisition strategy.	Sherwood, Metro, ODOT
Immediately north of Park Street to immediately south of Hwy 99	Sherwood	Design and construct.	Sherwood	None	Sherwood will design and construct by 2016	Sherwood with involvement of Metro and partners as needed.
Immediately south of Highway 99 to Roy Rogers Road, including Roy Rogers	Sherwood	To be determined in coordination with Metro and ODOT.	Sherwood	Sherwood to work with Metro and ODOT to determine scope of work for this segment pursuant to 2014-15 Regional Flex Funds award for Cedar Creek trail. Hwy 99	Public involvement needed to determine alignment in this area. Sherwood may need to	Sherwood Sherwood, ODOT Sherwood, ODOT with support of Metro and

Segment	Responsibility	Funding	Operation/ Maintenance	Issues	Actions	Responsibility for Actions
intersection)				undercrossing not included in 2014-15 Regional Flex Funds award.	acquire land for trail. Sherwood will apply in 2012 for ODOT/ STIP Enhance funds to design/construct Hwy 99 undercrossing.	partners.
Roy Rogers Road north to Tualatin River National Wildlife Refuge trailhead	Sherwood or Washington County	None	Sherwood may consider role in owning/building/operating and maintaining once the Cedar Creek portion of the trail is built.	Segment is in unincorporated Washington County, no obvious trail provider. Need to acquire land from one land owner.	Sherwood and Washington County determine ownership and O&M agreements.	Sherwood, Washington County
Immediately east of Tonquin Road/Oregon Street intersection to immediately north of Tualatin-Sherwood Road.	Sherwood	None	Sherwood	Funding not identified for design/construction. Need to acquire land from 8 land owners between Tonquin Rd. and Oregon St.	Sherwood to identify funding strategy Include trail in Sherwood's TSP update. Update trail description in Metro's 2035 RTP, including the Financially Constrained list. Sherwood to acquire trail.	City of Sherwood
Immediately north of Tualatin-Sherwood Road to immediately west of Cipole Road	Sherwood	None	Sherwood	Trail is recommended on north side of road in Right of Way. Funding not identified for design/construction	Include trail in Sherwood and Washington County TSP updates. Update trail description in Metro's 2035 RTP, including the Financially Constrained list. Sherwood to identify funding strategy	Sherwood, Tualatin, Washington County, Metro

Approved Ordinances: Since its adoption, the TSP has been amended by ordinance several times by City Council. Amendments have included modifications to support adopted concept plans for urban growth boundary (UGB) expansion areas and reclassification of local roadways to support development. The following is a brief summary of land use amendments and the associated adopted transportation system changes that will need to be incorporated into the plan development (and alternatives analysis) in the updated TSP document.

- Area 59.[28] Area 59, bordered on Elwert and Edy Road, is an area that was designated by Metro and brought into the Sherwood UGB in 2002. City Council adopted a concept plan in April 2006. In January 2007, the Council adopted amendments to the Comprehensive Plan to implement the concept plan, including amendments to TSP Figure 8-1 Functional Class. Classifications of Elwert and Handley (Arterial and Collector, respectively), are consistent with the Council amendments, but proposed local roadways are not reflected in the current TSP's.

- Brookman Road Concept Plan.[29] Brought into the UGB in 2002, the city adopted the Brookman Road Concept Plan in 2009. The project identified future land uses and public facilities, including parks and open space, civic uses, and transportation corridors. In order to implement the plan, amendments to the comprehensive plan, zoning code, and public facility plans are needed. The Brookman area will remain in unincorporated Washington County until voter-approved annexation brings it into the city.

- Adams Avenue North Concept Plan.[30] Metro also added this 33 acres north of Tualatin-Sherwood Road Metro as part of the 2002 regional UGB expansion. Metro's primary purpose was to allow for development of a road connection (Adams Avenue) between OR 99W and SW Tualatin-Sherwood Road. The North Adams Area was annexed in November 2009 and is zoned primarily Light Industrial with a portion of the area along 99W-zoned Office Commercial. The City's 2005 Transportation System Plan (TSP) identifies a new collector street through portions of land identified in the Metro Ordinance. The TSP identifies this project as "Adams Avenue, Tualatin-Sherwood Road to Home Depot" (Table 8-11, City Street Projects, ID 2). This portion of Adams Avenue will complete a direct connection between OR 99W and Old Town, an area where significant urban renewal investment has occurred and is planned.

[28] http://www.sherwoodoregon.gov/planning/page/area-59

[29] http://www.sherwoodoregon.gov/planning/page/brookman-road-concept-plan

[30] http://www.sherwoodoregon.gov/planning/page/adams-avenue-north-concept-plan

- Sherwood Cannery Square.[31] The Cannery Planned Unit Development (PUD) is located at the site of the former cannery in Old Town near the railroad tracks. The PUD proposal included a TSP amendment to change the classification of Columbia Street from a collector to a local street, an action City council approved in 2010. The proposal includes a mixed-use development with up to 10 construction phases and includes construction of new streets, public plaza, retail, office and residential. Public streets will be constructed prior to construction of development phases. While some improvements associated with the project have already been completed, the following transportation projects related to the site (that are not yet completed) have the potential to impact traffic circulation in the Old Town area:

    - Construct improvements to improve the operations of Pine Street/1st Street to meet City performance standards and mitigate queuing impacts at the Pine Street railroad crossing. This shall be accomplished by implementing a modified circulation for the downtown streets that includes:
        - Install a diverter for south-westbound on 1st Street at Ash Street or Oak Street to require vehicles travelling towards Pine Street to divert to 2nd Street.
        - Remove one side of on-street parking Ash Street-2nd Street or Oak Street-2nd Street to provide two 12-foot travel lanes from the diverter to Pine Street. Convert to one-way traffic flow approaching Pine Street for this segment.
        - Install an all-way stop at Pine Street/2nd Street. Stripe the south-westbound approach of 2nd Street to have a left turn lane and a shared through/right-turn lane.
        - Install traffic calming measures on 2nd Street southwest of Pine Street to manage the impact of the added traffic.
    -

- Tonquin Employment Area. The Tonquin Employment Area was brought into the UGB in 2002 and the City adopted a concept plan in 2010 that amended the Comprehensive Plan, Community Development Code, and TSP. Amendments to the TSP include a proposed east-west collector, the extension of SW Blake Street (as proposed in the Southwest Tualatin Concept Plan) through the area and connecting to Oregon Street. The proposed extension of SW 124th Avenue south was adopted as a proposed Arterial.

[31] http://www.sherwoodoregon.gov/planning/project/cannery-pud

- Cedar Brook Way. In 2012 the functional classification of SW Cedar Brook Way was changed from a local to a collector road connecting SW Elwert Road to SW Handley Street. The TSP amendment also identified one connection to SW Pacific Hwy along the extension, the location of which was to be determined at a later date.

Actions or Strategies to be considered in Updating the TSP

Several of the regional and local documents reviewed for this project identified transportation actions or strategies that will be considered in updated the City of Sherwood TSP. Relevant actions or strategies are summarized below.

Metro State of Safety Report (2012): It is the Portland Metro region's adopted goal to reduce the number of pedestrians, bicyclists, and automobile occupants killed or seriously injured on the region's roadways by 50% by 2035, compared to a 2005 baseline. The State of Safety report indicates that Sherwood has a lower rate of injury crashes and fatal crashes than the region, and is ranked 24th in the region for serious crashes per million residents (Tables 4-5 and Figure 1).

Table 4: Number of Automobile Crashes[32]

Jurisdiction	Annual Crashes	Fatal Crashes (per capita)	Injury A	Injury B	Injury C	All Injury	Fatal/Incapac (per capita)
Sherwood	111	0.3	1	14	30	45	1.3
METRO	18263	NA	481	1907	5174	7562	532

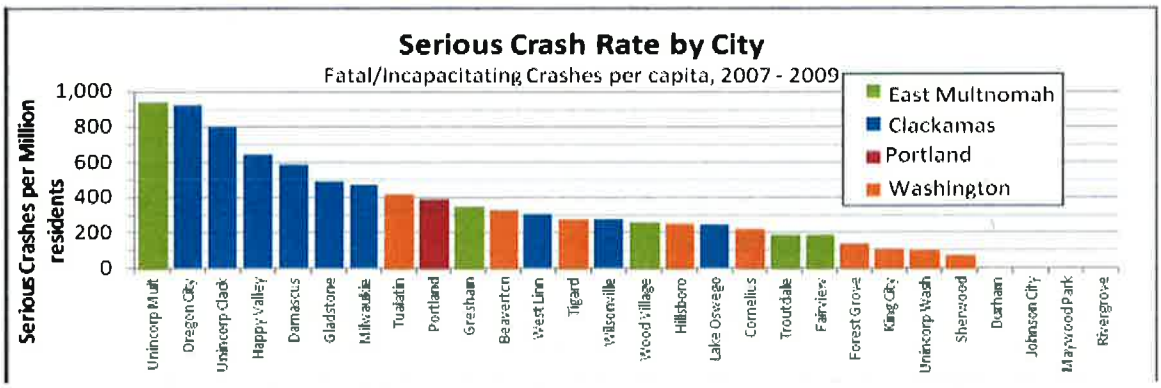
Table 5: Crashes per million residents[33]

Jurisdiction	Population	All injury (per million)	Fatal/incapac. (per million)	Ped. Injury Crashes (per Million)	Ped Fatal/Incapac. (per million)	Bike Injury Crashes	Bike Fatal/ Incap
Sherwood	18,207	2453	73	54.9	18.3	91.5	0.0
METRO	1,481,118	5106	359	190.6	40.7	230.9	27.2

[32] Crash rates were determined per capita. See p. 15 of the 2012 Metro State of Safety Report, http://www.oregonmetro.gov/index.cfm/go/by.web/id=42790, under "Related Documents.

[33] 2012 Metro State of Safety Report, pp. 16, 42, 63

Figure 1: Serious Crash Rate by City[34]



Section 10 – Findings and Strategies states:

- Arterial roadways comprise 59% of the region's serious crashes, 67% of the serious pedestrian crashes, and 52% of the serious bike crashes, while accounting for 40% of vehicle travel.
- Arterials have the highest serious crash rate per road mile and per VMT.

The safety report lists high-level strategies for implementation, several of which are relevant to this TSP update, including:

- Policies that reduce the need to drive, and therefore limit vehicle-miles travelled
- Strategies to reduce the prevalence of speeding and aggressive driving on surface streets
- Revisions to state, regional, and local mobility standards to consider safety as equally important, at a minimum, as vehicular capacity
- A focus on crosswalk and intersection lighting where pedestrian activity is expected
- Policies to improve the quality and frequency of pedestrian crossings on arterials and multi-lane roadways
- A focus on safe cycling facilities and routes, particularly in areas where serious crashes are occurring

Draft Regional Active Transportation Plan (August 2013): The need for a regional Active Transportation Plan (ATP) was identified as a follow up activity in the 2035 RTP. A regional Stakeholder Advisory Committee composed of staff from cities and counties and advocacy groups has been working to develop a strategy to complete and expand regional pedestrian and bicycle networks, including way to integrate non-motorized networks with transit and increase

[34] 2012 Metro State of Safety Report, p. 16

competitiveness for active transportation-related funding. The Ice Age Tonquin Trail and Western Trail and are shown as Regional Bicycle Parkways and Regional Pedestrian Parkways on the recommended Regional Bicycle Network and Regional Pedestrian Network.[35] While this document will remain a draft until it is proposed for adoption as a component of the RTP in July 2014, the TSP update will take into consideration design guidelines, policies and implementation actions related to trails and proposed improvements in Sherwood, where transportation system alternatives impact these facilities.

Southwest Corridor Plan: The Southwest Corridor Plan addresses the Barbur Boulevard/Highway 99W/I-5 corridor between Portland and Sherwood Town Center (see Figure 2.) The plan is being developed through a partnership of the cities of King City, Portland, Sherwood, Tigard, and Tualatin, Clackamas and Multnomah counties, ODOT, TriMet, and Metro. The intent of this project is to let the local plans and aspirations help shape and inform ultimate improvements so that all potential projects and ideas are screened through a local lens.

A brief overview of the project is summarized below:

- 2009 – The Joint Policy Advisory Committee on Transportation (JPAC) and the Metro Council designated the corridor as the next regional priority for high capacity transit (HCT) expansion. Based on existing traffic and transit counts, the Southwest Corridor shows the greatest ridership projections for potential HCT corridors in the region.

- December 2010 – Metro received a $2 million grant from the Federal Transit Administration to analyze alternatives for improving transit in the corridor.

- Spring 2012 – Metro completed a public involvement process to determine a vision and goals for the Southwest Corridor Plan. The outcomes of this process include: 1) bus rapid transit, light rail, roadway expansions/new roadways, rapid streetcar, and increasing local bus capacity are all transportation alternatives that must be included in the analysis. 2) Opportunities to expand the bicycle network and improve pedestrian mobility will also be studied.

- July 2013 – The Southwest Corridor Plan Steering Committee recommended transit alternatives for further study along with a set of potential roadway, bicycle, pedestrian, parks, trails and natural area investments that support land use, transportation and community-building goals in the corridor as part of the Southwest Corridor Shared Investment Strategy.

[35] http://www.oregonmetro.gov/index.cfm/go/by.web/id=39005

As part of the Shared Investment strategy, the transit recommendation directs TriMet to work with Southwest corridor jurisdictions and stakeholders to develop the Southwest Service Enhancement Plan. Plan implementation is intended to provide transit service that connects key Southwest corridor locations quickly and reliably to one another and to a potential high capacity transit line. Locations for future transit improvements include downtown Sherwood; however, the Steering Committee removed a high capacity transit (HCT) connection between Tigard and Sherwood on Highway 99W from further consideration to avoid impacts to auto and freight movement as well as to commercial

Recommended Roadway and Active Transportation projects in Sherwood are listed below and include the project reference number, which are keyed to maps in the Steering Committee Recommendation:[36]

- Arrow Street (Herman Road) - Build 3 lanes with sidewalks and bike lanes. Construct new road to collector standards (Project 1062). Build new 3 lane roadway with stream crossing and with bike lanes and sidewalks from Langer Farms Parkway Phase 2 to Gerda Lane/Galbreath Drive.

- Town Center Signal & Intersection Improvements (Downtown Sherwood) – Project 1068)- Improve intersection at Edy & Borchers; remove traffic signal at Baler/Tualatin-Sherwood Road; on Sherwood Boulevard remove traffic signal at Langer and disallow left turns from Langer to Sherwood, and add traffic signal at Century Drive.

- Tualatin-Sherwood Rd. (Langer Parkway to Teton Ave.) - Widening to 5 lanes with ped./bike (Project 1154). Widen from 3 to 5 lanes with bike lanes and sidewalks from Langer Parkway to Teton Avenue.

- Oregon-Tonquin Intersection & Street Improvements (Project 5020). Intersection improvements (consider roundabout) on Oregon at Tonquin Road; sidewalks and bike access through the intersection.

- 99W Sherwood TC Bicycle/Ped. Bridges (Project 6042). Ped/bike under/overcrossings of 99W at Sunset, Meinecke, Edy. Listed as a Regional Bicycle Parkway in the Regional Active Transportation Plan (5/9/13).

- Tonquin Trail (Project 9003). Construct multi-use trail with some on-street segments connecting multiple communities in Washington and Clackamas County. Listed as a

[36] See Steering Committee Recommendation "Attachment A," http://www.oregonmetro.gov/index.cfm/go/by.web/id=35309

Regional Bicycle Parkway and Regional Pedestrian Parkway in the Regional Active Transportation Plan (5/9/13).

- Westside Trial Segments (Project 9029). Tail opportunities within easements of BPA and PGE for connectivity. Listed as a Regional Bicycle Parkway and Regional Pedestrian Parkway in the Regional Active Transportation Plan (5/9/13).

Note that the bicycle/pedestrian and trail projects are only considered a priority where HCT is extended to the City of Sherwood. Widening Tualatin-Sherwood Road (Project 1154) is considered "critical" in this scenario, but less so if HCT does not extend to Sherwood.

With the first phase of the plan is completed, next steps will include implementation of the shared investment strategy and identifying projects to be packaged with the HCT alternative(s) for consideration in a Draft Environmental Impact Statement.

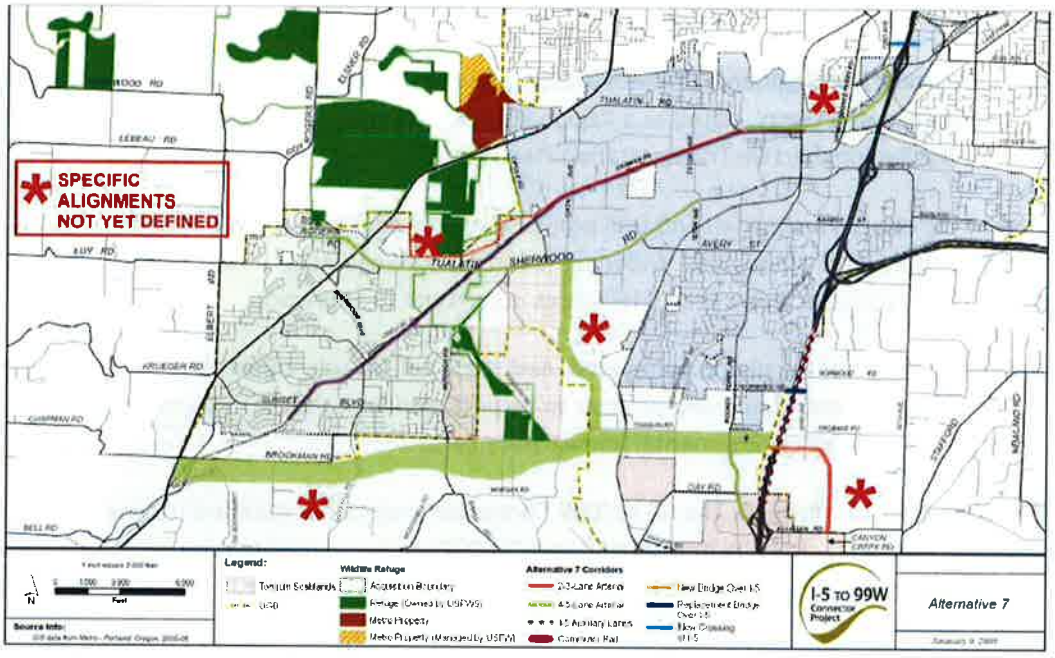
I-5 to 99W Connector Project: The I-5 to 99W Connector Project[37] is intended to develop long-term solutions to improving mobility between I-5 and OR 99W and is a collaboration between ODOT, Metro, Washington County, and other affected agencies and jurisdictions.

The project identified a number of improvements to support access to 2040 land uses, address existing deficiencies and serve increased travel demand. One primary function of this route is to connect the Washington Regional Center to the cities of Tigard, Tualatin and Sherwood, as well as to provide access to the Tualatin/Sherwood Industrial Area and Tualatin National Wildlife Refuge. The corridor provides short-line heavy rail access the region from the Willamette Valley and connects agricultural areas to the interstate highway system in this region, while serving as a secondary gateway to the region.

The study recommended a variety of transportation investments to improve the area's road, transit, bicycle, pedestrian and trail networks and to distribute traffic across a network of three arterials so that no single route would function as a defacto "connector." The Metro 2035 RTP places additional conditions on the Three Arterial Corridors Alternative recommendation and implementation. A map of Alternative 7 is provided in Figure 2.

[37] http://www.i5to99w.org/

Figure 2. I-5 to 99W Connector Alternative 7 (2009)



Alternative 7 is based on arterial development in a set of three northern, central, and southern arterial corridors. The central arterial projects are focused in Sherwood, although a proposed northern arterial project and area-wide projects affect Sherwood as well.

As noted in the figure, alignments are not yet final. The Alternative 7 recommendations that are relevant to Sherwood include the projects below. Cost estimates provided are conceptual costs in 2008 dollars.

Northern Arterial Project

- SW Herman Road – Construct a 3-lane extension between Tualatin Road and OR 99W; $30 million.[38]

Central Arterial Projects

[38] Since the completion of the I-5 to 99W Connector Project and Alternative 7 recommendations, the City of Tualatin has taken actions that impact the implementation of the project recommendations. These actions include removing the Tualatin River bridge (a component of the northern arterial) from urban renewal funding project list. In addition, Tualatin recently updated the City's TSP and removed most of the northern arterial components from the TSP. While improvements to the northern arterial corridor (Tualatin Road and Herman Road) are still included in the City's TSP, the outcome for the "northern arterial" as a package of improvements to improve east-west mobility is unknown.

- Tualatin–Sherwood Road – Widen to 5 lanes from OR 99W to SW 124th Avenue; $25 million.
- Tualatin–Sherwood Road – Widen to 5 lanes from SW 124th Avenue to Teton Avenue; $20 million.
- Roy Rogers Road – Widen to 5 lanes between Borchers Road and OR 99W; $5 million.

Other Projects

- TSM / TDM – Regional trail system, bike lanes, sidewalks, and bus stops; $30 million.
- Commuter Rail – Rail extension to Sherwood; $40 million.
- SW 124th Avenue – Extend 4-5 lane roadway between Tualatin-Sherwood Road and the Southern Arterial; $70 million.

The 2010-2013 STIP includes programmed funding for planning work related to the project. The 2035 Regional Transportation Plan (RTP) includes the following components related to the I-5 99W Connector, including those denoted in the financially-constrained (FC) project list:

- RTP 11179 (FC) – I-5 to 99W Replacement Projects – Construct improvements consistent with recommendations from I-5/99W Connector process
- RTP 10598 – I-5/99W Southern Arterial Right of Way – Purchase right-of-way when all project conditions are met: including integration with land use plans for UGB expansion areas and Urban Reserves, Conducting the I-5 South Corridor Refinement Plan, including Mobility Corridors[39] 2, 3, and 20 and resolution of access between I-5 and southern arterial with no negative impacts to I-5 and I-205 beyond the forecasted No-Build condition, addressing National Environmental Policy Act (NEPA)[40] compliance to determine the preferred alignment and addressing any conditions associated with land use goal exception for southern arterial.

[39] Metro has defined 24 "mobility corridors" that connect regional areas. These corridors include the following linkages: Corridor 2 (Portland Central City to Tualatin), Corridor 3 (Tualatin to Wilsonville), and Corridor 20 (Tualatin to Sherwood and Sherwood to Newberg).

[40] For some large scale projects, agencies are required to prepared documentation known as an Environmental Impact Statement (EIS) through a formalized process that demonstrates compliance with NEPA by showing that environmental values are integrated into the decision making process along with reasonable alternatives.

- RTP 11339 I-5/99W Southern Arterial Improvements – Construct the initial 2-3 lane arterial phase of the Southern Arterial from OR99W to the SW 124th Ave. Extension when all project conditions are met: including integration with land use plans for UGB expansion areas and Urban Reserves, Conducting the I-5 South Corridor Refinement Plan, including Mobility Corridors 2, 3, and 20 and resolution of access between I-5 and southern arterial with no negative impacts to I-5 and I-205 beyond the forecasted No-Build condition, addressing NEPA to determine the preferred alignment and addressing any conditions associated with land use goal exception for southern arterial.

- RTP 11340 – I-5/99W Southern Arterial Improvements – Expand to 4-5 lanes to serve growth in the area after improvements to Tualatin-Sherwood Rd. and an improved connection from SW Tualatin Rd. to the I-5/Lower Boones Ferry Rd. Interchange and when all project conditions are met: including integration with land use plans for UGB expansion areas and Urban Reserves, Conducting the I-5 South Corridor Refinement Plan, including Mobility Corridors 2, 3, and 20 and resolution of access between I-5 and southern arterial with no negative impacts to I-5 and I-205 beyond the forecasted No-Build condition, addressing NEPA to determine the preferred alignment and addressing any conditions associated with land use goal exception for southern arterial.

- RTP 11342 – I-5/99W Connector Southern Arterial/I-5 Interface –Connect the Southern Arterial to I-5 or other surface arterials in the vicinity of the N. Wilsonville interchange when all project conditions are met: including integration with land use plans for UGB expansion areas and Urban Reserves, Conducting the I-5 South Corridor Refinement Plan, including Mobility Corridors 2, 3, and 20 and resolution of access between I-5 and southern arterial with no negative impacts to I-5 and I-205 beyond the forecasted No-Build condition, addressing NEPA to determine the preferred alignment and addressing any conditions associated with land use goal exception for southern arterial.

City of Sherwood Comprehensive Plan (1991): The City of Sherwood originally adopted the Comprehensive Plan II in 1991. Elements of the Plan have been periodically updated, including the last update in 2009. Given the original adoption date, note that some data, findings, policies, and strategies in the Plan are outdated. The purpose of the Plan is to guide the physical growth and development of the community consistent with City policy goals and State Goals and Guidelines. The Plan is intended to articulate the City of Sherwood's perception of what it is, what it seeks to be and how it will achieve its desired future. Its aim is to preserve what is essential to its identity, develop what it needs to be economically and environmentally healthy and meet the needs of the people who contribute to its community life and make use of its land use resources.

Chapter 6, Transportation, provides goals, policies, and strategies relevant to the City's transportation system. The TSP update will need to combine transportation analysis with the application of the goals, objectives and policies described in this chapter.

The goals and policies described in this chapter are nearly identical from the 2005 Transportation System Plan, with the following exceptions:

- TSP Goal 1 Policy 5 is omitted from the comprehensive plan Policy 5 ("The City shall work cooperatively with the Port of Portland and local governments in the region to ensure sufficient air and marine passenger access for Sherwood residents.")
- Comprehensive Plan Goal 3, Policy 10 is not part of the Transportation System Plan ("The City of Sherwood will establish a set of guidelines and standards for traffic calming measures to retrofit existing streets and as part of land use review.")

Comprehensive Plan policies will need to be made consistent with modified and new transportation policies developed as part of the TSP update.

Sherwood Zoning and Development Code: The Zoning and Development Code ("code") implements the City's Comprehensive Plan by establishing zoning designations and use and other development regulations for the zones, as well as regulations and procedures for land division and application review. The following highlights code sections that address transportation-related requirements.

Access Management

Subsection .040.M of Chapter 16.106 (Transportation Facilities) addresses access management, and establishes required minimum spacing between driveways and intersections for local roads, neighborhood routes and collectors (25 feet, 50 feet, and 100 feet respectively). The subsection also refers to the Engineering Design and Standard Details Manual for street standards.[41] Minimum and maximum roadway and driveway spacing standards for city arterials and collectors are provided in the 2005 TSP.

Performance Standards and Targets

As referred to earlier in this report, the 2005 TSP and Roadway Element of the Washington County TSP establish level-of-service standards for both signalized and unsignalized intersections under their jurisdiction. This report also addresses regional performance targets from the RTP and RTFP regarding issues such as safety, congestion, freight reliability, and active transportation that will be integrated into the updated TSP.

[41] The purpose of the city's Engineering Design and Standard Details Manual is to set standards for the construction of new public improvements and for the reconstruction of existing facilities to upgrade existing infrastructure. These standards are primarily geared towards construction design; however, where applicable, this engineering document will need to be consistent with, and implement, the standards that are proposed in the updated TSP, as well as those reflected in development code requirements.

These standards and targets do not need to "live" in the code, but to ensure compliance with performance standard requirements a traffic impact analyses (TIA) requirement should be established in the code. Existing code sections 16.90.030.D and 16.106.040 include general TIA requirements for development proposals based on the type of proposed development, whether they are subject to site plan review, and their projected average daily vehicle trips (ADT).

Coordinated Review and Conditions of Approval

Written notice of Type II, III, IV, and V quasi-judicial and legislative actions is sent to Oregon Department of Transportation (ODOT), Metro, applicable transit service providers, and other affected or potentially affected agencies (Section 16.72.020.C). Also, pre-application conferences established in existing code (Section 16.70.010) are an opportunity to coordinate with other transportation facility and service providers.

General approval criteria for development applications grant authority to the Hearing Authority and Appeal Authority to approve the application with conditions (Section 16.72.010.C.1).

Plan and Land Use Regulation Amendments

The TPR seeks to protect transportation facilities by requiring consistency of land use with the function, capacity, and performance standards of transportation facilities. Existing Sherwood code provisions regarding approval criteria for plan amendments address TPR compliance, although the provisions do not necessarily reflect more recent TPR amendments (Section 16.80.030.C).

Pedestrian and Bicycle Access, Circulation, and Amenities

Requirements for on-site pedestrian, bicycle, and vehicular circulation are established in existing code (Chapter 16.96). Standards for residential and non-residential development require that a private pathway/sidewalk system extend throughout the site that connects existing development, building entrances, adjacent development, future phases of development, public rights-of-way, open space, and parking and storage areas.

Bicycle parking is required for uses including multi-family housing, office and most other commercial uses, institutional uses, and park-and-ride facilities (Section 16.94.020.C). The provisions address location and design of bicycle parking, and allow for long-term parking but do not require it.

Transportation Demand Management

Existing off-street parking regulations allow for shared parking, blended parking rates, on-street parking credits, preferential carpool/vanpool parking, residential parking districts, and reduced parking requirements in environmentally sensitive areas (Section 16.94.010).

On-site pathway/sidewalk systems addressed in Chapter 16.96 require the system to connect to transit facilities within 500 feet of the site. This is reinforced by language in the transportation

facilities section that requires site connections to transit streets, as designated in the TSP, and either provision of or allowance for transit amenities and/or easements (Section 16.106.040.J). Commercial, multi-family, institutional, and mixed-use development must be oriented to existing and planned transit facilities and be built with no or minimal setbacks according to underlying zoning and site plan provisions (Section 16.90.030.D.7).

Transportation System Design and Connectivity

Street design guidelines are provided in a transportation facilities section of existing code (Section 16.106.010). The narrowest street is a 28-foot local street, which is also shown in a cross-section in the 2005 TSP.

Street spacing is an element of network connectivity; currently, street collector spacing is addressed in the Engineering Design and Standard Details manual and 2005 TSP, as discussed above. Existing code (Section 16.106.30) establishes maximum block lengths of 530 feet for new streets, except for arterials, which have a maximum block length requirement of 1,800 feet. Where full street crossings occur at distances of more 1,200 feet, bicycle and pedestrian crossings must be provided at an average of 530 feet. Section 16.106.30 also requires consistency with a local connectivity plan established in the 2005 TSP.

Code requirements will need to be consistent with the recommendations of the updated TSP. An evaluation of the code and an assessment of how regulatory provisions meet the state TPR and regional RTFP will be included in the Needs, Opportunities, Constraints and Tools Report.

Sherwood Parks Master Plan (2006): The Sherwood Parks and Recreation Master Plan involves a comprehensive review of the existing inventory of land, recreation facilities, and recreation opportunities; development of a mission statement; development of a strategic set of goals, objectives, and actions for the next twenty years; survey of the needs of residents; identification of land for future parks and open space acquisition, preservation, or conservation; development of conceptual designs for parks; provision of a capital improvement schedule, and review of existing finance strategies; and development of recommendations to fund improvements.

High priority recommendations include:

- Preservation of natural areas, particularly the Tualatin River National Wildlife Refuge, as new development occurs to preserve and connection of such areas with the fabric of the community
- The creation of new trails wherever the opportunity arises, and provision of ten new walking loops.

The Plan also notes the following acquisitions and developments of Pedestrian & Bike Paths:

- from Edy Road south along Cedar Creek

- from the Senior Center to Stella Olsen Park
- Cedar Creek Trail and Land in the UGB expansion area.

The updated pedestrian and bicycle elements of the TSP will need need to be consistent with path and trail acquisitions and the recommendations of the Parks Master Plan.

Sherwood Urban Renewal Plan (Adopted 2000, updated through 2012): The Sherwood Urban Renewal Plan aims to eliminate blighting influences found in the Renewal Area and to implement the goals and objectives of the Sherwood Comprehensive Plan and the Vision for Old Town-2000. The boundary of the Renewal Area includes Old Town, Six Corners, and a portion of Sherwood High School.

Transportation improvements eligible for urban renewal funding may include streetscape enhancements, existing roadways reconstruction, new streets construction, and pedestrian and bicycle access improvements. Aesthetic improvements on the N. Sherwood Boulevard corridor connecting Old Town and Six Corners, creating vehicular and pedestrian linkages between Highway 99 and the Old Town area, and improving access to Stella Olson Park are mentioned specifically. Parking improvements called for in the plan include construction of public parking to support Old Town businesses and activities, and provision of separate areas for employee parking so close-in parking can be available for customers.

Appendix A: Applicable Plan and Policies

The following plans and policies were reviewed for the City of Sherwood TSP Update:

State of Oregon

- Transportation System Planning Guidelines
- Transportation Planning Rule (OAR 660-012-0010)
- Oregon Statewide Planning Goals
- Oregon Access Management Rule (OAR 734-051)
- Oregon Transportation Plan
- Oregon Highway Plan
- ODOT Highway Design Manual
- 2010-2013 Statewide Transportation Improvement Program

Metro/Regional Plans

- Metro 2035 Regional Transportation Plan
- Metro 2035 Regional Transportation Functional Plan
- Metro 2040 Growth Concept
- Metro Non-Single Occupancy Vehicle (SOV) Target Actions Study
- Metro State of Safety Report
- Regional Active Transportation Plan (August 2013 draft)
- Southwest Corridor Plan
- I-5 – 99W Connector Study
- Ice Age Tonquin Trail Master Plan

City of Sherwood

- 2005 City of Sherwood Transportation System Plan (and amendments)
- City of Sherwood Capital Improvement Plan
- City of Sherwood Comprehensive Plan
- City of Sherwood Zoning and Development Code
- City Engineering Design and Standard Details Manual
- City of Sherwood Urban Renewal Plan
- Sherwood Town Center Plan
- Sherwood Parks Master Plan
- Sherwood Capital Improvement Plan

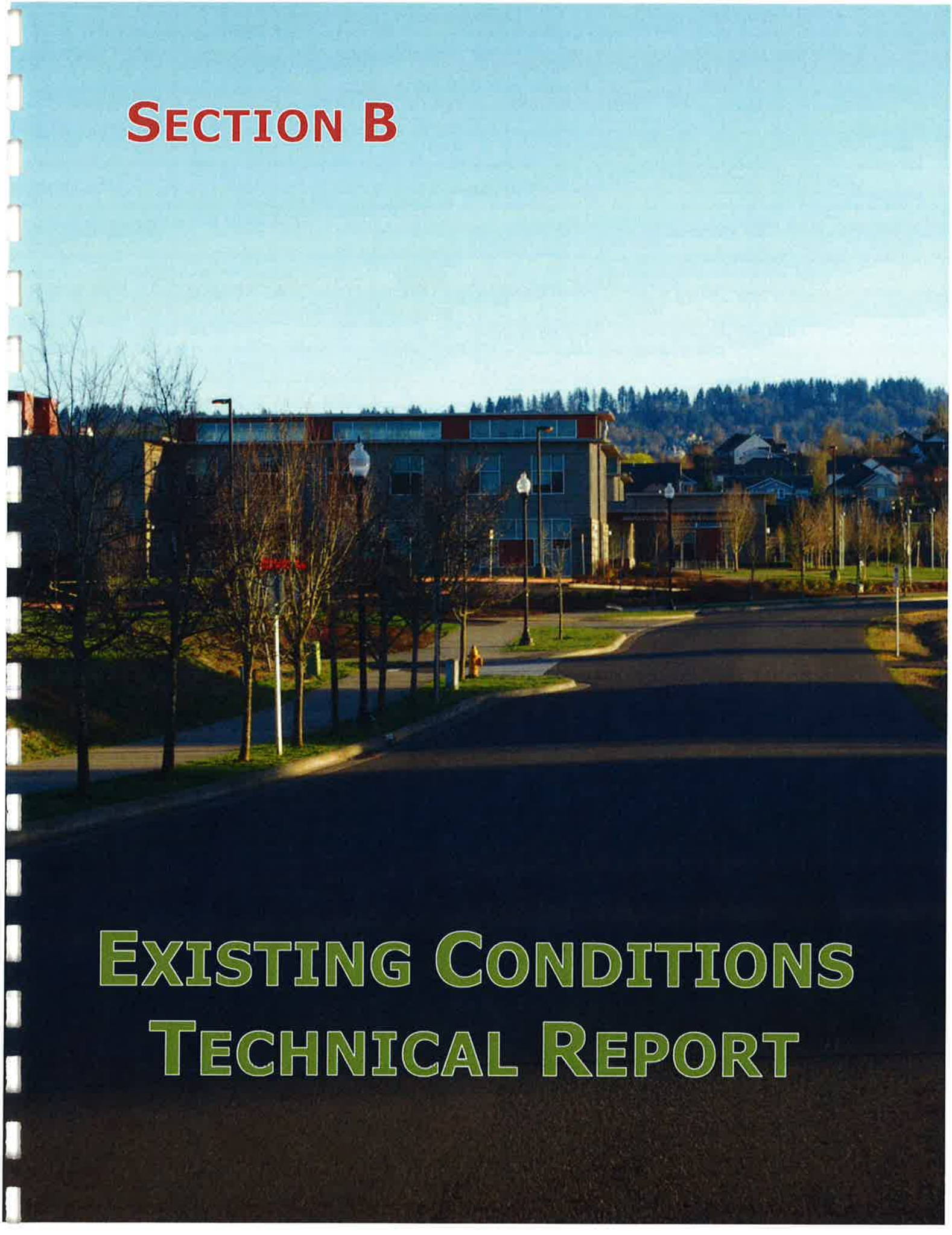
Washington County

- Washington County Transportation System Plan

TriMet

- TriMet Transit Investment Plan

SECTION B



EXISTING CONDITIONS TECHNICAL REPORT

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EXISTING CONDITIONS

Existing transportation inventories were collected and evaluated as part of the City of Sherwood Transportation System Plan (TSP) for transportation facilities serving various travel modes (pedestrians, bicycles, transit, motor vehicles, freight, water, air, and pipelines). This 2013 inventory of Sherwood's multimodal transportation infrastructure establishes existing transportation needs in Sherwood.

Study Area

The general TSP study area (Figure 1) includes the Sherwood city limits and the adjacent unannexed area within the existing urban growth boundary (UGB). Figure 1 also shows Sherwood's land use zoning, which includes a concentration of commercial uses along Highway 99W and in Old Town, Sherwood's historic core. For the purposes of this project, its boundaries are generally defined by the Old Town Overlay District on the City's zoning map. The City's industrial uses are generally located in the northeast area along Tualatin-Sherwood Road (including the Tonquin Employment Area) and the Portland & Western (P&W) Railroad track. The remainder of the City primarily includes residential uses of varying densities (i.e., low, medium, and high). The City has completed concept plans for areas that have not yet been annexed into the City, including the Brookman Addition area (southern edge) and Tonquin Employment Area (eastern edge).

Sherwood's transportation system includes infrastructure that supports the ability of residents and visitors to move around town. Figure 2 shows the locations of multiple "activity generators" (locations that attract various activity) around Sherwood. The highest concentration of generators is located in the Old Town area. Along the northern section of Highway 99W, there are multiple shopping centers. Bus stops are located along the roads having fixed transit routes (Langer Drive and Sherwood Boulevard). Schools and parks are the primary activity generators scattered throughout the community and intermixed with the residential areas. The location of these activity generators is important to consider when assessing the gaps and needs of various modes of travel. Having a well-connected transportation network that provides options for travel to and from these locations can be an asset to the community.

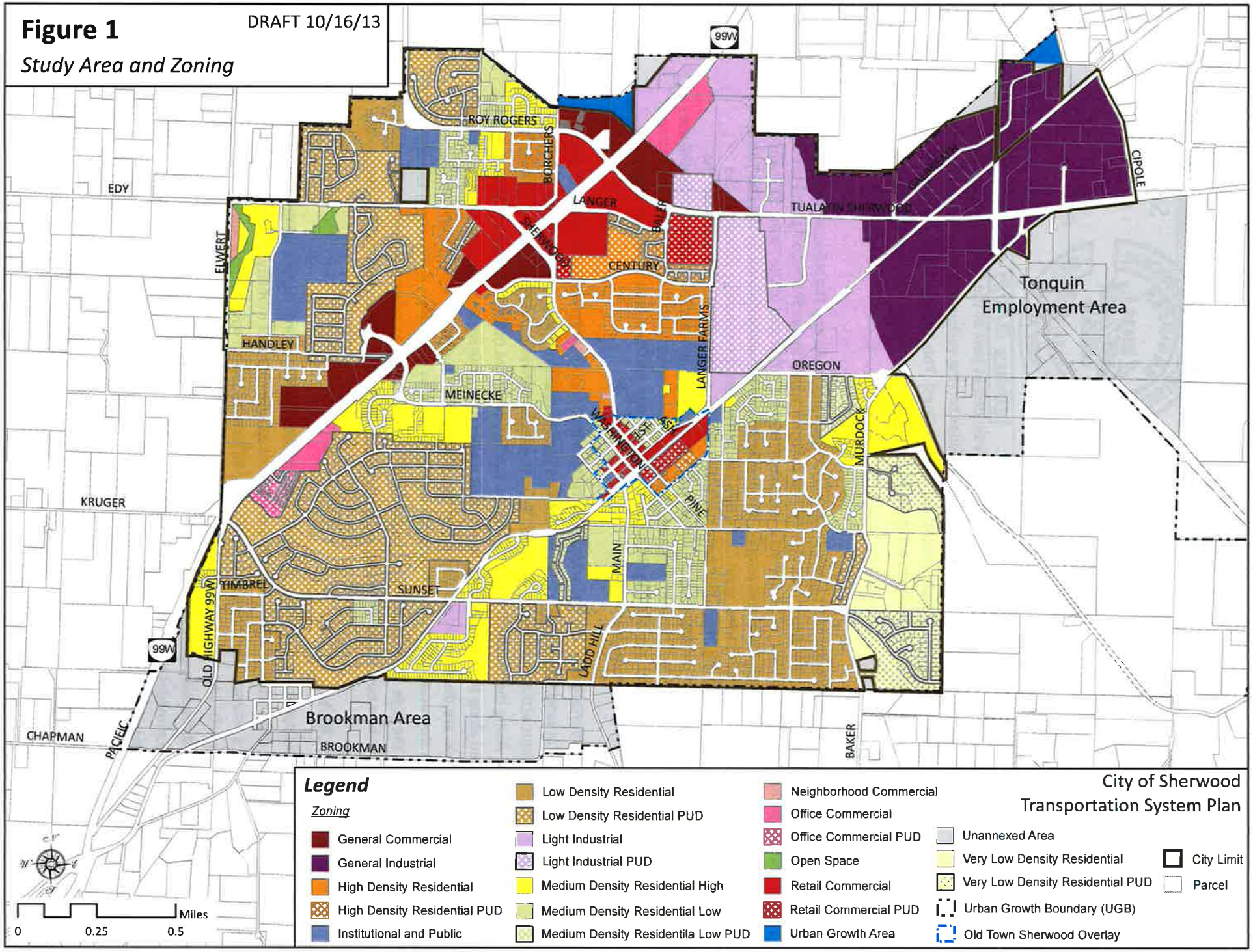
Street System

Sherwood's street system is hierarchal in nature and includes five functional classes, where streets with a higher classification (such as arterial streets) emphasize a higher level of mobility for through-movement versus access. They look and function very differently than a street with a lower classification (such as local streets), which emphasize land access. Higher classification streets tend to be higher traffic volume and speed roadways, though they can vary depending on land use context. The functional classification also provides helpful context for determining the desired spacing and general citywide street layout of the various types of facilities.

Figure 1

Study Area and Zoning

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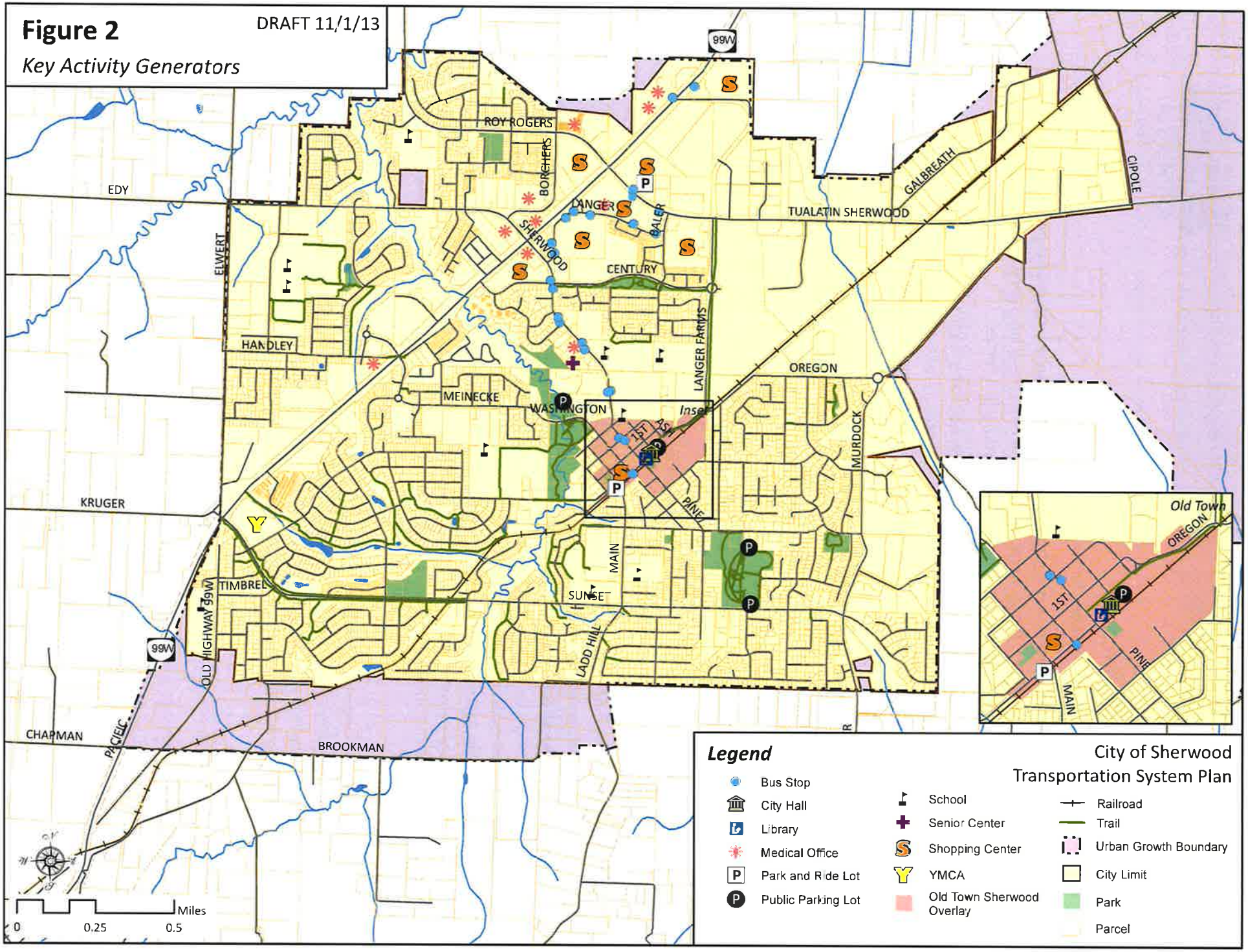


City of Sherwood
Transportation System Plan

Figure 2

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Key Activity Generators



Functional Classification

Sherwood has five functional classes for streets:

- **Principal Arterials** are access controlled highways that span several jurisdictions and provide a high level of mobility. They generally have four or more travel lanes, bicycle lanes (or shoulders), and limited access (preferably connecting primarily with arterials).
- **Arterials** serve as the major roadways within Sherwood and link major commercial, residential, industrial and institutional areas. Many of these roadways also extend beyond Sherwood and connect to other nearby cities. Limited access is a key feature of arterials to ensure increased mobility through town.
- **Collectors** have the primary role of facilitating circulation within Sherwood by funneling traffic from residential, commercial, and industrial areas to the arterial street network. They do not require as extensive control of access (compared to arterials).
- **Neighborhood Routes** are the primary roadways used to access residential neighborhoods. They serve a similar function as collector roadways but are designed to feel more like a neighborhood street.
- **Local Streets** have the sole function of providing access to immediate adjacent land. Service to "through traffic movement" on local streets is deliberately discouraged by design.

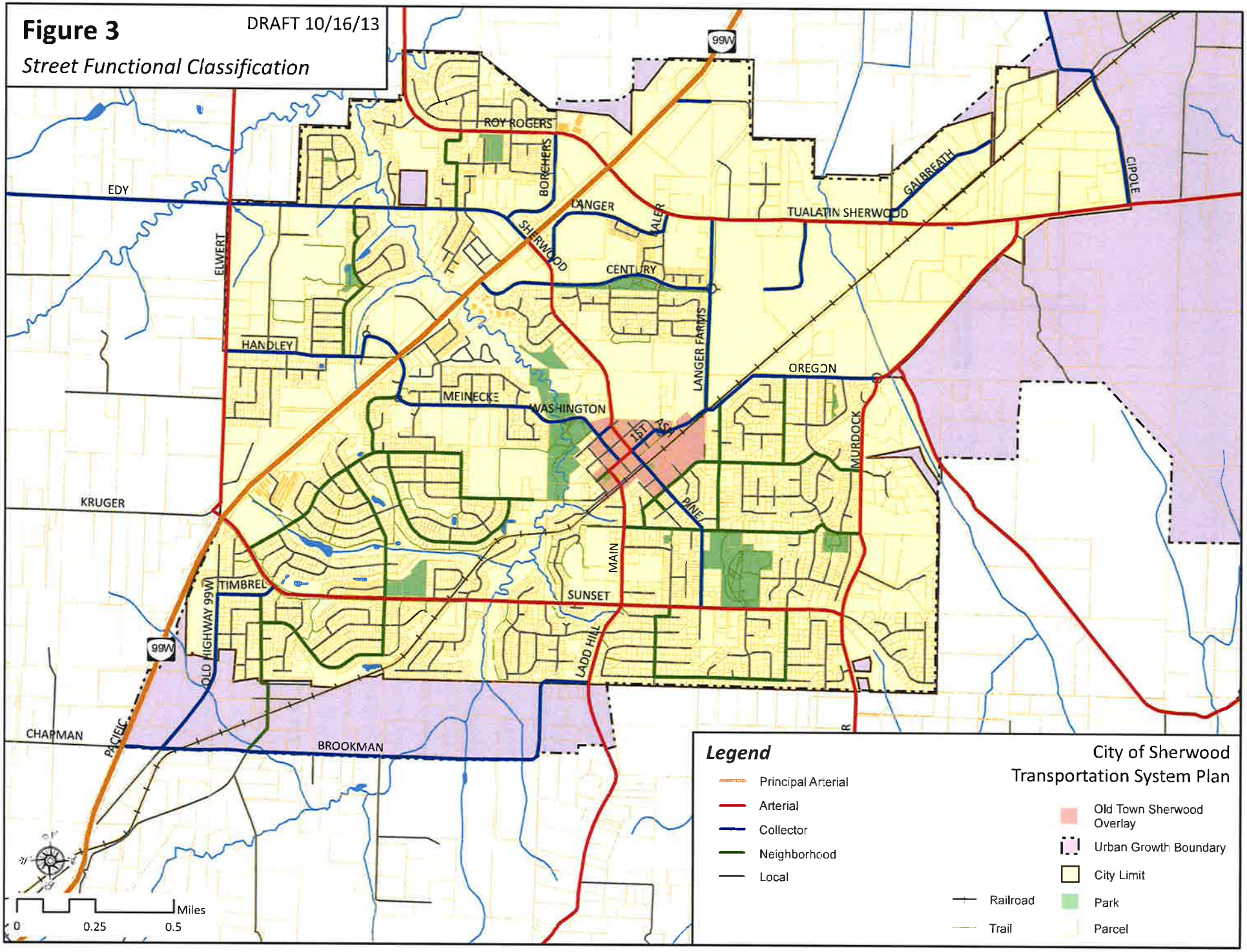
Figure 3 shows the functional classifications of Sherwood's roadways. The primary regional roadway providing mobility to residents and connecting the City of Sherwood with the surrounding area is Highway 99W, which is classified as a Principal Arterial. Highway 99W runs northeast-southwest through the northern half of the City and connects to the Portland Metropolitan Area to the northeast and Newberg, McMinnville, and other areas of Yamhill County to the southwest. Through Sherwood, Highway 99W has limited access, including five signalized intersections, which serve as the primary crossing locations between land uses on either side of the highway. There are only a few other accesses with local roads and private driveways, and these are all limited to right-in/right-out movements except Bookman Road.

The other major roadways within Sherwood (classified as Arterials) are the primary mobility routes that provide regional connections through Sherwood. These arterials include Tualatin-Sherwood Road (connecting to Tualatin), Roy Rogers Road (connecting to Beaverton), Oregon Street, Murdock Road, Sherwood Boulevard, Main Street, Sunset Boulevard, and Elwert Road.

Figure 3

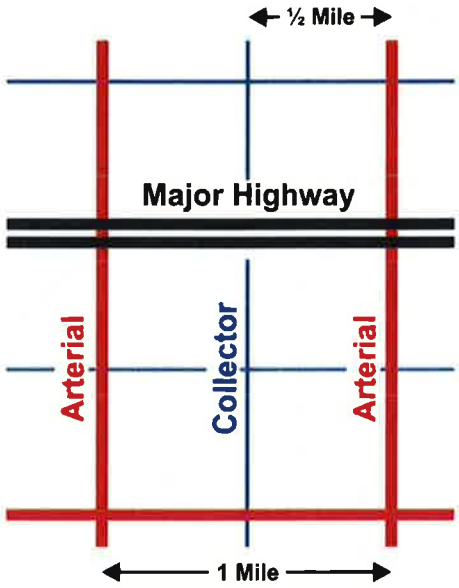
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Street Functional Classification



System Connectivity

The Metro Regional Transportation Functional Plan (RTFP) requires that each city incorporate street connectivity guidelines into local TSPs. The image at right shows the recommended spacing for arterial streets (approximately one-mile) and collector streets (approximately half-mile). There is allowance for deviations to this spacing based on the presence of significant barriers, such as topography, rail lines, freeways, existing development, and the presence of natural areas.[1] The roadway network spacing guidelines were recommended to support walking, biking, and access to transit, as well as improved connectivity to reduce demand on the arterial roadway system.



Based on these street connectivity guidelines, Sherwood currently has the following system connectivity characteristics in its arterial and collector network. Specific gaps (as numbered) are shown in Figure 3A.

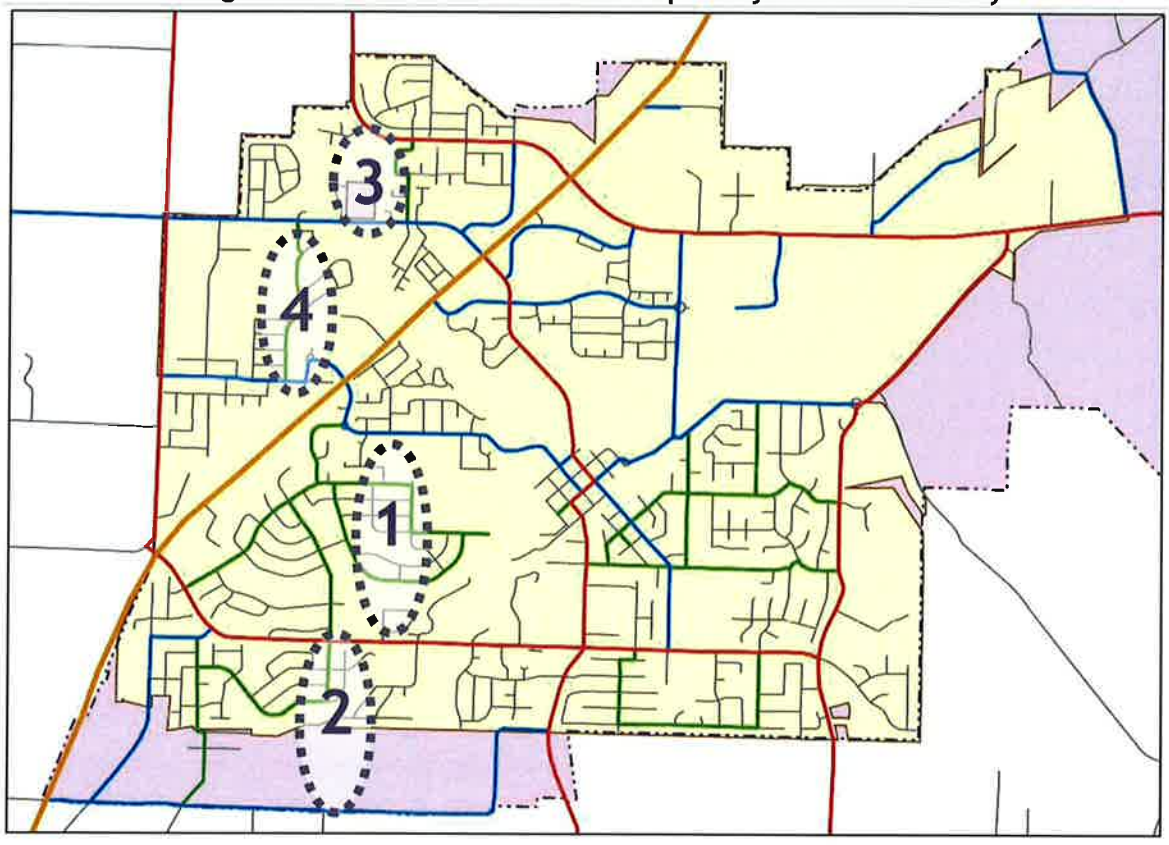
- **East-West Roadways (South of Highway 99W):** Tualatin-Sherwood Road and Sunset Boulevard are the two east-west arterials in Sherwood south of Highway 99W. They are spaced approximately 1¼ miles apart, which only slightly exceeds the desired one-mile arterial spacing guideline. Oregon Street and Meinecke Road are collectors that provide east-west connectivity located approximately midway between Tualatin-Sherwood Road and Sunset Boulevard (approximately ½ mile from each arterial). Brookman Road, a collector, also is located approximately ½ mile south of Sunset Boulevard.
- **North-South Roadways (South of Highway 99W):** Sherwood Boulevard – Main Street and Oregon Street-Murdock Road are the primary north-south arterials on the southern side of Highway 99W. Highway 99W also accommodates north-south travel. In general, these roadways are spaced between ¾ and 1 ¼ miles apart, which is generally consistent with the one-mile arterial spacing guideline. Langer Farms Parkway, a collector, provides north-south travel between Tualatin-Sherwood Road and Oregon Street and is located approximately ½ to ¾ mile from the adjacent arterial facilities. South of Oregon Street, Pine Street is the collector between Main Street and Murdock Road. However, west of Main Street the collector gaps are larger, including:
    - There is no collector (gap 1) that links Meinecke Road and Sunset Boulevard. This area is constrained by established residential neighborhoods, the rail line, and the creek. Dewey Drive and Pinehurst Drive serve as neighborhood routes to the west.

[1] Metro's Regional Transportation Functional Plan (RTFP), Title 1 section 3.08.110(C)

- South of Sunset Boulevard, there is a gap of approximately 1 ¼ miles (gap 2) east to Ladd Hill Road to Old Highway 99W and Timbrel Lane. While Pinehurst Drive (a neighborhood route) extends south of Sunset Boulevard, it ends in a residential neighborhood that backs against the rail line.

- **North of Highway 99W:** The two arterials north of Highway 99W, Roy Rogers Road and Elwert Road, are spaced approximately ½ miles apart to the north and 1 ½ miles apart near Highway 99W due to the curvature in Roy Rogers Road. Between the two arterials, Edy Road and Handley Street provide east-west connectivity. However, north-south collector connectivity is limited.
  - There is a north-south collector gap of nearly a mile (gap 3) between Borchers Drive and Elwert Road north of Edy Road. While a neighborhood route is located along Houston Drive and Lynnly Way, area to the west is somewhat constrained by the creek.
  - There is a north-south gap of approximately a mile south of Edy Road (gap 4). The neighborhood route of Bedstraw Terrace-Ladyfern Drive-Roellich Avenue is located in the general area that would meet the collector spacing guidelines. However, these roads are fronted by residential development that has direct access to the facility and would restrict the mobility function of a collector.

Figure 3A: Arterial and Collector Gaps in System Connectivity



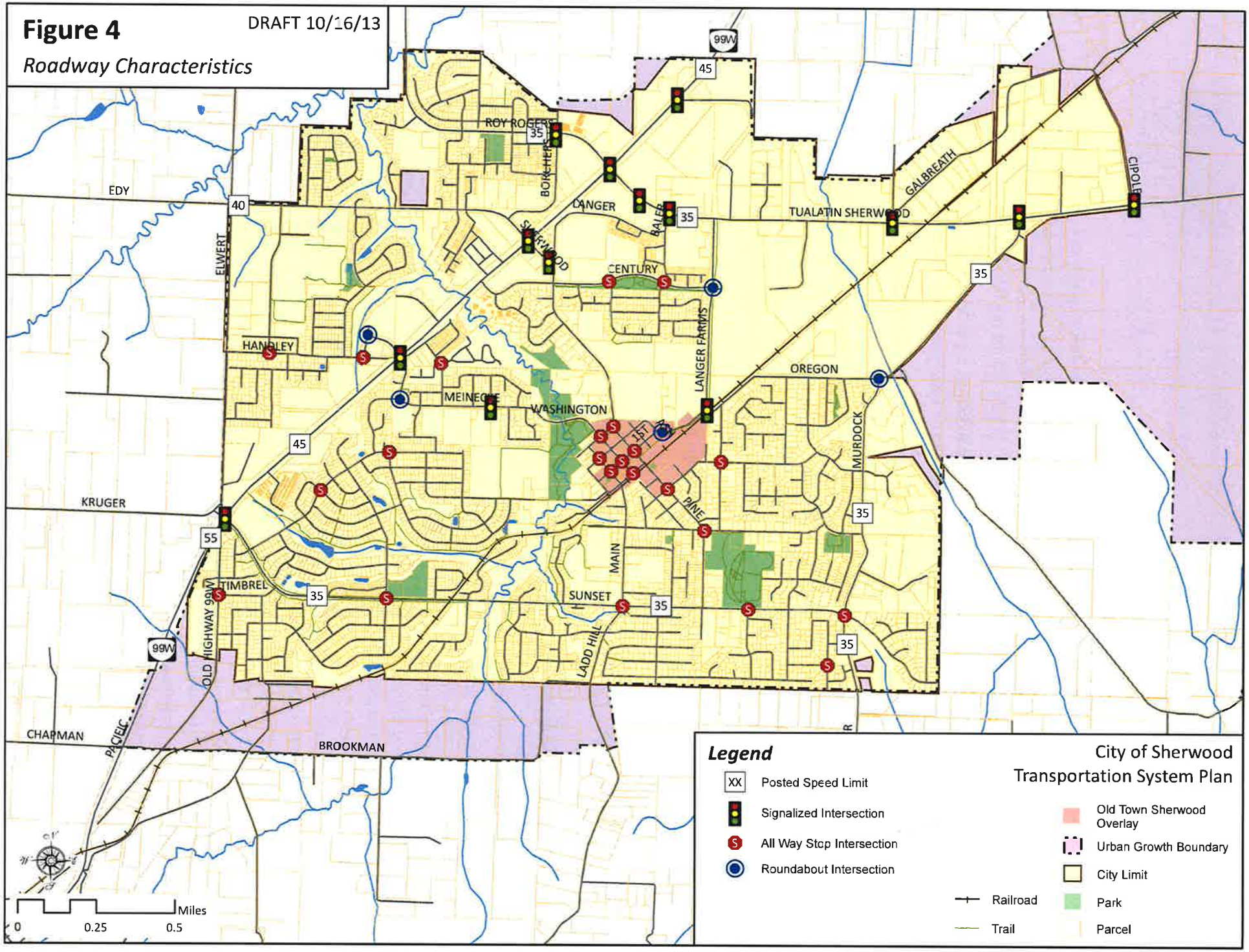
Roadway Characteristics

Figure 4 shows the speed limits on Sherwood's roadways and the traffic control used for the City's intersections. Most of the roadways have 25 mile per hour (mph) speed limits, with some of the arterial roadways having higher speeds of 35, 45, or 55 mph. The majority of the City's traffic signals are also on the arterial roadways, while roundabouts are located at various intersections around town. Old Town Sherwood has a large concentration of the City's all-way stops, and there are also a number of all-way stops on Sunset Boulevard.

Figure 4

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Roadway Characteristics



Pedestrian Facilities

Figure 5 shows the existing pedestrian facilities in Sherwood. Sidewalk connectivity is provided on a majority of the arterials, collectors, and local roadways including Tualatin-Sherwood Road and Sherwood Boulevard. In addition, connectivity and pedestrian linkages are relatively good for parks and schools. Roadways lacking sidewalk connectivity in key locations include the following:

- **Highway 99W** has significant gaps in sidewalk connectivity, especially a large portion south of Sherwood Boulevard that does not have sidewalks on either side of the highway.
- **Edy Road** along most of its length between Highway 99W and Elwert Road lacks sidewalks on at least one side of the road.
- **Division Street** along most of its length between Main Street and Mansfield Street lacks sidewalks on at least one side of the road.
- **Oregon Street** along most of its length between Langer Farms Parkway and Murdock Road lacks sidewalks on both sides of the road; however, the northern side of the road has undeveloped land.
- **12th Street** between Highway 99W and Sherwood Boulevard lacks sidewalks on the south side of the street.
- **Glen Eagle Neighborhood** lacks sidewalks along all streets (12th Street, Gleneagle Drive, Glenco Court, 11th Court, and 10th Street), including those that front homes.

Currently, trail facilities along Oregon St, Langer Farms Parkway and Century Drive connect Old Town to Tualatin Sherwood Road and Langer Park. In addition, the City of Sherwood is in the process of planning and constructing portions of the Cedar Creek Trail, which will connect to the regional Ice Age Tonquin Trail. The intended alignment of this trail will follow Oregon Street through Old Town and run along Cedar Creek to the north. In the short term, the nearest crossing of Highway 99W will be at Meinecke Road, but a grade-separated crossing of Highway 99W may be considered as a long-term



Sherwood's streets have a mix of pedestrian facilities that include sidewalks and meandering paths.

solution. This trail will serve as an important bicycle and pedestrian connection between land uses on the northwest side of Highway 99W and Old Town, as well as the other neighborhoods adjacent to the trail's alignment. It will also provide regional connectivity to the cities of Tualatin and Wilsonville to the east.

The railroad right-of-way is not a legal pedestrian use corridor. While pedestrian use is illegal, the railroad, which is rarely active, is sometimes used as a trail from southern/central neighborhoods to the high school, Stella Olsen Park, and Old Town. The illegal use by some pedestrians, indicates the desire for travel between these areas of the City. The railroad corridor will not be included in system connectivity analysis for pedestrians. However, the desire for travel between these key areas (southern/central neighborhoods and central/northern attractions) will be considered.

Street crossings are another important feature of Sherwood's pedestrian system. While controlled pedestrian crossings are provided at all major signalized intersections, there are some roadways where major intersections are spaced far apart, which results in crossing barriers for pedestrians. This is the case with Highway 99W, which only has five crossing locations in the three-mile section through town, with particularly long spacing on the 3/4-mile stretch between Sunset Boulevard and Meinecke Road.

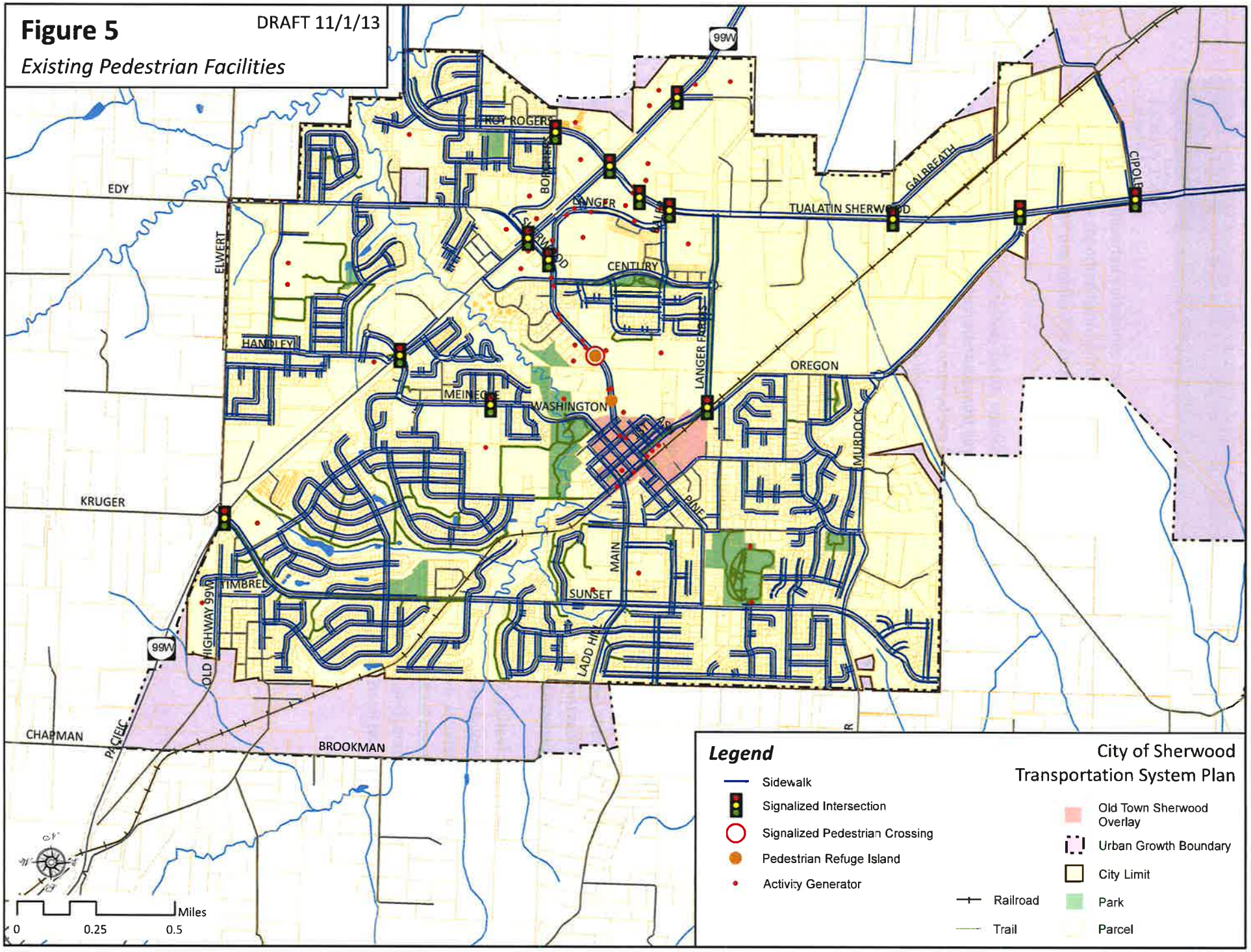
The Highway 99W crossings are located at signals, and each signal only allows pedestrian crossings on one leg of Highway 99W (with the other crossing being closed). In addition, the west crosswalk on Sherwood Boulevard at the intersection of Langer Drive is also closed. These closures can increase the crossing movements required by pedestrians to reach their destination. In some cases, a pedestrian may be required to cross three legs on an intersection rather than the desired (closed) leg. This increases the travel time for pedestrians as well as potential conflicts with motor vehicles.

Another major feature impeding pedestrian mobility is the large area of developed land without public rights of way through the properties between Old Town and the residential area to the north. While this area contains schools, a church, and other uses, it does not provide dedicated pedestrian connections between Sherwood Boulevard and Langer Farms Parkway. There are also major gaps in the undeveloped areas of Sherwood. One area with an existing pedestrian gap includes the undeveloped land between Tualatin-Sherwood Road and the section of Oregon Street west of Murdock Road.

Figure 5

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Existing Pedestrian Facilities



Bicycle Facilities

Figure 6 shows the existing bicycle facility inventory in Sherwood. Besides Highway 99W and Tualatin-Sherwood Road, most of the roadways do not provide bike lanes, although the majority of the residential road vehicle volumes and speed may be low enough (typically under 3,000 vehicles per day and 25 miles an hour) to be safe for bicycle travel. While the need for types of bicycle treatment vary by system context, typically roads with speeds lower than 25 miles an hour are appropriate for shared lanes, sharrows or bike boulevards. The current barriers to pedestrian travel (e.g., Highway 99W crossing opportunities, lack of connectivity north of Old Town, etc.) also affect bicyclists. The Tualatin-Sherwood Road bike lanes have been modified with an additional stripe to create "buffered bike lanes" that serve to create space and dedicated separation between bicyclists and motor vehicles.

Off-street path systems can serve both pedestrians and bicyclists and are typically preferred to on-street facilities. At the moment, Sherwood has existing trail facilities along Langer Farms Parkway, Century Drive, and Sunset Boulevard. Future trails are planned both within Sherwood and connecting to the southeast. The proposed Ice Age Tonquin Trail will connect Old Town to Highway 99W as well as Tonquin Road, the City of Tualatin, the City of Wilsonville, and the Willamette River to the east. This new trail will provide opportunities for bicycle users and pedestrians to make long distance commutes or recreational travel to nearby communities.

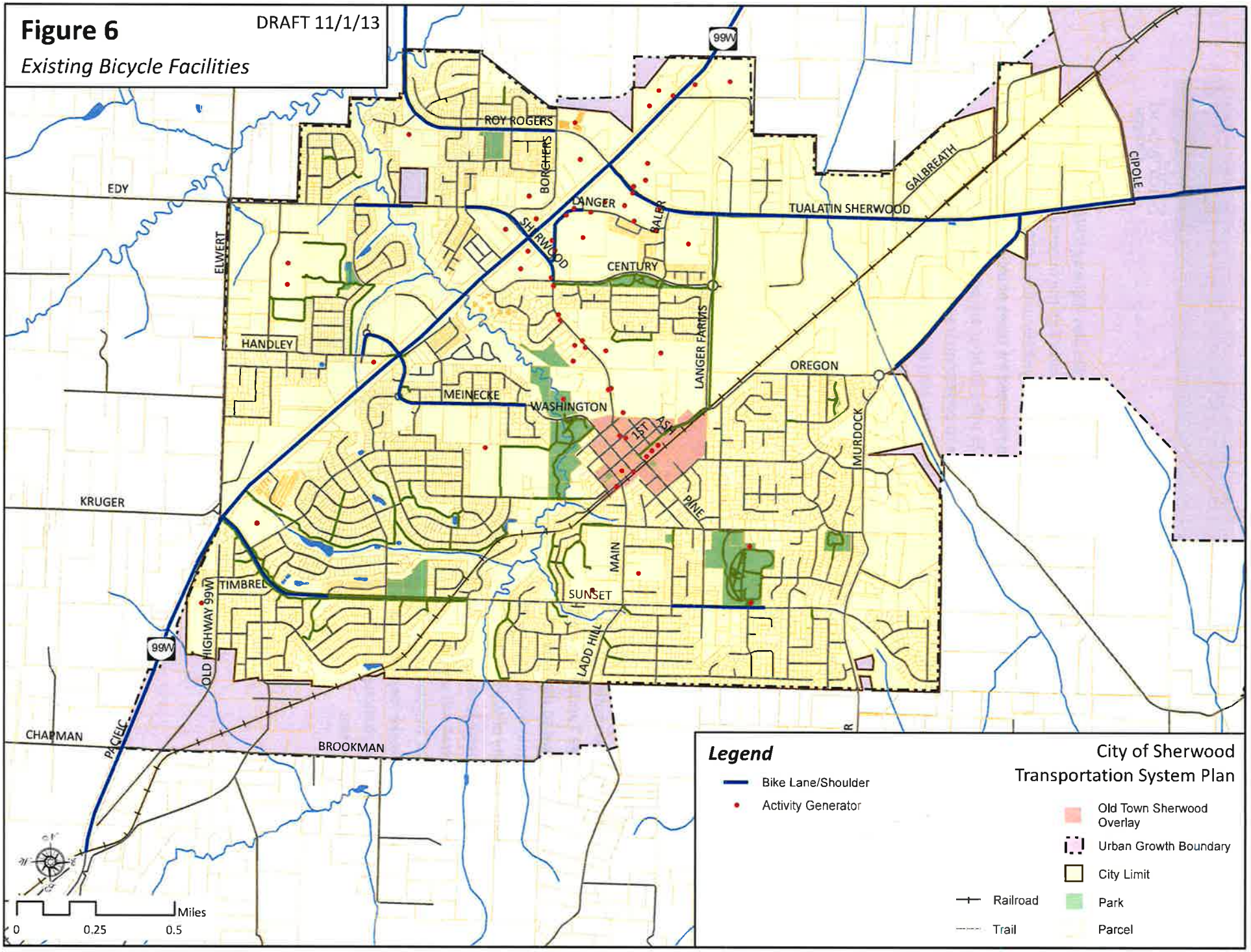


The bicycle lanes on Tualatin-Sherwood Road were restriped to create "buffered bike lanes" that serve to create space and dedicated separation between bicyclists and motor vehicles.

Figure 6

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Existing Bicycle Facilities



Transit Facilities

Transit service is provided by the Tri-County Metropolitan District of Oregon (TriMet) and the Yamhill County Transit Area District (YCTA). TriMet provides service and connections within the Portland Metro region (such as to Tigard, Beaverton, Portland, etc.), while YCTA connects Sherwood to Yamhill County and Tigard. Figure 7 shows the bus routes and bus stops of each transit service provider. In addition, the Metro RTP identifies the TriMet stop located at Railroad Street and Washington Street in Old Town Sherwood as a major transit stop. TriMet also provides park-and-ride lots at two of its stops in Sherwood; these include Old Town Sherwood on Railroad Avenue and off of Tualatin-Sherwood Road at the Regal Cinemas parking lot.

TriMet Lines 93 and 94 connect Old Town Sherwood to Highway 99W and run to/from the north. The focus of the service is to connect Sherwood with Tigard, Downtown Portland, and the greater Portland Metropolitan Area. Line 93 runs from Old Town Sherwood (Railroad Street/Washington Street) to the Tigard Transit Center. It operates seven days a week and runs approximately every 30-45 minutes or less during the weekdays from 4:30 AM to 11:30 PM. During the weekends, Line 93 runs approximately the same schedule as the weekdays. The typical travel time on this route between Old Town Sherwood and the Tigard Transit Center is 20-25 minutes.

Line 94 is an Express bus that runs between Old Town Sherwood and Downtown Portland. It only operates on weekdays, with short headways during the peak commuting hours (in the peak direction only) and longer headways during the off-peak hours. In the northbound direction (to Downtown Portland) the bus runs from about 5:45 AM to 8 AM with service every 15 minutes or less. Then, from 8 AM to 5:15 PM it provides service every 45 minutes. In the southbound direction (to Sherwood) the bus runs from 7:30 AM to 2 PM every 45 minutes. Then, from 2:00 PM to 7:00 PM the bus provides service every 15 minutes or less. During peak hours, the typical travel time from Downtown Portland to Old Town Sherwood is approximately one hour.



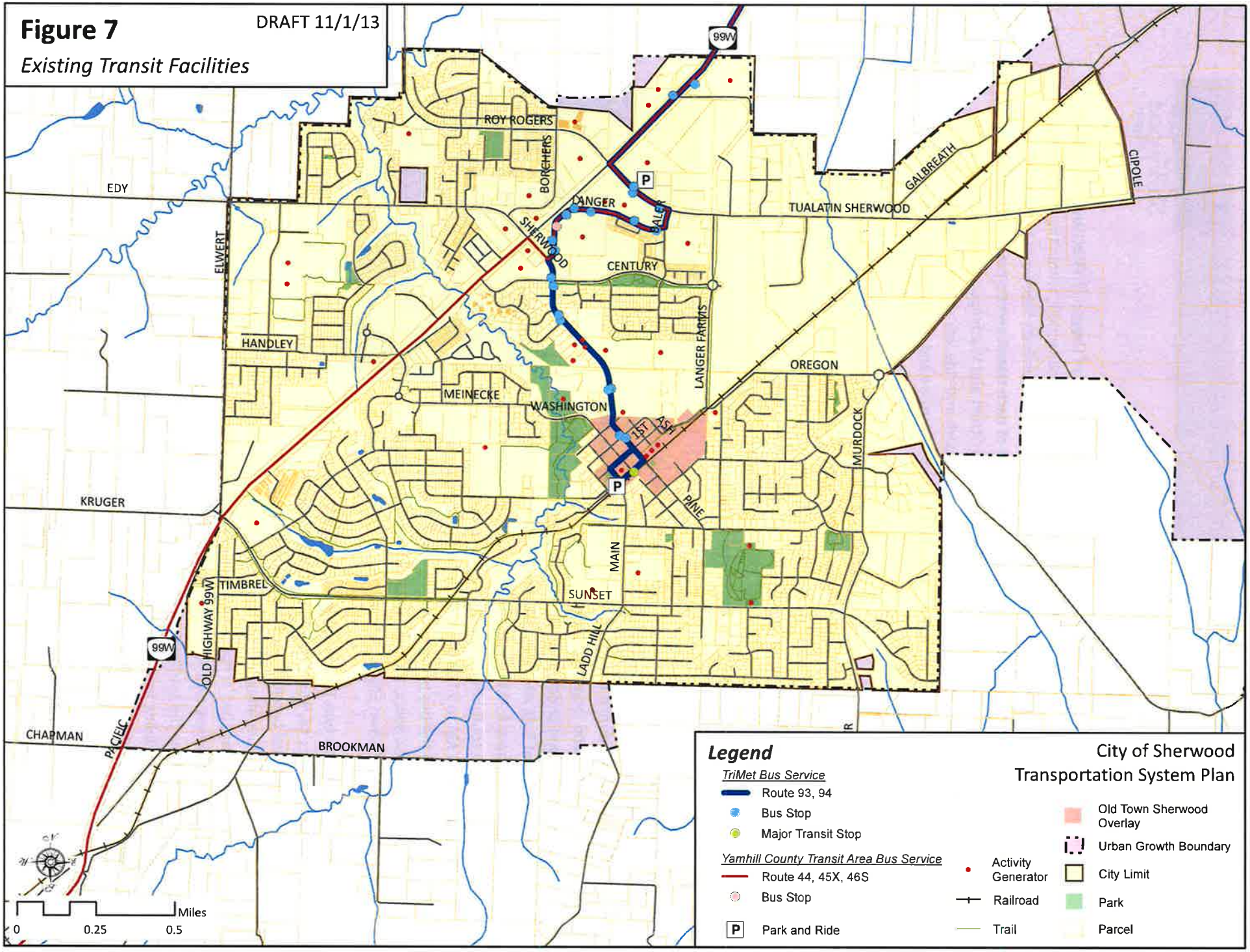
Some bus stops in Sherwood include amenities such as benches and shelters.

In addition to the two TriMet bus lines, the YCTA operates three bus lines; Routes 44, 45x (Express), and 46S (Saturday). These bus lines all travel between McMinnville and Tigard, with stops at the various cities along the corridor, including Sherwood. The only stop in Sherwood is located on SW Langer Drive near Shari's. Route 44 runs from about 6:00 AM to 7:00 PM, with service every hour during peak times and every two hours during off-peak times. Line 45X operates only two trips every weekday, one at 7:00 AM in the southbound direction and one at 5:45 PM in the northbound direction, which serves those traveling from residences in Sherwood to Yamhill County (potentially for employment) during the typical commute times.

Figure 7

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Existing Transit Facilities



Freight Routes

Efficient truck movement plays a vital role in the economical movements of raw materials and finished products. The designation of through truck routes provides for this efficient movement while at the same time maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. The Washington County TSP identifies through truck routes in the Sherwood areas as Highway 99W and Tualatin-Sherwood Road/Roy Rogers Road, which are shown in Figure 8. In addition, Highway 99W (a Statewide facility) has several designations related to mobility and goods movements, including National Highway System, National Network, Freight Route, and Reduction Review Route.[2] These designations can limit reductions to vehicle-carrying capacity and (under the Reduction Review Route designation) subjects proposed reductions to review.

Other Modes

There are four other transportation modes often considered for transportation systems: rail, pipeline, air, and water. Sherwood does not have any designated airports/heliports or navigable waterways. However, it does have rail and pipeline facilities, which are shown in Figure 9.

The rail line in Sherwood is operated by Portland & Western (P&W), a sister company of Willamette & Pacific (W&P) Railroad and a subsidiary of Genesee & Wyoming Incorporated. The line runs northeast-southwest through Sherwood and generally parallels Highway 99W between McMinnville and Tigard. The majority of rail crossings in the Sherwood area are gated, with the exceptions being at-grade (ungated) crossings at Brookman Road and Middleton Road (both located outside the City but within the UGB). Further south of Sherwood, the rail has a grade-separated crossing of Highway 99W.

Northwest Natural operates several high-pressure pipelines that serve Sherwood. These lines run along Elwert Road, Cipole Road, Tualatin-Sherwood Road, and Oregon Street. In addition, Kinder Morgan operates a petroleum gas line (gasoline and diesel) that runs from the Port of Portland to Eugene through the eastern part of Sherwood.

Both BPA and PGE transmission lines are located in Sherwood and generally run northwest from Tonquin Road near Tualatin. These lines cross existing roadways, including Oregon Street south of Tualatin-Sherwood Road and Tualatin-Sherwood Road east of Langer Farms Parkway. The lines constrain future roadway network layout and connections. The lines run through the Tonquin Employment Area and were considered during the concept planning process.

[2] *1999 Oregon Highway Plan*, The Oregon Department of Transportation, May 1999.

Figure 8

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Existing Through Truck Routes

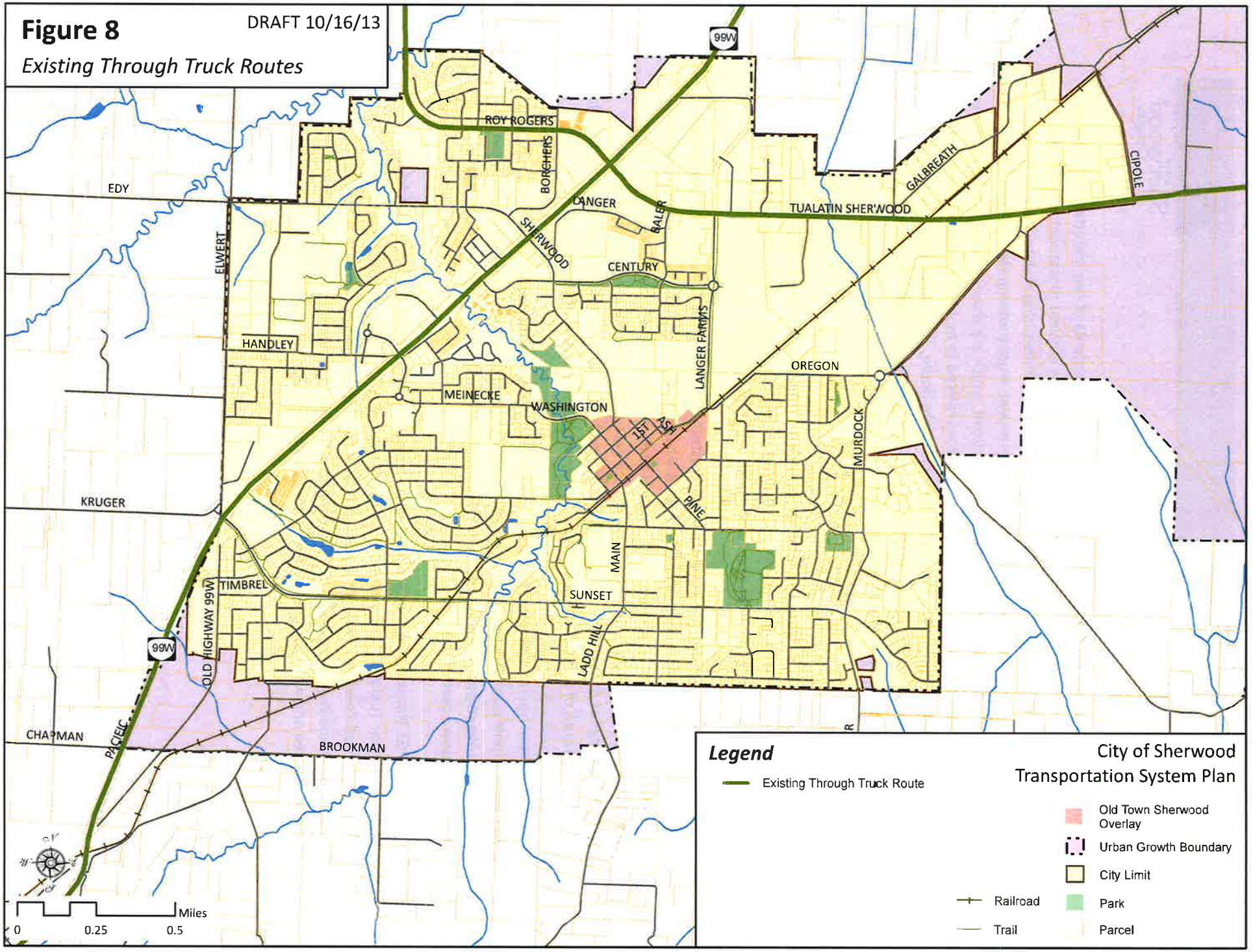
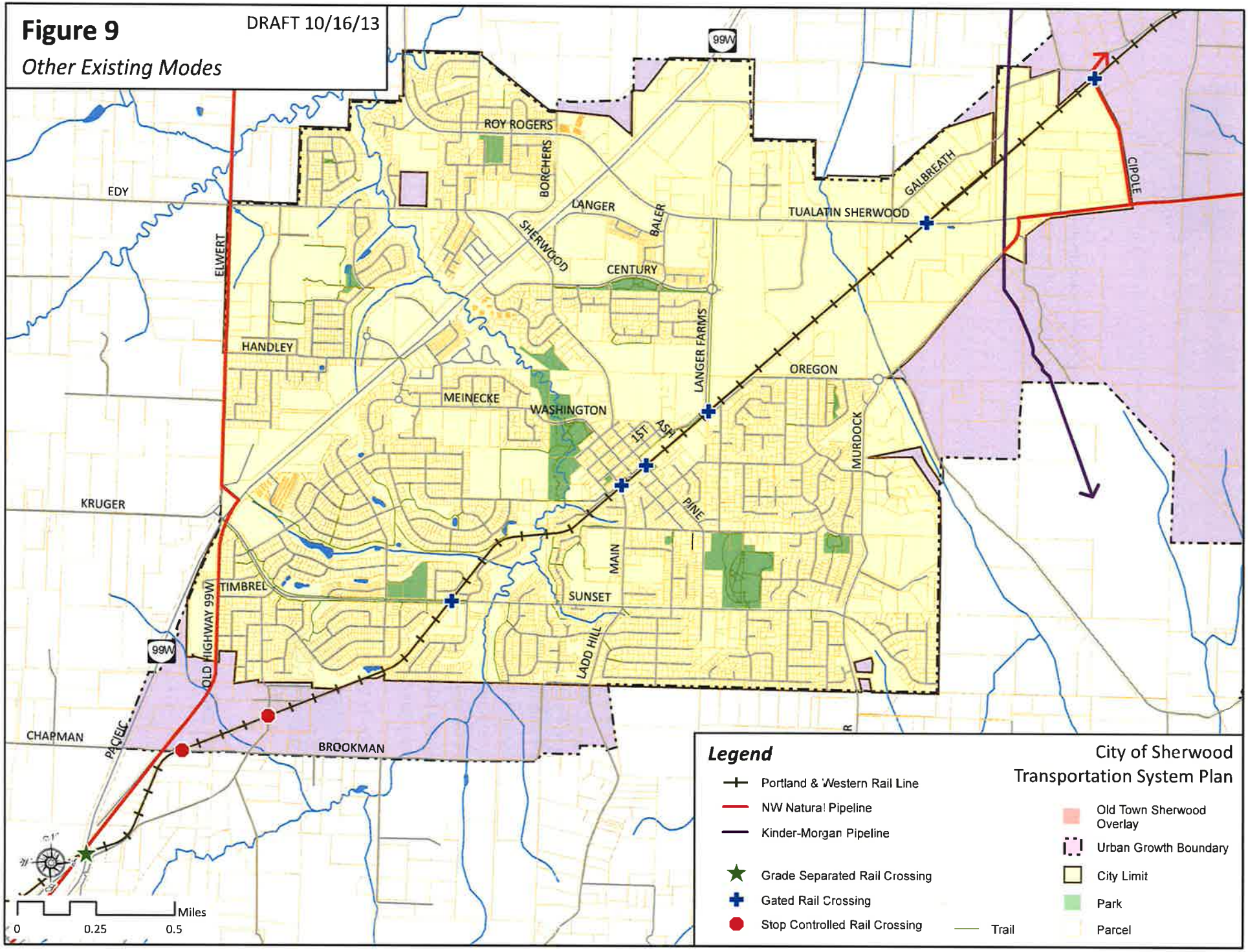


Figure 9

Other Existing Modes

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Safety Analysis

A safety analysis of roadways within Sherwood was performed using recent collision data. In addition, the Oregon Department of Transportation (ODOT) and Washington County both have Safety Priority Index Systems (SPIS) that rank locations by collision frequency and severity that were reviewed for the Sherwood area.

Collision Data

Collision data from the past five calendar years (2008 through 2012) was obtained from ODOT and reviewed to identify the location and characteristics of all collisions involving pedestrians or bicyclists. In addition, the data was reviewed for any fatal collisions, but none occurred within Sherwood during this time period. Other auto-auto collisions were separately analyzed for higher incident locations (next section). Figure 10 shows the locations of the pedestrian and bicycle collisions in Sherwood between 2008 and 2012. There were 10 pedestrian-related collisions and 11 bicycle-related collisions. A significant cluster of both types of collisions occurred in the vicinity of the Highway 99W/Sherwood Boulevard intersection. Other general locations including pedestrians or bicycles included the Old Town and area along Sunset Boulevard.

Washington County SPIS

Washington County's Safety Priority Index System (SPIS) prioritizes which intersections are in the greatest need of safety improvements based on three years of collision data. The County's current SPIS list includes collisions that occurred between 2007 and 2009. The SPIS prioritization is derived from factors such as the number of collisions, the type of collisions, the collision severity, and traffic volumes. The collision data only includes those collisions reported to the Oregon Department of Transportation. In addition, the County SPIS list only includes intersections that have at least one county controlled approach and where three or more crashes (or one or more severe injury or fatal crash) occurred at the intersection over the three year period. Sherwood has five intersections on the most recent County SPIS list. Table 1 lists each intersection along with the number of collisions by severity. These locations were further examined in the Collision Trend Analysis section.

Table 1: Washington County SPIS Rankings in Sherwood (2007-2009)

Ranking	Street	Cross Street	Total Collisions	Fatal Collisions	Injury Collisions
29	Highway 99W	Tualatin-Sherwood Rd/Roy Rogers Rd	42	0	21
40	Elwert Rd/ Sunset Blvd	Highway 99W	25	0	11
63	Oregon St	Tualatin-Sherwood Rd	27	0	12
73	Cipole Rd	Tualatin-Sherwood Rd	25	0	11
87	Gerda Ln	Tualatin-Sherwood Rd	10	0	6

ODOT SPIS

The Oregon Department of Transportation (ODOT) also uses a SPIS to identify which state highway sections experience the greatest number and highest severity of collisions. ODOT updates its SPIS list annually based on the most recent three years of collision data. ODOT's most recent SPIS list is from 2012 (calculated using crash data from based on 2009-2011). The 2012 SPIS list identifies the following segments of Highway 99W in Sherwood as being in the top 10% (or higher) locations in the state:

- MP 14.91 to MP 15.09 (Tualatin-Sherwood Road intersection) is a top 5% SPIS location.
- MP 16.61 to MP 16.73 (Elwert Road/Sunset Boulevard intersection) is a top 5% SPIS location
- MP 15.92 to MP 16.01 (Meinecke Road intersection) is a top 10% SPIS location.

The first two locations identified on the ODOT SPIS list were also identified on the Washington County SPIS list. The Highway 99W/Meinecke Road intersection does not include any County roads and so would not have been evaluated by Washington County.

Collision Trend Analysis

Collision trends were analyzed for the six locations identified as ODOT and/or Washington County SPIS locations using ODOT collision records from the past five calendar years (2008 through 2012). Table 2 lists the collision breakdown by type for each of the locations, which all occurred at signalized intersections.

Table 2: Collision Summary of ODOT and Washington County SPIS Locations (2008 to 2012)

Intersection	Total	By Severity		By Type						
		Injury	*PDO**	*Rear-End*	*Turn Mvmt*	*Fixed Object*	*Side-swipe*	*Angle*	*Bike/ Ped*	*Other*
Hwy 99W/Roy Rogers Rd/ Tualatin-Sherwood Rd	81	42	39	56	10	2	6	4	0	3
Tualatin-Sherwood Rd/Cipole Rd	62	36	26	59	1	0	1	0	0	1
Hwy 99W/Elwert Rd/Sunset Blvd	58	33	25	48	6	2	0	2	0	0
Tualatin-Sherwood Rd/Oregon St	47	23	24	33	10	2	1	0	0	1
Tualatin-Sherwood Rd/Gerda Ln	44	30	14	37	3	2	0	0	0	2
Hwy 99W/Meinecke Rd	38	20	18	21	8	6	1	2	0	0
TOTAL COLLISIONS	***330***	***184***	***146***	***254***	***38***	***14***	***9***	***8***	***0***	***7***
Percent of Total	***100%***	***56%***	***44%***	***77%***	***11%***	***4%***	***3%***	***3%***	***0%***	***2%***

*Note: PDO – Property Damage Only

Approximately half of the collisions resulted in injuries at most locations. The exception is the Tualatin-Sherwood Road/Gerda Lane, where more than two-thirds of the collisions resulted in injuries. At all of the intersections, the large majority of collisions were rear-ends, which is common at signalized intersections on high speed/high volume facilities.

A closer review of the six intersections indicated that the major cause of collisions, which primarily applied to the rear-end collisions, was "following too close" (190 collisions or 60%). Other causes included "careless" (29 collisions or 9%), "too fast for conditions" (28 collisions or 8%), and "other improper driving" (25 collisions or 7%). A summary of each location follows.

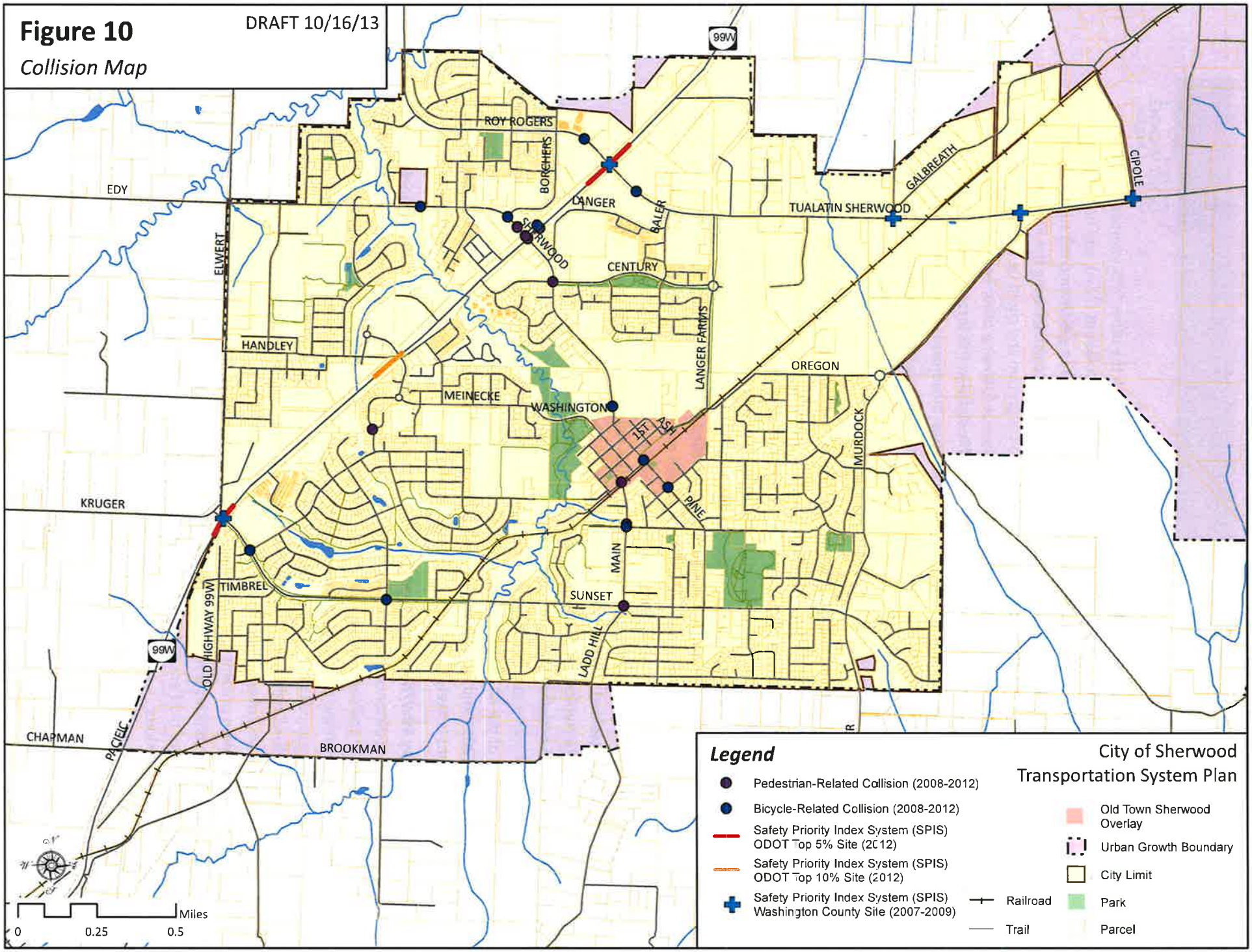
- **Highway 99W/Tualatin-Sherwood Road/Roy Rogers Road:** The majority of the collisions occurred along Highway 99W in either direction and varied in distance from the intersection. This pattern of rear-end collisions is common at signalized intersections on high speed/high volume facilities. In addition, there were a number of collisions on the side street approaches as well. Eight of the ten turning movement collisions occurred on Tualatin-Sherwood Road and involved vehicles turning right to travel north-eastbound on Highway 99W. This indicates a pattern that could be attributed to the yield condition and geometry of the right turn movement. Vehicles starting to turn on the yield movement and then suddenly stopping before entering the highway may cause the following vehicle (that is anticipating that the first vehicle will enter the highway) to collide. The geometry and traffic control for this movement is subject to change with the Washington County improvements that are currently under design. The congestion-related collision patterns at this location (rear-end and misjudged gap-entry) may increase along with future traffic growth.
- **Tualatin-Sherwood Road/Cipole Road:** Nearly all of the collisions occurred on Tualatin-Sherwood Road and slightly more occurred in the eastbound direction (34 collisions) versus the westbound direction (26 collisions). In addition, almost one-third (19 of 62 collisions) involved more than two vehicles, which is a very high proportion of collisions and may indicate sudden breaking, possibly due to unanticipated stopping. The rear-end collision pattern is related to congestion and may be due to the mix of the rural nature of the area with urban levels of congestion. While these crashes may increase in the future along with traffic growth, the pattern also may decrease as the area becomes more urbanized and developed.
- **Highway 99W/Elwert Road/Sunset Boulevard:** Nearly all of the collisions occurred along Highway 99W, with nearly two-thirds occurring in the southbound direction. The collisions varied in distance from the intersection, and the horizontal and vertical curvature in Highway 99W may be a contributing factor. The rural nature of this location may also contribute to driver expectancy issues related to drivers being unprepared to stop. The congestion related collision patterns on Highway 99W could increase along with future traffic growth. However, the crash frequency could decrease as the area becomes more urbanized and drivers anticipate congestion and stopping on the highway.

- **Tualatin-Sherwood Road/Oregon Street:** Compared with the other SPIS intersections, this intersection had proportionally more turning movement collisions (21%), and half of the turning collisions (five of ten collisions) involved a vehicle making the westbound left turn from Tualatin-Sherwood Road onto Oregon Street with most of these occurring during the PM peak hour (four of five collisions). This pattern is likely related to congestion and could be a result of a number of related issues including drivers near the end of queue following other vehicles beyond the protected green indication. In addition, the traffic signal at this location was modified in June 2008 to allow "permitted" (flashing yellow) left turn movements that require the turning vehicle yield to oncoming traffic. Misjudgment of the oncoming vehicle speeds may have contributed to turning movement collisions at this location. Additional growth and traffic volume is likely to increase these congestion-related collision patterns.
- **Tualatin-Sherwood Road/Gerda Lane:** Similar to the Cipole Road intersection, nearly all of the collisions occurred on Tualatin-Sherwood Road. However, the directionality of collisions was reversed and the majority occurred in the westbound direction (27 collisions) instead of the eastbound direction (16 collisions). Just over half of these collisions (14 of 27 collisions) occurred during the midday or p.m. peak periods (11 a.m. to 1 p.m. or 4 p.m. to 6 p.m.), likely due to higher traffic volumes. A traffic signal was installed at this intersection in late December 2010. Two of the turning movement collisions (which are typically more dangerous) occurred before the signal was installed. The third incident, while classified as a turn movement, occurred after the signal was installed and was related to a bus following a vehicle too closely and hitting it while it yielded to a pedestrian in the crosswalk. Therefore, no traditional turn movement collisions (typically made with a vehicle going straight and hitting a conflicting left turning vehicle) occurred after the signal was installed. As is generally typical for other locations, the rate of rear-end collisions at this location increased following the installation of the traffic signal. Only 8 of the 44 collisions occurred during 2008 through 2010, while 36 occurred in the two years (2011 and 2012) following the traffic signal installation. This high incidence of rear-end collisions is likely to increase with future traffic growth along Tualatin-Sherwood Road.
- **Highway 99W/Meinecke Road:** Nearly all of the collisions occurred along Highway 99W and varied in distance from the intersection. Slightly more occurred in the southbound direction (16 of the 27 collisions on Highway 99W). This patterns of rear-end collisions is similar to the trend present at the other SPIS locations. However, this location also includes a higher portion of turn movement collisions. Half of the turn movement collisions involved multiple vehicles making a northbound right from Meinecke onto Highway 99W. These incidents may be related to overly-aggressive drivers similar to the pattern at Highway 99W/Tualatin-Sherwood Road. The third observation present at this location is related to the higher number of fixed object collisions that involve vehicles driving into the ditch. This pattern may be related to drivers misjudging the separated medians at each leg of the intersection, which has a greater separation than other intersections.

Figure 10

Collision Map

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Transportation Funding

The City of Sherwood utilizes a number of revenue sources to fund the construction, operation, and maintenance of its transportation system. While transportation funding is commonly viewed as a user fee system (where system users pay for infrastructure through motor vehicle fees such as gas tax, registration fees, or transit fares), much of what the public views as new construction is commonly funded (partially or fully) through property tax levies, traffic impact fees, and required improvements by land development. In addition, a great share of motor vehicle user fees is used for road maintenance, operation, and preservation of the system rather than construction of new system capacity. Sherwood's budget over the last five year period was reviewed to estimate the amount of transportation revenue and expenses that are likely to occur on an annual basis.

Table 3 lists the yearly funding sources Sherwood is expected to have available to meet its transportation system needs. It also lists the City's ongoing transportation-related operational and maintenance expenses. The $1,982,000 yearly revenue is expected to exceed the $1,467,000 of ongoing yearly expenses by $515,000. This amount would be available for capital improvement projects and would provide a total of approximately $11.3 million through year 2035. However, additional construction may be facilitated through project-specific grants, intergovernmental contributions, or other means. Following the table, general descriptions of the City's funding sources and expenses are provided. In addition, potential new transportation system funding sources are identified and discussed.

Table 3: Sherwood's Yearly Transportation System Funding and Expenditures

Revenue and Expenditure Sources	Annual Amount	Use or Restrictions
Revenue		
State Apportionment of Vehicle Taxes	$995,000	Road-related expenditures
Washington County Gas Tax Allocation	$66,000	Road-related expenditures
Street Maintenance Fee	$261,000	Street maintenance only
Street Light Fee	$201,000	Street lights only
City and County SDC and TDT Charges	$250,000*	Capacity improvements only
Misc. Revenue (Operations)	$10,000	
Misc. Revenue (Capital Improvements)	$65,000	
Sidewalk Fee	Temporary	Only a 5-year program
Developer Exactions	Varies	Frontage or off-site improvements based on traffic impacts
Urban Renewal District	Varies	Approved projects within URD boundaries
Total Revenue	**$1,982,000**	
Expenses (Non-Capital)		

Revenue and Expenditure Sources	Annual Amount	Use or Restrictions
Administrative Services / Personnel	$787,000	Paid with tax allotments
Street Lighting (Electricity)	$180,000	Paid by Street Light Fee
Street/Landscape Repair and Maintenance	$500,000	Paid by Street Maintenance Fee
Total Expenses	**$1,467,000**	
Funds Available for Capital Improvements	**$515,000**	

Note: * SDC Estimate to be refined based on future growth assumptions.

Current Funding Sources and Expenditures

The City of Sherwood uses multiple funding sources to pay for the construction, operation, and maintenance of its transportation infrastructure and services. Two key financial policies that guide its funding choices[3] are: (1) the City of Sherwood will identify sustainable revenue levels and, to the extent possible, current operations will be funded by current sustainable revenues and (2) one-time revenues will be used for one-time expenditures or as contributions to reserves and will not be used to pay for established services. In general, the City observes the following practices:

- Improvements driven by new development are principally paid for using transportation system development charges (SDCs) and developer contributions.
- Improvements made to reduce blight and attract development within the City's urban renewal district (URD) are paid for by the district. Approved projects within the URD boundaries expire in year 2021.
- Other improvements undertaken by the City are paid for using a combination of various city funds depending on project components (e.g., streets, sidewalks, lighting, stormwater, etc.), some of which are paid for using a utility fee.
- Pedestrian and bicycle facilities are constructed as part of roadway projects or paid for as park improvements.
- Staff time (i.e., planning, engineering, and other administration) and supply costs are charged to the Streets Operating Fund for time spent working on transportation-related tasks and projects.

State Apportionment of Vehicle Taxes

The State of Oregon Highway Trust Fund collects various taxes and fees on fuel, vehicle licenses, and permits. A portion is paid to cities annually on a per capita basis. By statute, the money may be used for any road-related purpose. Sherwood uses it for street operating needs. Gas taxes are the primary revenue source for the Oregon Highway Trust Fund and are collected as a fixed amount per gallon of

[3] 2013-2014 Adopted Budget, City of Sherwood

gasoline served. Because there is no adjustment for inflation, the buying power of these funds has decreased over time; however, in 2010 the state legislature voted to raise the tax from 24 cents to 30 cents per gallon, which has boosted recent revenues. The State of Oregon has also considered and tested other means of collecting fees based on total miles traveled within the State, rather than on a per-gallon basis.

Washington County Gas Tax Allocation

A portion of the Washington County gas tax is distributed to cities. Sherwood uses its funds to help cover its transportation system operating expenses.

Street Maintenance Fee

The City of Sherwood charges a street maintenance fee to residential and commercial customers on their monthly utility bills. These funds go directly towards regular road repairs (i.e. patching, signage, stripe painting), exercises for longevity (i.e. crack and slurry sealing), and reconditioning (i.e. replacing an entire street). Residential customers are charged a monthly fee of $2.00 per household, while commercial customers are charged $2.00 per equivalent surface unit (ESU) per month.

Street Light Fee

The City of Sherwood charges a street light fee to residential and commercial customers on their monthly utility bills. While Portland General Electric (PGE) performs the work on the lights, the City budgets for routine and irregular maintenance for safety. Residential customers are charged a monthly fee of $2.32 per household, while commercial customers are charge $0.67 per equivalent surface unit (ESU) per month.

Sidewalk Fees

The City of Sherwood currently has two different sidewalk fees that it charges residential and commercial customers on their monthly utility bills. However, both of these fees are part of five-year programs. The first is a "Safe Sidewalks Fee" that is being used to build new sidewalks, especially in the high foot-traffic areas around schools. The "Sidewalk Repair Fee" provides funds to assist homeowners in repairing cracked and broken sidewalks in front of their homes to reduce tripping hazards. These fees were started in Fiscal Year 2012/2013. Since the five-year program is not expected to extend through the TSP horizon year of 2035, these revenues were not included in the average annual revenue for projecting total funds in 2035.

Washington County Transportation Development Tax (TDT)

The County Transportation Development Tax (TDT) is a tax on new development, approved by voters in 2008 to replace the previous tax, known as the Traffic Impact Fee (TIF). The tax is currently being phased in and has one more step increase. The TDT was approved by voters as a tax and as such is not limited by existing state statute in terms of how it is calculated or applied, though it does generally conform to statutory SDC requirements.

The Washington County TDT is levied on all new development based upon the amount of traffic added by the development and can only pay for new infrastructure needed to serve growth. TDT monies collected for development within incorporated cities are distributed back to those cities for their use on street projects in the community. There are limitations to the type of street projects that can be funded by TDT monies, and all projects must be approved by the Washington County Coordinating Committee, which consists of City and County elected officials representing each community. In order to obtain credit for the County's TDT, a project that is being constructed must appear on the County's TDT CIP list and must be built above Sherwood's minimum facility standard. The credit is only applicable for the cost portion above Sherwood's minimum facility standard.

Sherwood System Development Charges (SDCs)

The City's system development charges (SDCs) are assessed on all new residential and commercial construction within the city. These funds can only be used to construct capacity-related transportation improvements or provide a capital recovery element to compensate for existing capacity paid for by current users. The City of Sherwood currently charges $3,011.94 per single-family dwelling unit, which corresponds with one PM peak hour trip. The fee amount changes for other land use types, and the basis for the deriving the fee was the amount of traffic generated by those uses. In order to get credits for the City's SDC fee, an improvement must be to a collector roadway or higher classification and also appear on the City's CIP list.[4] Because of Washington County's TDT, which is remitted to the City when development occurs in city limits, the City's SDC fees are reduced appropriately to avoid double charging developers.

Miscellaneous Revenue

The City of Sherwood receives revenue from minor sources, such as project inspections, interest earnings, and other sales and services.

State/Regional Grants and Program Funds

The City of Sherwood applies for various grant opportunities to fund transportation projects. The City was recently awarded $5 million from Metro for the Cedar Creek Trail through the regional flexible funds program. While the various programs and grants are generally very competitive, they can provide valuable resources and opportunities. Some of these potential grant or program opportunities include Regional Flexible Funds, Enhance and Fix-It, and the Highway Safety Improvement Program (HSIP).

Developer Exactions

Exactions are improvements constructed by developers as conditions of development. Developers are generally required to mitigate traffic impacts, which may include frontage improvements and, in some cases, offsite improvements depending upon their level of traffic generation and the impact to the transportation system.

[4] Memorandum: Clarification of Credits Available for Road Construction, Sherwood Community Development Department, September 11, 2012.

Urban Renewal District

Sherwood's Urban Renewal District (URD), authorized in ORS 457, is a tax-funded district within the city that was formed in 2000 following an extensive public process. The URD is funded with the incremental increases in property taxes that result from construction of applicable improvements. This type of tax increment financing has been used in Oregon since 1960. Uses of the funding include, but are not limited to, transportation projects. Total projected transportation funding over the life of the district is $17.5 million. Approximately $16.5 million of the tax increment financing is assumed in selected street improvement projects identified in the URD and TSP.

Limitations of the District are geographic in nature with the URD covering about 15% of Sherwood. Because of the funding mechanism and its resulting cash flow over time, the City has made use of debt capacity in order to construct needed facilities.

New Funding Sources and Opportunities

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

The following funding sources have been used by other cities to fund the capital and maintenance aspects of their transportation programs. There may be means to begin to or further utilize these sources, as described below, to address Sherwood's transportation needs:

- **General Fund Revenues**: At the discretion of the City Council, the City can allocate General Fund revenues to pay for its Transportation program. (General Fund revenues primarily include property, use taxes, and any other miscellaneous taxes and fees imposed by the City.) This allocation is completed as a part of the City's annual budget process, but the funding potential of this approach is constrained by competing community priorities set by the City Council. General Fund resources can fund any aspect of the program, from capital improvements to operations, maintenance, and administration. Additional revenues available from this source to fund new aspects of the Transportation program are only available to the extent that either General Fund revenues are increased or City Council directs and diverts funding from other City programs.
- **Voter-Approved Local Gas Tax**: Communities such as Sandy, Woodburn, and Tillamook have adopted local gas taxes by public vote. In Sandy, the tax is 1 cent per gallon, paid to the City

monthly by distributors of fuel. The process for presenting such a tax to voters will need to be consistent with Oregon State law as well as the laws of the City of Sherwood.

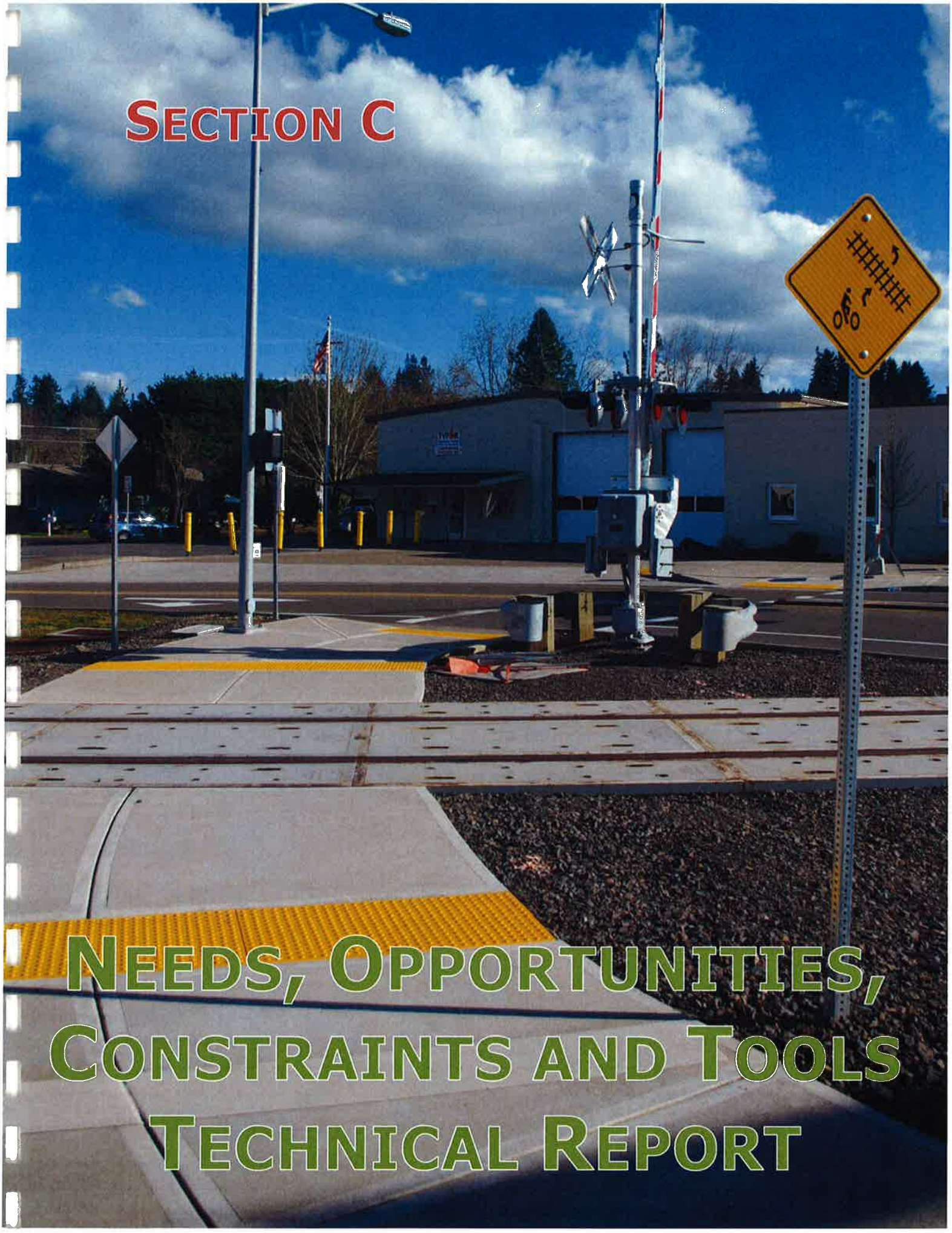
- **Local Improvement District Assessment Revenue**: Subject to voter approval, the City may set up Local Improvement Districts (LIDs) to fund specific capital improvement projects within defined geographic areas, or zones of benefit. LIDs impose assessments on properties within its boundaries. LIDs may not fund ongoing maintenance costs. They require separate accounting, and the assessments collected may only be spent on capital projects within the geographic area. A vote by citizens representing 33% of the assessment can terminate a LID and overturn the planned projects so projects and costs of a LID must meet with broad approval of those within the boundaries of the LID.
- **Direct Appropriations**: The City can seek direct appropriations from the State Legislature and / or U.S. Congress for transportation capital improvements. There may be projects identified in the Plan for which the City may want to pursue these special, one-time appropriations.
- **Special Assessments**: A variety of special assessments are available in Oregon to defray costs of sidewalks, curbs, gutters, street lighting, parking and CBD or commercial zone transportation improvements. These assessments would likely fall within the Measure 50 limitations. A regional example would be the Westside LRT where the local share of funding was voter approved as an addition to property tax.
- **Employment Taxes**: TriMet collects a tax for transit operations in the Portland region through payroll and self employment taxes. Approximately $145 million are collected annually in the Portland region for transit.

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

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

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

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SECTION C

NEEDS, OPPORTUNITIES, CONSTRAINTS AND TOOLS TECHNICAL REPORT

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NEEDS, OPPORTUNITIES, CONSTRAINTS AND TOOLS

The following sections summarize the existing and future needs of Sherwood's transportation system for pedestrians, bicyclists, transit users, and drivers. The analysis conducted through the TSP update will determine solutions to address these identified needs for each mode of travel. The following items, included in this report, prepare for the analysis that will develop transportation solutions:

- A list of needs for each travel mode
- A toolbox of measures and strategies that can be used to address the identified needs.
- Opportunities and constraints for major gaps in the pedestrian, bicycle, and roadway network.
- Evaluation criteria process that will be used to prioritize projects, and
- A summary of key items in Metro's Regional Transportation Functional Plan (RTFP) compliance checklist for Sherwood to address through this TSP update.

These items will provide the groundwork for developing a prioritized project list for the Sherwood Transportation System Plan to address the needs identified in this report.

Multi-Modal Transportation System Needs

The following sections summarize the needs of Sherwood's multi-modal transportation system.

Projected Growth

To address the future needs of the transportation system, it is important to evaluate how Sherwood and surrounding area are expected to grow. Growth in and around Sherwood have the potential to add traffic in Sherwood, whether originating/destined in Sherwood or as through trips. As shown in Figure 1A, significant growth is expected in Sherwood as well as at the fringes of the city limits. Figure 1B shows regional areas where existing urban reserve areas (URA) are anticipated to develop that will also impact the transportation system. The blend of housing and employment growth is projected to increase the households (+110 percent) and jobs (+124 percent) in and around Sherwood. Table 1 summarizes projected growth in the Sherwood area, including areas outside the urban growth boundary (UGB).

Table 1: Summary of Growth in Sherwood Area from 2010 to 2035*

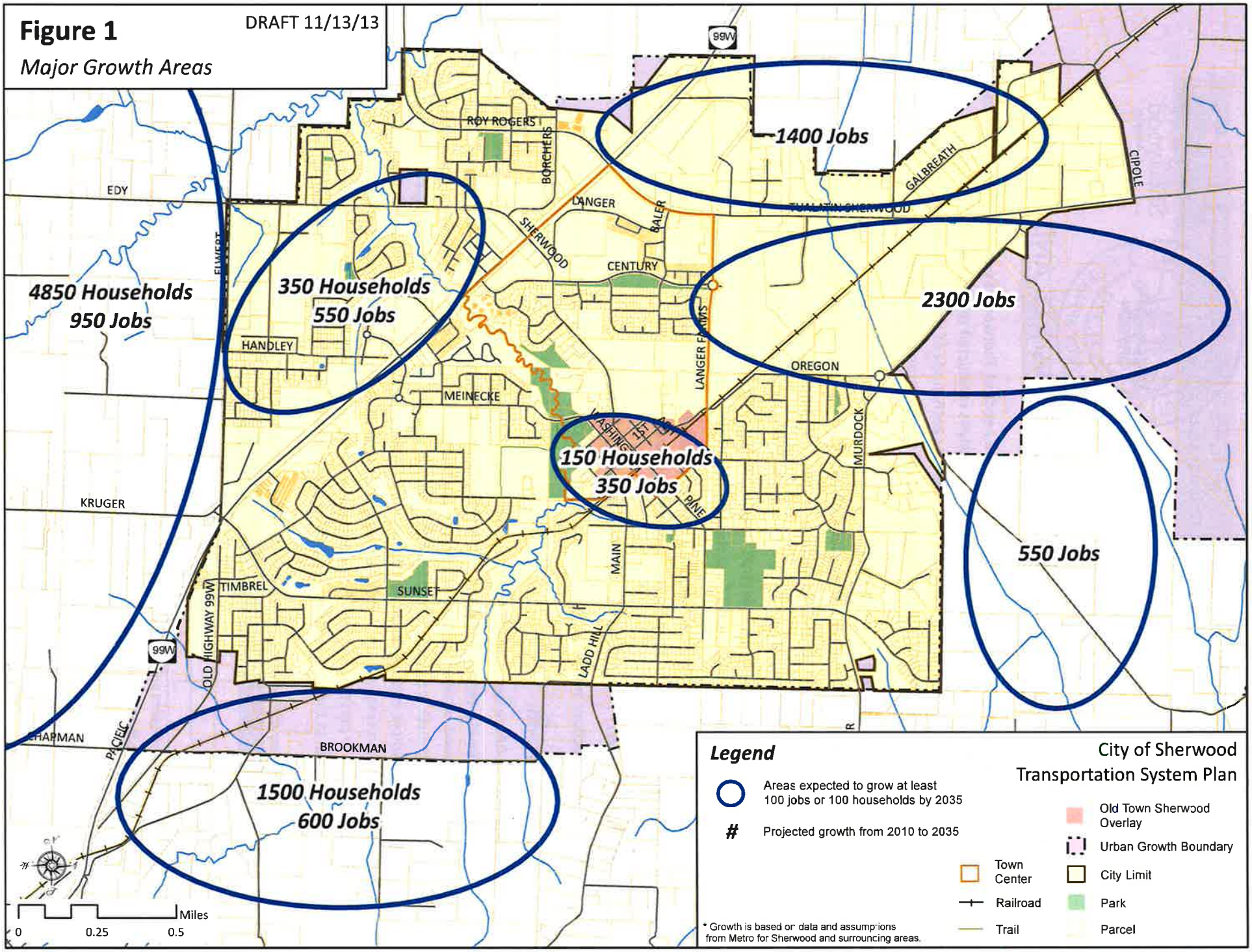
Land Use	Year 2010	Year 2035	Growth
Population	24,300	42,500	18,200 (+75%)
Households	7,500	15,950	8,450 (+110%)
Jobs	8,850	19,850	11,000 (+124%)

Note: Land use represents areas currently outside Sherwood city limits to capture overall growth in area, including vacant and reserve land. Land use growth and household size forecasts are consistent with Metro's projections.

Figure 1

Major Growth Areas

DRAFT 11/13/13



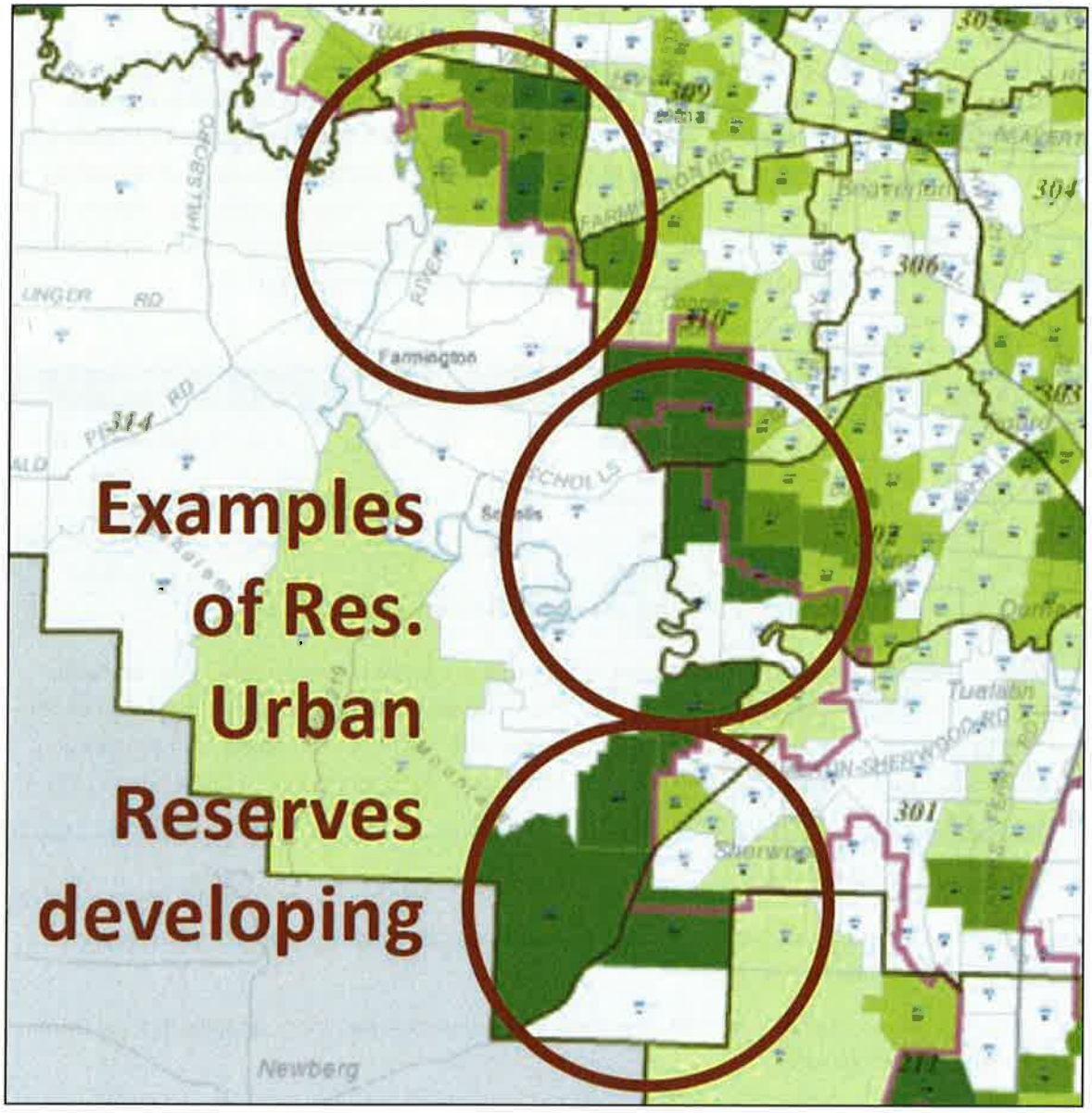


Figure 1B: Regional Residential Growth Areas (color intensity denotes growth intensity)[1]

In addition to growth within Sherwood's city limits or within the existing UGB, regional growth projections include urbanization in urban reserve areas (URA) that are currently located outside the UGB. These are areas set aside for future growth as the region expands. As a larger regional growth supply is needed in the future, the UGB will be expanded to include these areas. Figure 1B indicates that significant household growth is projected along the western edges of the UGB near Sherwood, Beaverton, and Hillsboro in areas that are currently designated as urban reserves.

[1] Source: Metro, MetroScope Jurisdiction Reviewed TAZ Gamma Forecast, DRAFT. (Disclaimer: This map is for research purposes only and does not reflect policy decisions by any jurisdictional authority.) Growth color is illustrative and is based on model zone boundaries and does not indicate growth for a specific parcel.

System Needs and Measures

System measures provide an overall assessment of Sherwood's future transportation system relative to existing conditions. Table 2 provides an overview of system measures that can be used to evaluate Sherwood's progress towards regional goals. As listed in Table 2, while the overall distance travelled by vehicles is projected to increase in the future, the average motor vehicle distance traveled per person is projected to decrease. This decrease is consistent with Metro's goals related to reducing reliance on the motor vehicle. The amount of delay in the system (including freight corridors) is anticipated to triple (an increase of 200%+) through 2035 without additional improvements to the system.

Table 2: System Performance Measures (PM Peak Hour)

Measure	Year 2010	Year 2035	Change
Total Vehicle Miles Travelled (VMT)	34,100 vmt	55,600 vmt	21,500 vmt (+63%)
VMT per capita	1.4 vmt/capita	1.3 vmt/capita	-0.1 (-7%)
Vehicle Hours of delay (VHD)	440	1,420	980 (+223%)
VHD on Freight Corridors*	240	870	630 (+263%)

Note: *Freight corridors include OR 99W, Tualatin-Sherwood Road, and Roy Rogers Road.

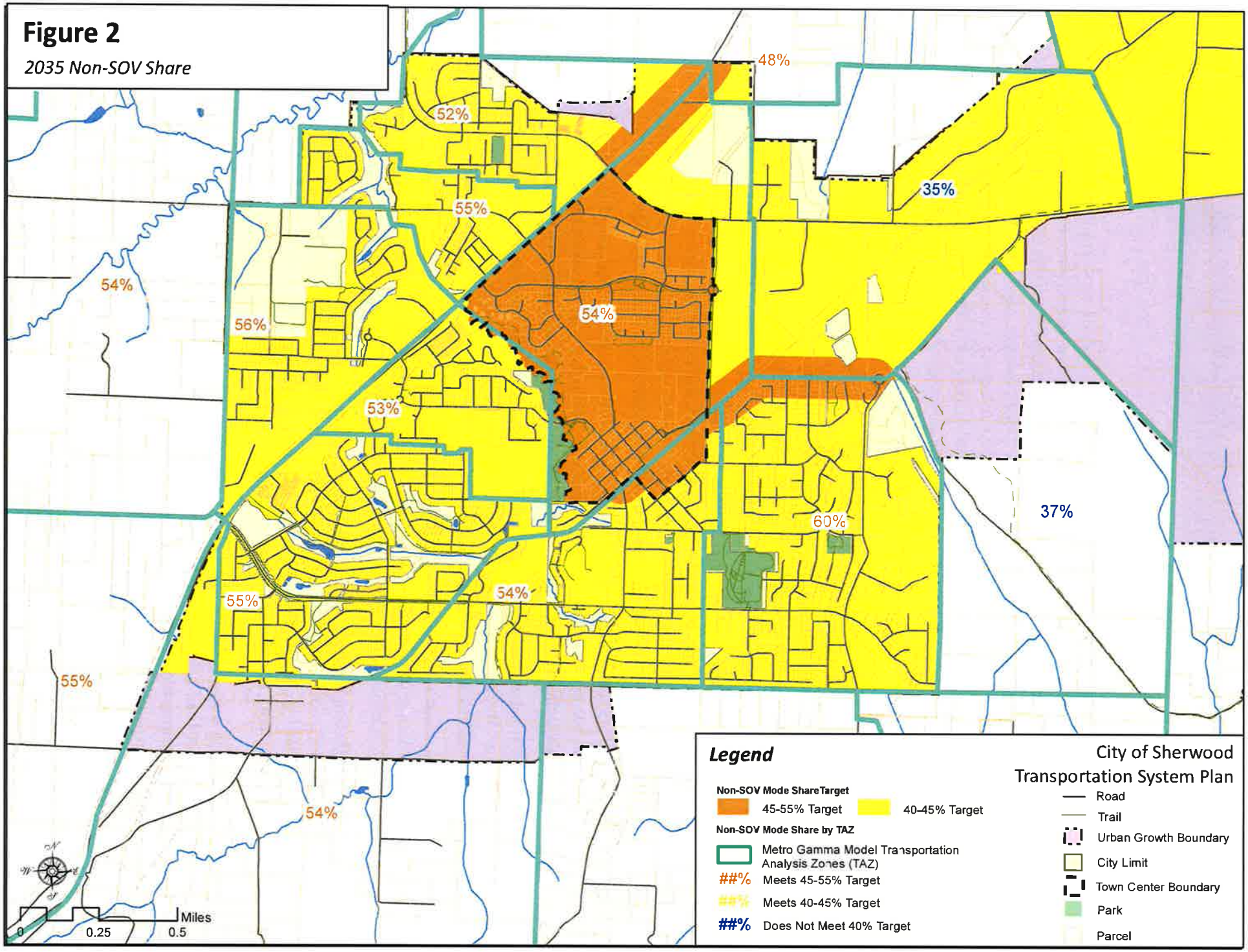
Metro also sets regional targets for the amount of trips that are made by means other than someone driving alone or a "single occupant vehicle" (SOV). These regional targets are set for the portion of non-SOV travel (trips made by pedestrian, bike, transit, carpool, etc.) based on the target land use density (the 2040 design type). The targets are structured so that more dense areas have a higher share of non-SOV trips. Each design type and non-SOV target is as follows:

- Portland Central City (60-70%)
- Regional Centers, Town Centers, Main Streets, Station Communities, Corridors, Passenger Intermodal Facilities (45-55%)
- Industrial Areas, Freight Intermodal Facilities, Employment Areas, Inner Neighborhoods, Outer Neighborhoods (40-45%)

The travel model provides estimates of the various modes of travel that can be generally assessed at the transportation analysis zone (TAZ) level. Figure 2 summarizes the level of non-SOV mode share estimated for 2035 using the regional travel demand model in comparison to the modal targets set in Metro's Regional Transportation Plan (RTP). These non-SOV targets are aggregated by design type groupings (as listed above) and colored in Figure 2 as orange (45-55% target) and yellow (40-45% target). For each TAZ, the 2035 non-SOV share is listed. The 2035 non-SOV share for each TAZ is also colored to indicate the highest target that is satisfied (orange for 45-55% target, and yellow for 40-45% target). Note that TAZ boundaries, which are the basis for the non-SOV share data, do not directly align with the 2040 design type boundaries (this is not critical). Based on the model data, it appears that the targets are typically achieved for the western areas but not met for areas east of Langer Farms Parkway.

Figure 2

2035 Non-SOV Share



Pedestrian System

While Sherwood's pedestrian network is generally well-developed, sidewalk connectivity gaps are present in key locations throughout the city, including within the Town Center, which has density and uses that support pedestrian activity. An assessment of gap locations prioritized the locations based on proximity to activity generators (such as schools, libraries, medical offices, parks, etc.). Figure 3 presents sidewalk gaps along the major street network (arterials and collectors), and indicates the preliminary prioritization based on density of activity generators. Solutions to address these gaps (including amenities on parallel facilities) will be explored during the next stage of the planning process.

Existing Needs

The *Existing Conditions Technical Report* identified the following key gaps in sidewalk connectivity:

- **Highway 99W** has significant gaps in sidewalk connectivity, especially a large portion south of Sherwood Boulevard that does not have sidewalks on either side of 99W. Several key sidewalk gaps on Highway 99W fall within high priority areas. These key gaps are adjacent to several shopping areas and medical offices. The highway also creates a barrier that is hard to cross
- **Oregon Street** along most of its length between Langer Farms Parkway and Murdock Road lacks sidewalks on both sides of the road; however, the northern side of the road has undeveloped land. These sidewalk gaps, however, are in low priority areas since they are further away from the activity generators. Some gaps may be filled by funded Cedar Creek Trail improvements.
- **Edy Road** along most of its length between Highway 99W and Elwert Road lacks sidewalks on at least one side of the road. Several key sidewalk gaps along Edy Road fall within high priority areas due to the high concentration of medical offices and elementary/middle schools.
- **12th Street** between Highway 99W and Sherwood Boulevard lacks sidewalks on the south side of the street. These sidewalk gaps fall within high priority areas as it serves shopping centers, medical offices, and the major transit route through the city.
- **Division Street** along most of its length between Main Street and Mansfield Street lacks sidewalks on at least one side of the road. As a neighborhood facility, its gaps are not shown in Figure 2. However, it falls within a high priority area due to its proximity to Old Town.
- **Gleneagle Neighborhood** lacks sidewalks along all streets (12th Street, Gleneagle Drive, Glenco Court, 11th Court, and 10th Street), including those that front homes. This network of local roads falls within high priority areas due to their proximity to the major transit route through the city, medical offices, shopping centers, and schools.

Other high priority gap locations include:

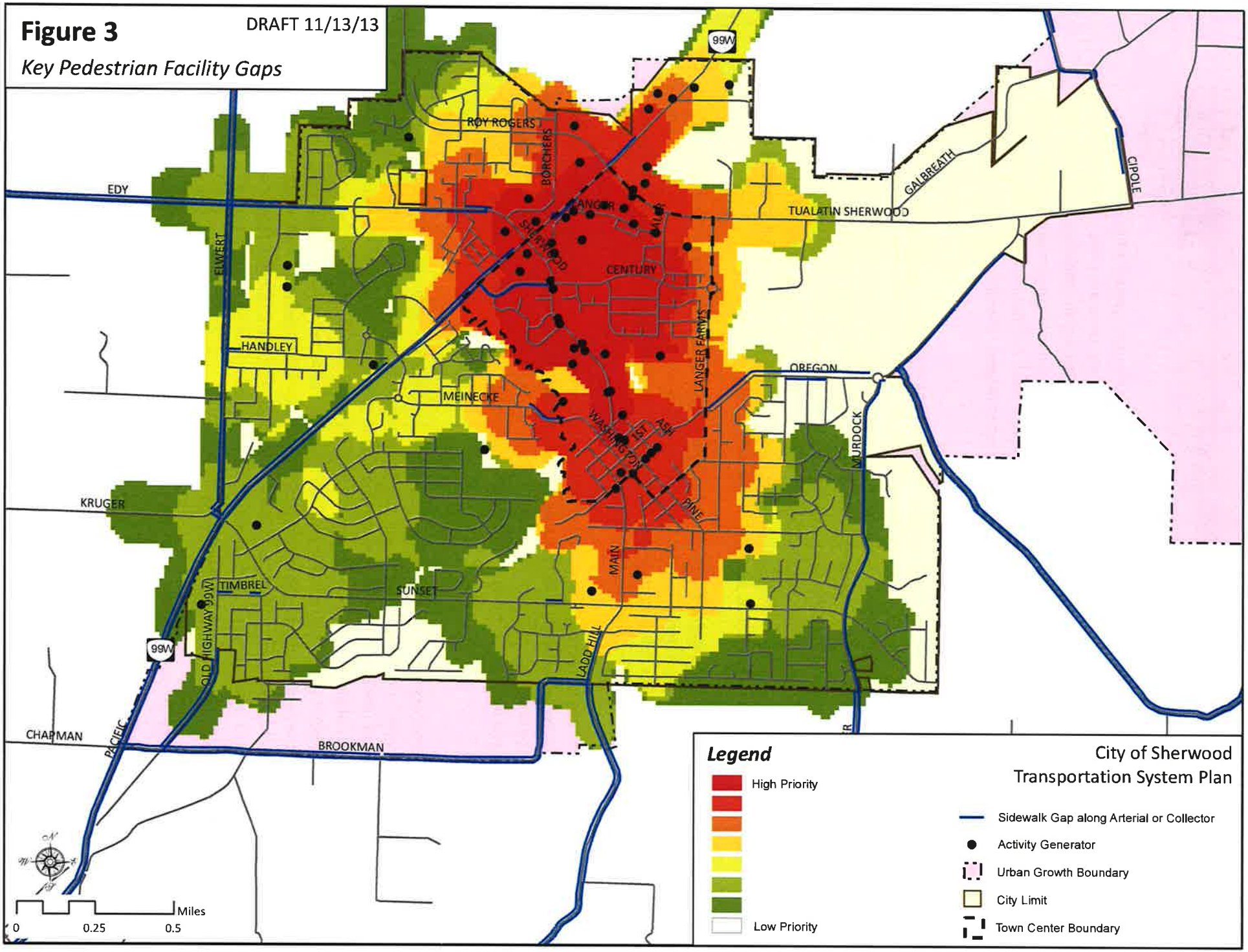
- **Meinecke Road** lacks sidewalk along the north side of the street east of Lee Drive for approximately 400 feet. This route is a major connection serving Old Town, which is dense with activity generators.

The appendix includes a complete prioritized list of sidewalk gaps on collector and arterial facilities.

Figure 3

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Key Pedestrian Facility Gaps



Street crossings are another important feature of Sherwood's pedestrian system. While controlled pedestrian crossings are provided at all major signalized intersections, there are some roadways where major intersections are spaced far apart, which results in crossing barriers for pedestrians. Highway 99W only has five crossing locations in the three-mile section through town, with particularly long spacing on the 3/4-mile stretch between Sunset Boulevard and Meinecke Road. Another pedestrian crossing gap located along a major roadway is located on Sunset Boulevard between Pinehurst Drive and St Charles Way.

The Highway 99W crossings are located at signals, and each signal only allows pedestrian crossings on one leg of Highway 99W (with the other crossing being closed). In addition, the west crosswalk on Sherwood Boulevard at the intersection of Langer Drive is also closed. In some cases these closures may have been made to address traffic operation needs to improve the flow of traffic by removing conflicting pedestrian movements. However, these closures are a tradeoff that can increase the crossing movements required by pedestrians to reach their destination. In some cases, a pedestrian may be required to cross three legs on an intersection rather than the desired (closed) leg. This increases the travel time for pedestrians as well as potential conflicts with motor vehicles.

Another major feature impeding pedestrian mobility is the large area of developed land without public rights of way through the properties between Old Town and the residential area to the north. While this area contains schools, a church, and other uses, it does not provide dedicated pedestrian connections between Sherwood Boulevard and Langer Farms Parkway.

There are also existing gaps in regional connectivity between Sherwood and neighboring communities. To address this issue, coordination will be required with Washington County and neighboring communities to develop regional trail connections. The Ice Age Tonquin Trail is an example of a regional facility that will provide regional connections between Sherwood, Tualatin, and Wilsonville.

Future Needs

As Sherwood grows, demand on the pedestrian system and the need to connect the city will also grow. Gaps in the sidewalk network within significant growth areas include: Brookman Road, Elwert Road, Oregon Street, and Tonquin Road. While pedestrian demand along these facilities is low today, they will become more critical routes by 2035. Several major arterials along the fringes of the city (e.g., Murdock Road, Oregon Street, Tualatin-Sherwood Road, Elwert Road) are expected to serve large growth areas by 2035, and will pose as major barriers to pedestrians without well-spaced pedestrian crossings. As these areas develop, enhanced pedestrian crossings will be needed along these facilities. Finally, increased activity within the Town Center will continue to highlight the need for pedestrian and bicycle improvements to enhance options for multimodal travel.

Bicycle System

With the exception of Highway 99W and Tualatin-Sherwood Road, most roadways do not provide bike lanes. An assessment of bicycle lane gaps on major roads and their proximity to activity generators was conducted. Figure 4 shows bike lane gaps along major roads (arterials and collector facilities), and indicates a preliminary prioritization based on density of activity generators. Several of these prominent locations are within the Town Center area, which is shown as having high potential for bicycle need due to the proximity to a number of activity generators.

Existing Needs

There are several key roadway segments without bicycle facilities that are located in high bicycle demand areas. These priority gap locations (which may not include the entire street length) include:

- **Edy Road** from Houston Drive to Elwert Road (near medical offices and schools)
- **Borchers Drive** from Edy Road to Roy Rodgers Road (near medical offices and shopping)
- **Roy Rodgers Road** from Highway 99W to Borchers Drive (near a concentration of medical offices, and near a shopping center)
- **Langer Drive** from Baler Road to the northbound Highway 99W right-in-right-out access (along the major transit route through the city, and near shopping centers and medical offices)
- **Baler Road** from Tualatin Sherwood Road to Langer Drive (along the major transit route through the city, and near shopping centers and medical offices)
- **12th Street** from Highway 99W to Sherwood Boulevard (near the major transit route through the city, shopping centers, and medical offices)
- **Sherwood Boulevard** from 12th Street to 3rd Street (along the major transit route and near medical offices, schools, and the senior center)
- **Pine Street** from 3rd Street to Sunset Boulevard (near Old Town)
- **Meinecke Road-Washington Street** from Lee Drive to 1st Street (near Old Town)
- **Main Street** from 1st Street to Sunset Boulevard (near Old Town)



Bike gap along Sherwood Boulevard near Clyde Hopkins Elementary School

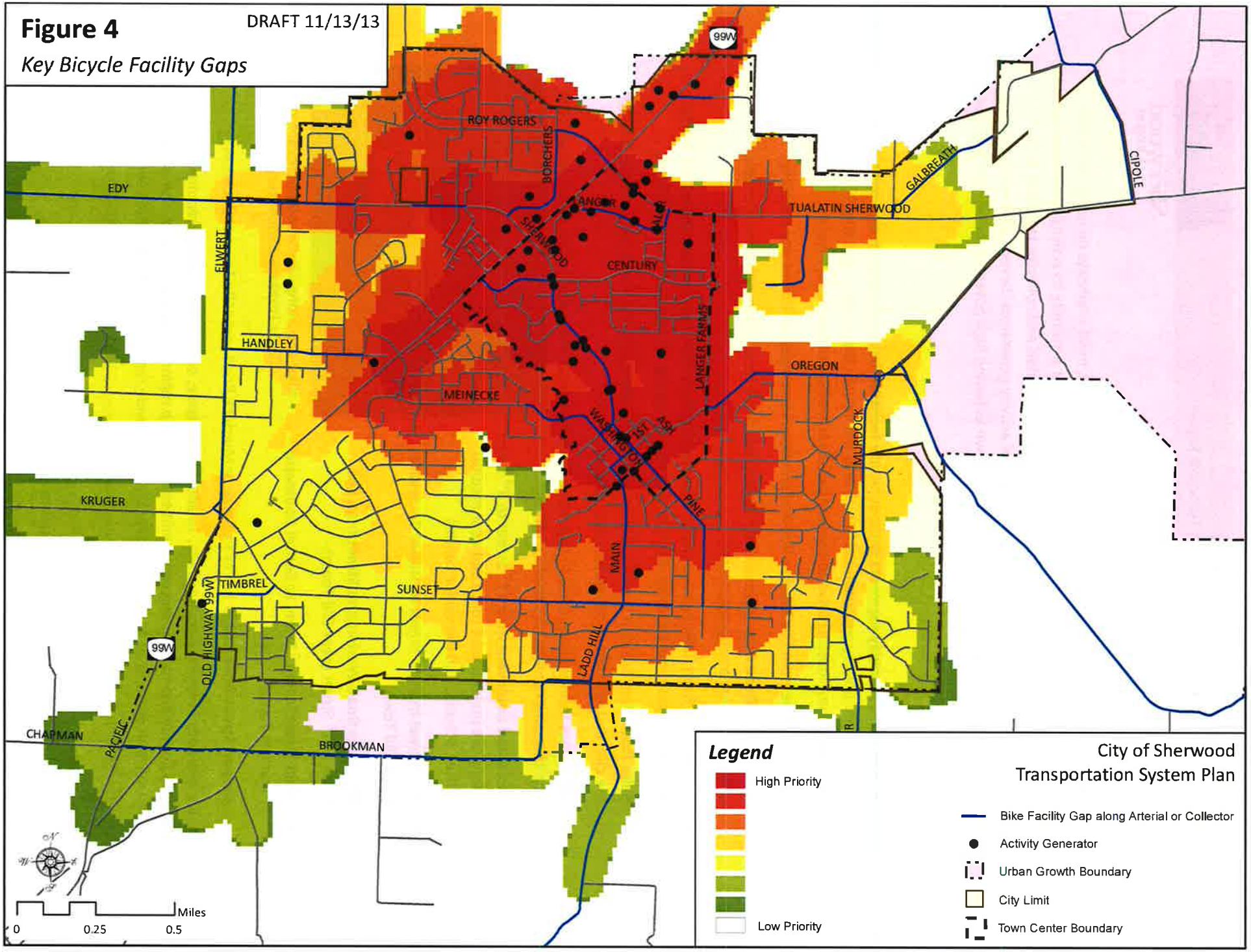
- **Oregon Street** from Langer Farms Parkway to Murdock Road (near Old Town and schools)

There are also gaps in regional connectivity. To address this issue, coordination will be required with Washington County and neighboring communities to develop regional trail connections. The Ice Age Tonquin Trail is an example of a regional facility that will provide regional connections between Sherwood, Tualatin, and Wilsonville.

Figure 4

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Key Bicycle Facility Gaps



Future Needs

Many identified growth areas are absent of adequate bicycle facilities. As motor vehicle volumes increase and bicycle demand grows, there will be a greater need to separate bicycles from the travel lane. Bicycle gaps in key growth areas include: Brookman Road, Old Highway 99W, Handley Street, Galbreath Drive, Tonquin Road, Elwert Road, Edy Road, and Pine Street.

Transit System

Transit service in Sherwood is provided by the Tri-County Metropolitan District of Oregon (TriMet) and the Yamhill County Transit Area (YCTA). TriMet provides service and connections within the Portland Metro region, while YCTA connects Sherwood to Yamhill County and Tigard. The following sections discuss the existing needs of the transit system and the projected needs of the transit system as the city grows through 2035.

Existing Needs

- **Transit stop amenities:** Only some of the bus stops in Sherwood offer benches and shelters.[2] Provision of passenger amenities at bus stops creates a more pleasant and attractive environment for bus riders and may encourage people to use the transit system.
- **Sidewalk connections to transit stops:** In general, Sherwood's sidewalk network is well built, especially near transit stops. However, filling gaps and expanding the existing sidewalk network near transit stops will make the transit system more attractive to potential users.
- **YCTA service:** YCTA bus routes currently stop at SW Langer Drive near Shari's. While demand may not facilitate expanding service within Sherwood, YCTA could consider implementing stops at the existing park and ride lots. While extending service to the major transit stop in Old Town Sherwood would increase travel times along the existing bus routes, it would provide a more manageable transit option for Sherwood residents and employees traveling to and from Yamhill County.
- **Development a transit center:** The Old Town Sherwood transit stop along SW Railroad Street is identified as a major transit stop. This stop could act as a major transit center for TriMet and YCTA routes, as well as a potential local circulation route. While this stop provides shelter, seating, signage, and trash amenities, there is still potential for further streetscape and amenity improvements (e.g., bicycle parking, sidewalk



Old Town major transit stop

[2] Sherwood is at the edge of the Metro area which dictates that passengers are generally getting off in the southbound direction and thus the stops generally do not have shelters. The northbound locations are more likely to have shelters since boardings are more common.

infill, pedestrian crossing enhancements). It is important to note right-of-way at this transit stop is constrained by the railroad just to the south.

- **Local transit circulation:** There is a need for a local Sherwood circulation route or expanded service as a large population of residents live outside a comfortable walking distance to existing transit. This route could connect residents to major trip attractors, especially TriMet and YCTA transit stops.

Future Needs

- **Transit service in future growth areas:** As shown in Figure 1, the Sherwood region will continue to grow internally as well as outside of the city limits. As these areas grow, so will demand for transit. Sherwood's public transit system should be proactively planned to meet the needs of the growing city. This includes expanding sidewalk connectivity, improving existing amenities, developing new transit stops, improving frequency, and expanding operational hours in these growth areas.

Motor Vehicle System

The motor vehicle street system was reviewed to identify major street (collector and arterial) gaps in the street grid network as well as future year 2035 capacity needs.

Connectivity Gaps

Four collector gaps within the city were previously identified in the Existing Conditions Technical Report. These gaps were determined by comparing existing street spacing to the Metro Regional Transportation Functional Plan (RTFP) recommended spacing for arterial and collector streets. It was determined that arterial spacing in Sherwood is acceptable. Collector gaps in the city include:

1. Meinecke Road to Sunset Boulevard between Highway 99W and Main Street
2. Sunset Boulevard to Brookman Road between Old Highway 99W and Ladd Hill Road
3. Roy Rodgers Road to Edy Road between Borchers Drive and Elwert Road
4. Edy Road to Handley Street between Highway 99W and Elwert Road

These locations are mapped and described in further detail in the Opportunities and Constraints section.

Mobility Needs

A travel demand model was used to estimate future year 2035 conditions on the roadway system. The model was based on Washington County's latest 2035 Gamma model with additional refinements and detail (all public roads, lane turn lanes, and intersection control) to capture estimated future circulation patterns and congestion. The model was applied as a screening tool to identify potential locations that may require additional operational or capacity improvements. The model assumed the following changes to the transportation system because of investments already committed or reasonably likely to be committed:

- Improvements consistent with Washington County's Tualatin-Sherwood Road project between Borchers Drive and Langer Farms Parkway (road cross section, intersection control, etc.)
- Improvements consistent with the developer agreement for Langer PUD (extension of Langer Farms Parkway from Tualatin-Sherwood Road to Highway 99W, Century Drive connection, traffic signal at Tualatin-Sherwood Road/Langer Farms Parkway).
- Major transportation elements of Tonquin Employment Area (new east-west collector with roundabout at Oregon Street and traffic signal at 124th Avenue)
- Major transportation elements of Brookman Area (traffic signal at Brookman Road and 99W)
- Traffic signal at Scholls-Sherwood Road/Roy Rogers intersection.

Even with the above transportation system improvements, the additional growth on the transportation system through year 2035 would increase congestion at many locations. Figure 5 and Figure 6 show the general operational performance for all roadway segments and intersections using level of service (LOS) and volume-to-capacity (V/C) performance measures. LOS is similar to a report card rating to indicate general level of condition based on average delay. The V/C ratio indicates the portion of overall capacity or "how full" a road or intersection is operating. On both figures, segments and intersections shown in green are those that will operate relatively well, while those in warmer colors (up to dark red) indicate increasing levels of congestion

Figure 5 indicates the general amount of traffic projected to use streets in the Sherwood area (based on the width of the color) and the general level of congestion (noted by warmer colors). The following road segments were identified as locations that are projected to be congested during evening peak hour conditions and may require additional capacity improvements by year 2035. Locations along freight corridors are designated with *.

- OR 99W north of SW Tualatin Sherwood Rd*
- SW Roy Rogers Rd West of OR 99W*
- SW Tualatin Sherwood Rd east of OR 99W*
- SW Edy Rd west of OR 99W
- OR 99W south of SW Edy Rd*
- SW Oregon St east of SW Murdock Rd
- SW Sunset Blvd between SW Pinehurst Dr and SW Murdock Rd
- SW Langer Farms Pkwy south of SW Century Dr

Many of the intersections expected to experience higher delays by 2035 are along these roadway segments. These intersection locations are mapped in Figure 5 (based on v/c ratio) and Figure 6 (based on LOS). Many of these locations have high overall traffic volumes (such as traffic signals along Highway 99W) or are unsignalized locations where side streets have delay waiting to make a turn (such as along Sunset Boulevard). For a complete list of flagged intersections that may require additional capacity improvements by 2035, refer to the appendix.

Figure 5: Year 2035 Projected Congestion Locations (V/C)

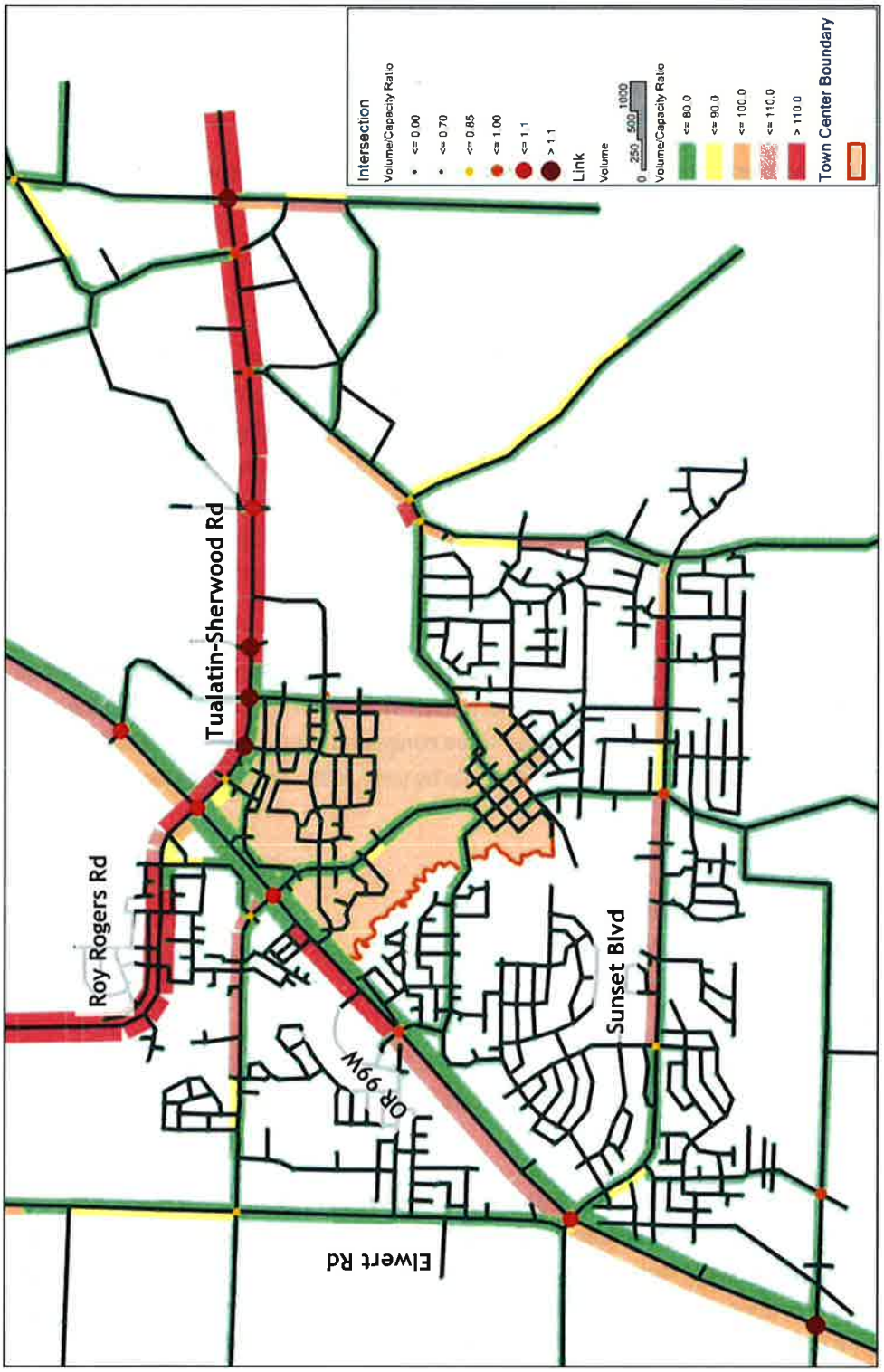
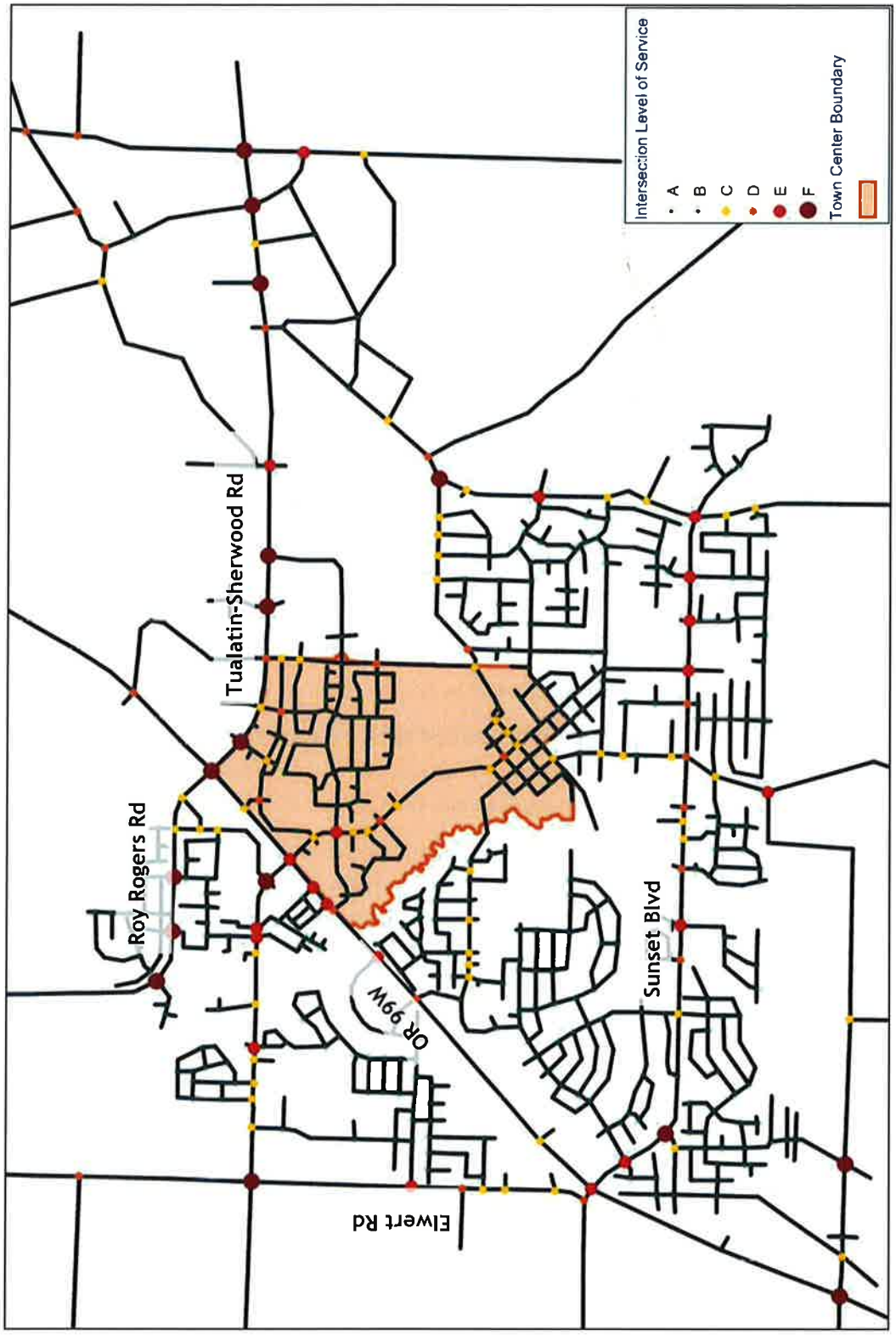


Figure 6: Year 2035 Projected Congestion Locations (LOS)



Freight Needs

The motor vehicle capacity analysis conducted with the travel demand model was also summarized for freight corridors (OR 99W, Tualatin-Sherwood Road, and Roy Rogers Road). These corridors are major facilities that serve freight as well as high volumes of non-freight traffic. Due to the high level of traffic on these corridors, they account for the majority of the existing congestion (delay) in the system. The existing delay on these corridors is approximately 55 percent of the system total. In 2035, the amount of delay on these corridors is projected to grow to 60 percent of the total. A number of roadway segments and intersections identified as capacity constraints are located along the freight corridors. Capacity constraints at these locations will need to be addressed in order to ensure the mobility of freight through the system.

Safety Needs

The following locations were identified as having safety needs based on a review of collision data.

- Road segments along Highway 99W
    - MP 14.91 to MP 15.09 (Tualatin-Sherwood Road intersection)
    - MP 16.61 to MP 16.73 (Elwert Road/Sunset Boulevard intersection)
    - MP 15.92 to MP 16.01 (Meinecke Road intersection)
- Intersections
    - Highway 99W/Tualatin-Sherwood Road/Roy Rogers Road:
        - The majority of the collisions occurred along Highway 99W in either direction and varied in distance from the intersection. This pattern of rear-end collisions is common at signalized intersections on high speed/high volume facilities.
        - There were a number of collisions on the side street approaches as well. Eight of the ten turning movement collisions occurred on Tualatin-Sherwood Road and involved vehicles turning right to travel north-eastbound on Highway 99W. This indicates a pattern that could be attributed to the yield condition and geometry of the right turn movement. Vehicles starting to turn on the yield movement and then suddenly stopping before entering the highway may cause the following vehicle (that is anticipating that the first vehicle will enter the highway) to collide. The geometry and traffic control for this movement is subject to change with the Washington County improvements that are currently under design. The congestion-related collision patterns at this location (rear-end and misjudged gap-entry) may increase along with future traffic growth.
    - Tualatin-Sherwood Road/Cipole Road:
        - Nearly all of the collisions occurred on Tualatin-Sherwood Road and slightly more occurred in the eastbound direction (34 collisions) versus the westbound

direction (26 collisions). In addition, almost one-third (19 of 62 collisions) involved more than two vehicles, which is a very high proportion of collisions and may indicate sudden breaking, possibly due to unanticipated stopping. The rear-end collision pattern is related to congestion and may be due to the mix of the rural nature of the area with urban levels of congestion. While these crashes may increase in the future along with traffic growth, the pattern also may decrease as the area becomes more urbanized and developed.

- Highway 99W/Elwert Road/Sunset Boulevard:
  - Nearly all of the collisions occurred along Highway 99W, with nearly two-thirds occurring in the southbound direction. The collisions varied in distance from the intersection, and the horizontal and vertical curvature in Highway 99W may be a contributing factor. The rural nature of this location may also contribute to driver expectancy issues related to drivers being unprepared to stop. The congestion related collision patterns on Highway 99W could increase along with future traffic growth. However, the crash frequency could decrease as the area becomes more urbanized and drivers anticipate congestion and stopping on the highway.
  - Sherwood Police Department indicated that there are many near collisions for traffic crossing the highway. This is related to the shared lanes and traffic quickly maneuvering around vehicles that are stopped while yielding to on-coming traffic. These vehicles are obscured to the oncoming left turn vehicles.
- Tualatin-Sherwood Road/Oregon Street:
  - Compared with the other SPIS intersections, this intersection had proportionally more turning movement collisions (21%), and half of the turning collisions (five of ten collisions) involved a vehicle making the westbound left turn from Tualatin-Sherwood Road onto Oregon Street with most of these occurring during the PM peak hour (four of five collisions). This pattern is likely related to congestion and could be a result of a number of related issues including drivers near the end of queue following other vehicles beyond the protected green indication. In addition, the traffic signal at this location was modified in June 2008 to allow "permitted" (flashing yellow) left turn movements that require the turning vehicle yield to oncoming traffic. Misjudgment of the oncoming vehicle speeds may have contributed to turning movement collisions at this location. Additional growth and traffic volume is likely to increase these congestion-related collision patterns.
- Tualatin-Sherwood Road/Gerda Lane:
  - Similar to the Cipole Road intersection, nearly all of the collisions occurred on Tualatin-Sherwood Road. However, the directionality of collisions was reversed

and the majority occurred in the westbound direction (27 collisions) instead of the eastbound direction (16 collisions). Just over half of these collisions (14 of 27 collisions) occurred during the midday or p.m. peak periods (11 a.m. to 1 p.m. or 4 p.m. to 6 p.m.), likely due to higher traffic volumes. A traffic signal was installed at this intersection in late December 2010. Two of the turning movement collisions (which are typically more dangerous) occurred before the signal was installed. The third incident, while classified as a turn movement, occurred after the signal was installed and was related to a bus following a vehicle too closely and hitting it while it yielded to a pedestrian in the crosswalk. Therefore, no traditional turn movement collisions (typically made with a vehicle going straight and hitting a conflicting left turning vehicle) occurred after the signal was installed.

- As is generally typical for other locations, the rate of rear-end collisions at this location increased following the installation of the traffic signal. Only 8 of the 44 collisions occurred during 2008 through 2010, while 36 occurred in the two years (2011 and 2012) following the traffic signal installation. This high incidence of rear-end collisions is likely to increase with future traffic growth along Tualatin-Sherwood Road.

- Highway 99W/Meinecke Road:
  - Nearly all of the collisions occurred along Highway 99W and varied in distance from the intersection. Slightly more occurred in the southbound direction (16 of the 27 collisions on Highway 99W). This patterns of rear-end collisions is similar to the trend present at the other SPIS locations.
  - This location also includes a higher portion of turn movement collisions. Half of the turn movement collisions involved multiple vehicles making a northbound right from Meinecke onto Highway 99W. These incidents may be related to overly-aggressive drivers similar to the pattern at Highway 99W/Tualatin-Sherwood Road. The third observation present at this location is related to the higher number of fixed object collisions that involve vehicles driving into the ditch. This pattern may be related to drivers misjudging the separated medians at each leg of the intersection, which has a greater separation than other intersections.

The Tools to Address Identified Needs

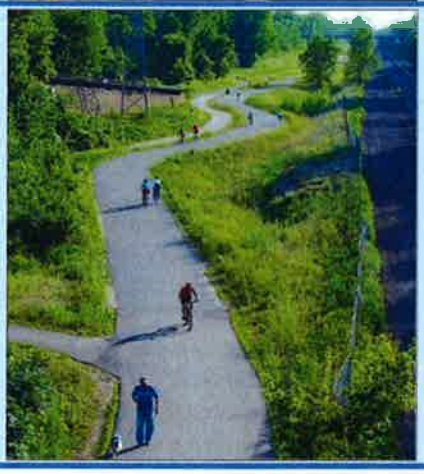
A variety of potential improvements to address the needs of the transportation system through 2035 are displayed in Table 3. These potential solutions are organized by improving walking, improving biking, improving transit, and improving driving in Sherwood.

Table 3: Potential Tools to Address the Needs of the Transportation System

MODE	TOOL	EXAMPLE
walking	**Crosswalks** High-visibility markings, often consisting of a "zebra" striping pattern, can be effective at locations with high pedestrian crossing volumes, near schools, and/or areas where motorist awareness of pedestrian crossings may be poor.	
walking	**Pedestrian Refuge Islands** Refuge islands allow pedestrians to cross one segment of the street to a relatively safe location out of the travel lanes, and then continue across the next segment in a separate gap in traffic. Refuge islands are most appropriate at midblock crossings where right-of-way allows for adequate space between opposing travel lanes.	
walking	**Sidewalks and Sidewalk Infill** Good sidewalks are continuous, accessible to everyone, provide adequate travel width and feel safe. Sidewalks can provide social spaces for people to interact and contribute to quality of place. Completing sidewalk gaps improves the connectivity of the pedestrian network. Sidewalk gap infill should be prioritized in higher demand areas. Sidewalk infill can often be addressed as frontage improvements when land develops or redevelops.	

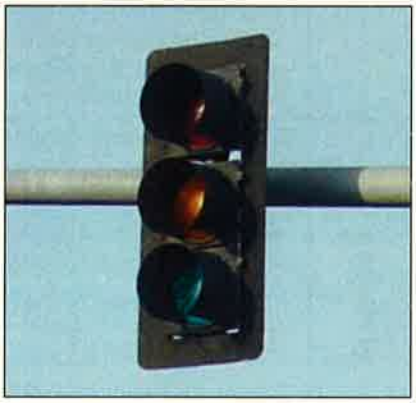
MODE	TOOL	EXAMPLE
walking	**Curb Extensions** Curb extensions reduce the pedestrian crossing distance and improve motorists' visibility of pedestrians waiting to cross the street. Curb extensions can also serve as good locations for bike parking, benches, public art, and other streetscape features. Curb extensions are most appropriate where travel lanes are excessively wide, or where on-street parking is provided.	
walking	**Rectangular Rapid Flashing Beacon (RRFB)** The RRFB is designed to encourage greater motorist compliance at crosswalks. The RRFB is a rectangular shaped lightbar with two high intensity LED lightheads that flash in a wig-wag flickering pattern. The lights are installed below the pedestrian crosswalk sign (located on each side of the road near the crosswalk button) and are activated when a pedestrian pushes the crosswalk button. RRFB's are most applicable at midblock locations when pedestrians must cross multi-lane roadways, near schools, at locations with pedestrian safety issues, and at locations where pedestrian visibility is restricted.	
walking	**Streetscape Improvements** Streetscape improvements are features that enhance the pedestrian experience. These include public art, pocket parks, ornamental lighting, gateway features and street furniture. Many of these improvements can easily integrate environmentally- friendly "green" elements. Potential streetscape improvements are often constrained by available right-of-way, and do not directly address the connectivity or gap needs. Streetscape improvements can typically be provided along facilities where sidewalks are greater than six feet in width, or where roadways are excessively wide.	

MODE	TOOL	EXAMPLE
walking	**Pedestrian Countdown Signals** Countdown signals display the number of seconds remaining for a pedestrian to complete a crossing, enabling users to make their own judgment whether to cross or wait based on their speed and comfort. The allotted time can be adjusted to accommodate slower pedestrians, such as seniors or children.	
walking	**Curb Ramp Retrofits** Retrofitting ADA-compliant curb ramps to existing sidewalks greatly improves mobility and accessibility for mobility-impaired users. Curb ramps also improve the walking environment for pedestrians with strollers, delivery carts, and other "wheel" devices.	
biking	**Bike Lanes** Designated exclusively for bicycle travel, bike lanes are separated from vehicle travel lanes with striping and also include pavement stencils. Bike lanes are typically recommended along arterials and collectors, especially for roadways with high vehicle volumes and speeds. Right-of-way often constrains quick installation of bike lanes and can often lead to tradeoffs with parking availability.	
biking	**Bike Box** A bike box is a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of stopped traffic during the red signal phase. When a bike box is present, vehicles are prohibited from turning right during a red phase. Bike boxes may not be appropriate at signalized intersections with existing or expected congestion issues.	
biking	**Bike Box for Left-turns at Signalized Intersections** A bike box for left turns (otherwise known as a Copenhagen Left) allows bicyclists to make left-turns at intersections without having to veer across traffic. A bicyclist turns left by travelling through the intersection in the direction they are heading, and then waiting in the designated left-turn box before proceeding across the street on a green light. These are most appropriate for multi-lane roadways, especially those with high vehicles volumes and speeds.	

MODE	TOOL	EXAMPLE
biking	**Share the Road Signage** 'Share the Road' signage can be used to raise awareness and legitimize the presence of bicycles on the roadways. This signage is applicable to roadways where bike lanes are not necessarily appropriate (e.g., roadways with low vehicle volumes and speeds). 'Share the Road' signage can be used to supplement shared lane markings.	
biking	**Shared Lane Marking** Shared-lane markings or "sharrows" are designed to inform motorists to expect cyclists to be in the middle of the travel lane, and to inform cyclists that they should be In the travel lane and away from parked cars. An uphill bike lane and downhill shared lane markings can be used on hilly routes that do not have room to accommodate bike lanes in both directions. Shared lane markings should not be used on facilities where vehicle speeds are significantly greater than bicyclist speeds. Roads with under 3,000 vehicles per day and speeds under 25 miles per hour are typically best sulted for shared lane markings.	
biking	**Bicycle Boulevard/Neighborhood Greenway** Traffic calming can be used to optimize neighborhood streets for bicycle and pedestrian travel. Intersection improvements can be made to assist bicyclists at difficult roadway crossings. A roadway should only be converted to a bicycle boulevard where it is appropriate to discourage through-motor vehicle traffic. Bicycle boulevards work well when a parallel route is available to motorists.	
Biking/walking	**Shared-use paths** Shared-use paths can provide a desirable facility particularly for novice riders, recreational trips, and cyclists of all skill levels preferring separation from traffic. Facilities may be constructed adjacent to roads, through parks, or along linear corridors such as active or abandoned railroad lines or waterways. Shared-use paths are a useful tool when both bicycle and pedestrian gaps are present, especially when right-of-way is constrained along one side of the roadway. When right-of-way is constrained, shared-use paths may provide a less impactful solution to providing full pedestrian and bicycle facilities than a typical cross-section with bike lanes and sidewalks.	

MODE	TOOL	EXAMPLE
biking	**Wayfinding Signage and Pavement Markings** Directional signage indicating locations of destinations and travel time/distance to those destinations increases users' comfort and accessibility to the pedestrian and bicycle systems. Pavement markings can be used on bicycle boulevards, which are low-traffic bike routes without bike lanes. Wayfinding signage also helps direct bicyclists to routes with comfortable bicycle facilities.	
biking	**Colored Bike Lanes** Colored bike lanes are used in areas where automobiles and bicycles cross paths and it is not clear who has the right-of-way. Colored bike lanes and accompanying signs assign priority to the bicyclist. Due to required maintenance of repainting the bike lane, colored bike lanes are not typically a system-wide solution.	
biking	**Bicycle Detection at Signalized Intersections** Bicycle-activated loop detectors are installed within the roadway to allow the presence of a bicycle to trigger a change in the traffic signal. Detectors that are sensitive enough to detect bicycles should have pavement markings to instruct cyclists how to activate them. Bicycle detection is most effective at locations with significant bicycle activity and where traffic signal phases are often skipped due to low motor vehicle traffic.	
biking	**Bicycle Parking** Short-term parking: parking meant to accommodate visitors, customers and others expected to depart within two hours; requires approved standard rack, appropriate location and placement, and weather protection. Long-term parking: parking meant to accommodate employees, students, residents, commuters, and others expected to park more than two hours. This parking should be provided in a secure, weather-protected manner and location. Bicycle parking is typically most appropriate at bus stops, schools, parks, major commercial or employment locations, and other trip attractors.	

MODE	TOOL	EXAMPLE
transit	**Transit Stop Enhancements** Provision of passenger amenities at bus stops creates a more pleasant and attractive environment for bus riders and may encourage people to use the transit system. Common amenities include: shelters, benches, trash cans, and bus route information. Shelters should be placed at least 2 feet from the curb when facing away from the street and at least 4 feet away when facing toward it. The adjacent sidewalk must still have a 5-foot clear passage. Orientation of the shelter should consider prevailing winter winds.	
transit	**Construct Bus Pullouts** Bus pullouts allow transit vehicles to pick up and drop off passengers in an area outside the traveled way and are generally provided on high-volume and/or high-speed roadways. They are frequently constructed at bus stops with a high number of passenger boardings such as large shopping centers and office buildings. By removing stopped buses from travel lanes, delay to traffic is considerably reduced and safety is enhanced by removing an obstruction from the traveled way. They also help better define bus stop locations, can be used for bus layovers, and create a more relaxed environment for loading and unloading. Available right-of-way often constrains the ability to provide a bus pullout.	
transit	**Move Bus Stops to Far Side of Signalized Intersections** On multi-lane streets or streets with wide shoulders where motor vehicles may pass uncontrolled around a stopped bus, bus stops located on the far side of intersections are preferred to provide needed sight distance. At signalized intersections, bus stops may be located on either the near side or far side of the intersection. However, in locations where bus pullouts are desired, far-side stops should be used. In general, far-side bus stops are desired because they reduce conflicts with right turning vehicles, encourage pedestrians to cross behind the bus, minimize the area needed for curbside bus zones, make it easier for buses to reenter traffic at signalized intersections, and have fewer impacts on roadway capacity. However, far-side stops also require passengers to access the bus further from the crosswalks, may interfere with right turns from the side street, and where pullouts are not used, can result in blockages of an intersection.	

MODE	TOOL	EXAMPLE
driving	**Construct Turn Lanes to separate Turning Vehicles from Through Traffic** The provision of turn lanes (left or right) removes slowing or stopped vehicles attempting to turn off of a roadway from faster moving through traffic. This not only provides significant safety benefits, but also enhances system capacity.	
driving	**Modernization to meet Design Standards** The modernization of a roadway generally refers to upgrading elements to meet current design standards and capacity needs. Outdated roadway designs may not be serving present day demands due to insufficient number and width of lanes, poor geometry, or failure to accommodate a particular mode of travel (e.g., no bike lanes).	
driving	**Modify Intersection Approach Geometry** When the configuration of through and turn lanes at intersection approaches does not properly reflect the demand for these movements, the right of way at signalized intersections cannot be efficiently utilized. Also, poor alignment of opposing lanes or mismatched left turn treatments often require signal phasing that may not be the most effective option for maximizing through capacity. By reconfiguring the number and type of lanes approaching a signalized intersection, significant improvements in capacity may be achieved.	
driving	**Signal Timing Enhancements** The assignment of right of way to competing movements at an intersection plays a critical role in the overall capacity of that intersection and the roadway itself. Old signal timing plans may not be appropriately serving current demands or may not be designed to accommodate fluctuating demands throughout the day or week. Also, timing plans can be created based on specific priorities, such as giving preference to the mainline during peak travel periods. In some situations, signal timing may be adequate, but adjacent signals are not equipped to communicate with each other or are too close together to coordinate properly. Signal timing enhancements can be a quick and cheap solution to reducing congestion at signalized intersections.	

MODE	TOOL	EXAMPLE
driving	**Intelligent Transportation Systems (ITS)** Intelligent Transportation Systems (ITS) come in many forms and have numerous applications. In general, they include any number of ways of collecting and conveying information regarding roadway operations to agency staff managing the facility or to motorists. This can allow both operators and motorists to make informed decisions based on real-time information, leading to quicker responses to incidents, diversion away from congestion, and increased efficiencies in roadway operation.	
driving	**Restriction of Left Turns at Traffic Signals** Because left turn and through movements are often competing for limited right of way, the removal of left turns from an intersection, either completely or during a specific time of day, can significantly improve through traffic capacity. If left turns are restricted, a practical alternative route should be available. While removing left turns at signalized intersections can improve conditions at the respective intersection, it could have detrimental effects to the transportation system as a whole and may "move the problem".	
driving	**Restrict Turning Movements at Approaches** The number of conflict points on a roadway introduced by a particular approach can be significantly reduced by restricting turn movements, such as allowing only right-in and right-out movements, allowing only right-in movements, or prohibiting only left-out movements (as shown in graphic). This treatment is most appropriate for developments with several accesses or where left turns out of the access are difficult due to high conflicting volumes. Restricting turning movements can also present the opportunity to install non-traversable medians.	
driving	**Construct Non-traversable Medians** The construction of non-traversable medians is a means of reducing the number of conflict points introduced on a roadway by approaches. Non-traversable medians can be simple concrete islands or barriers or can be constructed to include landscaping or other decorated treatments. Stamping colored concrete with a brick or rock pattern is a simple median treatment that may be more aesthetically pleasing that plain concrete. They can also be used to accommodate pedestrian refuges or can have breaks allowing for limited or full turning movements.	

MODE	TOOL	EXAMPLE
driving	**Provide Alternate Access through Improved Local Street Connectivity** Reasonable alternate access can be provided where it does not currently exist by constructing new roadways adjacent to properties that abut a high volume roadway. Such roadways can take the form of frontage roads, backage roads, or can simply be new collector or local streets.	
driving	**Move Approaches to Lower Volume Facilities** This treatment is often a good option for properties fronting high volume streets (such as Tualatin-Sherwood Road) that also have frontage along lower volume road. However, where existing site circulation or building locations create a dependency for the pre-existing access, the ability to change site access may require total or partial site redevelopment. Also, before access is reestablished to a side street, it should be confirmed that there would be adequate separation between the new driveway and the intersection with the high volume roadway to avoid turning conflicts or frequent obstruction by vehicle queues.	
driving	**Consolidate Multiple Approaches to Single Properties** A common method of reducing approach density is to eliminate multiple approaches to a single property where feasible. This can be done where it has been determined that the property can adequately be served with fewer approaches than it currently maintains. However, where existing site circulation or building locations create a dependency for the pre-existing roadway access, the ability to change site access may require total or partial site redevelopment.	
driving	**Create Shared Approaches to Properties using Easements or under Common Ownership** Sharing an approach to a roadway is a means of consolidating approaches while providing direct access to properties that might not otherwise have it. This tool is most advantageous when applied between two landlocked properties that have no other means of reasonable access than to a high volume roadway. Such properties would typically be provided their own approach. However, when a shared approach can be arranged, the end result is only one approach to the roadway rather than two.	
driving	**Intersection or Roadway Capacity Enhancements** Capacity improvements at intersections (adding turn lanes or changing traffic control) are considered system management measures and are generally preferred over widening an entire corridor. Roadway widening improvements should only be considered if all other strategies have been explored and considered insufficient (see the Evaluation Criteria section).	

Opportunities and Constraints

This section identifies the opportunities and constraints of transportation system gaps previously identified in this memorandum. These items will be considered as solutions are identified and assessed during the next phase of the planning process. Due to the limitations in local and regional transportation funding opportunities, issues related to project cost can become significant obstacles. As projects are identified and prioritized, general considerations for project cost can impact project feasibility.

Pedestrian and Bicycle Gaps

For each of the identified existing and high priority pedestrian and bicycle gaps, opportunities and constraints are discussed at a high-level.

- **Highway 99W Sidewalks:** With at least 180 feet of right-of-way and existing pavement widths around 140 feet, there is ample space to build a complete sidewalk network along Highway 99W.
- **Oregon Street Sidewalks:** West of Murdock Road, a sidewalk gap exists along a strip of residences between Hall Street and Orland Street—there are no significant constraints regarding infill at this location. East of Murdock Road, a long sidewalk gap exists along the east side of Oregon Street—sidewalks could be built at this location as the adjacent properties develop.
- **Edy Road Sidewalks:** Several sidewalk gaps exist along Edy Road. Infill may be possible with minimal right-of-way impacts. Just east of Settlement Drive, a guardrail lines the south side of the street—sidewalk infill at this location may be difficult.
- **12th Street Sidewalks:** While residences line the sidewalk gap along the south side of 12th Street, available right-of-way appears to extends south past the roadway. Therefore, there is potential for building sidewalk south of the roadway. There is also an opportunity to reduce the motor vehicle width of the roadway to provide additional space for sidewalk if necessary, as the two-lane facility is at least 35 feet wide with parking allowed on the south side only.
- **Meinecke Road Sidewalks:** While the gap of sidewalk along Meinecke Road is located near wetland, sidewalk infill may be possible without impact to the wetland. However, design opportunities may be constrained by the wetland proximity.
- **Division Street Sidewalks:** Many sidewalk gaps exist along Division Street. While street and right-of-way widths change frequently, providing continuous pedestrian facilities is likely possible. It is important to note that while sidewalk infill would likely be built within right-of-way, it would be built across the frontage of many residential properties in the area.
- **Glen Eagle Neighborhood Sidewalks:** Building a sidewalk network in the Glen Eagle neighborhood would require building sidewalk along the frontage of residences in the area. In some locations these improvements may be achieved within existing right-of-way. Lower impact options could include building sidewalk on only one side of the street, or building sidewalk over existing pavement (effectively removing on-street parking).

- **Edy Road Bike Facilities:** Several gaps in bicycle facilities existing along Edy Road, especially on the south side. To provide adequate separated facilities for bicycles, the roadway would need to be widened. Widening the roadway for bikes, and filling sidewalk gaps may be difficult within existing right-of-way. Also, just east of Settlement Drive, a guardrail lines the south side of the street, which would make roadway widening difficult at this location, especially considering adjacent wetland areas. No adjacent parallel facilities exist that could provide alternative facilities for bikes.
- **Borchers Drive Bike Facilities:** Borchers Drive is a relatively wide facility that may be able to accommodate bike lanes through striping. There is a short pinch-point near Daffodil Street that would need to be widened along the east side, which could be addressed as the adjacent property is developed.
- **Roy Rodgers Road Bike Facilities:** The Tualatin Sherwood Road (SW Borchers Drive to SW Adams Avenue) project is currently being designed. It is likely that buffered bike lanes will soon be constructed through this bike gap as a continuation of the buffered bike lanes located to the east on Tualatin-Sherwood Road.
- **Langer Drive Bike Facilities:** Langer Drive is not wide enough to accommodate bicycle facilities, unless the center turn lane is removed. There is potential to widen the roadway to accommodate bike lanes. However, this would require removing and rebuilding sidewalks and landscaping, which is currently in good condition. The Sherwood Town Center Plan[3] recommends reallocating the center turn lane to provide for buffered bike lanes or a cycle track.
- **Baler Road Bike Facilities:** There may be enough right-of-way to widen this short section of roadway (approximately 240 feet) to accommodate bike lanes. However, bike lanes may not be appropriate in the northbound direction as the majority of northbound travelers turns left or right at the Tualatin-Sherwood Road intersection. There is also potential to remove the southbound left turn refuge to provide a southbound bike lane. The Sherwood Town Center Plan proposes accommodating bike lanes along Baler Road from Tualatin-Sherwood Road to Century Drive.
- **12th Street Bike Facilities:** 12th Street is a two-lane facility with on-street parking along the south side. There is potential for reducing the motor vehicle with of the roadway to accommodate bike lanes, which may result in a loss of on-street parking. However, the need for pedestrian facilities along the south side of the street may restrict the potential to widen the roadway for bike lanes. The Sherwood Town Center Plan identifies that this facility is planned to accommodate bike lanes.
- **Sherwood Boulevard Bike Facilities:** Dieting the road to provide bicycle facilities would requirement removal of the center turn lane. This is an unfavorable option as the center turn

[3] Sherwood Town Center Plan, City of Sherwood, June 2013.

lane provides refuge for motorists turning left into the numerous accesses along the facility, and allows for the pedestrian refuge islands at the two midblock school crossings. The Sherwood Town Center Plan recommends replacing the sidewalk on the east side with a wider shared-use path to accommodate bicyclists.

- **Pine Street Bike Facilities:** In Old Town Sherwood, Pine Street is a two-lane facility with on-street parking along both sides of the street. Widening the roadway would impact buildings, especially City Hall. Bicycles can either be accommodated through shared street signing and/or pavement marking. The traffic speed and volumes in Old Town are likely to remain within thresholds for shared lane bikeways.

  South of Old Town Sherwood, Pine Street is a narrow two-lane facility. To accommodate bike lanes, the roadway would need to be widened. It may be possible to widen the roadway within available right-of-way. It is important to note that widening the roadway would cut into the frontage of the residential corridor. The Sherwood Town Center Plan identifies that this facility is planned to be a shared roadway.

- **Meinecke Road-Washington Street Bike Facilities:** West of Old Town Sherwood, the cross-section of Meinecke Road-Washington Street has significant variation. North of the bridge, the roadway narrows to two-lanes. It may be possible to widen the roadway to include bike lanes and sidewalks while staying within existing right-of-way. At the bridge, separated bicycle facilities cannot be provided. South of the bridge, the roadway is wide enough to stripe bike lanes. However, this would require prohibiting on-street parking, thus removing a handful of parking spaces near the Woodhaven Community Church. The Sherwood Town Center Plan identifies that this facility is planned to accommodate bike lanes.

  Within Old Town Sherwood, the only opportunity to provide separate bicycle facilities would involve removal of on-street parking. The preferred option here is likely to sign/stripe the roadway as a shared facility. The traffic speed and volumes in Old Town are likely to remain within thresholds for shared lane bikeways.

- **Main Street Bike Facilities:** There is not available right-of-way to widen the cross-section to include bike lanes along Main Street. While this narrow 24-foot roadway cannot provide for bike lanes, separated sidewalks line the corridor. A likely unfavorable option would be to remove the landscape buffer between the roadway and sidewalks, and dedicate the space for bike lanes. Given this constraint, the facility may continue to be a shared roadway, where bicyclists have the option to ride along the sidewalk. The Sherwood Town Center Plan identifies that this facility is planned to be a shared roadway.

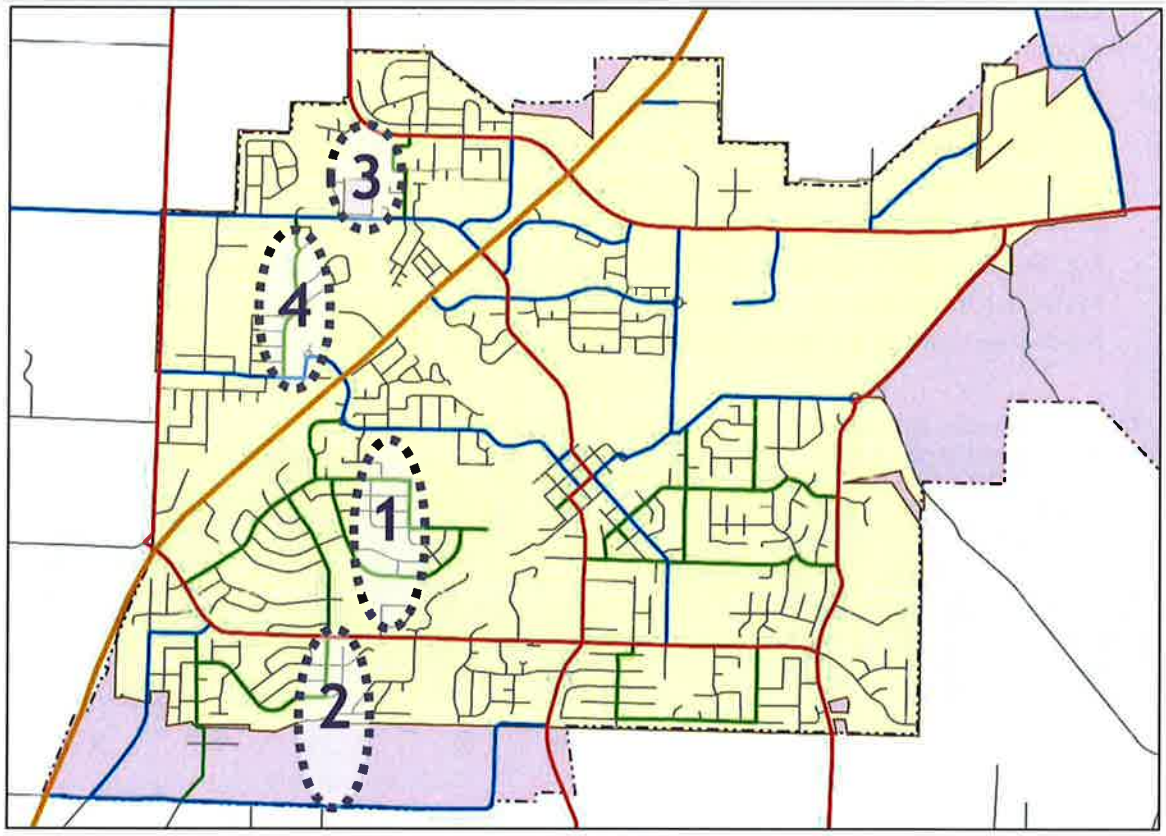
- **Oregon Street Bike Facilities:** The south side of Oregon Street is lined with residences, and the north side is bordered by a rail line and undeveloped property. The rail line and developed properties may constrain the potential for widening the roadway to include bike lanes. With the need for sidewalk along the south side of the street, extending the shared-use path that ends at

Langer Farms Parkway is a potential solution, and is identified in the Sherwood Town Center Plan as a planned improvement.

Street Network (Collector Facility) Gaps

Opportunities and constraints for each of the collector roadway gaps are discussed in the following section. The connectivity gaps are shown in Figure 7 and summarized in Table 4

Figure 7: Arterial and Collector Gaps in System Connectivity



These locations, as mapped in Figure 7, have the following opportunities and constraints:

1. **North-South gap - Meinecke Road to Sunset Boulevard (between Highway 99W and Main Street):** This area is heavily constrained by established residential neighborhoods, in addition to the rail line and the creek. Building a new collector facility through this area is infeasible. Pinehurst Drive and Dewey Drive are neighborhood routes that provide north-south connectivity in the area. However, due to the number of residences and driveways along these routes, upgrading the streets to a collector classification may not be optimal for a mobility function.
2. **North-South gap - Sunset Boulevard to Brookman Road (between Old Highway 99W and Ladd Hill Road):** This area is also constrained by established residential neighborhoods and the rail

line. Pinehurst Drive presents an ideal conceptual alignment for a collector in this area. However, it is lined with residences and driveways. In addition, to continue Pinehurst Drive south, it would require acquiring two residences at the south terminus. This combination of constraints make this gap difficult to address.

3. **North-South gap - Roy Rodgers Road to Edy Road (between Borchers Drive and Elwert Road):** While the Houston Drive and Lynnly Way facilities provide a north-south neighborhood route in the area, there is potential to create a more direct collector route just to the west. A new collector through this area may impact a small number of properties, though rail and environmental constraints do not appear to exist.

4. **North-South gap - Edy Road to Handley Street (between Highway 99W and Elwert Road):** The Bedstraw Terrace-Ladyfern Drive-Roellich Avenue neighborhood route fits the ideal collector spacing. However, this route is lined with residences and driveways the entire length, and is kinked by two three-leg intersections. Therefore, upgrading this route to a collector facility is not ideal as mobility would be significantly restricted. There are no opportunities for parallel routes due to wetland constraints to the east and existing development (e.g., established residences, Laurel Ridge Middle School) constraints to the west of the neighborhood route.

Table 4: Summary of Connectivity Gap Opportunities and Constraints

Location	Constraints			Opportunities	
	Environmental	Rail	Development	Undeveloped ROW (Future Connection)	Existing Facility
1) Meinecke Road to Sunset Boulevard between Highway 99W and Main Street	X	X	X		X
2) Sunset Boulevard to Brookman Road between Old Highway 99W and Ladd Hill Road		X	X	X	X
3) Roy Rodgers Road to Edy Road between Borchers Drive and Elwert Road			X	X	
4) Edy Road to Handley Street between Highway 99W and Elwert Road	X		X		X

Evaluation Criteria

When determining the prioritization and inclusion of projects in the Sherwood TSP Update, proposed projects will be evaluated based on the Metro Regional Transportation Functional Plan (RTFP) hierarchy of strategies. As outlined in section 3.08.022, the hierarchy of strategies is as follows:



This includes Transportation Demand Management (TDM), safety, operational, and access management improvements.

Improving connectivity and providing better amenities for pedestrians, bicyclists, and transit users presents motorists with an attractive alternative to driving.

Improving safety (or perceived safety) for bicyclists and pedestrians through traffic calming techniques may increase non-motorized travel.

These land use strategies—set forth in the Oregon Administrative Rules (OAR), section 660-012-0035 (2)—are designed to reduce trip distances and to promote walking, biking, and transit use.

Connectivity improvements to provide parallel routes, which include pedestrian and bicycle facilities. This includes connectivity improvements for roadways of all functional classifications.

These improvements will only be considered if it is determined that other strategies are not appropriate or cannot adequately address identified transportation needs.

As shown in the above hierarchy, TSMO projects will be prioritized above all other projects, and motor vehicle capacity improvement projects will be considered last.

Potential evaluation criteria were developed based on the content of Sherwood's transportation goals and policies. These potential criteria, listed in Table 5, may be implemented on a qualitative and quantitative basis to determine how potential transportation improvements align with local objectives.

Table 5: Potential Evaluation Criteria for Project Analysis

Policy Measure	Evaluation Score	
Goal 1. Provide a transportation network supportive to land use plans and alternative modes		
Circulation Improves mobility through separation of local and through traffic	+1	Increases separation of through and local trips on differentiated facilities
	0	No change
	-1	Further mixes local and through traffic on same facilities
Hierarchy Classifies and improves roadways according to designation and accompanying design standards	+1	Adds roadway improvement consistent with roadway intent/purpose
	0	No change
	-1	Doesn't follow hierarchy and accompanying design standards
Encourages non-auto modes of travel Adds bikeway, walkways, trails, transit facilities or other projects to encourage alternative modes of travel	+1	Encourages non-auto trips
	0	No change
	-1	Discourages non-auto trips
Pollution Impact Minimizes transportation related pollution to air and water	+1	Minimizes impacts to air or water quality
	0	Has average environmental impact
	-1	Has greater environmental impact than alternatives
Demand Management Invests in demand management strategies	+1	Reduces demand for single occupant trips
	0	Has no impact
	-1	Increases SOV demand on network
Goal 2. Develop a transportation system consistent with adopted local, state and regional plans		
Compatibility Compatible with other jurisdiction's plans and policies, (including adjacent cities, counties, Metro or ODOT).	+1	Compatible with other plans and contributes to their implementation
	0	Compatible with other plans, but does not necessarily contribute to their implementation
	-1	Not compatible with other plans
Agency Standards Consistent with the standards of the City, Region, and State as a whole.	+1	Consistent with all standards
	0	May require some deviations to standards, but likely to be approved
	-1	Inconsistent with standards and not expected that deviations would be approved
Modal Targets Contributes to the establishment of, and achievement toward meeting non-single occupant modal targets for all design types established in 2040 Growth Concept	+1	Contributes to meeting modal targets
	0	No impact on mode share
	-1	Negative impact on meeting modal targets

Policy Measure	Evaluation Score	
Goal 3. Establish design and development regulations to promote multi-modal transportation		
Land Development Standards Promotes standardized processes for developers to assess and accommodate transportation impacts from development	+1	Creates or abides by standardized development procedures
	0	No impact on development processes
	-1	Avoids standardizing procedures
Roadway Design Standards Promotes standardized cross-sections that ensure sufficient right of way for bikeway and pedestrian movements.	+1	Promotes standardized cross-sections that accommodate all modes
	0	Has no effect on roadway design
	-1	Does not meet design standards for applicable modes
Access Management Standards Promotes standardized property access and spacing standards for all roadway classifications	+1	Creates or applies access and spacing standards
	0	Has no impact on access and spacing
	-1	Does not meet or apply standards to access and spacing
Traffic Calming Measures Promotes standards and guidelines that encourage traffic calming and pedestrian friendly environments	+1	Promotes or builds traffic calming measures
	0	Has no effect on traffic calming initiatives
	-1	Undermines pedestrian friendly environment
Goal 4. Develop bicycle & pedestrian infrastructure to provide residents more options		
Pedestrian and Bicycle Facilities Adds bikeway and walkways that fill in system gaps, improve system connectivity, and are accessible to all users.	+1	Improves pedestrian or bicycle connectivity or accessibility
	0	No change
	-1	Reduces connectivity or accessibility
Connections to Regional Trails Supports connections to regional pedestrian and bicycle trails, particularly to recreation areas	+1	Connectivity to regional trails
	0	Has no impact on connectivity to regional trails
	-1	Negative impact on connectivity to regional trails
Access for All Eliminate physical and architectural barriers from public spaces that limit disabled and elderly access	+1	Improves accessibility to public spaces
	0	No change
	-1	Negative affect on accessibility

Policy Measure	Evaluation Score	
Goal 5. Provide reliable, convenient transit service and special options to residents and businesses		
Expands Transit Service Adds service hours, additional routes, stops, or special ride services.	+1	Improves/ increases transit service
	0	No change
	-1	Negative impact on transit services
Transit Supportive Infrastructure Improves transit supportive infrastructure and facilities	+1	Improves transit infrastructure
	0	No change
	-1	Negatively impacts transit infrastructure
Future Needs Supports preservation and development of future right of way (ROW) to support commuter rail services	+1	Preserves future ROW
	0	No change
	-1	Endangers ROW preservation
Goal 6. Provide safe and convenient connections within and between Old Town and the Six Corners Area		
Design Standards Develops or refines special standards to facilitate pedestrian and transit friendly development in Old Town and Six Corners	+1	Contributes to pedestrian & transit friendly environment in Old Town/ Six Corners Area
	0	No change
	-1	Has adverse effect on pedestrian or transit environment in Old Town/ Six Corners Area
Corridor Connectivity Improves connectivity through acquisitions and dedications to achieve better street spacing and enhance off-street trail system	+1	Improves roadway connectivity
	0	No change
	-1	Negative impact on roadway connectivity
Goal 7. Develop and maintain freight infrastructure to support local and regional economic expansion and diversification goals		
Freight Mobility Invests in infrastructure and services needed to meet current and future demand	+1	Improves freight mobility
	0	No change
	-1	Degrades freight mobility
Freight Access Regulates and improves access, including loading and transfer facilities	+1	Improves freight access
	0	No change
	-1	Degrades freight mobility

Policy Measure	Evaluation Score	
Intermodal Connectivity Partners with local, regional and state entities to support intermodal facilities for seamless freight transfer.	+1	Promotes intermodal freight connections
	0	Has no effect on intermodal freight
	-1	Degrades intermodal freight connections
Goal 8. Manage the system to ensure timely implementation and updates to comply with evolving local and regional priorities		
Funding Leverages local, regional, state, federal or private funds.	+1	Funding sources and partnerships available
	0	Feasible costs, but no identified funding
	-1	High costs and no identified funding
Project Compatibility Project or policy is listed on Capital Improvement Plan, or other approved planning document	+1	Project identified in other approved plans
	0	Project previously identified, but not approved in plan
	-1	Project doesn't exist in other planning documents

Plan and Policy Compliance

Sherwood's TSP and land use regulations were evaluated for compliance with state and regional requirements identified in the Plan and Policy Summary Report. Specifically, the evaluation focused on compliance with the State's Transportation Planning Rule (TPR) and Metro's Regional Transportation Functional Plan (RTFP). In conducting this evaluation, we reviewed the following documents:

- 2005 TSP;
- City of Sherwood Title 16, Zoning and Community Development Code ("development code" or "code"); and
- City of Sherwood Engineering Design and Standard Details Manual ("engineering manual"), Sections 120 (Street Design), 210 (Street Design), 420 (Shared-Use Paths), 430 (On-Street Facilities), and 440 (Bicycle Parking Standards).

The findings and recommendations are intended as starting points in identifying and discussing specific amendments that may be necessary to implement the recommendations of the updated TSP, as well as to meet regional and state requirements. The full set of requirements and additional findings about how the requirements are addressed through the existing plans and policies are provided in the appendix.

Summary of Recommendations

A detailed review of how the City's TSP update will comply with the RTFP and an evaluation of adopted development code and engineering standards for compliance with the RTFP and the TPR have been conducted. The following tables highlight issues identified in this detailed evaluation that will need to be discussed and addressed as part of the TSP update:

- Table 6: Issues Related to TSP Elements
- Table 7: Issues Related to the Development Code
- Table 8: Issues Related to Policy
- Table 9: Issues Related to the Engineering Manual.

Note that the numbering in these tables does not indicate importance, but is provided for reference and to aid in future discussions. RTFP and TPR citations also are provided for reference.

Table 6: Issues Related to TSP Elements

	Notes/Recommendations for Updating the TSP	TPR or RTFP Reference
TSP-1	Identify bike and pedestrian improvements needed to connect to transit stops, considering the proximity of transit stops to activity generators and the available facilities that connect them.	• RTFP Section 3.08.120A Transit System Design
TSP-2	Re-inventory and reevaluate the City's transit network, using Chapter 7 (Transit) of the current TSP as a starting point. Reprioritize the prior projects and identify new projects as necessary, with particular emphasis on connecting and integrating all travel modes.	• RTFP Section 3.08.120B.1 Transit System Design
TSP-3	Evaluate the City's collector and arterial grid system and identify system gaps and deficiencies, including regional needs consistent with the RTP.	• RTFP Section 3.08.210 Transportation Needs
TSP-4	Address the needs of youth, seniors, people with disabilities, and environmental justice populations through ADA compliant design standards and transit service improvements.	• RTFP Section 3.08.210 Transportation Needs
TSP-5	Evaluate prioritized list of RTFP strategies and their anticipated effect on the transportation system (see list in RTFP). Provide list of recommended strategies and projects, with preference given to those strategies at the top of the list. Include documentation and analysis of all recommendations and coordinate with Washington County, Metro, TriMet, and/or ODOT for projects on the City outskirts and for larger projects serving regional needs.	• RTFP Section 3.08.220 Transportation Solutions

Table 7: Issues Related to the Development Code

	Recommendations for Updating the Development Code	TPR or RTFP Reference
DC-1	Identify and update all references to the TSP in the code.	
DC-2	Ensure that code requirements in Chapter 16.96 (On-site Circulation) and Chapter 16.106 (Transportation Facilities) related to access spacing/management and design of streets, bikeways, sidewalks, and accessways/paths are consistent with the standards established in the updated TSP.	• TPR Section -0045(2)(a) Access Control • TPR Section -0045(3)(b) On-site Pedestrian and Bicycle Circulation and Connections • TPR Section -0045(7) Minimizing Roadway Width • RTFP Section 3.08.110B

	Recommendations for Updating the Development Code	TPR or RTFP Reference
		Street System Design for Pedestrian and Bicycle Access
DC-3	Define or update the following terms and ensure consistency between the TSP, code, and engineering manual: accessway, multi-use path, and shared-use path.	• TPR Section -0045(3)(b) On-site Pedestrian and Bicycle Circulation and Connections • RTFP Sections 3.08.110B & E Street System Design
DC-4	Consider whether providing additional guidance in Code Sections 16.90.030.D and 16.106.040, and/or a new section, regarding the preparation of TIAs is desired.	• TPR Section -0045(2)(b) Standards to Protect Roadways
DC-5	Given TPR requirements for coordinated review, consider whether inviting transportation facility and service providers to pre-application conferences would be helpful to the review process and thus would be language to include in the code (Section 16.70.010).	• TPR Section -0045(2)(d) Coordinated Review of Land Use Decisions
DC-6	Consider providing more guidance about the meaning/definition of "preferential" carpool and vanpool parking spaces in parking provisions in Section 16.94.010.E.3.a.	• TPR Section -0045(4)(d) Employee Parking
DC-7	Consider code changes if there are TDM program elements developed for the updated TSP that lend themselves to implementation in code.	• TPR Section -0045(5)(b) Transportation Demand Management (TDM) Programs
DC-8	Consider addressing structured parking in Chapter 16.94, including exemptions from maximum parking space standards.	• TPR Section -0045(5)(d) Parking Management
DC-9	[Administrative amendments note: Address editorial changes in the footnotes for the parking standards table in Section 16.94.020.]	• TPR Section -0045(5)(d) Parking Management
DC-10	Consider the feasibility of allowing a local street cross-section of 20-28 feet and under what conditions.	• TPR Section -0045(7) Minimizing Roadway Width
DC-11	Consider modifying the code provisions for plan and land use regulation amendments in Section 16.80.030.C (Transportation Rule Consistency) to make simpler reference to Section -0060 in order to capture all of its requirements and allowances related to reviewing plan and land use regulation amendments.	• TPR Section -0060 Plan and Land Use Regulations Amendments
DC-12	Variances – Provide a variance process in Chapter 16.84 (Variances and Adjustments) and/or Chapter 16.94 (Off-	• RTFP Section 3.08.410

	Recommendations for Updating the Development Code	TPR or RTFP Reference
	Street Parking and Loading) that allows maximum parking standards to be exceeded.	Parking Management
DC-13	Major driveways – Define major driveways in the code for mixed-use and residential developments, and add requirements in Chapter 16.90 (Site Planning) and Chapter 16.128 (Land Division Design Standards) to align major driveways with existing and/or planned streets.	
DC-14	On-street loading – Add on-street loading provisions in "appropriate locations" such as downtown. These new provisions would include specific conditions for when on-street loading would be permitted.	
DC-15	Bicycle parking – Require, rather than allow, long-term (protected and secured) parking in Section 16.94.020.C.	
DC-16	Consider whether having a hierarchy of management to capacity strategies (RTFP Section 3.08.220A) would be effective as part of traffic impact analysis and legislative decision conditions of approval.	• RTFP Sections 3.08.510 A & B Comprehensive Plan and TSP Amendments

Table 8: Issues Related to Policy

	Recommendations for Updating Policy	TPR or RTFP Reference
P-1	As noted in Table 5, the City has considered transportation solutions in 3.08.220A as part of the TSP update process.	• RTFP Sections 3.08.510 A & B Comprehensive Plan and TSP Amendments
P-2	Ensure that the policy and strategies related to parking from the Town Center Plan are integrated and consistent with updated policies in the TSP.	• RTFP Section 3.08.410I Parking Management

Table 9: Issues Related to the Engineering Standards

	Recommendations for Updating the Engineering Manual	TPR or RTFP Reference
EM-1	Ensure that code requirements in Sections 120 (Street Design), 210 (Street Design), 420 (Shared-Use Paths), 430 (On-Street Facilities), and 440 (Bicycle Parking Standards) related to access spacing/management and design of streets, bikeways, sidewalks, and accessways/paths are consistent with the standards established in the updated TSP.	• TPR Section -0045(2)(a) Access Control • TPR Section -0045(3)(b) On-site Pedestrian and Bicycle Circulation and Connections • TPR Section -0045(7)

	Recommendations for Updating the Engineering Manual	TPR or RTFP Reference
		Minimizing Roadway Width • RTFP Section 3.08.110B Street System Design
EM-2	Define or update the following terms and ensure consistency between the TSP, code, and engineering manual: accessway, multi-use path, and shared-use path.	• TPR Section -0045(3)(b) On-site Pedestrian and Bicycle Circulation and Connections
EM-3	Amend the cul-de-sac standards in Section 210.7 to be consistent with and implement the standards of the updated TSP and code.	• RTFP Section 3.08.110E Street System Design
EM-4	Ensure that the engineering manual (Section 440) is consistent with the code (Section 16.94.020.C) regarding bicycle parking requirements.	• RTFP Section 3.08.410 Parking Management

TECHNICAL APPENDIX
NEEDS, OPPORTUNITIES, CONSTRAINTS AND TOOLS

Pedestrian System Gaps Priority List

This list categorizes pedestrian system gaps along arterials and collector roadways into high, medium, and low priority gaps. These gaps are grouped based on their proximity to activity generators within a ½ mile walking distance, as shown in Figure 3.

High Priority Gaps

- Highway 99W (west side only) between Roy Rogers Road and the existing sidewalk terminus to the north (approximately 600 feet north of Roy Rogers Road).
- Highway 99W between Tualatin-Sherwood Road and Meinecke Road. This includes discontinuous gaps along both sides of the highway.
- 12th Street (south side only) between Highway 99W to Sherwood Boulevard.
- Meinecke Road (north side only) between Lee Drive and the existing sidewalk terminus to the east (approximately 400 feet east of Lee Drive).
- Edy Road (both sides) between Borchers Drive and Trailblazer Place.
- Division Street pedestrian gaps are not shown in Figure 3 as it is a neighborhood collector. However, it was highlighted in the Existing Conditions Technical Report as a major gap, and falls within a high pedestrian demand area.
- Gleneagle neighborhood pedestrian gaps are not shown in Figure 3 as they are local roads. However, they were highlighted in the Existing Conditions Technical Report as major gaps, and fall within a high pedestrian demand area.

Medium Priority Gaps

- Highway 99W (both sides) between Meinecke Road and Sunset Boulevard.
- Edy Road (both sides) between Trailblazer Place and Elwert Road.
- Elwert Road (both sides) between Highway 99W and Edy Road.
- Handley Street (north side only) between Elwert Road and existing sidewalk terminus to the east (approximately 250 feet east of Elwert Road).
- Timbrel Lane (north side only) between Old Highway 99W and Middleton Road. This includes two short sidewalk gaps.

- Old Highway 99W (both sides) from Brookman Road to existing sidewalk terminus to the north (approximately 1,800 feet north of Brookman Road).
- Sunset Boulevard (north side only) from Eucalyptus Terrace to St Charles Way.
- Ladd Hill Road (west side only) from Willow Drive to Brookman Road.
- Baker Road (east side only) from Sunset Boulevard to Lavon Lane.
- Murdock Road (west side) from Willamette Street to existing sidewalk terminus to the north (approximately 130 feet north of Willamette Street).
- Murdock Road (east side only) from Willamette Street to Upper Roy Street.
- Murdock Road (east side only) from Upper Roy Street to Sunset Boulevard. While the pedestrian facilities on the west side act as a shared-use path, there will likely be demand for pedestrian facilities along the east side as the area develops.

Low Priority Gaps

- Highway 99W (both sides) south of Sunset Boulevard.
- Edy Road (both sides) west of Elwert Road.
- Elwert Road (both sides) north of Edy Road.
- Ladd Hill Road (both sides) south of Brookman Road.
- Brookman Road (both sides) between Highway 99W and Ladd Hill Road.
- Baker Road (both sides) south of Lavon Lane.
- Murdock Road (east side only) from Oregon Street to Willamette Street.
- Oregon Street (south side) from Hall Street to Orland Street.
- Oregon Street (north side) from Murdock Road to Langer Farms Parkway.
- Oregon Street (south side) from Murdock Road to existing sidewalk terminus to the east (approximately 2,700 feet east of Murdock Road).
- Tonquin Road (both sides) south of Oregon Street.
- Cipole Road (west side) from Tualatin-Sherwood Road to existing sidewalk terminus to the north (approximately 1,250 feet north of Tualatin-Sherwood Road).
- Cipole Road (east side) from existing terminus (approximately 1,250 feet north of Tualatin-Sherwood Road) to the north for approximately 450 feet.

Bicycle System Gaps Priority List

This list categorizes bicycle system gaps along arterials and collector roadways as high, medium, and low priority gaps. These gaps are grouped based on their proximity to activity generators within a mile biking distance, as shown in Figure 4.

High Priority Gaps

- Roy Rogers Road between Highway 99W and Borchers Drive.
- Borchers Drive between Roy Rogers Road and Edy Road.
- Langer Drive between Baler Way and the Highway 99W northbound access.
- Baler Drive between Tualatin-Sherwood Road and Langer Drive.
- 12th Street between Highway 99W and Sherwood Boulevard.
- Sherwood Boulevard between 12th Street and 3rd Street.
- Pine Street between 3rd Street and Sunset Boulevard.
- Meinecke Road-Washington Street between Lee Drive and 1st Street.
- 3rd Street between Washington Street and Sherwood Boulevard
- 1st Street between Main Street and Pine Street.
- Century Drive between Tualatin-Sherwood Road and existing terminus.
- Oregon Street between Murdock Road and Langer Farms Parkway.
- Sunset Boulevard between Greengate Drive and Cinnamon Hill Place.
- Ladd Hill Road between Sunset Boulevard and Brookman Road.
- Home Depot access road between Highway 99W and existing terminus.
- Edy Road between Cherry Orchards Street and Trailblazer Place.
- Edy Road between Wagontrain Place and Elwert Road.

Medium Priority Gaps

- Ladd Hill Road between Brookman Road and Oberst Lane.
- Brookman Road between Highway 99W and Ladd Hill Road.
- Timbrel Lane between Sunset Boulevard and Old Highway 99W.
- Old Highway 99W between Timbrel Lane and Brookman Road.
- Handley Street between Brook Way and Elwert Road.
- Murdock Road between Oregon Street and Sunset Boulevard.

- Sunset Boulevard between Aldergrove Avenue and Murdock Road.
- Galbreath Drive between Gerda Lane and city limits.
- Gerda Lane between Tualatin-Sherwood Road and Galbreath Drive.
- Baker Road between Sunset Boulevard and McConnell Road.
- Elwert Road between Highway 99W and Edy Road.

Low Priority Gaps

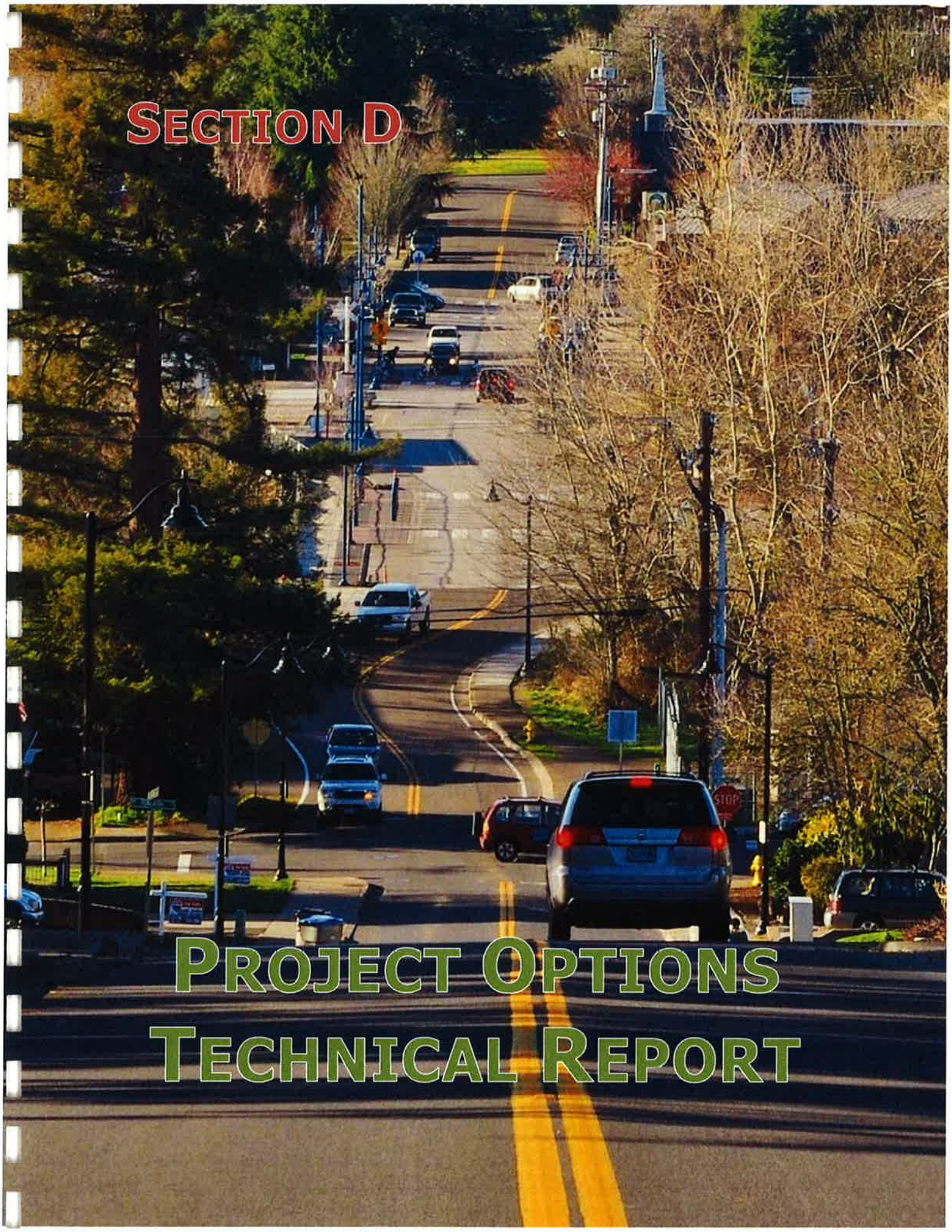
- Tonquin Road south of Oregon Street.
- Cipole Road north of Tualatin-Sherwood Road.
- Ladd Hill Road south of Oberst Lane.
- Edy Road west of Elwert Road.
- Elwert Road north of Edy Road.

Intersections with Potentially High Levels of Congestion

The following intersections are expected to experience higher levels of congestion by 2035. These intersections are indicated by warmer colors in Figure 5 and Figure 6. Intersections with an asterisk denote the intersection to be along a freight corridor.

- Highway 99W and Home Depot access road/Langer Farms Parkway (extension)*
- Highway 99W and Tualatin Sherwood Road*
- Highway 99W and Edy Road/Sherwood Boulevard*
- Highway 99W and Sunset Boulevard*
- Highway 99W and Brookman Road*
- Highway 99W and Red*
- Highway 99W and future road (south of Red)*
- Highway 99W and 12th St*
- Highway 99W and Cedar Brook Way*
- Highway 99W and Meinecke Road*
- TualatIn-Sherwood Road and Baler Way*
- Tualatin-Sherwood Road and Langer Farms Parkway*
- Tualatin-Sherwood Road and Olds Place*
- Tualatin-Sherwood Road and Gerda Lane*
- Tualatin-Sherwood Road and Langer Drive*
- Tualatin-Sherwood Road and Wildrose Place*
- Tualatin-Sherwood Road and Cipole Road*
- Tualatin-Sherwood Road and 124th Avenue*
- Roy Rogers Road and Cedarview Way*
- Roy Rogers Road and Lynnly Way*
- Roy Rogers Road and Lavender Place*
- Cipole Road and Herman Road
- Herman Road and 129th Avenue
- 124th Avenue and Myslony Street
- 124th and Cipole Road (extension)
- Langer Drive and Langer Drive
- Langer Drive and Baler Way
- Elwert Road and Conzelmann Road
- Elwert Road and Edy Road
- Elwert Road and Handley Street
- Elwert Road and Haide Road
- Elwert Road and Sunset Boulevard
- Edy Road and Bedstraw Terrace
- Edy Road and Houston Drive
- Edy Road and Madeira Terrace
- Edy Road and Borchers Drive
- Sherwood Boulevard and 12th Street
- Sherwood Boulevard and Gleneagle Drive
- Langer Farms Parkway and Whetstone Way
- Oregon Street and Murdock Road
- Oregon Street and Tonquin Road
- Oregon Street and Lincoln Street
- Murdock Road and Willamette Street
- Pine Street and 2nd Street
- Sunset Boulevard and Woodhaven Drive
- Sunset Boulevard and Timbrel Lane
- Sunset Boulevard and Richen Park Terrace
- Sunset Boulevard and Greengate Place
- Sunset Boulevard and Redfern Place
- Sunset Boulevard and Myrica Court
- Sunset Boulevard and Main Street
- Sunset Boulevard and Cinnamon Hills Place
- Sunset Boulevard and Pine Street
- Sunset Boulevard and Aldergrove Avenue
- Sunset Boulevard and Brittany Place
- Sunset Boulevard and Murdock Road
- Ladd Hill Road and Brookman Road
- Brookman Road and Middleton Road

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SECTION D
PROJECT OPTIONS
TECHNICAL REPORT

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PROJECT OPTIONS

This document summarizes the transportation system improvements needed to accommodate existing and future travel needs in Sherwood. The following sections include a summary of the process used to develop and analyze the project options, summaries of each projects for locations that have multiple options, and an initial prioritization of the project list using the evaluation criteria. Additional appendix material provides the comprehensive list of transportation needs and full set of transportation projects that were considered.

Document Reader Guide

These items summarize key elements of the analysis methodology presented in this document.

- Developing a List of Potential Projects
  - The list of potential projects includes projects that were previously identified in prior plans as well as new projects to address the needs that have been identified through the TSP update process.
  - The complete list of projects is included in the Appendix and is shown in Figures 1, 2, and 3.
- Initial Project Evaluation
  - An initial project evaluation was conducted using criteria based on Sherwood's transportation goals and policies. This primary evaluation provided a basis for comparing projects with different transportation elements that serve different modes.
  - Secondary criteria were applied to distinguish between projects within each mode that received the same evaluation score.
- Assessment of Alternative Projects
  - A summary of project advantages and disadvantages was provided in cases where multiple options have been identified to address a particular transportation need.
  - A dashed line appears around the project options that initially appear to be most favorable for addressing a given transportation need. This is primarily based on the evaluation criteria but may consider other factors. Note that this is only the initial assessment and that the project evaluation has not been fully vetted by TSP review committees and the public.
  - Transportation needs that have only a single identified fix are not described in additional detail. However, these projects are included in the overall project list.

- Improvements to Mobility
    - Motor vehicle projects were grouped by project type based on the regional strategies included in the Regional Transportation Functional Plan (RTFP) hierarchy. Some of these groups were not analyzed directly since they would require analysis outside the scope of the TSP update. The groups that were assessed, and corresponding RTFP level, include:
        - Group 1 – TSMO Projects (RTFP Level 1)
        - Group 2 – Connectivity Projects (RTFP Level 5)
        - Group 3 – Widening Projects (RTFP Level 6)

- Prioritization of Potential Projects
    - An initial prioritization was performed based on potential revenue streams and the project evaluation. This prioritization has not yet been fully vetted by the TSP review committees and the public and is subject to change.

Developing a List of Potential Projects

Transportation projects that have been previously identified but have not been constructed were reviewed to determine how they address the needs identified in the *Needs, Opportunities, Constraints and Tools Technical Report* (a summary of these needs appears in the Appendix). While not all of these previously planned projects satisfy the specific needs that were identified through the TSP update, many of these projects do complement the goals and policies of the Sherwood TSP. Therefore, these projects were carried forward for consideration with this TSP update since they could address other needs that were not directly assessed through this update. Projects from the following plans were used to identify the initial project list:

- Sherwood TSP
- Metro RTP
- Ice Age Tonquin Trail Master Plan
- Sherwood Town Center Plan
- Concept Plans (Brookman Addition, Tonquin Employment Area, Adams Avenue North)

Where needs are unsatisfied by previously planned projects, new solutions were developed. In some cases, multiple alternative solutions are presented to meet a need. A complete list of potential projects is provided in the Appendix and displayed in Figures 1 through 3.

Figure 1

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Motor Vehicle Projects

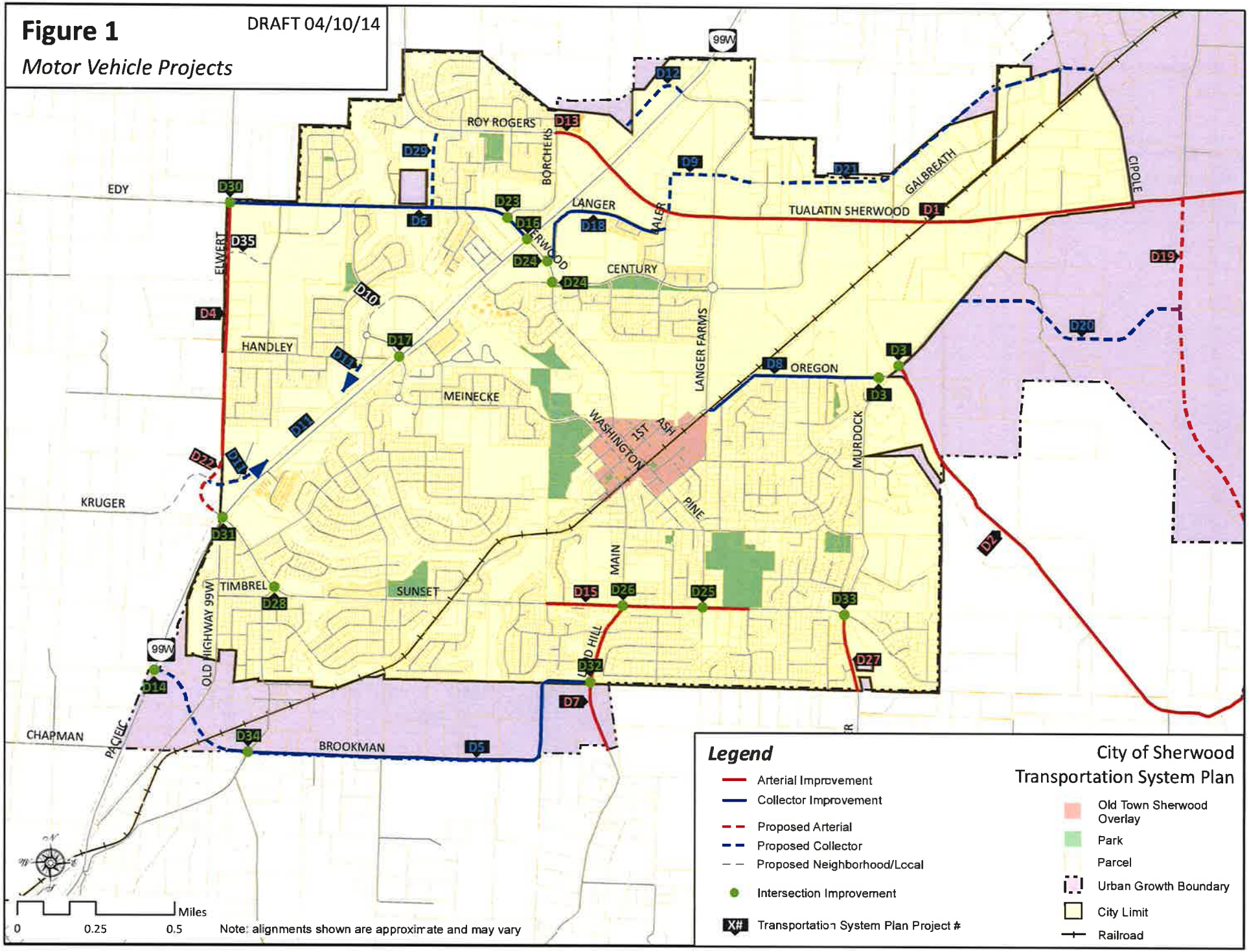


Figure 2

Pedestrian Projects

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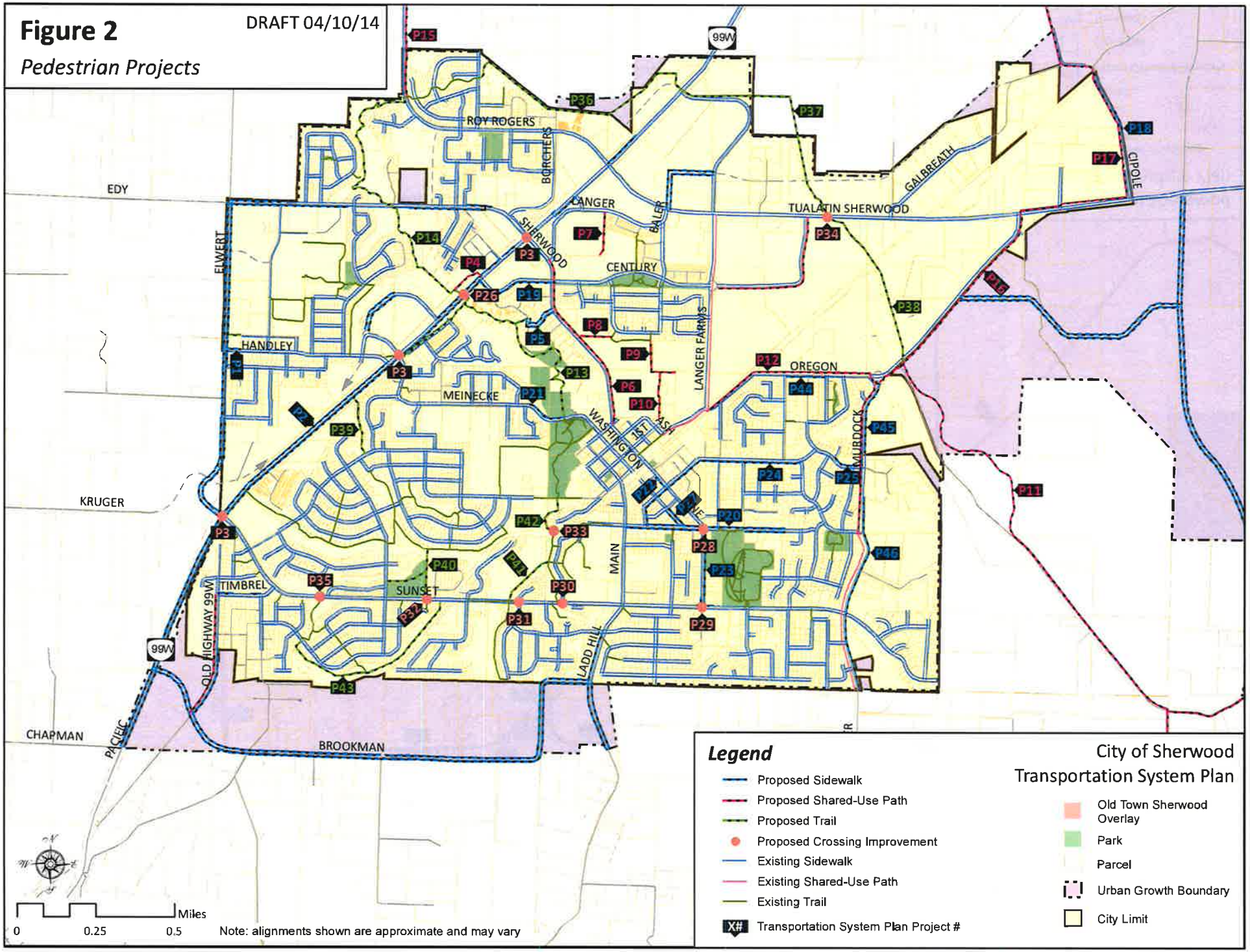
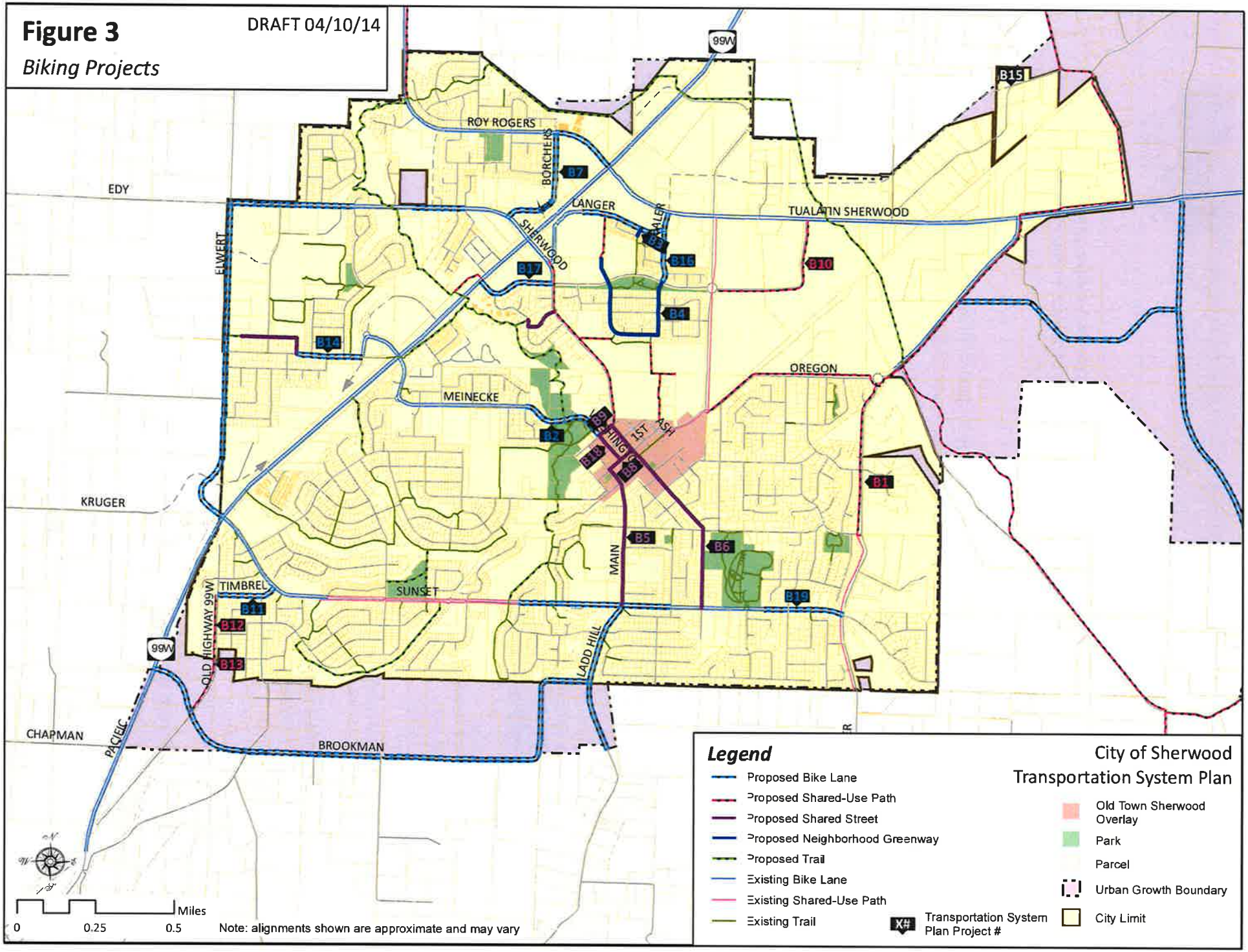


Figure 3

Biking Projects

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Initial Project Evaluation

The identified projects were evaluated with evaluation criteria to provide a relative comparison across all modes of travel. This evaluation provides an initial prioritization of projects to determine funding priorities for the City through year 2035.

Evaluation Criteria

Sherwood's Comprehensive Plan includes eight transportation goals with several objectives and strategies to achieve the goals. These strategies were grouped and condensed into draft evaluation criteria to measure how well transportation projects addressed Sherwood's goals. Feedback received from the TSP Citizen Advisory Committee was used to focus on specific measures that represented the community. Through this process, the final evaluation criteria were developed by taking the top one or two performance metrics for each transportation goal. In cases that more than one strategy was identified for a goal, each strategy was given half of the score so that all eight of the goals remained equally weighted.

Table 1 lists the evaluation criteria used to assess potential projects. The full scoring of projects is included in the Appendix.

Table 1: Evaluation Criteria for Project Analysis

Policy Measure	Evaluation Score	
Goal 1: Provide a transportation network supportive to land use plans and alternative modes.		
Circulation Improves mobility through separation of local and through traffic	+1	Increases separation of through and local trips on differentiated facilities
	0	No change
	-1	Further mixes local and through traffic on same facilities
Goal 2: Develop a transportation system consistent with adopted local, state and regional plans		
Compatibility Compatible with other jurisdiction's plans and policies, (including adjacent cities, counties, Metro or ODOT)	+1/2	Compatible with other plans and contributes to their implementation
	0	Compatible with other plans, but does not contribute to implementation
	-1/2	Not compatible with other plans
Agency Standards Consistent with the standards of the City, Region, and State as a whole	+1/2	Consistent with all standards
	0	May require some deviations to standards, but likely to be approved
	-1/2	Inconsistent with standards and not expected that deviations would be approved
Goal 3: Establish design and development regulations to promote multi-modal transportation		
Land Development Standards Promotes standardized processes for developers to assess and accommodate transportation impacts from development	+1	Creates or abides by standardized development procedures
	0	No impact on development processes
	-1	Avoids standardizing procedures
Goal 4: Develop bicycle & pedestrian infrastructure to provide residents more options		
Pedestrian and Bicycle Facilities Adds bikeway and walkways that	+1	Improves pedestrian or bicycle connectivity or accessibility
	0	No change

fill in system gaps, improve system connectivity, and are accessible to all users	-1	Reduces connectivity or accessibility
Goal 5: Provide reliable, convenient transit service and special options to residents and businesses		
Expands Transit Service Adds service hours, additional routes, stops or special ride services	+1/2	Improves/ increases transit service
	0	No change
	-1	Negatively impact on transit services
Transit Supportive Infrastructure Improves transit supportive infrastructure and facilities	+1/2	Improves transit infrastructure
	0	No change
	-1/2	Negatively impacts transit infrastructure
Goal 6: Provide safe and convenient connections within and between Old Town and the Six Corners Area		
Designs Standards Develops or refines special standards to facilitate pedestrian and transit friendly development in Old Town and Six Corners	+1/2	Contributes to pedestrian & transit friendly environment in Old Town/ Six Corners Area
	0	No Change
	-1/2	Has adverse effect on pedestrian or transit environment in Old Town/ Six Corners Are
Corridor Connectivity Improves connectivity through acquisitions and dedications to achieve better street spacing and enhance off-street trail system	+1/2	Improves roadway connectivity
	0	No change
	-1/2	Negative impact on roadway connectivity
Goal 7: Develop and maintain freight infrastructure to support local and regional economic expansion and diversification goals		
Freight Mobility Invests in infrastructure and services needed to meet current and future demand	+1/2	Improves freight mobility
	0	No change
	-1/2	Degrades freight mobility
Freight Access Regulates and improves access, including loading and transfer facilities	+1/2	Improves freight access
	0	No change
	-1/2	Degrades freight mobility
Goal 8: Manage the system to ensure timely implementation and updates to comply with evolving local and regional priorities		
Funding Leverages local, regional, state, federal or private funds	+1	Funding sources and partnerships available
	0	Feasible costs, but no identified funding
	-1	High costs and no identified funding

The evaluation criteria listed in Table 1 represent the primary basis for evaluating projects across all modes. A secondary set of criteria were applied to provide a basis for sub-prioritize projects that received the same evaluation score. These criteria were based on the following items:

- Pedestrian/Bicycle – Project location and proximity to activity generators (as previously mapped).
- Motor Vehicle – Hierarchy of projects based on regional strategies (intersection improvements are highest priority and major corridor widening is lowers priority).

Assessment of Alternative Projects

There are several transportation needs that were identified where multiple options are available. This section lists the alternative projects that could be carried forward to the TSP project list and describes the advantages and disadvantages for each option. In addition, the evaluation score is listed for each alternative and the most favorable alternative is highlighted by a dashed box—note that the highest scoring alternative is not necessarily the recommended improvement as there are context factors to consider that might not be captured in the evaluation criteria.

Note that this section only addresses locations where multiple options have been identified. The Appendix includes the full set of projects (which are mapped in Figures 1, 2 and 3).

Reader Notes

- A summary of project advantages and disadvantages was provided in cases where multiple options have been identified to address a particular transportation need. This summary is provided in the blue boxes on the following pages.
- A dashed line appears around the project options that initially appear to be most favorable for addressing a given transportation need. This is primarily based on the evaluation criteria but may consider other factors. Note that this is only the initial assessment and that the project evaluation has not been fully vetted by TSP review committees and the public.
- Transportation needs that have only a single identified fix are not described in additional detail (i.e., they do not appear in the blue boxes on the following pages). However, these projects are included in the overall project list (see Appendix).

Motor Vehicle Project Alternatives

Need: Traffic control enhancement at Oregon Street/Tonquin Road.

D3.A: Install a traffic signal

Advantages: A traffic signal at this location will have a smaller footprint and will likely have a lower cost than a roundabout as a roundabout would likely require additional right-of-way

Disadvantages: Queues from the signal could potentially back into the Murdock roundabout, which could impact safety and mobility

Evaluation Score: **4.0**

D3.B: Install a single lane roundabout with dual westbound through lanes

Advantages: Roundabouts typically experience 25% less crashes than signalized and unsignalized intersections[1]; queuing issues likely less than queuing issues related to a signal. The hybrid configuration would allow both intersections (Tonquin/Oregon and Murdock/Oregon) to operate well and meet mobility standards. This option would continue to offer a full accessibility of movements, unlike a combined "dumbbell" configuration. The additional westbound lane could fit within the existing roadway width.

Disadvantages: Roundabouts have large footprints, and the area is constrained by wetlands—it may be difficult to fit a roundabout within the available space. The existing roundabout at Oregon/Murdock would need to be reconfigured in order for the westbound lane configuration to fit.

Evaluation Score: **4.0**

D3.C: Install a "dumbbell" (elongated oval) roundabout with combined with the existing roundabout at Murdock. The combined configuration would require that a vehicle would pass through both intersections to make a left turn movement.

Advantages: Roundabouts typically experience 25% less crashes than signalized and unsignalized intersections[2]; this solution would fully mitigate the queuing issue between intersections since the space between the roundabouts two intersections would be part of the roundabout circulation.

Disadvantages: It may be difficult to fit a roundabout within the available space, travel distances would be increased, and delays would likely be greater than two individual roundabouts due to more circulating vehicles

Evaluation Score: **1.5**

[1] CMF Clearinghouse, www.cmfclearinghouse.org.

[2] Ibid.

Need: Roadway improvements along Brookman Road.

D5.A: Rebuild Brookman Road as a three lane collector facility

Advantages: Provides a balance of mobility and access to Brookman Concept area, which in turn provides relief to Sunset Boulevard from future urban growth.
Disadvantages: N/A
Evaluation Score: **2.5**

D5.B: Rebuild Brookman Road as a five lane arterial

Advantages: Further increases east-west mobility for through traffic
Disadvantages: Would inhibit access to the Brookman Concept Area and is not consistent with findings and recommendations of the Concept Plan or the I-5 to 99W Connector Project. The I-5 to 99W Connector project proposed a new, separate access-restricted facility to serve as a regional corridor and provide mobility for traffic between 99W and I-5. Concept planning for the Brookman area identified Brookman Road to serve the function of providing access to the area for future urban development. Limiting access to future development in Brookman area would force traffic to the north and further burden Sunset Boulevard.
Evaluation Score: **1.5**

Need: Traffic control enhancement at Sherwood Boulevard/Century Drive.

D24.A: Install a traffic signal

Advantages: A traffic signal at this location will have a smaller footprint and will likely have a lower cost than a roundabout as a roundabout would likely require acquiring additional right-of-way
Disadvantages: High side street delay
Evaluation Score: **4.0**

D24.B: Install a roundabout

Advantages: Roundabouts typically experience 25% less crashes than signalized and unsignalized intersections[3]; could provide for gateway treatments for the Town Center; provides U-turn opportunities for traffic leaving businesses west of Sherwood Boulevard
Disadvantages: Roundabouts have large footprints and could require acquiring additional right-of-way; the property on the southwest corner may be significantly impacted
Evaluation Score: **4.0**

[3] Ibid.

Need: Traffic control enhancement at Edy Road/Borchers Drive.

D23.A: Install a traffic signal

Advantages: A traffic signal at this location will have a smaller footprint and will likely have a lower cost than a roundabout as a roundabout would likely require acquiring additional right-of-way; a signal could coordinate with the Highway 99W/Edy Road signal, which would require coordination with ODOT

Disadvantages: Potential for queuing to back up to the Highway 99W/Edy Road intersection due to limited space, which has the potential to impact both safety and mobility

Evaluation Score: **3.5**

D23.B: Install a roundabout

Advantages: Roundabouts typically experience 25% less crashes than signalized and unsignalized intersections[4]; high turn volumes from Borchers could be served without having to wait for a green signal if no conflicting volumes are present

Disadvantages: There is potential for queuing from the Highway99W/Edy Road intersection to back up to the intersection, which can gridlock a roundabout and poses a safety concern if a queued vehicle is stopped in the roundabout due to sight issues; roundabout have large footprints and could require acquiring additional right-of-way; through movements on Edy Road may experience more delay due to high turn volumes

Evaluation Score: **3.5**

D23.C: Prohibit left turn movements from Borchers and install a roundabout west on Edy Road

Advantages: Mitigates safety issues related to potential vehicle queue stacking between adjacent Highway 99W/Edy Road intersection that could existing with either a traffic signal or roundabout treatment; provides opportunity for a new roundabout to the west that could be used for U-turns and potential future connections to Roy Rogers Road and/or access for future development along 99W frontage to avoid need for highway access.

Disadvantages: Increases travel distance by removing left turn movements from Borchers Drive, may cause some traffic to shift to other routes. This alternative would need to provide internal access from medical offices to new roundabout at west since left turns from Borchers would be removed. Adjacent roundabout project would not be well-suited to existing roadway network and may be difficult to place without a roadway extension to the north or development access to the south.

Evaluation Score: **3.0**[5]

[4] Ibid.

[5] While this project does not score as highly as the other two options, it provides additional safety benefits.

Need: Traffic control enhancement at Elwert Road/Edy Road.

D30.A: Install a traffic signal

Advantages: A traffic signal would have a smaller footprint than a roundabout and would best fit in the constrained space

Disadvantages: Opportunities for additional turn lanes at the traffic signal are limited due to constrained right of way; the signal would need to be signed well to alert drivers with advanced warning.

Evaluation Score: **1.5**

D30.B: Install a roundabout

Advantages: Roundabouts typically experience 25% less crashes than signalized and unsignalized intersections[6]; delay will likely be less than as a signalized intersection.

Disadvantages: Roundabouts have large footprints and could require acquiring additional right-of-way; while adjacent properties are undeveloped, the adjacent creek and wetlands would make widening for a roundabout difficult

Evaluation Score: **2.5**

Need: Traffic control enhancement at Brookman Road/Highway 99W.

D14.A: Install a traffic signal

Advantages: Provides access to future growth areas; provides relief to Sunset Boulevard; may increase safety at Sunset due to improving expectancy for traffic as the urban fringe is shifted south

Disadvantages: Increases the potential for rear-end incidents on Highway 99W due to signal located on the urban fringe

Evaluation Score: **4.0**

D14.B: Install a traffic signal and realign Brookman Road to the north to be located in urban area

Advantages: Consistent with Brookman Concept Plan and provides spacing for potential I-5 to 99W connection to south. Provides access to future growth areas; provides relief to Sunset Boulevard; may increase safety at Sunset due to improving expectancy for traffic as the urban fringe is shifted south. Realigning the road to the north would provide urban context and move it away from the southern fringe, providing a safety benefit due to driver expectancy.

Disadvantages: May impact future connections north/west of 99W (Chapman Road) as urban growth areas urbanize.

Evaluation Score: **5.0**

[6] Ibid.

Bicycle Project Alternatives

Need: Bicycle facilities on Murdock Road between Oregon Street and the Urban Growth Boundary.

B1.A: Widen the roadway to provide bike lanes

Advantages: Provides bicycle facilities on both sides of the roadway; cross-section would fit within existing right-of-way

Disadvantages: Requires extensive roadway widening

Evaluation Score: **2.0**

B1.B: Build a shared-use path between Oregon Street and Upper Roy Street

Advantages: Connects the existing shared-use path south of Upper Roy Street to the proposed path on Oregon Street, and has fewer impacts

Disadvantages: Replaces existing sidewalk and therefore provides little benefit to pedestrians; northbound bicyclists may be inclined to ride in the two-lane roadway

Evaluation Score: **3.0**

Need: Bicycle facilities on Timbrel Lane between Sunset Boulevard and Old Highway 99W.

B11.A: Widen the roadway to provide bike lanes

Advantages: Provides dedicated space for bicycle travel that is separated from the motor vehicle space

Disadvantages: Requires widening the roadway, which would require obtaining an additional 4 feet of right-of-way

Evaluation Score: **2.0**

B11.B: Provide shared lane markings

Advantages: Low cost solution, and is located along a low volume and low speed roadway in a school zone for an elementary school

Disadvantages: Bicyclists must share the roadway with vehicles and it does not meet the standard design for collector roadways

Evaluation Score: **3.0**

Need: Bicycle facilities on Century Drive between Tualatin-Sherwood Road and its existing terminus.

B10.A: Widen the roadway to provide bike lanes

Advantages: Provides an alternative route to riding along an arterial, meets collector standards, and provides dedicated space for bicyclists
Disadvantages: Requires widening the newly built facility; would require obtaining an additional 12 feet of right-of-way
Evaluation Score: **4.0**

B10.B: Direct bicyclists to use Tualatin-Sherwood Road and Langer Farms Parkway instead of Century Drive east of Langer Farms Parkway

Advantages: Low cost solution
Disadvantages: Bicyclists must travel on an arterial for a longer distance, bike facilities would not be available for bicyclists using this segment of Century Drive, and it does not meet the standard design for collector roadways
Evaluation Score: **1.0**

B10.C: Add shared lane markings

Advantages: Low cost solution
Disadvantages: This facility could become a higher volume facility as an alternative route to Tualatin-Sherwood Road; this facility is also adjacent to commercial land uses
Evaluation Score: **1.5**

B10.D: Continue the Century Drive path along this segment by widening sidewalk on the north/west side

Advantages: Provides a continuous path from Sherwood Boulevard to Tualatin-Sherwood Road
Disadvantages: Eastbound bicyclists may be inclined to ride in the roadway; would require obtaining additional right-of-way to widen sidewalk
Evaluation Score: **4.5**

Need: Bicycle facilities on Old Highway 99W between Timbrel Lane and Crooked River Lane.

B12.A: Remove on-street parking to provide bike lanes

Advantages: Low cost solution, and provides dedicated space for bicycle travel that is separated from the motor vehicle space

Disadvantages: Requires removing parking on the east side of the roadway, which may be critical for school and resident parking

Evaluation Score: **4.0**

B12.B: Provide shared lane markings

Advantages: Low cost solution and is located in a low speed facility in a school zone for an elementary school

Disadvantages: Bicyclists must share the roadway with vehicles; it does not meet the standard design for collector roadways, and bicyclists would be forced back into the roadway if the segment from Brookman Road to Crooked River Lane is widened to provide bike lanes

Evaluation Score: **3.0**

B12.C: Widen the roadway to provide bike lanes

Advantages: Provides dedicated space for bicycle travel that is separated from the motor vehicle space, and maintains parking

Disadvantages: Requires widening the roadway, which would require obtaining an additional 3 feet of right-of-way from the east side of the roadway, and is the highest cost option

Evaluation Score: **3.0**

B12.D: Widen the sidewalk along the west side to provide a shared-use path

Advantages: Does not impact the physical roadway space, parking, or private properties

Disadvantages: Does not provide bike facilities on the east side of the roadway; the path could be heavily populated with young children during drop-off and pick-up times

Evaluation Score: **2.5**

Need: Bicycle facilities on Handley Street between Cedar Brook Way and Elwert Road.

B14.A: Remove curb extensions and chokers to provide bike lanes

Advantages: Provides dedicated space for bicycle travel that is separated from the motor vehicle space

Disadvantages: Requires removing chokers and curb extensions, which calm traffic speeds along this 25mph facility; removal of curb extensions increase pedestrian crossing distance and reduce visibility of pedestrians; it would also remove on-street parking, which is minimal

Evaluation Score: **1.0**

B14.B: Provide shared lane markings

Advantages: Low cost solution, is a low speed facility (25 mph), and space is available between curb extensions for bicyclists to move out of the motor vehicle way

Disadvantages: Bicyclists must share the roadway with vehicles, and it does not meet the standard design for collector roadways

Evaluation Score: **2.0**

Need: Bicycle facilities on Baler Way between Tualatin-Sherwood Road and Century Drive.

B16.A: Rebuild Baler Way between Tualatin-Sherwood Road and Century Drive to provide bike lanes (Sherwood Town Center project)

Advantages: Provides dedicated space for bicycle travel that is separated from the motor vehicle space, and provides a continuous treatment between Tualatin-Sherwood Road and Century Drive

Disadvantages: Requires removing on-street parking and curb extensions along the local road segment between Langer Drive and Century Drive; removal of curb extensions increase pedestrian crossing distance and reduce pedestrian visibility

Evaluation Score: **3.0**

B16.B: Add neighborhood greenway improvements between Century Drive and Langer Drive, and rebuild Baler Way between Langer Drive and Tualatin-Sherwood road to provide bike lanes

Advantages: Lower cost solution, and maintains on-street parking, and provides a more appropriate treatment to the local segment of Baler Way, and ties into the planned neighborhood greenway improvements on Baler Way south of Century Drive

Disadvantages: Bicyclists must share the roadway with vehicles between Baler Way and Langer Drive; however, this segment is a 25mph local road

Evaluation Score: **4.0**

Need: Bicycle facilities on Galbreath Drive/Gerda Lane between Tualatin-Sherwood Road and City Limits.

B15.A: Remove on-street parking on Galbreath Drive and widen Gerda Lane to provide bike lanes

Advantages: Lower cost solution than widening Galbreath Drive, and provides dedicated space for bicycle travel that is separated from the motor vehicle space

Disadvantages: Requires removing parking on both sides of Galbreath Drive, which is currently used as overflow parking for adjacent businesses

Evaluation Score: **3.5**

B15.B: Widen Galbreath Drive and Gerda Lane to provide bike lanes and to maintain parking on Galbreath Drive

Advantages: Provides dedicated space for bicycle travel that is separated from the motor vehicle space, and maintains parking on Galbreath Drive

Disadvantages: High cost, and bicycle demand along this facility is likely low; widening may impact site circulation and on-site parking; would require obtaining an additional 6 feet of right-of-way

Evaluation Score: **3.0**

B15.C: Direct bikes to use the future Herman Road extension instead of Galbreath Drive and Gerda Lane

Advantages: Bicyclists using Galbreath can potentially take refuge from motor vehicles in the on-street parking space when not occupied

Disadvantages: Bike facilities would not be available for bicyclists using this corridor, travel distance for rerouted bicyclists may increase, and it does not meet the standard design for collector roadways; this is also contingent on the Herman Road extension, which is not a guaranteed project and the location of its western terminus is currently undecided

Evaluation Score: **3.5**

Pedestrian Project Alternatives

Need: Pedestrian crossing across Tualatin-Sherwood Road at Rock Creek Trail.

P34.A: Install a marked crosswalk with pedestrian refuge islands

Advantages: Low cost project; provides pedestrians refuge crossing a five lane arterial
Disadvantages: Refuge may conflict with motorists turning left onto Century Drive
Evaluation Score: **3.5**

P34.B: Install a marked crosswalk with pedestrian refuge islands and Rectangular Rapid Flashing Beacons (RRFBs)

Advantages: Provides pedestrians refuge crossing a five lane arterial, and alerts oncoming motorists of crossing pedestrians
Disadvantages: Higher cost; refuge may conflict with motorists turning left onto Century Drive
Evaluation Score: **3.5**

Improvements to Mobility in Sherwood

Motor vehicle projects were evaluated to address system mobility needs that have been identified in Sherwood. Projects that match identified needs were grouped into three system alternatives (based on similar project types) and were analyzed at both a system-level and location-specific perspective to determine:

- Would the project address the identified mobility need? (Individual Need)
- Would the group of projects provide an overall system benefit? (System Measures)

The following sections describe how the projects were grouped into system alternatives and the results of the mobility analysis. Previously identified projects that do not address any of the identified needs are still included in the overall project list but were not included in this analysis.

Motor Vehicle System Alternatives

The evaluation process was based on Metro's Regional Transportation Functional Plan (RTFP) requirements that local TSPs consider lower cost and impact intersection enhancement projects before assessing major projects related to corridor widening. This general order for considering six different types of projects is summarized in Figure 4.



Figure 4: RTFP Project Hierarchy

Motor vehicle projects that had been identified to address Sherwood's mobility needs were grouped into three categories based on the RTFP project hierarchy: Transportation System Management and Operations (TSMO) projects (Group 1), connectivity projects (Group 2), and widening projects (Group 3). Group 1 projects are lower-cost improvements at the intersection level, and will be prioritized before Group 2 and Group 3 projects. Group 2 projects will be prioritized over Group 3 projects as new connections not only reduce vehicle demand on existing facilities, but they also improve connectivity for pedestrian and bicycle modes. Group 2 projects will only include collector and arterial connections.

Group1: TSMO Projects

- **D3**: Install a roundabout at Tonquin Road/Oregon Street intersection with dual westbound through lanes and a single eastbound through/right lane. Add a second westbound approach lane to the Murdock Road/Oregon Street roundabout for separated westbound left and westbound through lanes. Keep three lanes on the bridge structure.
- **D16**: At the Highway 99W/Edy Road intersection, restripe the east approach to have exclusive left, through, and right turn lanes, and change the eastbound left and westbound left turn phasing to protective-permissive phasing.
- **D17**: Change the eastbound left and westbound left turn phasing to protective-permissive phasing at the Highway 99W/Meinecke Road intersection.
- **D22**: Realign Elwert Road to provide more storage at Highway 99W and realign the Kruger Road intersection to the Cedarbrook extension as a single lane roundabout.
- **D23**: Add traffic control enhancements to the Edy Road/Borchers Drive intersection. Model assumes D23.A: install a traffic signal.
- **D24**: Remove the signal at the Sherwood Boulevard/Langer Drive intersection. Change the intersection to a two-way stop-control intersection with right-in, right-out, left-in movements allowed. Add traffic control enhancements to the Sherwood Boulevard/Century Drive intersection. Model assumes D24.A: add a traffic signal and add eastbound left and westbound left turn lanes.
- **D28**: Install a single lane roundabout at the Sunset Boulevard/Timbrel Lane intersection.
- **D30**: Add traffic control enhancements to the Elwert Road/Edy Road intersection. Model assumes D30.A: install a traffic signal with an added westbound right turn lane (all other approaches are single lane approaches).
- **D32**: Add a southbound right turn lane at the Ladd Hill Road/Brookman Road intersection.
- **D33**: Add a southbound right turn lane and a northbound left turn lane at the Murdock Road/Sunset Boulevard intersection.
- **D34**: Move the existing stops signs at the Brookman Road/Middleton Road intersection to the north and south approaches, and add a southbound left turn lane.
- **D14**: Install a signal at the realigned Highway 99W/Brookman Road intersection, and add a westbound left and southbound right turn lane.
- **D31**: Add westbound and eastbound left turn lanes at Highway 99W/Sunset Boulevard with protective-permissive phasing.
- **D25**: Restripe Sunset Boulevard at Pine Street to add eastbound and westbound left turn lanes.

Group 2: Connectivity Projects

- **D29**: Build a new collector connection between Edy Road and Roy Rogers Road.

Group 3: Widening Projects

- **D1**: Widen Tualatin-Sherwood Road to five lanes from Langer Farms Parkway to 124th Avenue

Mobility Improvements - Local Evaluation

The travel demand model developed for the TSP was used to estimate future year 2035 system mobility for each alternative. The model was based on Washington County's latest 2035 Gamma model with additional refinements and detail (all public roads, lane turn lanes, and intersection control) to capture estimated future circulation patterns and congestion. The figures on the following pages show the mobility conditions[7] for each of the three groups that were analyzed. Key findings include:

- **Group 1 (TSMO Projects) [Figure 5]** – The majority of motor vehicle capacity needs would be met with the addition of these projects, which generally include intersection control or additional turn lanes. Locations that would not meet standards include:
    - Edy/Elwert – With the addition of a traffic signal or roundabout this intersection would operate near capacity. Additional turn lanes for a traffic signal would be beneficial, however may not fit within the available right of way.
    - 99W/Sunset – With the additional turn lanes (that would require the reconfiguration of the Kruger/Elwert intersection) this intersection would continue to operate just over capacity during the PM peak hour.
    - Roy Rogers and Tualatin-Sherwood corridor - The high amount of future traffic projected on the corridor indicates the need for future widening to five lanes.
    - Sunset corridor – High traffic volumes on Sunset Road would lead to higher side street delay at intersections east of Main Street, which are primarily low volume approaches.
- **Group 2 (Connectivity Projects) [Figure 6]** – The north-south collector connection between Roy Rogers Road and Edy Road would provide limited additional benefit to Roy Rogers Road. However this project would have the potential to reduce neighborhood cut-through traffic.
- **Group 3 (Widening Projects) [Figure 7]** – This group of projects included major corridor widening to increase throughput.
    - **Tualatin-Sherwood Road** - Widening to Tualatin-Sherwood Road (east of Langer Farms Parkway) to five lanes would provide the needed capacity for this corridor. This widening has been identified in Washington County's TSP and Metro's RTP.
    - **Roy Rogers Road** – The high amount of traffic projected on the corridor indicates the need for future widening to five lanes. This widening has not been previously identified in plans but may be explored through Washington County's current TSP update.

[7] Mobility needs were measured using volume-to-capacity (V/C) ratios rather than level of service (LOS) to focus on system mobility and filter out locations that may experience high side street delay but serve low traffic volumes.

Figure 5: Year 2035 PM Peak Hour Projected Congestion Locations (V/C) - Group 1 (TSMO)

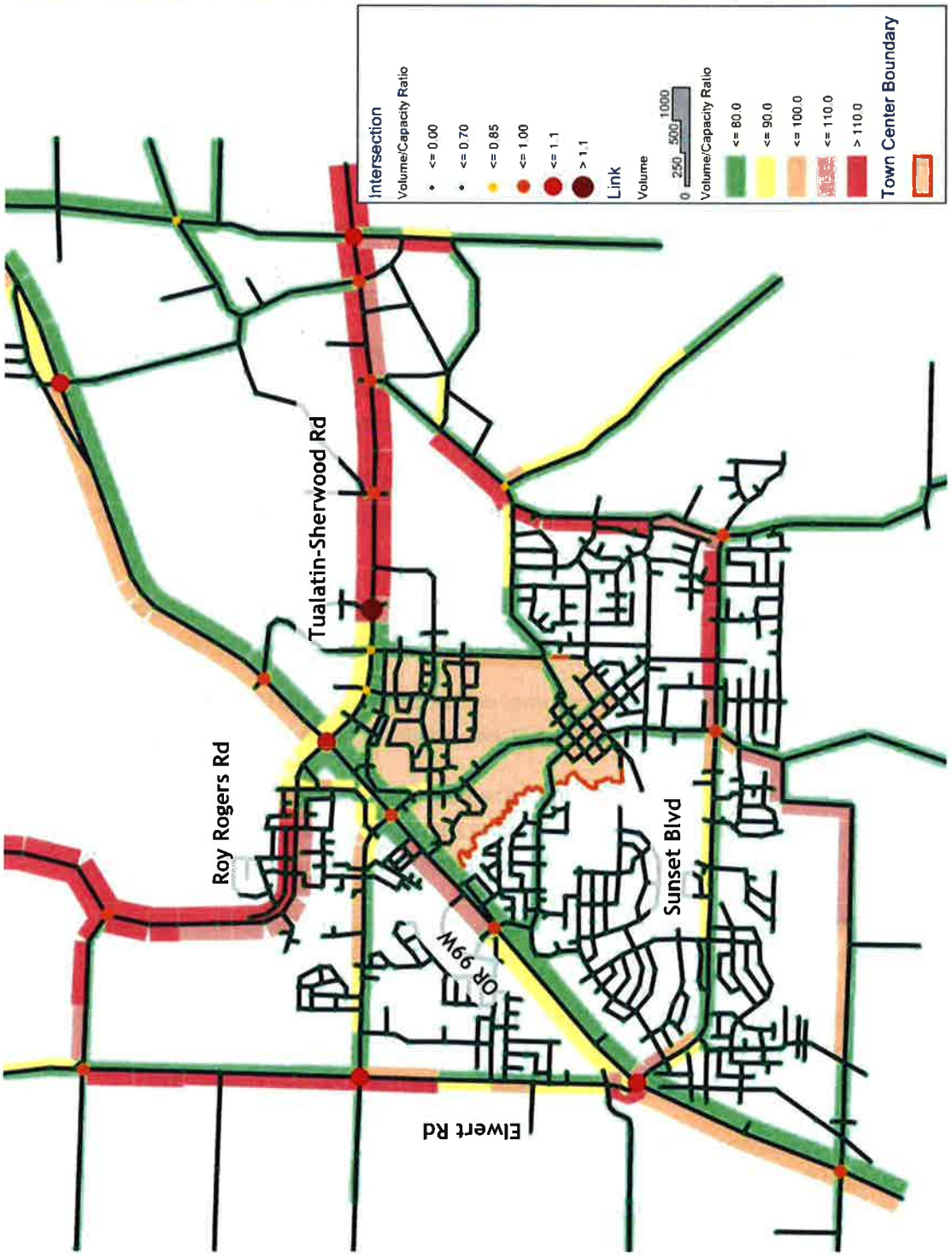


Figure 6: Year 2035 PM Peak Hour Projected Congestion Locations (V/C) - Group 2 (Connectivity)

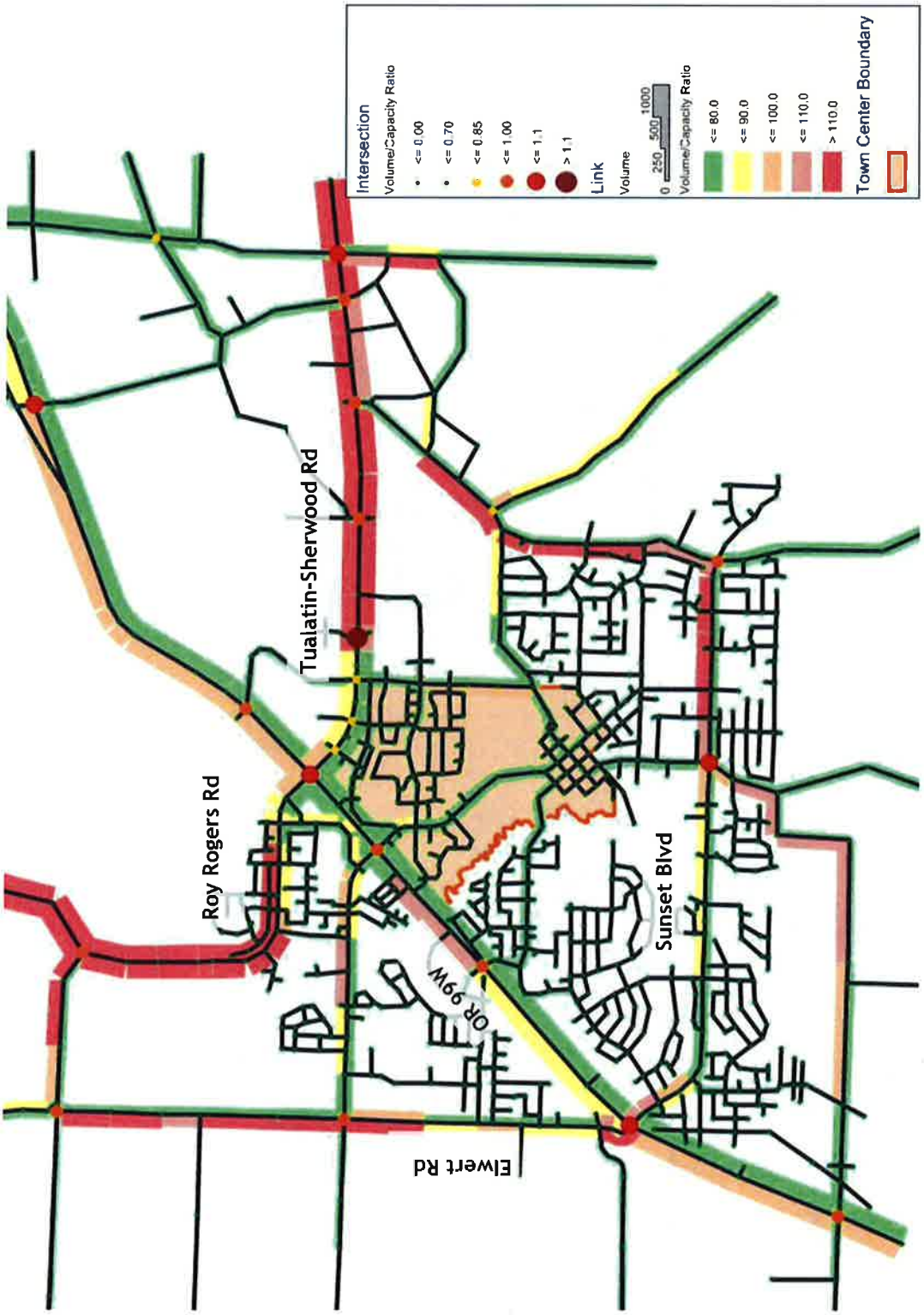
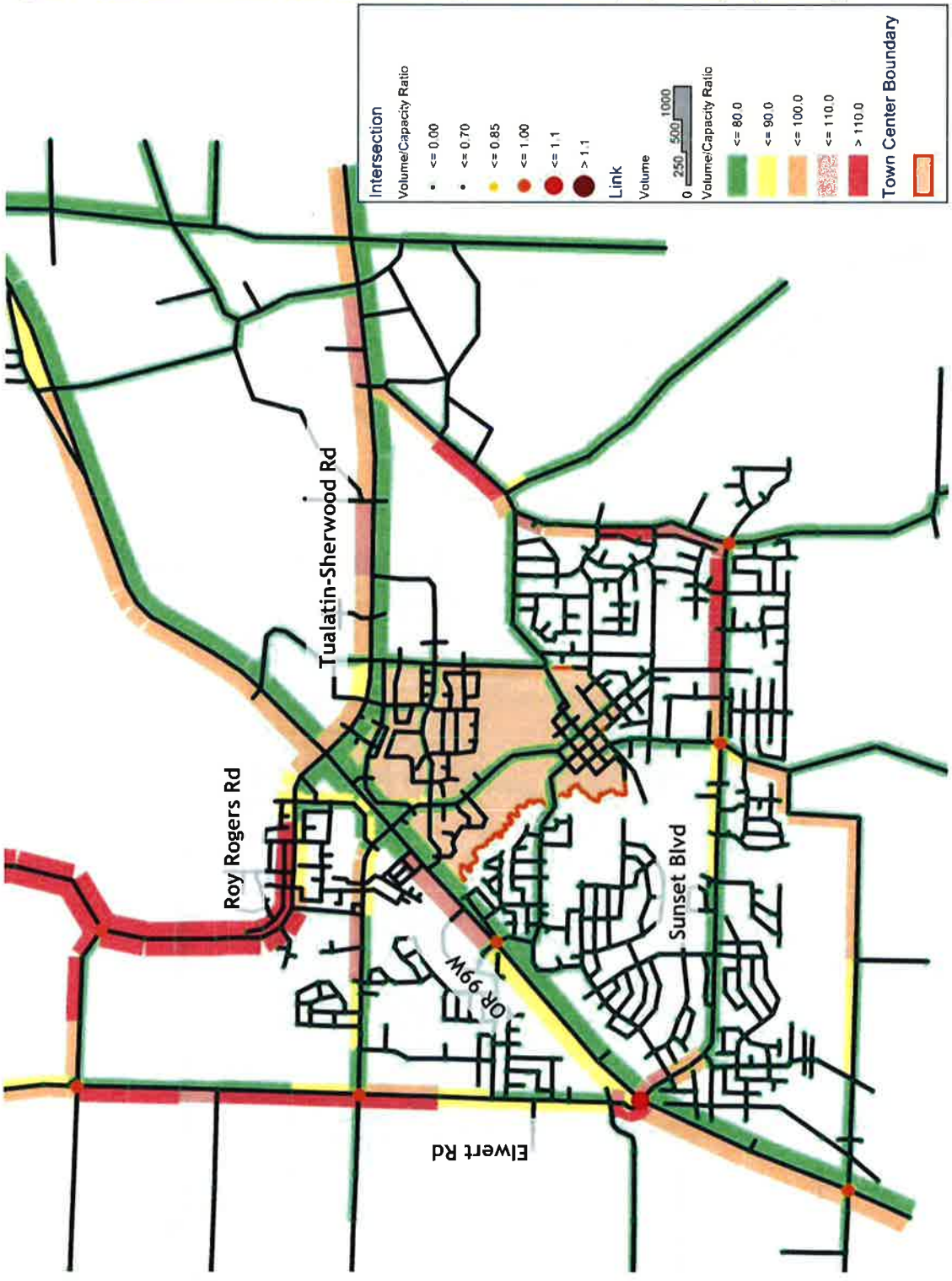


Figure 7: Year 2035 PM Peak Hour Projected Congestion Locations (V/C) - Group 3 (Widening)



Mobility Improvements - System Evaluation

A system planning-level evaluation of the transportation conditions for each of the three year 2035 alternative scenarios was conducted using the travel demand model. The alternatives were evaluated during the p.m. peak hour based on the following system measures of effectiveness (MOE's):

- **Vehicle Miles Travelled (VMT), VMT per capita -** VMT is the total vehicle miles of travel associated with the study-area trips (vehicle trips beginning and/or ending in the study area) on roadways within the Metro region boundary. The VMT per person living in the study area is estimated by traffic volumes from the travel demand model and the 2035 population estimates provided by Metro.
- **Vehicle Hours of Delay (VHD), VHD on Freight Corridors** – VHD is the difference between the total vehicle travel time under congested conditions and free-flow conditions. The study-area VHD is a measure of the overall congestion in the study area. The freight corridors include Roy Rogers Road, Tualatin-Sherwood Road, and Hwy 99W.

The MOE's collectively can generally be considered as a rough proxy for several other measures such as fuel use and greenhouse-gas emissions. One of the primary goals of the transportation improvements is to positively impact the above MOE's. The p.m. peak hour MOE's for the base year and each of the future alternatives are listed in Table 2. Key observations for these system measures include:

- VMT would reduce due to mobility improvements and vehicles travelling on more direct routes. However, the overall VMT reduction (even with Group 3) would be less than one percent.
- VHD would improve under each group of alternatives, particularly with improvements to Tualatin-Sherwood Road. These improvements would significantly reduce freight delay along the corridor.

Table 2: System Performance Measures (PM Peak Hour)

Measure	Year 2010	Year 2035 (Baseline)	Group 1: TSMO	Group 2: Connectivity	Group 3: Widening
Total Vehicle Miles Travelled (VMT)	34,100 vmt	55,600 vmt	55,550 vmt	55,500 vmt	55,350 vmt
VMT per capita	1.4 vmt/capita	1.3 vmt/capita	1.3 vmt/capita	1.3 vmt/capita	1.3 vmt/capita
Vehicle Hours of delay (VHD)	440	1,420	1,360	1,360	1,130
VHD on Freight Corridors*	240	870	960	950	780

Note: *Freight corridors include OR 99W, Tualatin-Sherwood Road, and Roy Rogers Road.

Prioritization of Potential Projects

The previous sections summarized how the full project list was developed and evaluated. The following section describes the process that was used to determine the initial prioritization of the project list.

Developing the Prioritized List of Projects

The list of potential projects was prioritized to identify which projects could likely be funded through 2035 based on transportation funding assumptions and the project prioritization process.

Transportation Funding

Sherwood must make investment decisions to develop a set of transportation improvements that could reasonably be funded to best meet identified transportation needs through 2035. As summarized in the Existing Conditions Technical Report, it is estimated that Sherwood would have approximately $11.3 million to spend on capital improvement projects through 2035 based on historical growth that has occurred over the last several years. However, assuming the level of growth related to urbanization of surrounding areas through 2035 (which in turn leads to additional trips and triggers transportation needs), Sherwood's available funds for transportation projects would grow to approximately $60 million. These potential funding levels were both considered in the development of the project lists and the prioritization process.

Prioritization Process

The prioritized project list was developed based on a three-tier evaluation process, which included:

- **Tier 1: Screening for Needs** – Previously identified projects were screened to determine if they addressed a specific need identified in the TSP update. Additional projects were developed to address the needs that were not otherwise addressed with previously identified projects. Projects that were previously identified but did not directly address a given need were given a "low" priority (regardless of the Tier 2 and Tier 3 evaluation).

- **Tier 2: Primary Evaluation Criteria** – Evaluation criteria were applied to projects across all modes based on consistency with Sherwood's transportation goals. These criteria provided a means to evaluate very different projects using the broad criteria that was applied to all project types.

- **Tier 3: Secondary Criteria** – In order to further differentiate projects that received the same primary evaluations score within a given mode, sets of secondary criteria were applied. These criteria were different for each mode and were only used to compare projects relative to other projects of the same mode. These criteria were:

    - Pedestrian/Bicycle – Project location and proximity to schools and other activity generators (previously mapped).

- Motor Vehicle – Hierarchy of projects based on regional strategies (intersection improvements are highest priority and major corridor widening is lowers priority).

Through application of the above criteria and consideration for the City's transportation budget available for capital improvements, the following general prioritization groups were identified.

- Short-term priority – The highest scoring projects (based on evaluation criteria) that fall within Sherwood's anticipated transportation budget for capital improvements through 2035. assuming an historical revenue stream of $11 million

- Medium-term priority – Projects that would require funding beyond the historical revenue stream of $11 million, but that are anticipated to be achievable through the projected revenue stream of $60 million.

- Long-term priority – Projects that address an identified transportation need but exceed the anticipated available funding, and projects that were previously identified that do not directly address one of the identified needs.

Short-term Priority Projects

Projects that are currently identified as short-term priority (those assumed likely to be funded through 2035) are listed in Table 3 (total funds of approximately $11 million) These project groups were identified based on initial assumptions about approximate project costs. However, the project lists will be further refined as project costs are developed. The full prioritized project list is located in the Appendix. The Short-term priority project list includes:

- Bicycle Projects (6)
- Motor vehicle projects (8)
- Pedestrian Projects (9)
- Transit Projects (2)

Medium-term Priority Projects

The additional Group 2 medium-term priority projects (assuming a revenue stream of $60 million) are listed in Table 4. While there are many projects that are not expected to be funded through 2035, improvements to Sherwood's revenue stream, project-specific grants, and intergovernmental contributions can help Sherwood build additional projects. The initial prioritization of the project list is likely to be refined as additional information is provided about unique elements of project needs and constraints that were not captured in the overall system analysis. Additionally, assumptions about project costs and potential funding sources can affect the overall project list.

Table 3: Preliminary Short-term Priority (Conservatively Funded) Project List

Project #	Project Name	Project Description
Bicycle Projects		
B2	Meinecke Bike Lanes	Add bike lanes on Meinecke Road from Marshall Street to 3rd Street.
B7	Borchers Bike Lanes	Build bike lanes on Borchers Road between Edy Road and Roy Rogers Road.
B10	Century Drive Shared-Use Path	Widen the sidewalk on the south/east side of Century Drive between Tualatin-Sherwood Road and the existing terminus to provide a shared-use path
B13	Old Highway 99W Improvements Segment 2	Upgrade Old Highway 99W (from Crooked River Lane to Brookman Road) to a two lane collector with a shared use path on the west side and sidewalks on the east side.
B16	Baler Way Bike Lanes	Rebuild Baler Way to a collector between Century Drive and Tualatin-Sherwood Road to include bike lanes.
B17	12th Street Bike Lanes	Add bike lanes on 12th Street between Highway 99W and Sherwood Boulevard.
Motor Vehicle Projects		
D3	Oregon Intersections Improvements at Murdock and Tonquin	Install a roundabout at the Tonquin Road/Oregon Street intersection with dual westbound through lanes and a single eastbound through/right lane. Consider creating a "Dumbbell Roundabout" with the Oregon/Murdock roundabout by disallowing the west circulating lane at Oregon/Tonquin and disallowing the east circulating lane at Oregon/Murdock. Add a second westbound approach lane to the Murdock Road Oregon Street roundabout for separated westbound left and westbound through lanes. Keep three lanes on the bridge structure.
D13	Tualatin-Sherwood Improvements – Phase 1	Widen Tualatin-Sherwood Road/Roy Rogers Road between Borchers Drive and Baler Way to five lanes. Includes intersection modifications at OR 99W, the Sherwood Market Center, and at Baler Way.
D16	Edy/Highway 99W Intersection Improvements	Restripe the westbound Sherwood Boulevard approach to have a single left turn lane, a single through lane, and a single right turn lane. Eliminate the split phase timing for the side streets, and maintain the existing green time on OR 99W for the northbound and southbound through movements. Add the missing crosswalk to the south approach. Consider implementing P3 alongside this project.
D18	Langer Drive Improvements	Construct improvements to Langer Drive between Baler Way and Sherwood Boulevard that are consistent with the Sherwood Town Center Plan. Major improvements include: buffered bike lanes, on-street parking, wider sidewalks, narrower travel lanes, removal of the center turn lane, and landscaping.
D19	124th Avenue Extension	Extend 124th Avenue as an arterial from Tualatin-Sherwood Road to Tonquin Road.

Project #	Project Name	Project Description
D22	Kruger/Elwert Intersection Safety Improvement	Realign Elwert Road to provide more storage at Highway 99W, and realign the Kruger Road intersection to the Cedarbrook extension as a single lane roundabout. Consider implementing D31 with this project.
D24	Sherwood Boulevard Intersection Modifications	Remove the Sherwood Boulevard/Langer Drive traffic signal (allow right-in, right-out, and left-in movements only), and install a traffic signal at the Sherwood Boulevard/Century Drive intersection (add eastbound and westbound left turn lanes).
D31	Highway 99W/Sunset Improvements	Add westbound and eastbound left turn lanes at Highway 99W/Sunset Boulevard with protective-permissive phasing. Consider implementing D22 and P3 alongside this project.
Pedestrian Projects		
P6	Sherwood Boulevard Improvements	Construct improvements to Sherwood Boulevard between Langer Drive and 3rd Street that are consistent with the Sherwood Town Center Plan. Major improvements include: a shared-use path on the east side, wider sidewalks on the west side, narrower travel lanes, and landscaping.
P12	Ice Age Tonquin Trail Segment 7	Implement Tonquin Trail Segment 7 improvements from immediately west of the Tonquin/Oregon Street intersection to immediately north of Park Street.
P13	Ice Age Tonquin Trail Segment 8	Implement Tonquin Trail Segment 8 improvements from immediately north of Park Street to immediately south of Highway 99W.
P14	Ice Age Tonquin Trail Segment 9	Implement Tonquin Trail Segment 9 improvements from immediately south of Highway 99W to Roy Rogers Road (including Roy Rogers intersection).
P19	12th Street Sidewalk Infill	Construct sidewalk along the south side of 12th Street from Highway 99W to Sherwood Boulevard.
P22	Pine Street Sidewalk Infill Segment 1	Construct sidewalk along the west side of Pine Street from Willamette Street to Columbia Street.
P23	Pine Street Sidewalk Infill Segment 2	Construct sidewalk along the east side of Pine Street from Division Street to Sunset Boulevard, and fill the sidewalk gap along the west side of Pine Street just north of Sunset Boulevard.
P48	Downtown Streetscapes Master Plan Phase 3 (Old Town Secondary Streets)	Complete Phase 3 (Old Town Secondary Streets) of the Downtown Streetscapes Master Plan.
P49	Downtown Streetscapes Master Plan Phase 4 (Old Town Residential Neighborhoods)	Complete Phase 4 (Old Town Residential Neighborhoods) of the Downtown Streetscapes Master Plan.
Transit Projects		
T2	Improve Pedestrian Connections to Transit Facilities	Improve Pedestrian Connections to Transit Facilities.
T3	Increase Density Adjacent to Transit	Increase Density Adjacent to Transit.

Table 4: Preliminary Medium-Term (Projected Funded) Project List

Project #	Project Name	Project Description
Bicycle Projects (plus Short-Term)		
B1	Murdock Shared-Use Path	Build a shared-use path along the west side of Murdock Road from Oregon Street to Upper Roy Street.
B5	Main Street Shared Lane Markings	Add shared lane markings to Main Street between 1st Street and Sherwood Boulevard.
B6	Pine Street Shared Lane Markings	Add shared lane markings to Pine Street between 3rd Street and Sherwood Boulevard.
B8	3rd Street Shared Lane Markings	Add shared lane markings on 3rd Street from Washington Street to Sherwood Boulevard.
B9	1st Street Shared Lane Markings	Add shared lane markings on 1st Street from Main Street to Pine Street.
B12	Old Highway 99W Shared-Use Path	Widen the sidewalk along the west side of Old Highway 99W between Timbrel Lane and Crooked River Lane to provide a shared-use path
B18	Washington Street Shared Lane Markings	Add shared lane markings on Washington Street between 3rd Street and 1st Street.
B19	Sunset Bike Lanes	Add bike lanes on Sunset Boulevard between Aldergrove Avenue and Murdock Road
Motor Vehicle Projects (plus Short-Term)		
D4	Elwert Road Improvements	Upgrade Elwert Road (from Highway 99W to Edy Road) to a three lane arterial with bike lanes and sidewalks. This project may be phased with D30 for design and construction purposes.
D6	Edy Road Improvements	Upgrade Edy Road (from Borchers Drive to City Limits) to a three lane collector with bike lanes and sidewalks.
D7	Ladd Hill Road Improvements	Upgrade Ladd Hill Road (from Sunset Boulevard to the Urban Growth Boundary) to a three arterial with bike lanes and sidewalks.
D8	Oregon Street Improvements	Upgrade Oregon Street (from Murdock Road to the railroad crossing) to a three lane collector with sidewalks on south side and a shared-use path on the north side (part of the Ice Age Tonquin Trail).
D12	Extension of Langer Farms Parkway at 99W	Extend Langer Farms Parkway from 99W west as a collector road.
D14	Highway 99W/Brookman Traffic Signal and Realignment	Realign Brookman Road to intersect with Highway 99W approximately 1/4 mile north of its existing intersection; this improvement includes a traffic signal at the realigned intersection with a westbound left and southbound right turn lane, and a grade separated railroad crossing.
D15	Sunset Boulevard Improvements	Upgrade Sunset Boulevard (from Aldergrove Avenue to Eucalyptus Terrace) to a three lane arterial with sidewalks and bike lanes. Address vertical crest sight distance issues near Pine Street.

Project #	Project Name	Project Description
D17	Meinecke/Highway 99W Intersection Improvements	Change the eastbound and westbound left turn phasing on Meinecke Road from permitted to permitted/protected and maintaining the existing green time on OR 99W for the northbound and southbound through movements. Consider implementing P3 alongside this project.
D25	Sunset/Pine Improvements	Restripe Sunset Boulevard at Pine Street to add eastbound and westbound left turn lanes.
D27	Baker Road Improvements	Upgrade Baker Road (from Sunset Boulevard to the urban growth boundary) to a two lane arterial with bike lanes and sidewalks.
D30	Elwert/Edy Roundabout	Install a single lane roundabout at the Elwert Road/Edy Road intersection. This project may be phased with D4 for design and construction purposes.
D33	Sunset/Murdock Turn Lanes	Add a southbound right turn lane and a northbound left turn lane at the Sunset Boulevard/Murdock Road intersection.
D34	Brookman/Middleton Traffic Control Enhancements	Move the stop signs to the north and south approaches, and add a southbound left turn lane at the Brookman Road/Middleton Road intersection.
D35	Area 59 Neighborhood Route	Build a neighborhood roadway, connecting Elwert Road and Copper Terrace as identified in the Area 59 concept plan.
Pedestrian Projects (plus Short-Term)		
P1	Handley Street Sidewalk Infill	Construct sidewalk along the north side of Handley Street from Elwert Road to the existing sidewalk terminus approximately 250 feet east of Elwert Road.
P2	Highway 99W Sidewalk Infill	Construct sidewalks along both sides of Highway 99W between the north Urban Growth Boundary and the south Urban Growth Boundary.
P3	Highway 99W Crosswalks	Add missing crosswalks at existing traffic signal locations on Highway 99W between Edy Road and Sunset Boulevard. The crosswalk enhancements may be phased individually with their corresponding intersection improvements (D16, D17, D31).
P4	Ice Age Tonquin Trail/Highway 99W Connection	Construct a shared use path that connects the proposed Cedar Creek/Tonquin Trail to Highway 99W.
P5	10th Street Neighborhood Greenway	Add sidewalks and shared lane markings to 10th Street and Gleneagle Drive from Sherwood Boulevard to the planned Cedar Creek/Tonquin Trail connection.
P16	Ice Age Tonquin Trail Segment 11	Implement Tonquin Trail Segment 11 improvements from immediately east of the Tonquin Road/Oregon Street intersection to immediately west of Cipole Road.
P18	Cipole Road Sidewalk Infill	Construct sidewalk along the east side of Cipole Road from approximately 1,250 feet north of Tualatin-Sherwood Road to the existing sidewalk terminus approximately 450 feet north.
P20	Division Street Sidewalk Infill	Construct sidewalk along both sides of Division Street from Main Street to Cuthill Place.

Project #	Project Name	Project Description
P21	Meinecke Road Sidewalk Infill	Construct sidewalk along the north side of Meinecke Road from Lee Drive to the existing sidewalk terminus to the east (approximately 400 feet).
P26	Highway 99W Grade Separated Crossing	Build a grade-separated crossing of Highway 99W for pedestrians and bicyclists, providing a direct connection for the Ice Age Tonquin Trail east and west of the highway.
P30	Sunset Boulevard/St Charles Way Crossing Improvements	Install marked crosswalks at the Sunset Boulevard/St Charles Way intersection.
P31	Sunset Boulevard/Redfern Drive Crossing Improvements	Install enhanced pedestrian crossing at the Sunset Boulevard/Redfern Drive intersection.
P32	Sunset Boulevard/Galewood Drive Crossing Improvements	Install enhanced pedestrian crossing at the Sunset Boulevard/Galewood Drive intersection.
P44	Oregon Street Sidewalk Infill	Construct sidewalk along the south side of Oregon Street between Hall Street and Orland Street.
P45	Murdock Road Sidewalk Infill Segment 1	Construct sidewalk along the east side of Murdock Road from Willamette Street to Oregon Street.
P47	Downtown Streetscapes Master Plan Phases 1 and 2 (Old Town Core)	Complete Phase 1 (Old Town Core) and Phase 2 (Cannery Arterials) of the Downtown Streetscapes Master Plan.
Transit Projects (plus Short-Term)		
T1	Provide Transit Amenities at Major Transit Stops	Provide Transit Amenities at Major Transit Stops.
T5	Provide Local Service	Provide local service to enhanced regional service.

Needs List

Need #	Needs
Pedestrian Needs (High Priority Gaps)	
1	Highway 99W (west side only) between Roy Rogers Road and the existing sidewalk terminus to the north (approximately 600 feet north of Roy Rogers Road).
2	Highway 99W between Tualatin-Sherwood Road and Meinecke Road. This includes discontinuous gaps along both sides of the highway.
3	12th Street (south side only) between Highway 99W to Sherwood Boulevard.
4	Meinecke Road (north side only) between Lee Drive and the existing sidewalk terminus to the east (approximately 400 feet east of Lee Drive).
5	Edy Road (both sides) between Borchers Drive and Trailblazer Place.
6	Pine Street (west side only) from Willamette Street to Columbia Street.
7	While Division Street is a neighborhood collector, it was highlighted in the Existing Conditions Technical Report as a major gap, and falls within a high pedestrian demand area.
8	While Gleneagle neighborhood pedestrian gaps are along local roads, they were highlighted in the Existing Conditions Technical Report as major gaps, and fall within a high pedestrian demand area.
Pedestrian Needs (Medium Priority Gaps)	
9	Highway 99W (both sides) between Meinecke Road and Sunset Boulevard.
10	Edy Road (both sides) between Trailblazer Place and Elwert Road.
11	Elwert Road (both sides) between Highway 99W and Edy Road.
12	Handley Street (north side only) between Elwert Road and existing sidewalk terminus to the east (approximately 250 feet east of Elwert Road).
13	Timbrel Lane (north side only) between Old Highway 99W and Middleton Road. This includes two short sidewalk gaps.
14	Old Highway 99W (both sides) from Brookman Road to existing sidewalk terminus to the north (approximately 1,800 feet north of Brookman Road).
15	Sunset Boulevard (north side only) from Eucalyptus Terrace to St Charles Way.
16	Ladd Hill Road (west side only) from Willow Drive to Brookman Road.
17	Baker Road (east side only) from Sunset Boulevard to Lavon Lane.
18	Murdock Road (west side) from Willamette Street to existing sidewalk terminus to the north (approximately 130 feet north of Willamette Street).
19	Murdock Road (east side only) from Willamette Street to Upper Roy Street.
20	Murdock Road (east side only) from Upper Roy Street to Sunset Boulevard. While the pedestrian facilities on the west side act as a shared-use path, there will likely be demand for pedestrian facilities along the east side as the area develops.
21	Pine Street (east side) from Division Street to Sunset Boulevard, and Pine Street (west side) just north of Sunset Boulevard.
Pedestrian Needs (Low Priority Gaps)	
22	Highway 99W (both sides) south of Sunset Boulevard.
23	Edy Road (both sides) west of Elwert Road.
24	Elwert Road (both sides) north of Edy Road.
25	Ladd Hill Road (both sides) south of Brookman Road.
26	Brookman Road (both sides) between Highway 99W and Ladd Hill Road.
27	Baker Road (both sides) south of Lavon Lane.
28	Murdock Road (east side only) from Oregon Street to Willamette Street.
29	Oregon Street (south side) from Hall Street to Orland Street.
30	Oregon Street (north side) from Murdock Road to Langer Farms Parkway.
31	Oregon Street (south side) from Murdock Road to existing sidewalk terminus to the east (approximately 2,700 feet east of Murdock Road).
32	Tonquin Road (both sides) south of Oregon Street.
33	Cipole Road (west side) from Tualatin-Sherwood Road to existing sidewalk terminus to the north (approximately 1,250 feet north of Tualatin-Sherwood Road).
34	Cipole Road (east side) from existing terminus (approximately 1,250 feet north of Tualatin-Sherwood Road) to the north for approximately 450 feet.
Pedestrian Needs (Connectivity)	
35	Crossings along Highway 99W
36	Crossings along Sunset Boulevard between Pinehurst Drive and St Charles Way
37	Pedestrian connection between Old Town and residential area to the north
38	Regional Pedestrian Connections
Bicyle Needs (High Priority Gaps)	
39	Roy Rogers Road between Highway 99W and Borchers Drive.
40	Borchers Drive between Roy Rogers Road and Edy Road.
41	Langer Drive between Baler Way and the Highway 99W northbound access.
42	Baler Way between Tualatin-Sherwood Road and Langer Drive.
43	12th Street between Highway 99W and Sherwood Boulevard.
44	Sherwood Boulevard between 12th Street and 3rd Street.
45	Pine Street between 3rd Street and Sunset Boulevard.
46	Meinecke Road-Washington Street between Lee Drive and 1st Street.
47	3rd Street between Washington Street and Sherwood Boulevard
48	1st Street between Main Street and Pine Street.
49	Century Drive between Tualatin-Sherwood Road and existing terminus.
50	Oregon Street between Murdock Road and Langer Farms Parkway.
51	Sunset Boulevard between Greengate Drive and Cinnamon Hill Place.
52	Main Street between 1st Street and Sunset Boulevard
53	Ladd Hill Road between Sunset Boulevard and Brookman Road.
54	Home Depot access road between Highway 99W and existing terminus.
55	Edy Road between Cherry Orchards Street and Trailblazer Place.
56	Edy Road between Wagontrain Place and Elwert Road.
Bicyle Needs (Medium Priority Gaps)	
57	Ladd Hill Road between Brookman Road and Oberst Lane.
58	Brookman Road between Highway 99W and Ladd Hill Road.

59	Timbrel Lane between Sunset Boulevard and Old Highway 99W.
60	Old Highway 99W between Timbrel Lane and Brookman Road.
61	Handley Street between Cedar Brook Way and Elwert Road.
62	Murdock Road between Oregon Street and Sunset Boulevard.
63	Sunset Boulevard between Aldergrove Avenue and Murdock Road.
64	Galbreath Drive between Gerda Lane and city limits.
65	Gerda Lane between Tualatin-Sherwood Road and Galbreath Drive.
66	Baker Road between Sunset Boulevard and McConnell Road.
67	Elwert Road between Highway 99W and Edy Road.
Bicyle Needs (Low Priority Gaps)	
68	Tonquin Road south of Oregon Street.
69	Cipole Road north of Tualatin-Sherwood Road.
70	Ladd Hill Road south of Oberst Lane.
71	Edy Road west of Elwert Road.
72	Elwert Road north of Edy Road.
Transit Needs	
73	Provide full range of amenities at bus stops, including shelters, seating, route signage, and trash amenities.
74	Sidewalk connections to transit stops.
75	Improve YCTA accessibility.
76	A Sherwood Transit Center.
77	Local transit circulation.
Motor Vehicle Needs (Connectivity)	
78	Collector Gap: Meinecke Road to Sunset Boulevard between Highway 99W and Main Street.
79	Collector Gap: Sunset Boulevard to Brookman Road between Old Highway 99W and Ladd Hill Road.
80	Collector Gap: Roy Rodgers Road to Edy Road between Borchers Drive and Elwert Road.
81	Collector Gap: Edy Road to Handley Street between Highway 99W and Elwert Road.
Motor Vehicle Needs (Corridor Mobility)	
82	OR 99W north of SW Tualatin Sherwood Rd*
83	SW Roy Rogers Rd West of OR 99W*
84	SW Tualatin Sherwood Rd east of OR 99W*
85	SW Edy Rd west of OR 99W
86	OR 99W south of SW Edy Rd*
87	SW Oregon St east of SW Murdock Rd
88	SW Sunset Blvd between SW Pinehurst Dr and SW Murdock Rd
89	SW Langer Farms Pkwy south of SW Century Dr
Motor Vehicle Needs (Intersection Operations)	
90	Highway 99W and Home Depot access road/Langer Farms Parkway (extension)*
91	Highway 99W and Tualatin Sherwood Road*
92	Highway 99W and Edy Road/Sherwood Boulevard*
93	Highway 99W and Sunset Boulevard*
94	Highway 99W and Brookman Road*
95	Highway 99W and Red*
96	Highway 99W and future road (south of Red)*
97	Highway 99W and 12th St*
98	Highway 99W and Cedar Brook Way*
99	Highway 99W and Meinecke Road*
100	Tualatin-Sherwood Road and Baler Way*
101	Tualatin-Sherwood Road and Langer Farms Parkway*
102	Tualatin-Sherwood Road and Olds Place*
103	Tualatin-Sherwood Road and Gerda Lane*
104	Tualatin-Sherwood Road and Langer Drive*
105	Tualatin-Sherwood Road and Wildrose Place*
106	Tualatin-Sherwood Road and Cipole Road*
107	Tualatin-Sherwood Road and 124th Avenue*
108	Roy Rogers Road and Cedarview Way*
109	Roy Rogers Road and Lynnly Way*
110	Roy Rogers Road and Lavender Place*
111	Cipole Road and Herman Road
112	Herman Road and 129th Avenue
113	124th Avenue and Myslony Street
114	124th and Cipole Road (extension)
115	Langer Drive and Langer Drive
116	Langer Drive and Baler Way
117	Elwert Road and Conzelmann Road
118	Elwert Road and Edy Road
119	Elwert Road and Handley Street
120	Elwert Road and Haide Road
121	Elwert Road and Sunset Boulevard
122	Edy Road and Bedstraw Terrace
123	Edy Road and Houston Drive
124	Edy Road and Madeira Terrace
125	Edy Road and Borchers Drive
126	Sherwood Boulevard and 12th Street
127	Sherwood Boulevard and Gleneagle Drive
128	Langer Farms Parkway and Whetstone Way
129	Oregon Street and Murdock Road

130	Oregon Street and Tonquin Road
131	Oregon Street and Lincoln Street
132	Murdock Road and Willamette Street
133	Pine Street and 2nd Street
134	Sunset Boulevard and Woodhaven Drive
135	Sunset Boulevard and Timbrel Lane
136	Sunset Boulevard and Richen Park Terrace
137	Sunset Boulevard and Greengate Place
138	Sunset Boulevard and Redfern Place
139	Sunset Boulevard and Myrica Court
140	Sunset Boulevard and Main Street
141	Sunset Boulevard and Cinnamon Hills Place
142	Sunset Boulevard and Pine Street
143	Sunset Boulevard and Aldergrove Avenue
144	Sunset Boulevard and Brittany Place
145	Sunset Boulevard and Murdock Road
146	Ladd Hill Road and Brookman Road
147	Brookman Road and Middleton Road
Safety Needs (Road Segments)	
148	MP 14.91 to MP 15.09 (Tualatin-Sherwood Road intersection)
149	MP 16.61 to MP 16.73 (Elwert Road/Sunset Boulevard intersection)
150	MP 15.92 to MP 16.01 (Meinecke Road intersection)
Safety Needs (Intersections)	
151	Highway 99W/Tualatin-Sherwood Road/Roy Rogers Road
152	Tualatin-Sherwood Road/Cipole Road
153	Highway 99W/Elwert Road/Sunset Boulevard
154	Tualatin-Sherwood Road/Oregon Street
155	Tualatin-Sherwood Road/Gerda Lane
156	Highway 99W/Meinecke Road

Sherwood TSP Update - Project List - ADOPTED 06/17/14

Legend

Financially Constrained Group 1 ($11 million through 2035)

Financially Constrained Group 2 ($60 million through 2035)

Project List

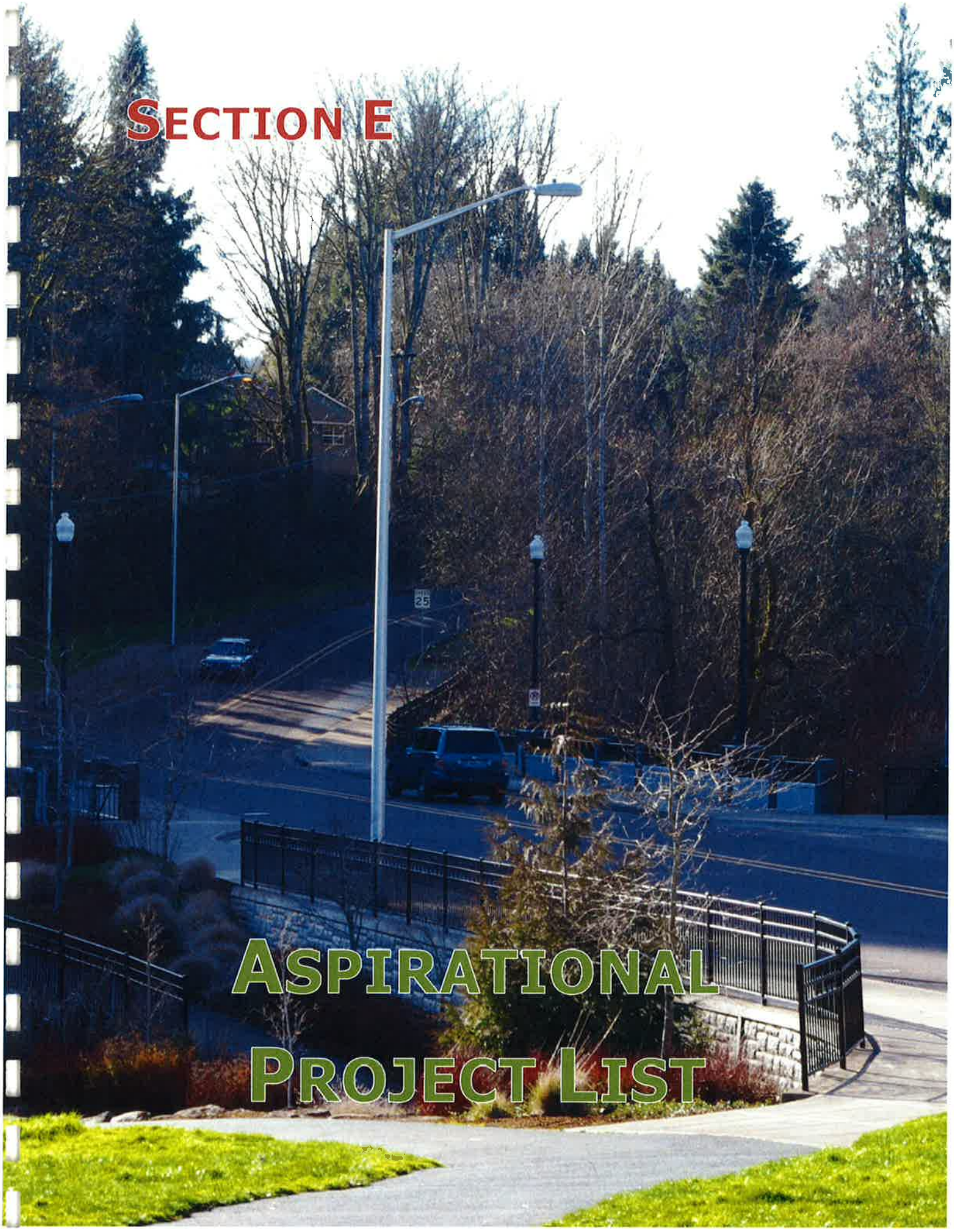
Project #	Project Name	Primary Mode	Project Start Point	Project End Point	Project Details	Evaluation Score	Need Reference #
D1	Tualatin-Sherwood Road Improvements - Phase 2	Roads/bridges	Langer Farms Parkway	Teton Avenue	Widen Tualatin-Sherwood Road (from Langer Farms Parkway to Teton Avenue) to five lanes with bike lanes and sidewalks.	2.5	102-107
D2	Tonquin Road Safety Improvements	Roads/bridges	Grahams Ferry Road	Oregon Street	Widen Tonquin Road (from Grahams Ferry Road to Oregon Street) to provide shoulders.	2.5	32, 68
D3	Oregon Intersections Improvements at Murdock and Tonquin	Roads/bridges	Oregon Street/Tonquin Road	Oregon Street/Murdock Road	Install a roundabout at the Tonquin Road/Oregon Street intersection with dual westbound through lanes and a single eastbound through/right lane. Consider creating a "Dumbbell Roundabout" with the Oregon/Murdock roundabout by disallowing the west circulating lane at Oregon/Tonquin and disallowing the east circulating lane at Oregon/Murdock. Add a second westbound approach lane to the Murdock Road Oregon Street roundabout for separated westbound left and westbound through lanes. Keep three lanes on the bridge structure.	3.5	129, 130
D4	Elwert Road Improvements	Roads/bridges	Highway 99W	Edy Road	Upgrade Elwert Road (from Highway 99W to Edy Road) to a three lane arterial with bike lanes and sidewalks. This project may be phased with D30 for design and construction purposes.	3.5	11, 119, 120, 121
D5	Brookman Road Improvements (Three Lane Collector)	Roads/bridges	Highway 99W	Middleton Road	Implement Brookman Road Concept Plan improvements to Brookman Road from Highway 99W to Middleton Road. Major improvements include: rebuild road to a three lane collector facility, and a shared-use path along the north side. The Concept Plan identifies Brookman Road as a collector with the intended function of also providing access to neighborhoods to the north. In addition, reserve right-of-way for the potential widening to five lanes in the event that further refinements to the I-5/99W Connector Plan identify Brookman Road as the Southern Arterial to serve as the primary route for east-west mobility.	1.5	58, 146, 147, 94
D6	Edy Road Improvements	Roads/bridges	Borchers Drive	City Limits	Upgrade Edy Road (from Borchers Drive to City Limits) to a three lane collector with bike lanes and sidewalks.	4.0	5, 10, 55, 56, 122, 123, 124
D7	Ladd Hill Road Improvements	Roads/bridges	Sunset Boulevard	Urban Growth Boundary	Upgrade Ladd Hill Road (from Sunset Boulevard to the Urban Growth Boundary) to a three arterial with bike lanes and sidewalks.	3.5	53, 57, 146
D8	Oregon Street Improvements	Roads/bridges	Murdock Road	Railroad Crossing	Upgrade Oregon Street (from Murdock Road to the railroad crossing) to a three lane collector with sidewalks on south side and a shared-use path on the north side (part of the Ice Age Tonquin Trail).	3.0	28, 29, 49, 130
D9	Baler to Herman Connection	Roads/bridges	Baler Way/Tualatin-Sherwood Road	Herman Road/Langer Farms Parkway	Build a collector roadway, connecting Baler Way at Tualatin-Sherwood Road to the future terminus of the Herman Road at Langer Farms Parkway.	2.0	None (previously planned project)
D10	Cedar Brook Way Extension Segment 1	Roads/bridges	Meinecke Road	Existing Terminus	Extend Cedar Brook Way from its existing terminus to Meinecke Road as a two lane local road.	2.0	None (previously planned project)
D11	Cedar Brook Way Extension Segment 2	Roads/bridges	Handley Street	Highway 99W	Extend Cedar Brook Way from its existing terminus at Handley Street south to Elwert Road as a two lane collector road.	2.0	None (previously planned project)
D12	Extension of Langer Farms Parkway at 99W	Roads/bridges	Highway 99W	-	Extend Langer Farms Parkway from 99W west as a collector road.	2.5	None (previously planned project)
D13	Tualatin-Sherwood Improvements – Phase 1	Roads/bridges	Borchers Drive	Baler Way	Widen Tualatin-Sherwood Road/Roy Rogers Road between Borchers Drive and Baler Way to five lanes. Includes intersection modifications at OR 99W, the Sherwood Market Center, and at Baler Way.	-	None (previously planned project)
D14	Highway 99W/Brookman Traffic Signal and Realignment	Roads/bridges	Highway 99W	Middleton Road	Realign Brookman Road to intersect with Highway 99W approximately 1/4 mile north of its existing intersection; this improvement includes a traffic signal at the realigned intersection with a westbound left and southbound right turn lane, and a grade separated railroad crossing.	5.0	94
D15	Sunset Boulevard Improvements	Roads/bridges	Aldergrove Avenue	Eucalyptus Terrace	Upgrade Sunset Boulevard (from Aldergrove Avenue to Eucalyptus Terrace) to a three lane arterial with sidewalks and bike lanes. Address vertical crest sight distance issues near Pine Street.	3.5	15, 51, 139-143
D16	Edy/Highway 99W Intersection Improvements	Roads/bridges	Edy Road/Highway 99W	-	Restripe the westbound Sherwood Boulevard approach to have a single left turn lane, a single through lane, and a single right turn lane. Eliminate the split phase timing for the side streets, and maintain the existing green time on OR 99W for the northbound and southbound through movements. Add the missing crosswalk to the south approach. Consider implementing P3 alongside this project.	5.5	92
D17	Meinecke/Highway 99W Intersection Improvements	Roads/bridges	Meinecke Road/Highway 99W	-	Change the eastbound and westbound left turn phasing on Meinecke Road from permitted to permitted/protected and maintaining the existing green time on OR 99W for the northbound and southbound through movements. Consider implementing P3 alongside this project.	2.5	99
D18	Langer Drive Improvements	Roads/bridges	Baler Way	Sherwood Boulevard	Construct improvements to Langer Drive between Baler Way and Sherwood Boulevard that are consistent with the Sherwood Town Center Plan. Major improvements include: buffered bike lanes, on-street parking, wider sidewalks, narrower travel lanes, removal of the center turn lane, and landscaping.	4.5	41
D19	124th Avenue Extension	Roads/bridges	Tualatin-Sherwood Road	Tonquin Road	Extend 124th Avenue as an arterial from Tualatin-Sherwood Road to Tonquin Road.	1.0	None (previously planned project)
D20	Tonquin Employment Area East-West Collector	Roads/bridges	Oregon Street	124th Avenue Extension	Build an east-west collector facility between Oregon Street and the 124th Avenue extension in the Tonquin Employment Area; improvement includes a roundabout at the Oregon Street intersection.	2.0	None (previously planned project)
D21	Herman Road Extension	Roads/bridges	Cipole Road	Highway 99W or Langer Farms Parkway	Extend Herman Road from its existing terminus at Cipole Road west to either Highway 99W or Langer Farms Parkway as a two to three lane collector facility.	4.0	None (previously planned project)
D22	Kruger/Elwert Intersection Safety Improvement	Roads/bridges	Kruger Road/Elwert Road	-	Realign Elwert Road to provide more storage at Highway 99W, and realign the Kruger Road intersection to the Cedarbrook extension as a single lane roundabout. Consider implementing D31 with this project.	2.5	153
D23	Edy/Borchers Right-In/Right-Out and Eastbound Lefts	Roads/bridges	Edy Road/Borchers Drive	-	Convert the Edy Road/Borchers Drive intersection to only allow right-in/right-out and eastbound left in; build a roundabout on Edy Road to the west at the south property's existing driveway.	3.0	None (previously planned project)
D24	Sherwood Boulevard Intersection Modifications	Roads/bridges	Sherwood Boulevard/ Langer Drive	Sherwood Boulevard/ Century Drive	Remove the Sherwood Boulevard/Langer Drive traffic signal (allow right-in, right-out, and left-in movements only), and install a traffic signal at the Sherwood Boulevard/Century Drive intersection (add eastbound and westbound left turn lanes).	4.0	126
D25	Sunset/Pine Improvements	Roads/bridges	Sunset Boulevard/ Pine Street	-	Restripe Sunset Boulevard at Pine Street to add eastbound and westbound left turn lanes.	2.5	142

D26	Sunset/Main Traffic Control Enhancement	Roads/bridges	Sunset Boulevard/Main Street	-	Install a traffic signal at the Sunset Boulevard/Main Street intersection	4.0	None (previously planned project)
D27	Baker Road Improvements	Roads/bridges	Sunset Boulevard	Urban Growth Boundary	Upgrade Baker Road (from Sunset Boulevard to the urban growth boundary) to a two lane arterial with bike lanes and sidewalks.	3.0	17, 66
D28	Sunset/Timbrel Traffic Control Enhancement	Roads/bridges	Sunset Boulevard/ Timbrel Lane	-	Install a single lane roundabout at the Sunset Boulevard/Timbrel Lane intersection.	2.5	135
D29	Edy to Roy Rogers Collector Roadway	Roads/bridges	Edy Road	Roy Rogers Road	Build a collector roadway from Edy Road to Roy Rogers Road, between Cedarview Way and Lynnly Way.	2.5	80
D30	Elwert/Edy Roundabout	Roads/bridges	Elwert Road/Edy Road	-	Install a single lane roundabout at the Elwert Road/Edy Road intersection. This project may be phased with D4 for design and construction purposes.	2.5	118
D31	Highway 99W/Sunset Improvements	Roads/bridges	Highway 99W/Sunset Boulevard	-	Add westbound and eastbound left turn lanes at Highway 99W/Sunset Boulevard with protective-permissive phasing. Consider implementing D22 and P3 alongside this project.	3.0	93
D32	Ladd Hill/Brookman Improvements	Roads/bridges	Ladd Hill Road/Brookman Road	-	Add a southbound right turn lane at the Ladd Hill Road/Brookman Road intersection.	2.0	146
D33	Sunset/Murdock Turn Lanes	Roads/bridges	Sunset Boulevard/ Murdock Road	-	Add a southbound right turn lane and a northbound left turn lane at the Sunset Boulevard/Murdock Road intersection.	2.5	145
D34	Brookman/Middleton Traffic Control Enhancements	Roads/bridges	Brookman Road/Middleton Road	-	Move the stop signs to the north and south approaches, and add a southbound left turn lane at the Brookman Road/Middleton Road intersection.	2.5	147
D35	Area 59 Neighborhood Route	Roads/bridges	Elwert Road	Copper Terrace	Build a neighborhood roadway, connecting Elwert Road and Copper Terrace as identified in the Area 59 concept plan.	4.5	None (previously planned project)
P1	Handley Street Sidewalk Infill	Pedestrian	Elwert Road	Existing Sidewalk Terminus to the East	Construct sidewalk along the north side of Handley Street from Elwert Road to the existing sidewalk terminus approximately 250 feet east of Elwert Road.	2.0	12
P2	Highway 99W Sidewalk Infill	Pedestrian	North Urban Growth Boundary	South Urban Growth Boundary	Construct sidewalks along both sides of Highway 99W between the north Urban Growth Boundary and the south Urban Growth Boundary.	2.5	1, 2, 9, 22
P3	Highway 99W Crosswalks	Pedestrian	Edy Road	Sunset Boulevard	Add missing crosswalks at existing traffic signal locations on Highway 99W between Edy Road and Sunset Boulevard. The crosswalk enhancements may be phased individually with their corresponding intersection improvements (D16, D17, D31).	3.5	35
P4	Ice Age Tonquin Trail/Highway 99W Connection	Pedestrian	Highway 99W	Tonquin Trail	Construct a shared use path that connects the proposed Cedar Creek/Tonquin Trail to Highway 99W.	3.5	None (previously planned project)
P5	10th Street Neighborhood Greenway	Pedestrian	Sherwood Boulevard	Cedar Creek/Tonquin Trail Connection	Add sidewalks and shared lane markings to 10th Street and Gleneagle Drive from Sherwood Boulevard to the planned Cedar Creek/Tonquin Trail connection.	2.0	8
P6	Sherwood Boulevard Improvements	Pedestrian	Langer Drive	3rd Street	Construct improvements to Sherwood Boulevard between Langer Drive and 3rd Street that are consistent with the Sherwood Town Center Plan. Major improvements include: a shared-use path on the east side, wider sidewalks on the west side, narrower travel lanes, and landscaping.	4.5	44
P7	Langer to Trumpeter Shared Use Path	Pedestrian	Langer Drive	Trumpeter Drive	Construct a shared use path connecting Langer Drive and Trumpeter Drive.	4.0	None (previously planned project)
P8	Hopkins Elementary School North Shared Use Path	Pedestrian	Sherwood Boulevard	Trail south of Baler Way	Construct a shared-use path on the north side of Hopkins Elementary School, connecting Sherwood Boulevard to the existing trail south of Baler Way.	3.5	None (previously planned project)
P9	Hopkins Elementary School East Shared Use Path	Pedestrian	Trail at the northeast baseball field	St Francis south access road	Construct a shared use path on the east side of Hopkins Elementary School, connecting the existing trail south of Baler Way to the St Francis south access road.	3.5	None (previously planned project)
P10	Sherwood Middle School Shared Use Path	Pedestrian	Roundabout at the Oregon Street/Ash Street intersection	Hopkins Elementary School East Shared Use Path	Construct a shared use path on the east side of Sherwood Middle School, connecting the Hopkins Elementary School East Shared Use Path to the roundabout at the Oregon Street/Ash Street intersection.	3.5	None (previously planned project)
P11	Ice Age Tonquin Trail Segment 6	Regional Trail	Tonquin Road/Morgan Road	Tonquin Road/Oregon Street	Implement Tonquin Trail Segment 6 improvements from immediately west of the Tonquin Road/Morgan Road intersection to the Tonquin Road/Oregon Street intersection.	3.5	32, 68
P12	Ice Age Tonquin Trail Segment 7	Regional Trail	Tonquin Road/Oregon Street	Park Street	Implement Tonquin Trail Segment 7 improvements from immediately west of the Tonquin/Oregon Street intersection to immediately north of Park Street.	4.0	30
P13	Ice Age Tonquin Trail Segment 8	Regional Trail	Park Street	Highway 99W	Implement Tonquin Trail Segment 8 improvements from immediately north of Park Street to immediately south of Highway 99W.	4.0	None (previously planned project)
P14	Ice Age Tonquin Trail Segment 9	Regional Trail	Highway 99W	Roy Rogers Road	Implement Tonquin Trail Segment 9 improvements from immediately south of Highway 99W to Roy Rogers Road (including Roy Rogers intersection).	4.0	35
P15	Ice Age Tonquin Trail Segment 10	Regional Trail	Roy Rogers Road	Tualatin River National Wildlife Refuge Trailhead	Implement Tonquin Trail Segment 10 improvements from Roy Rogers Road north to Tualatin River National Wildlife Refuge trailhead.	3.5	None (previously planned project)
P16	Ice Age Tonquin Trail Segment 11	Regional Trail	Tonquin Road/Oregon Street	Cipole Road	Implement Tonquin Trail Segment 11 improvements from immediately east of the Tonquin Road/Oregon Street intersection to immediately west of Cipole Road.	3.0	31
P17	Ice Age Tonquin Trail Segment 12	Regional Trail	Cipole Road	Highway 99W	Implement Tonquin Trail Segment 12 improvements from immediately west of Cipole Road to immediately north of Highway 99W.	3.0	None (previously planned project)
P18	Cipole Road Sidewalk Infill	Pedestrian	Approximately 1,250 feet north of Tualatin-Sherwood Road	Existing Sidewalk Terminus to the North	Construct sidewalk along the east side of Cipole Road from approximately 1,250 feet north of Tualatin-Sherwood Road to the existing sidewalk terminus approximately 450 feet north.	2.0	34
P19	12th Street Sidewalk Infill	Pedestrian	Highway 99W	Sherwood Boulevard	Construct sidewalk along the south side of 12th Street from Highway 99W to Sherwood Boulevard.	3.0	3
P20	Division Street Sidewalk Infill	Pedestrian	Main Street	Cuthill Place	Construct sidewalk along both sides of Division Street from Main Street to Cuthill Place.	2.5	7
P21	Meinecke Road Sidewalk Infill	Pedestrian	Lee Drive	Existing Sidewalk Terminus to the East	Construct sidewalk along the north side of Meinecke Road from Lee Drive to the existing sidewalk terminus to the east (approximately 400 feet).	2.5	4
P22	Pine Street Sidewalk Infill Segment 1	Pedestrian	Willamette Street	Columbia Street	Construct sidewalk along the west side of Pine Street from Willamette Street to Columbia Street.	3.0	6
P23	Pine Street Sidewalk Infill Segment 2	Pedestrian	Division Street	Sunset Boulevard	Construct sidewalk along the east side of Pine Street from Division Street to Sunset Boulevard, and fill the sidewalk gap along the west side of Pine Street just north of Sunset Boulevard.	4.0	21
P24	Willamette Street Sidewalk Infill Segment 1	Pedestrian	Division Street	Upper Roy Street	Construct sidewalk along the south side of Willamette Street from Division Street to Upper Roy Street.	3.0	None (previously planned project)
P25	Willamette Street Sidewalk Infill Segment 2	Pedestrian	Cochran Drive	Murdock Road	Fill the sidewalk gap along the north side of Willamette Street from Cochran Drive to Murdock Road.	3.0	None (previously planned project)
P26	Highway 99W Grade Separated Crossing	Pedestrian	Edy Road	Sunset Boulevard	Build a grade-separated crossing of Highway 99W for pedestrians and bicyclists, providing a direct connection for the Ice Age Tonquin Trail east and west of the highway.	3.0	35

P27	Washington Street Sidewalk Infill	Pedestrian	Division Street	Tualatin Street	Construct sidewalk along both sides of Washington Street from Division Street to Tualatin Street.	3.0	None (previously planned project)
P28	Pine Street/Division Street Crossing Improvements	Pedestrian	Pine Street/Division Street		Install marked crosswalks at the Pine Street/Division Street intersection.	3.0	None (previously planned project)
P29	Pine Street/Sunset Boulevard Crossing Improvements	Pedestrian	Pine Street/Sunset Boulevard	"	Install marked crosswalks at the Pine Street/Sunset Boulevard intersection.	2.5	None (previously planned project)
P30	Sunset Boulevard/St Charles Way Crossing Improvements	Pedestrian	Sunset Boulevard/St Charles Way	"	Install marked crosswalks at the Sunset Boulevard/St Charles Way intersection.	2.5	36
P31	Sunset Boulevard/Redfern Drive Crossing Improvements	Pedestrian	Sunset Boulevard/Redfern Drive	"	Install enhanced pedestrian crossing at the Sunset Boulevard/Redfern Drive intersection.	2.5	36
P32	Sunset Boulevard/Galewood Drive Crossing Improvements	Pedestrian	Sunset Boulevard/Galewood Drive	"	Install enhanced pedestrian crossing at the Sunset Boulevard/Galewood Drive intersection.	3.0	36
P33	Cedar Creek Trail/Railroad Tracks Crossing Improvements	Pedestrian	Cedar Creek Trail/Railroad Tracks	"	Install a controlled crossing across the railroad tracks at the Cedar Creek Trail.	3.5	None (previously planned project)
P34	Rock Creek Trail/Tualatin-Sherwood Road Protected Crossing Improvements	Pedestrian	Rock Creek Trail/Tualatin-Sherwood Road	"	Install a marked crossing across Tualatin-Sherwood Road at the Rock Creek Trail with pedestrian refuge islands and Rectangular Rapid Flashing Beacons.	3.5	None (previously planned project)
P35	Sunset Boulevard/Existing Trail Crossing Improvements	Pedestrian	Sunset Boulevard/Existing Trail	"	Install a marked crossing across Sunset Boulevard at the existing trail just west of Heatherwood Lane.	4.0	None (previously planned project)
P36	Local Off-Street Trail Segment 1	Pedestrian	Seely Lane	Highway 99W/Home Depot Access	Construct an off-street trail from the existing trail on Seely Lane to the Highway 99W/Home Depot Access intersection (approximately 4,100 feet).	4.0	None (previously planned project)
P37	Local Off-Street Trail Segment 2	Pedestrian	Highway 99W/Home Depot Access	Tualatin-Sherwood Road	Construct an off-street trail from the Highway 99W/Home Depot Access intersection to Tualatin-Sherwood Road, approximately 150 feet east of the Century Drive intersection (approximately 4,800 feet).	4.0	None (previously planned project)
P38	Local Off-Street Trail Segment 3	Pedestrian	Tualatin-Sherwood Road	Oregon Street/Tonquin Road	Construct an off-street trail from Tualatin-Sherwood Road, approximately 150 feet east of the Century Drive intersection, to the Oregon Street/Tonquin Road intersection (approximately 2,800 feet).	4.0	None (previously planned project)
P39	Local Off-Street Trail Segment 4	Pedestrian	Highway 99W	Woodhaven Drive	Construct an off-street trail from Highway 99W to Woodhaven Drive, approximately 150 feet west of Dewey Drive (approximately 1,000 feet).	3.0	None (previously planned project)
P40	Local Off-Street Trail Segment 5	Pedestrian	Stellar Drive Trail	Sunset Boulevard	Construct an off-street trail from the Stellar Drive trail to Sunset Boulevard at the Galewood Drive pedestrian access, and on off-street trail connecting the Richen Park Terrace pedestrian access to Pinehurst Drive along the back of Woodhaven City Park (approximately 1,600 feet).	3.0	None (previously planned project)
P41	Local Off-Street Trail Segment 6	Pedestrian	Sunset Boulevard	Saint Charles Way Trail	Construct an off-street trail from Sunset Boulevard, just west of Redfern Place, to the Saint Charles Way trail (approximately 1,500 feet).	2.0	None (previously planned project)
P42	Local Off-Street Trail Segment 7	Pedestrian	Saint Charles Way Trail	Villa Road	Construct an off-street trail from the north end of the Saint Charles Way trail to Villa Road at the existing trail head (approximately 1,200 feet).	3.0	None (previously planned project)
P43	Local Off-Street Trail Segment 9	Pedestrian	Sunset Boulevard	Inkster Drive	Construct an off-street trail from Sunset Boulevard to Inkster Drive (approximately 3,500 feet).	3.0	None (previously planned project)
P44	Oregon Street Sidewalk Infill	Pedestrian	Hall Street	Orland Street	Construct sidewalk along the south side of Oregon Street between Hall Street and Orland Street.	2.5	29
P45	Murdock Road Sidewalk Infill Segment 1	Pedestrian	Willamette Street	Oregon Street	Construct sidewalk along the east side of Murdock Road from Willamette Street to Oregon Street.	2.0	18, 28
P46	Murdock Road Sidewalk Infill Segment 2	Pedestrian	Sunset Boulevard	Existing Sidewalk Terminus to the North	Construct sidewalk along the east side of Murdock Road from Sunset Boulevard to the existing sidewalk terminus approximately 600 feet north of Upper Roy Street.	2.0	20
P47	Downtown Streetscapes Master Plan Phases 1 and 2 (Old Town Core)	Pedestrian	Downtown Sherwood	"	Complete Phase 1 (Old Town Core) and Phase 2 (Cannery Arterials) of the Downtown Streetscapes Master Plan.	4.5	None (previously planned project)
P48	Downtown Streetscapes Master Plan Phase 3 (Old Town Secondary Streets)	Pedestrian	Downtown Sherwood	"	Complete Phase 3 (Old Town Secondary Streets) of the Downtown Streetscapes Master Plan.	4.5	None (previously planned project)
P49	Downtown Streetscapes Master Plan Phase 4 (Old Town Residential Neighborhoods)	Pedestrian	Downtown Sherwood	"	Complete Phase 4 (Old Town Residential Neighborhoods) of the Downtown Streetscapes Master Plan.	4.5	None (previously planned project)
P50	Downtown Streetscapes Master Plan Phase 6 (Railroad Siding Relocation)	Pedestrian	Downtown Sherwood	"	Complete Phase 6 (Railroad Siding Relocation) of the Downtown Streetscapes Master Plan.	4.5	None (previously planned project)
B1	Murdock Shared-Use Path	Bike	Oregon Street	Upper Roy Street	Build a shared-use path along the west side of Murdock Road from Oregon Street to Upper Roy Street.	3.0	62
B2	Melnecke Bike Lanes	Bike	Marshall Street	1st Street	Add bike lanes on Melnecke Road from Marshall Street to 3rd Street.	4.0	46
B3	Holland Lane Neighborhood Greenway	Bike	Langer Drive	Trail Head along Holland Lane	Add neighborhood greenway improvements (e.g., shared lane markings) to Holland Lane between Langer Drive and the existing trail head.	1.5	None (previously planned project)
B4	Baler Way Neighborhood Greenway	Bike	Trumpeter Drive	Century Drive (east intersection)	Add neighborhood greenway improvements (e.g., shared lane markings) to Baler Way between Trumpeter Drive and the eastern intersection with Century Drive.	2.0	None (previously planned project)
B5	Main Street Shared Lane Markings	Bike	1st Street	Sherwood Boulevard	Add shared lane markings to Main Street between 1st Street and Sherwood Boulevard.	2.0	52
B6	Pine Street Shared Lane Markings	Bike	3rd Street	Sherwood Boulevard	Add shared lane markings to Pine Street between 3rd Street and Sherwood Boulevard.	2.5	45
B7	Borchers Bike Lanes	Bike	Edy Road	Roy Rogers Road	Build bike lanes on Borchers Road between Edy Road and Roy Rogers Road.	3.0	40
B8	3rd Street Shared Lane Markings	Bike	Washington Street	Sherwood Boulevard	Add shared lane markings on 3rd Street from Washington Street to Sherwood Boulevard.	2.0	47
B9	1st Street Shared Lane Markings	Bike	Main Street	Pine Street	Add shared lane markings on 1st Street from Main Street to Pine Street.	2.0	48
B10	Century Drive Shared-Use Path	Bike	Tualatin-Sherwood Road	Existing Terminus	Widen the sidewalk on the south/east side of Century Drive between Tualatin-Sherwood Road and the existing terminus to provide a shared-use path.	4.5	49
B11	Timbrel Lane Improvements	Bike	Sunset Boulevard	Old Highway 99W	Upgrade Timbrel Lane (from Sunset Boulevard to Old Highway 99W) to a two lane collector with bike lanes and sidewalks. Would require removal of street trees.	2.0	59
B12	Old Highway 99W Shared-Use Path	Bike	Timbrel Lane	Crooked River Lane	Widen the sidewalk along the west side of Old Highway 99W between Timbrel Lane and Crooked River Lane to provide a shared-use path.	2.5	60
B13	Old Highway 99W Improvements Segment 2	Bike	Crooked River Lane	Brookman Road	Upgrade Old Highway 99W (from Crooked River Lane to Brookman Road) to a two lane collector with a shared use path on the west side and sidewalks on the east side.	3.5	60
B14	Handley Bike Facilities	Bike	Cedar Brook Way	Elwert Road	Add bike lanes along Handley Street between Cedar Brook Way and Meadow Terrace through parking removal and restriping. Add shared lane markings and signage along Meadow Terrace and Cereghino Lane as an alternative bike route to Handley Street west of Meadow Terrace. Create a bicycle/pedestrian connection between the west end of Cereghino Lane and Elwert Road.	2.0	#N/A
B15	Galbreath Drive Bike Reroute	Bike	Gerda Lane/Tualatin-Sherwood Road	City Limits	Direct bicyclists to use the Herman Road extension instead of Galbreath Drive and Gerda Lane.	3.5	64, 65

B16	Baker Bay Bike Lanes	Bike	Century Drive	Tualatin-Sherwood Road	Rebuild Baker Way to a collector between Century Drive and Tualatin-Sherwood Road to include bike lanes.	3.0	42
B17	12th Street Bike Lanes	Bike	Highway 99W	Sherwood Boulevard	Add bike lanes on 12th Street between Highway 99W and Sherwood Boulevard.	3.5	43
B18	Washington Street Shared Lane Markings	Bike	3rd Street	1st Street	Add shared lane markings on Washington Street between 3rd Street and 1st Street.	1.0	46
B19	Sunset Bike Lanes	Bike	Aldergrove Avenue	Murdock Road	Add bike lanes on Sunset Boulevard between Aldergrove Avenue and Murdock Road	2.5	63
T1	Provide Transit Amenities at Major Transit Stops	Transit Capital	Citywide	-	Provide Transit Amenities at Major Transit Stops .	2.5	73
T2	Improve Pedestrian Connections to Transit Facilities	Transit Capital	Citywide	-	Improve Pedestrian Connections to Transit Facilities.	3.5	74
T3	Increase Density Adjacent to Transit	Transit Capital	Citywide	-	Increase Density Adjacent to Transit.	5.0	None (previously planned project)
T4	Decrease Headways	Transit Capital	Citywide	-	Decrease Headways.	2.5	None (previously planned project)
T5	Provide Local Service	Transit Capital	Citywide	-	Provide local service to enhanced regional service.	2.5	77

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SECTION E

ASPIRATIONAL PROJECT LIST

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Sherwood TSP Project List

Project #	Project Name	Project Details	Evaluation Score	Estimated Cost	City Cost	Priority
Motor Vehicle Projects						
D1	Tualatin-Sherwood Road Improvements - Phase 2	Widen Tualatin-Sherwood Road (from Langer Farms Parkway to Teton Avenue) to five lanes with bike lanes and sidewalks.	2.5	$43,042,500	$0	Long-Term
D2	Tonquin Road Safety Improvements	Widen Tonquin Road (from Grahams Ferry Road to Oregon Street) to provide shoulders.	2.5	$28,406,000	$0	Long-Term
D3	Oregon Intersections Improvements at Murdock and Tonquin	Install a roundabout at the Tonquin Road/Oregon Street intersection with dual westbound through lanes and a single eastbound through/right lane. Consider creating a "Dumbbell Roundabout" with the Oregon/Murdock roundabout by disallowing the west circulating lane at Oregon/Tonquin and disallowing the east circulating lane at Oregon/Murdock. Add a second westbound approach lane to the Murdock Road Oregon Street roundabout for separated westbound left and westbound through lanes. Keep three lanes on the bridge structure.	3.5	$2,945,000	$1,389,000	Short-Term
D4	Elwert Road Improvements	Upgrade Elwert Road (from Highway 99W to Edy Road) to a three lane arterial with bike lanes and sidewalks. This project may be phased with D30 for design and construction purposes.	3.5	$11,430,000	$2,286,000	Medium-Term
D5	Brookman Road Improvements (Three Lane Arterial)	Implement Brookman Road Concept Plan improvements to Brookman Road from Highway 99W to Middleton Road. Major improvements include: rebuild road to a three lane arterial facility, and a shared-use path along the north side. In addition, reserve right-of-way for the potential widening to five lanes in the event that further refinements to the I-5/99W Connector Plan identify Brookman Road as the Southern Arterial to serve as the primary route for east-west mobility.	1.5	$15,300,000	$3,060,000	Long-Term
D6	Edy Road Improvements	Upgrade Edy Road (from Borchers Drive to City Limits) to a three lane collector with bike lanes and sidewalks.	4	$8,760,000	$8,760,000	Medium-Term
D7	Ladd Hill Road Improvements	Upgrade Ladd Hill Road (from Sunset Boulevard to the Urban Growth Boundary) to a three arterial with bike lanes and sidewalks.	3.5	$6,340,000	$6,340,000	Medium-Term
D8	Oregon Street Improvements	Upgrade Oregon Street (from Murdock Road to the railroad crossing) to a three lane collector with sidewalks on south side and a shared-use path on the north side (part of the Ice Age Tonquin Trail).	3	$6,712,000	$6,712,000	Medium-Term
D9	Baler to Herman Connection	Build a collector roadway, connecting Baler Way at Tualatin-Sherwood Road to the future terminus of the Herman Road at Langer Farms Parkway.	2	$3,802,000	$3,802,000	Long-Term
D10	Cedar Brook Way Extension Segment 1	Extend Cedar Brook Way from its existing terminus to Meinecke Road as a two lane local road.	2	$596,000	$596,000	Long-Term
D11	Cedar Brook Way Extension Segment 2	Extend Cedar Brook Way from its existing terminus at Handley Street south to Elwert Road as a two lane collector road.	2	$13,000,000	$13,000,000	Long Term
D12	Extension of Langer Farms Parkway at 99W	Extend Langer Farms Parkway from 99W west as a collector road.	2.5	$3,243,000	$3,243,000	Medium-Term
D13	Tualatin-Sherwood Improvements – Phase 1	Widen Tualatin-Sherwood Road/Roy Rogers Road between Borchers Drive and Baler Way to five lanes. Includes intersection modifications at OR 99W, the Sherwood Market Center, and at Baler Way.	-	$0	$0	Committed Funding
D14	Highway 99W/Brookman Traffic Signal and Realignment	Realign Brookman Road to intersect with Highway 99W approximately 1/4 mile north of its existing intersection; this improvement includes a traffic signal at the realigned intersection with a westbound left and southbound right turn lane, and a grade separated railroad crossing.	5	$7,020,000	$1,404,000	Medium-Term
D15	Sunset Boulevard Improvements	Upgrade Sunset Boulevard (from Aldergrove Avenue to Eucalyptus Terrace) to a three lane arterial with sidewalks and bike lanes. Address vertical crest sight distance issues near Pine Street.	3.5	$8,316,000	$8,316,000	Medium-Term
D16	Edy/Highway 99W Intersection Improvements	Restripe the westbound Sherwood Boulevard approach to have a single left turn lane, a single through lane, and a single right turn lane. Eliminate the split phase timing for the side streets, and maintain the existing green time on OR 99W for the northbound and southbound through movements. Add the missing crosswalk to the south approach. Consider implementing P3 alongside this project.	5.5	$1,070,000	$214,000	Short-Term
D17	Meinecke/Highway 99W Intersection Improvements	Change the eastbound and westbound left turn phasing on Meinecke Road from permitted to permitted/protected and maintaining the existing green time on OR 99W for the northbound and southbound through movements. Consider implementing P3 alongside this project.	2.5	$5,000	$1,000	Medium-Term
D18	Langer Drive Improvements	Construct improvements to Langer Drive between Baler Way and Sherwood Boulevard that are consistent with the Sherwood Town Center Plan. Major improvements include: buffered bike lanes, on-street parking, wider sidewalks, narrower travel lanes, removal of the center turn lane, and landscaping.	4.5	$2,000,000	$2,000,000	Short-Term
D19	124th Avenue Extension	Extend 124th Avenue as an arterial from Tualatin-Sherwood Road to Tonquin Road.	1	$82,500,000	$0	Committed Funding
D20	Tonquin Employment Area East-West Collector	Build an east-west collector facility between Oregon Street and the 124th Avenue extension in the Tonquin Employment Area; improvement includes a roundabout at the Oregon Street intersection.	2	$6,400,000	$6,400,000	Long-Term
D21	Herman Road Extension	Extend Herman Road from its existing terminus at Cipole Road west to either Highway 99W or Langer Farms Parkway as a two to three lane collector facility.	4	$8,190,000	$8,190,000	Long-Term
D22	Kruger/Elwert Intersection Safety Improvement	Realign Elwert Road to provide more storage at Highway 99W, and realign the Kruger Road intersection to the Cedarbrook extension as a single lane roundabout. Consider implementing D31 with this project.	2.5	$1,550,000	$0	Committed Funding
D23	Edy/Borchers Right-In/Right-Out and Eastbound Lefts	Convert the Edy Road/Borchers Drive intersection to only allow right-in/right-out and eastbound left in; build a roundabout on Edy Road to the west at the south property's existing driveway.	3	$2,000,000	$2,000,000	Long-Term
D24	Sherwood Boulevard Intersection Modifications	Remove the Sherwood Boulevard/Langer Drive traffic signal (allow right-in, right-out, and left-in movements only), and install a traffic signal at the Sherwood Boulevard/Century Drive intersection (add eastbound and westbound left turn lanes).	4	$900,000	$900,000	Medium-Term
D25	Sunset/Pine Improvements	Restripe Sunset Boulevard at Pine Street to add eastbound and westbound left turn lanes.	2.5	$6,000	$6,000	Medium-Term
D26	Sunset/Main Traffic Control Enhancement	Install a traffic signal at the Sunset Boulevard/Main Street intersection	4	$250,000	$250,000	Long-Term
D27	Baker Road Improvements	Upgrade Baker Road (from Sunset Boulevard to the urban growth boundary) to a two lane arterial with bike lanes and sidewalks.	3	$779,000	$779,000	Medium-Term
D28	Sunset/Timbrel Traffic Control Enhancement	Install a single lane roundabout at the Sunset Boulevard/Timbrel Lane intersection.	2.5	$300,000	$300,000	Long-Term
D29	Edy to Roy Rogers Collector Roadway	Build a collector roadway from Edy Road to Roy Rogers Road, between Cedarview Way and Lynnly Way.	2.5	$3,400,000	$3,400,000	Long-Term
D30	Elwert/Edy Roundabout	Install a single lane roundabout at the Elwert Road/Edy Road intersection. This project may be phased with D4 for design and construction purposes.	2.5	$1,500,000	$750,000	Medium-Term

D31	Highway 99W/Sunset Improvements	Add westbound and eastbound left turn lanes at Highway 99W/Sunset Boulevard with protective-permissive phasing. Consider implementing D22 and P3 alongside this project.	3	$500,000	$100,000	Short-Term
D32	Ladd Hill/Brookman Improvements	Add a southbound right turn lane at the Ladd Hill Road/Brookman Road intersection.	2	$250,000	$250,000	Long-Term
D33	Sunset/Murdock Turn Lanes	Add a southbound right turn lane and a northbound left turn lane at the Sunset Boulevard/Murdock Road intersection.	2.5	$750,000	$750,000	Medium-Term
D34	Brookman/Middleton Traffic Control Enhancements	Move the stop signs to the north and south approaches, and add a southbound left turn lane at the Brookman Road/Middleton Road intersection.	2.5	$250,000	$50,000	Medium-Term
D35	Area 59 Neighborhood Route	Build a neighborhood roadway, connecting Elwert Road and Copper Terrace as identified in the Area 59 concept plan.	4.5	$2,167,000	$2,167,000	Medium-Term
D36	Sherwood System Monitoring Program	Establish and maintain a program involving monitoring performance measures semiannually. Performance measures to be evaluated will be determined through an initial study. This program will evaluate if planning efforts are leading to performance targets, monitor growth , and identify when improvements are needed.	2.5	$400,000	$400,000	Long-Term
Pedestrian Projects						
P1	Handley Street Sidewalk Infill	Construct sidewalk along the north side of Handley Street from Elwert Road to the existing sidewalk terminus approximately 250 feet east of Elwert Road.	2	$15,000	$15,000	Medium-Term
P2	Highway 99W Sidewalk Infill	Construct sidewalks along both sides of Highway 99W between the north Urban Growth Boundary and the south Urban Growth Boundary.	2.5	$1,090,000	$218,000	Medium-Term
P3	Highway 99W Crosswalks	Add missing crosswalks at existing traffic signal locations on Highway 99W between Edy Road and Sunset Boulevard. The crosswalk enhancements may be phased individually with their corresponding intersection improvements (D16, D17, D31).	3.5	$7,000	$1,400	Medium-Term
P4	Ice Age Tonquin Trail/Highway 99W Connection	Construct a shared use path that connects the proposed Cedar Creek/Tonquin Trail to Highway 99W.	3.5	$209,000	$41,800	Medium-Term
P5	10th Street Neighborhood Greenway	Add sidewalks and shared lane markings to 10th Street and Gleneagle Drive from Sherwood Boulevard to the planned Cedar Creek/Tonquin Trail connection.	2	$10,500	$10,500	Medium-Term
P6	Sherwood Boulevard Improvements	Construct improvements to Sherwood Boulevard between Langer Drive and 3rd Street that are consistent with the Sherwood Town Center Plan. Major improvements include a shared-use path on the east side, wider sidewalks on the west side, narrower travel lanes, and landscaping.	4.5	$2,123,500	$2,123,500	Short-Term
P7	Langer to Trumpeter Shared Use Path	Construct a shared use path connecting Langer Drive and Trumpeter Drive.	4	$292,000	$292,000	Long-Term
P8	Hopkins Elementary School North Shared Use Path	Construct a shared-use path on the north side of Hopkins Elementary School, connecting Sherwood Boulevard to the existing trail south of Baler Way.	3.5	$219,000	$219,000	Long-Term
P9	Hopkins Elementary School East Shared Use Path	Construct a shared use path on the east side of Hopkins Elementary School, connecting the existing trail south of Baler Way to the St Francis south access road.	3.5	$365,000	$365,000	Long-Term
P10	Sherwood Middle School Shared Use Path	Construct a shared use path on the east side of Sherwood Middle School, connecting the Hopkins Elementary School East Shared Use Path to the roundabout at the Oregon Street/Ash Street intersection.	3.5	$365,000	$365,000	Long-Term
P11	Ice Age Tonquin Trail Segment 6	Implement Tonquin Trail Segment 6 improvements from immediately west of the Tonquin Road/Morgan Road intersection to the Tonquin Road/Oregon Street intersection.	3.5	$7,005,000	$1,401,000	Long-Term
P12	Ice Age Tonquin Trail Segment 7	Implement Tonquin Trail Segment 7 improvements from immediately west of the Tonquin/Oregon Street intersection to immediately north of Park Street.	4	$1,770,000	$354,000	Short-Term
P13	Ice Age Tonquin Trail Segment 8	Implement Tonquin Trail Segment 8 improvements from immediately north of Park Street to immediately south of Highway 99W.	4	$4,677,000	$0	Committed Funding
P14	Ice Age Tonquin Trail Segment 9	Implement Tonquin Trail Segment 9 improvements from immediately south of Highway 99W to Roy Rogers Road (including Roy Rogers intersection).	4	$2,540,000	$508,000	Short-Term
P15	Ice Age Tonquin Trail Segment 10	Implement Tonquin Trail Segment 10 improvements from Roy Rogers Road north to Tualatin River National Wildlife Refuge trailhead.	3.5	$4,216,000	$843,200	Long-Term
P16	Ice Age Tonquin Trail Segment 11	Implement Tonquin Trail Segment 11 improvements from immediately east of the Tonquin Road/Oregon Street intersection to immediately west of Cipole Road.	3	$2,738,000	$547,600	Medium-Term
P17	Ice Age Tonquin Trail Segment 12	Implement Tonquin Trail Segment 12 improvements from immediately west of Cipole Road to immediately north of Highway 99W.	3	$11,697,000	$2,339,400	Long-Term
P18	Cipole Road Sidewalk Infill	Construct sidewalk along the east side of Cipole Road from approximately 1,250 feet north of Tualatin-Sherwood Road to the existing sidewalk terminus approximately 450 feet north.	2	$27,000	$27,000	Medium-Term
P19	12th Street Sidewalk Infill	Construct sidewalk along the south side of 12th Street from Highway 99W to Sherwood Boulevard.	3	$70,000	$70,000	Short-Term
P20	Division Street Sidewalk Infill	Construct sidewalk along both sides of Division Street from Main Street to Cuthill Place.	2.5	$327,000	$327,000	Medium-Term
P21	Meinecke Road Sidewalk Infill	Construct sidewalk along the north side of Meinecke Road from Lee Drive to the existing sidewalk terminus to the east (approximately 400 feet).	2.5	$23,500	$23,500	Medium-Term
P22	Pine Street Sidewalk Infill Segment 1	Construct sidewalk along the west side of Pine Street from Willamette Street to Columbia Street.	3	$12,000	$12,000	Short-Term
P23	Pine Street Sidewalk Infill Segment 2	Construct sidewalk along the east side of Pine Street from Division Street to Sunset Boulevard, and fill the sidewalk gap along the west side of Pine Street just north of Sunset Boulevard.	4	$68,500	$68,500	Short-Term
P24	Willamette Street Sidewalk Infill Segment 1	Construct sidewalk along the south side of Willamette Street from Division Street to Upper Roy Street.	3	$191,000	$191,000	Long-Term
P25	Willamette Street Sidewalk Infill Segment 2	Fill the sidewalk gap along the north side of Willamette Street from Cochran Drive to Murdock Road.	3	$8,500	$8,500	Long-Term
P26	Highway 99W Grade Separated Crossing	Build a grade-separated crossing of Highway 99W for pedestrians and bicyclists, providing a direct connection for the Ice Age Tonquin Trail east and west of the highway.	3	$13,300,000	$2,660,000	Medium-Term
P27	Washington Street Sidewalk Infill	Construct sidewalk along both sides of Washington Street from Division Street to Tualatin Street.	3	$11,000	$11,000	Long-Term
P28	Pine Street/Division Street Crossing Improvements	Install marked crosswalks at the Pine Street/Division Street intersection.	3	$1,000	$1,000	Long-Term
P29	Pine Street/Sunset Boulevard Crossing Improvements	Install marked crosswalks at the Pine Street/Sunset Boulevard intersection.	2.5	$1,000	$1,000	Long-Term
P30	Sunset Boulevard/St Charles Way Crossing Improvements	Install marked crosswalks at the Sunset Boulevard/St Charles Way intersection.	2.5	$1,000	$1,000	Medium-Term

P31	Sunset Boulevard/Redfern Drive Crossing Improvements	Install enhanced pedestrian crossing at the Sunset Boulevard/Redfern Drive intersection.	2.5	$10,000	$10,000	Medium-Term
P32	Sunset Boulevard/Galewood Drive Crossing Improvements	Install enhanced pedestrian crossing at the Sunset Boulevard/Galewood Drive intersection.	3	$10,000	$10,000	Medium-Term
P33	Cedar Creek Trail/Railroad Tracks Crossing Improvements	Install a controlled crossing across the railroad tracks at the Cedar Creek Trail.	3.5	$15,000	$15,000	Long-Term
P34	Rock Creek Trail/Tualatin-Sherwood Road Protected Crossing Improvements	Install a marked crossing across Tualatin-Sherwood Road at the Rock Creek Trail with pedestrian refuge islands and Rectangular Rapid Flashing Beacons.	3.5	$35,000	$35,000	Long-Term
P35	Sunset Boulevard/Existing Trail Crossing Improvements	Install a marked crossing across Sunset Boulevard at the existing trail just west of Heatherwood Lane.	4	$1,000	$1,000	Long-Term
P36	Local Off-Street Trail Segment 1	Construct an off-street trail from the existing trail on Seely Lane to the Highway 99W/Home Depot Access intersection (approximately 4,100 feet).	4	$496,000	$496,000	Long-Term
P37	Local Off-Street Trail Segment 2	Construct an off-street trail from the Highway 99W/Home Depot Access intersection to Tualatin-Sherwood Road, approximately 150 feet east of the Century Drive intersection (approximately 4,800 feet).	4	$421,000	$421,000	Long-Term
P38	Local Off-Street Trail Segment 3	Construct an off-street trail from Tualatin-Sherwood Road, approximately 150 feet east of the Century Drive intersection, to the Oregon Street/Tonquin Road intersection (approximately 2,800 feet).	4	$262,000	$262,000	Long-Term
P39	Local Off-Street Trail Segment 4	Construct an off-street trail from Highway 99W to Woodhaven Drive, approximately 150 feet west of Dewey Drive (approximately 1,000 feet).	3	$93,000	$93,000	Long-Term
P40	Local Off-Street Trail Segment 5	Construct an off street trail from the Stellar Drive trail to Sunset Boulevard at the Galewood Drive pedestrian access, and on off-street trail connecting the Richen Park Terrace pedestrian access to Pinehurst Drive along the back of Woodhaven City Park (approximately 1,600 feet).	3	$149,000	$149,000	Long-Term
P41	Local Off-Street Trail Segment 6	Construct an off-street trail from Sunset Boulevard, just west of Redfern Place, to the Saint Charles Way trail (approximately 1,500 feet).	2	$140,000	$140,000	Long-Term
P42	Local Off-Street Trail Segment 7	Construct an off-street trail from the north end of the Saint Charles Way trail to Villa Road at the existing trail head (approximately 1,200 feet).	3	$112,000	$112,000	Long-Term
P43	Local Off-Street Trail Segment 9	Construct an off-street trail from Sunset Boulevard to Inkster Drive (approximately 3,500 feet).	3	$327,000	$327,000	Long-Term
P44	Oregon Street Sidewalk Infill	Construct sidewalk along the south side of Oregon Street between Hall Street and Orland Street.	2.5	$32,000	$32,000	Short-Term
P45	Murdock Road Sidewalk Infill Segment 1	Construct sidewalk along the east side of Murdock Road from Willamette Street to Oregon Street.	2	$77,000	$77,000	Medium-Term
P46	Murdock Road Sidewalk Infill Segment 2	Construct sidewalk along the east side of Murdock Road from Sunset Boulevard to the existing sidewalk terminus approximately 600 feet north of Upper Roy Street.	2	$201,000	$201,000	Long-Term
P47	Roy Rogers Crossing Improvement	Install a pedestrian crossing on Roy Rogers Road between Lynnly Way and Lavender Ave (e.g., at the Seely Lane alignment)	2.5	$50,000	$50,000	Long-Term
P48	Downtown Streetscapes Master Plan Phases 1 and 2 (Old Town Core)	Complete Phase 1 (Old Town Core) and Phase 2 (Cannery Arterials) of the Downtown Streetscapes Master Plan.	4.5	$2,801,032	$448,060	Medium-Term
P49	Downtown Streetscapes Master Plan Phase 3 (Old Town Secondary Streets)	Complete Phase 3 (Old Town Secondary Streets) of the Downtown Streetscapes Master Plan.	4.5	$3,457,000	$0	Short-Term
P50	Downtown Streetscapes Master Plan Phase 4 (Old Town Residential Neighborhoods)	Complete Phase 4 (Old Town Residential Neighborhoods) of the Downtown Streetscapes Master Plan.	4.5	$528,000	$0	Short-Term
P51	Downtown Streetscapes Master Plan Phase 6 (Railroad Siding Relocation)	Complete Phase 6 (Railroad Siding Relocation) of the Downtown Streetscapes Master Plan.	4.5	$637,000	$0	Long-Term
Bike Projects						
B1	Murdock Shared-Use Path	Build a shared-use path along the west side of Murdock Road from Oregon Street to Upper Roy Street.	3	$950,000	$950,000	Medium-Term
B2	Meinecke Bike Lanes	Add bike lanes on Meinecke Road from Marshall Street to 3rd Street.	4	$399,000	$399,000	Short-Term
B3	Holland Lane Neighborhood Greenway	Add neighborhood greenway improvements (e.g., shared lane markings) to Holland Lane between Langer Drive and the existing trail head.	1.5	$4,500	$4,500	Long-Term
B4	Baler Way Neighborhood Greenway	Add neighborhood greenway improvements (e.g., shared lane markings) to Baler Way between Trumpeter Drive and the eastern intersection with Century Drive.	2	$43,500	$43,500	Long-Term
B5	Main Street Shared Lane Markings	Add shared lane markings to Main Street between 1st Street and Sherwood Boulevard.	2	$10,500	$10,500	Medium-Term
B6	Pine Street Shared Lane Markings	Add shared lane markings to Pine Street between 3rd Street and Sherwood Boulevard.	2.5	$18,500	$18,500	Medium-Term
B7	Borchers Bike Lanes	Build bike lanes on Borchers Road between Edy Road and Roy Rogers Road.	3	$370,000	$370,000	Short-Term
B8	3rd Street Shared Lane Markings	Add shared lane markings on 3rd Street from Washington Street to Sherwood Boulevard.	2	$2,000	$2,000	Medium-Term
B9	1st Street Shared Lane Markings	Add shared lane markings on 1st Street from Main Street to Pine Street.	2	$3,000	$3,000	Medium-Term
B10	Century Drive Shared-Use Path	Widen the sidewalk on the south/east side of Century Drive between Tualatin-Sherwood Road and the existing terminus to provide a shared-use path	4.5	$601,000	$601,000	Short-Term
B11	Timbrel Lane Improvements	Upgrade Timbrel Lane (from Sunset Boulevard to Old Highway 99W) to a two lane collector with bike lanes and sidewalks. Would require removal of street trees.	2	$608,000	$608,000	Long-Term
B12	Old Highway 99W Shared-Use Path	Widen the sidewalk along the west side of Old Highway 99W between Timbrel Lane and Crooked River Lane to provide a shared-use path	2.5	$347,000	$347,000	Medium-Term
B13	Old Highway 99W Improvements Segment 2	Upgrade Old Highway 99W (from Crooked River Lane to Brookman Road) to a two lane collector with a shared use path on the west side and sidewalks on the east side.	3.5	$691,000	$691,000	Short-Term
B14	Handley Bike Facilities	Add bike lanes along Handley Street between Cedar Brook Way and Meadow Terrace through parking removal and restriping. Add shared lane markings and signage along Meadow Terrace and Cereghino Lane as an alternative bike route to Handley Street west of Meadow Terrace. Create a bicycle/pedestrian connection between the west end of Cereghino Lane and Elwert Road.	2	$97,000	$97,000	Long-Term
B15	Galbreath Drive Bike Reroute	Direct bicyclists to use the Herman Road extension instead of Galbreath Drive and Gerda Lane.	3.5	$1,000	$1,000	Long-Term

B16	Baler Way Bike Lanes	Rebuild Baler Way to a collector between Century Drive and Tualatin-Sherwood Road to include bike lanes.	3	$718,000	$718,000	Short-Term
B17	12th Street Bike Lanes	Add bike lanes on 12th Street between Highway 99W and Sherwood Boulevard.	3.5	$815,000	$815,000	Short-Term
B18	Washington Street Shared Lane Markings	Add shared lane markings on Washington Street between 3rd Street and 1st Street.	1	$3,000	$3,000	Medium-Term
B19	Sunset Bike Lanes	Add bike lanes on Sunset Boulevard between Aldergrove Avenue and Murdock Road	2.5	$980,000	$980,000	Medium-Term
Transit Projects						
T1	Provide Transit Amenities at Major Transit Stops	Provide Transit Amenities at Major Transit Stops.	2.5	$50,000	$10,000	Medium-Term
T2	Improve Pedestrian Connections to Transit Facilities	Improve Pedestrian Connections to Transit Facilities.	3.5	$0	$0	Short-Term
T3	Increase Density Adjacent to Transit	Increase Density Adjacent to Transit.	5	$0	$0	Short-Term
T4	Decrease Headways	Decrease Headways.	2.5	$2,000,000	$400,000	Long-Term
T5	Provide Local Service	Provide local service to enhanced regional service.	2.5	$2,000,000	$400,000	Long-Term
T6	Support Regional Service to Tualatin	Support potential transit connections to Tualatin	2.5	$2,000,000	$400,000	Medium-Term



SECTION F

TRAFFIC CALMING TOOLBOX

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Residential Traffic Calming Program Toolbox

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PHASE I

DO NOT ENTER SIGN 3
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ONE-WAY SIGN 5
PAVEMENT MARKINGS 6
POLICE ENFORCEMENT 7
SPEED MONITORING TRAILER 8
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Do Not Enter Sign

Description: Restrict access

Purpose: The purpose of a this sign is to indicate to drivers that they are not permitted to proceed straight ahead. When used as a traffic calming measure, it is intended to discourage through traffic from short-cutting along a street. The sign may be accompanied by a supplementary plate sign indicating the time(s) of the day and the days of the week when the regulation applies.

Advantages
- May result in significant reductions in traffic volumes

Disadvantages
- No significant effect on vehicle speeds.
- Restricts resident access.

Equipment Cost: $100 to $200 per sign, installed.



Neighborhood Speed Watch

Description: Residents use radar equipment to identify speeding vehicles. The information gathered is matched with the Driver and Motor Vehicle Service (DMV) records. The City then sends a letter to the vehicle's registered owner advising the owner their vehicle was seen speeding. The letter appeals to the owner and/or driver to slow down on neighborhood streets. This program does not issue speeding tickets.

Purpose: To slow vehicle traffic, educate drivers about vehicle speeds, and allow residents to take an active part in the program.

Advantages
- Reduces speed by increasing driver awareness about speeding on residential streets and about safety.
- An effective public relations and educational tool.

Disadvantages
- Not an enforcement tool.
- Not effective in modifying long-term habits.

Cost: $500



One-Way Sign

Description: Directional movement sign.

Purpose: The purpose of a One-Way sign is to indicate to drivers that traffic is allowed to travel only in the direction of the arrow on the street or section of street. When used as a traffic calming measure, the intent of a One-Way sign is to prevent through traffic from short-cutting along a street.

Advantages
- Vehicle-vehicle and vehicle-pedestrian conflicts at intersections are reduced as there are fewer turning movements.
- Reduction in traffic volume.

Disadvantages
- Removal of traffic travelling in the opposing direction can result in an increase in vehicle speeds.
- Reduction in traffic volume may be partially offset by an increase in traffic in the remaining direction.

Cost: $100 to $200 per sign, installed.



Pavement Markings

Description: Stop bars, yield bars, turn arrows, delineators, lane markings, crosswalks, etc.

Purpose: To delineate and to transmit to motorists, bicyclists, and pedestrians important information necessary to safely travel upon the City's street.

Advantages
- Low initial cost.
- Quick application.

Disadvantages
- Maintenance cost.
- May not be visible when covered with snow.

Cost: Varies widely depending on type and amount of material used.

Police Enforcement

Description: Increased enforcement of speed limits on problem local streets.

Purpose: To reduce traffic speed and increase traffic safety.

Potential Advantages
- Visible enforcement could reduce speed by increasing driver awareness about speeding on residential streets and about safety.
- The approach is flexible and can be tailored to suit needs.
- Response can be quick and effective.

Potential Disadvantages
- Long-term benefits of speed reduction are unsubstantiated without regular periodic enforcement.
- It may be difficult to provide enforcement to the extent and with the frequency that residents desire.

Cost: $90,000 to $100,000 per year for one officer and equipment.



Speed Monitoring Trailer

Description: Portable radar speed meter capable of measuring vehicle speed and displaying the speed of the motorist.

Purpose: To slow vehicle traffic and to educate residents and drivers about vehicle speeds.

Advantages
- Speeds may be reduced during short intervals where the radar trailer is located.
- An effective public relations and educational tool.

Disadvantages
- Not an enforcement tool.
- Not effective in modifying long-term habits.
- Effect on speed limited to the vicinity of the trailer.
- Not effective on multi-lane roadways.

Cost: $8,000 - $13,000 per trailer.



Turn Prohibition

Description: Turn Prohibition sign

Purpose:The purpose of a Right (Left) Turn Prohibition sign is to indicate to drivers that they are not permitted to turn right (left). When used as a traffic calming measure, this sign is intended to prevent traffic from short-cutting along a street. The sign may be accompanied by a supplementary plate indicating the time(s) of the day and the days of the week when the regulation applies.

Advantages
- May result in significant reductions in traffic volumes where supported periodically with police enforcement.

Disadvantages
- No significant effect on vehicle speeds.
- Restricts resident access.

Cost: $100 to $200 per sign, installed.



PHASE II - HORIZONTAL DEFLECTION

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Bulb-Outs

Description: The lane is narrowed at an intersection or mid-block by extending the curbs on one or both sides of the street toward the center of the roadway or by building detached raised islands to allow for drainage and bike lane passage. May be used in conjunction with striped crosswalks.

Purpose: To slow traffic at intersections and to improve pedestrian safety.

Potential Advantages
- May reduce vehicle speed.
- May reduce cut-through traffic.
- Reduces crossing distance for pedestrians.
- Minimal impact to emergency vehicles.
- Does not restrict access for residents.
- Can be designed to restrict truck entry.
- Can be aesthetically pleasing, if landscaped.

Potential Disadvantages
- Some designs can create conflicts for bicyclists (properly designed bulb-outs do not create such conflicts).
- Can impact drainage (depending on design and location).
- Curbside parking must be prohibited at the bulb, thus eliminating at least one space at each bulb location.
- Low impact on mid-block speeding.
- Maintenance responsibility, if landscaped.
- Can impede legitimate truck movements.

Cost: $3,000 -$5,000





Center Island Narrowing

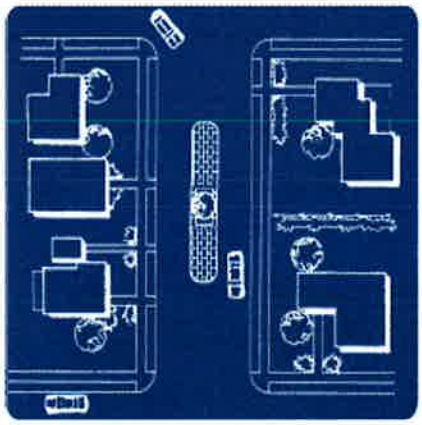
Description: Constructed or painted islands located before an intersection or mid-block along the centerline of a street.

Purpose: To reduce traffic speed by narrowing the roadway with a median, and to increase pedestrian safety by providing a refuge halfway across the street, so that only one direction of traffic need be crossed at a time.

Potential Advantages
- May reduce traffic speed.
- Improves pedestrian safety.
- Does not restrict emergency vehicle access.
- Can be aesthetically pleasing if landscaped.

Potential Disadvantages
- May divert traffic to adjacent streets without traffic calming.
- May impact parking depending on lane width.
- May eliminate the possibility of future bike lane installation on street by narrowing the travel lane.

Cost: $60 per linear foot; $7,000 to $10,000 per device





Chicanes

Description: Curb extensions or islands that alternate from one side of the street to the other, forming S-shaped curves.

Purpose: To slow vehicle speed mid-block using horizontal deflection.

Potential Advantages
- May reduce speed.
- Minimal impact to emergency vehicles.
- Does not restrict access to residents.
- Can be aesthetically pleasing if landscaped.

Potential Disadvantages
- May increase conflicts between motor vehicles and bicyclists and pedestrians.
- May create opportunities for head-on collisions on narrow streets.
- May divert traffic to parallel streets.
- Loss of curbside parking.
- Maintenance responsibility if landscaped.

Cost: $1,000 per 250 sq. ft. of offset; $22,500 - $37,000





Chokers/Slow Points

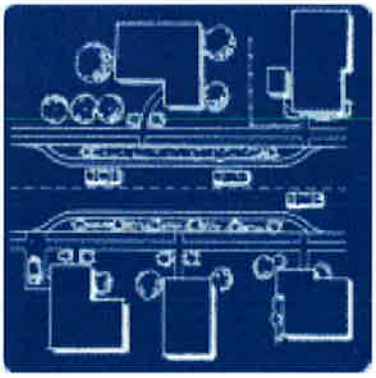
Description: Curb extensions on one or both sides of the street that narrow the street at that location. They may be designed to alter the path of travel or to create single lane, one-way traffic.

Purpose: To reduce vehicle speed mid-block; to increase pedestrian safety.

Potential Advantages
- Reduces vehicle speed (more effective when used in series).
- Can reduce crossing distance for pedestrians.
- Aesthetically pleasing if landscaped; provides visual obstruction.

Potential Disadvantages
- Some choker designs can be hazardous for cyclists; however the device can be designed to be safe and comfortable for cyclists.
- May create conflict between opposing drivers.
- May impact emergency response times.
- May divert traffic to adjacent streets without traffic calming.
- Maintenance responsibility if landscaped.
- Reduces curbside parking.

Cost: $5,000 - $15,000 per pair of offset curb extensions.





Full Closures

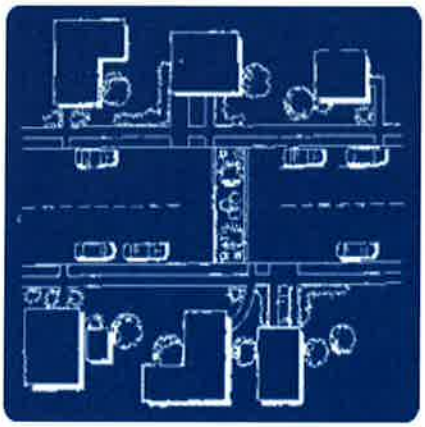
Description: Complete closure of a street either at an intersection or at a mid-block location.

Purpose: To reduce traffic volume and speed.

Potential Advantages
- Effective at reducing traffic speeds and volumes.
- Improves traffic safety.
- Can allow bicycle and pedestrian through-movements.
- Can be designed to allow emergency vehicle access.
- Aesthetically pleasing if landscaped.
- Creates effective dead-ends that may encourage pedestrian activity.

Potential Disadvantages
- May impact emergency response times.
- May divert traffic to adjacent streets.
- May increase trip length.
- May create confusion for users unless signed properly.

Cost: $5,000 - $40,000







Full Diverter

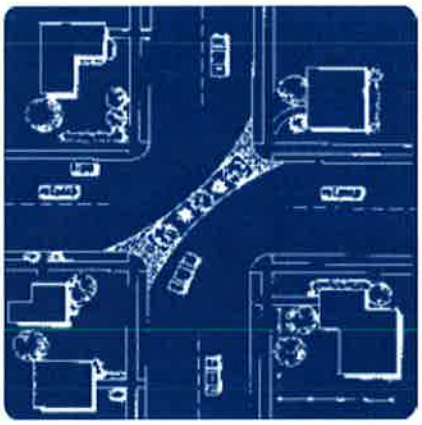
Description: Barriers placed diagonally across an intersection, blocking through movement. May be used in conjunction with stop signs.

Purpose: To reduce traffic volume.

Potential Advantages
- Reduces traffic volume on the protected street.
- Can be designed to preserve emergency vehicle access.
- Can be designed to allow pedestrian and bicycle through-movement.

Potential Disadvantages
- Diverts traffic to other streets.
- Can increase trip length.

Cost: $5,000 - $20,000





Lane Narrowing

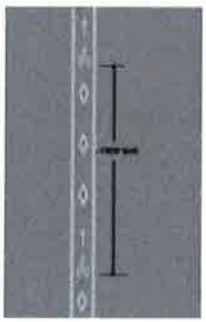
Description: Narrowing travel lanes on streets using striping (lane lines) or changes in parking configuration (angled parking or changes in parking density).

Purpose: To slow traffic speed.

Potential Advantages
- Changes can be implemented quickly.
- Striping can be modified easily if paint is used.
- Requires minimum maintenance.
- Speed may decrease and safety may be improved through the provision of positive guidance to drivers.

Potential Disadvantages
- May increase car/bike conflicts.
- Would increase regular maintenance cost.
- Residents do not always perceive striping as an effective tool for speed reduction.

Cost :The cost of lane striping is variable depending upon the type and amount installed. Crosswalks and other pavement markings are between $200 and $500 per installation. Signs are typically $200 per installation.





Median Barriers

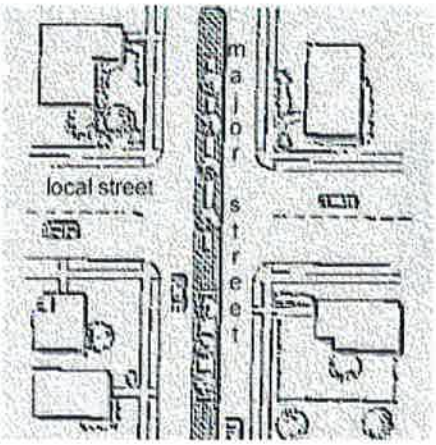
Description: Islands located along the centerline of a street and continuing through an intersection to block through movement across a major street.

Purpose: To reduce traffic speed using roadway narrowing on the street with the median, and to increase pedestrian safety. Traffic volume is reduced on cross streets because through traffic is eliminated.

Potential Advantages
- Makes intersection safer by reducing the number of conflicting turning movements.
- Can be designed to allow through-movement for cyclists traveling on local street.
- Reduces local street volumes.
- Aesthetically pleasing if landscaped.
- Eliminates the need for future traffic signal installation.

Potential Disadvantages
- May shift traffic to other locations where turn opportunities exist.
- May inconvenience local residents.
- May impact parking on the major street depending on lane width.
- Blocks emergency vehicle access and delays emergency response
- Maintenance responsibility if landscaped.

Cost: $10,000 - $20,000





Semi-Diverters

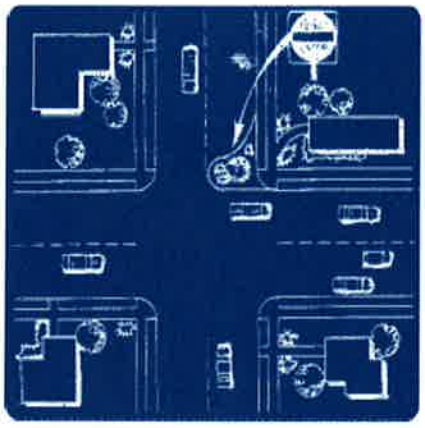
Description: Barriers that block travel in one direction for a short distance on otherwise two-way streets.

Purpose: To reduce traffic volume in the diverted direction.

Potential Advantages
- Restricts movement into a street while maintaining access and movement within the street block for residents.
- Reduces cut-through traffic.
- More self-enforcing and aesthetically pleasing than turn restriction signing.
- Reduces crossing distance for pedestrians.
- Aesthetically pleasing if landscaped.
- Emergency vehicles can travel in restricted direction.
- Can be designed to provide two-way access for bicycles.

Potential Disadvantages
- May divert traffic to parallel streets without traffic calming measures.
- May increase trip length for some residents.
- Curbside parking spaces must be eliminated adjacent to device.
- May increase emergency response times as they maneuver around the barrier.

Cost: $10,000 - $20,000





Traffic Circles

Description: Islands of varying dimensions placed in intersections around which traffic circulates.

Purpose: To slow vehicle speeds at intersections using horizontal deflection and a visual deterrent to higher speeds.

Potential Advantages
- May reduce vehicle speeds.
- Improve safety.
- Visually appealing if landscaped.
- Create a visual obstruction that deters through traffic.
- Do not restrict access for residents.

Potential Disadvantages
- Effect on vehicle speed limited to device's immediate vicinity.
- Loss of curbside parking at each corner (typically 25' to 30' of curb space is restricted at each approach).
- May increase emergency vehicle response time.
- May limit truck and bus access.
- Maintenance responsibility if landscaped.
- Automobile driver's lines of sight may be reduced if landscaped.
- May promote deliberate violation of proper movement.
- May divert traffic to parallel streets.

Cost: $5,000 to $15,000





PHASE II - VERTICAL DEFLECTION

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Raised Crosswalks

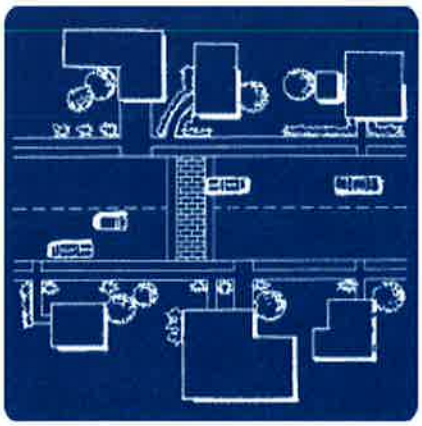
Description: Raised pavement (similar to a speed table) that may be outfitted with crosswalk markings and/or signage to channelize pedestrian crossings, providing pedestrians with a level street crossing. May be used mid-block or at intersections.

Purpose: To reduce vehicle speeds mid-block and to improve pedestrian safety.

Potential Advantages
- May reduce vehicle speeds.
- Less disruptive than speed humps.
- May improve safety for pedestrians by making them more visible.

Potential Disadvantages
- The physical forces exerted by this vertical deflection device upon fragile persons with disability may cause injury.
- Less effective at speed reduction than speed humps.
- May impact emergency vehicle response.
- May disrupt drainage depending on design.
- May divert traffic to other streets.
- May increase noise.
- May give pedestrians a false sense of security.

Cost: $2,000 per location.







Raised Intersections

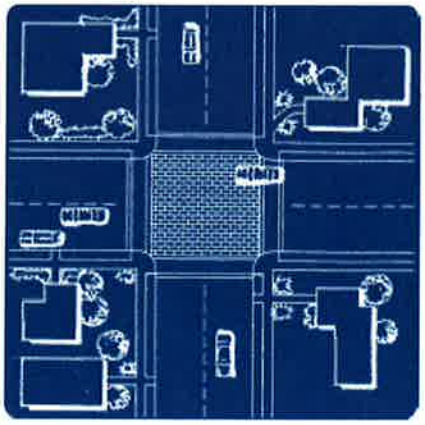
Description: Flat raised areas covering entire intersections with ramps on all approaches and often with brick or other textured materials on the flat section.

Purpose: To slow vehicle traffic at an intersection.

Potential Advantages
- Slows vehicles in intersections and therefore makes conflict avoidance easier.
- Highlights intersection.
- Improves pedestrian safety.
- Aesthetically pleasing if well designed.
- Effective speed reduction at intersection.

Potential Disadvantages
- May increase emergency response time.
- May increase turning difficulty.
- Increases maintenance.
- Impact on speed limited to within approximately 200' of intersection.
- May increase noise due to acceleration and braking.

Cost: $6,000 - $8,000





Speed Humps/Tables

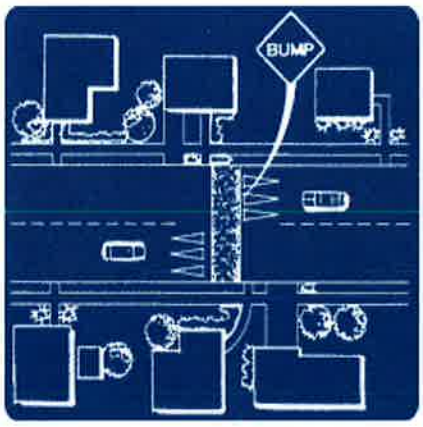
Description: Raised section of pavement across the roadway with curved transitions. Humps are generally 3.5" high and 12' wide. Elongated speed humps (speed tables) are generally 3"-4" high x 22' wide. Impacts on vehicle speed vary with size of device.

Purpose: To reduce vehicle speed using vertical deflection.

Potential Advantages
- Reduces vehicle speed.
- Can reduce vehicular volumes.
- Does not restrict parking.
- Requires minimum maintenance.

Potential Disadvantages
- May increase emergency response times.
- May divert traffic to parallel streets.

Cost: $2,000 - $6,800





Textured Pavement

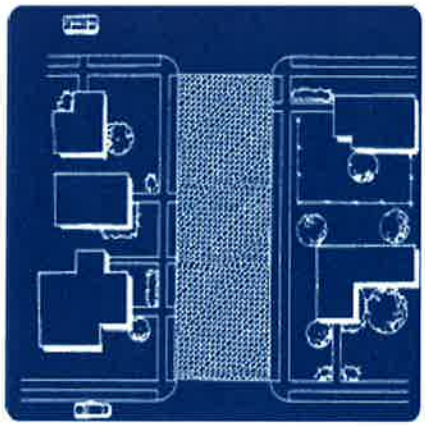
Description: A textured surface used in the roadway or crosswalk that causes drivers to feel a slight vibration over some distance, while improving the aesthetic quality of the street environment. May use brick or stone, but for safety and maintenance reasons, imprinted concrete or pavers that are less slick, less bumpy and easier to maintain are preferable.

Purpose: To reduce vehicle speed.

Potential Advantages
- Reduces vehicle speeds.
- Improves pedestrian safety.
- Can be aesthetically pleasing.

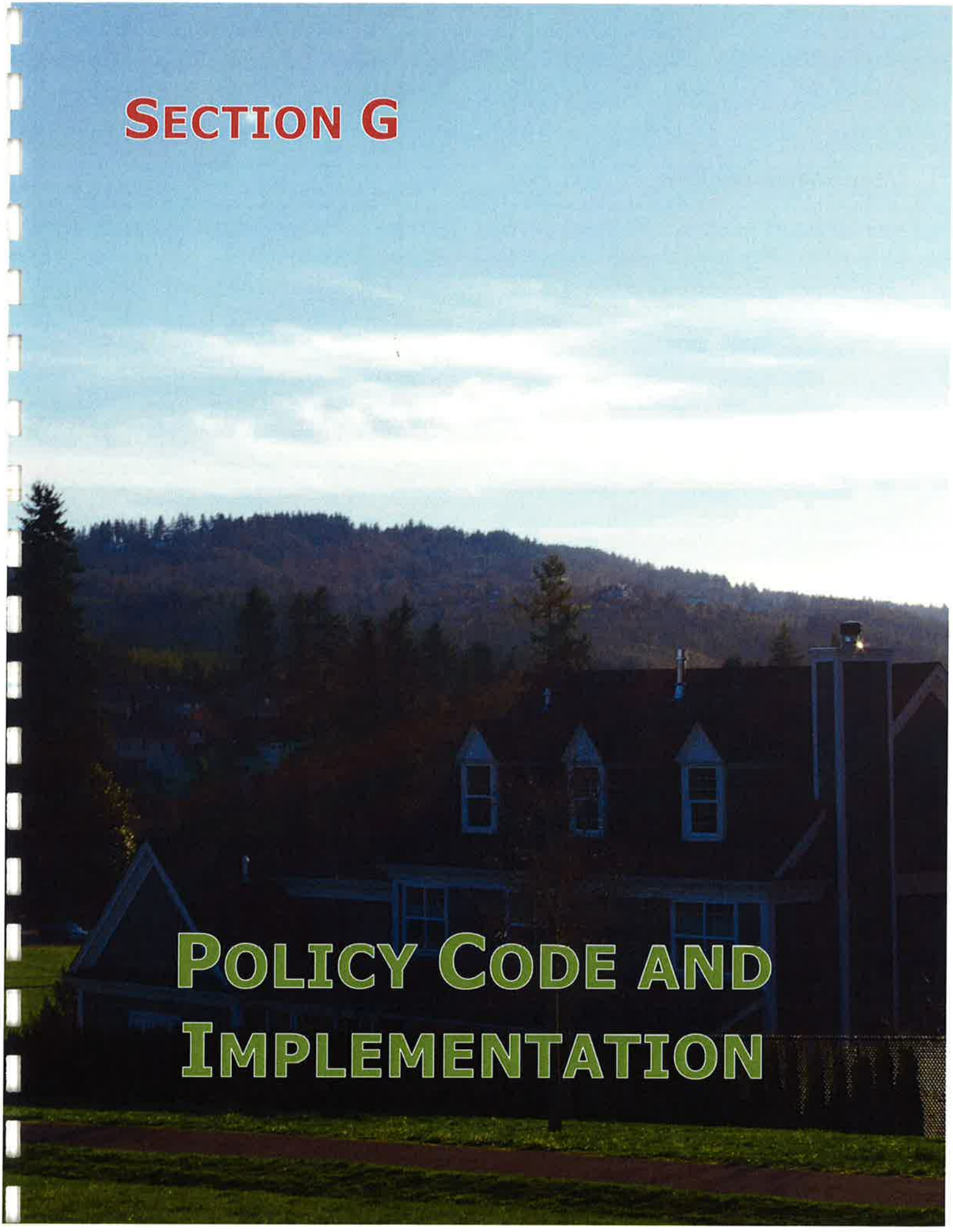
Potential Disadvantages
- Increases vehicle noise.
- Some materials can create hazards for cyclists and pedestrians, particularly when wet.
- Can be high maintenance.
- Materials like cobblestones provide too much texture and can create hazards for the disabled, particularly when the material begins to degrade.

Cost: Varies widely depending on type and amount of material used.





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SECTION G

POLICY CODE AND IMPLEMENTATION

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PROPOSED TRANSPORTATION GOALS AND POLICIES

The tables below focus on proposed amendments to the City's adopted transportation goals, policies and strategies that implement the updated Transportation System Plan (TSP). Identical transportation policy language is found in both Chapter 2 of the adopted TSP from 2005 and Chapter 6 of the Comprehensive Plan (Transportation). Language recommended for addition to Chapter 6 of the Comprehensive Plan is underlined and language recommended for removal is struck through. The tables in which the amendments are presented include a commentary column explaining the background and rationale for the proposed amendment.

Note that, in addition to goals, policies, and strategies (Section B, pp. 1-11), Comprehensive Plan Chapter 6 includes an introduction (Section A, p. 1) and a section addressing roadway functional classification and the transportation improvement program projects from the 2005 TSP (Section C, pp. 11-17). Proposed amendments to these sections are presented in order, in Tables 1, 2, and 3 respectively.

Table 1: Draft Proposed Amendments to SECTION A - Introduction

Existing and Proposed Text	***Commentary***
The purpose of the Transportation element of the Comprehensive Plan is to describe a multi-modal system which will serve the future transportation needs of Sherwood. The plan for the future transportation system should be capable of effective implementation, responsive to changing conditions and be consistent with plans of adjoining jurisdictions. The Plan seeks to foresee specific transportation needs and to respond to those needs as growth occurs. The original Transportation Network Plan was created in 1979. The original transportation policy element was created in 1980 as part of the first Comprehensive Plan acknowledged by the Oregon Department of Land Conservation and Development. The plan policies were updated in 1989 and a ~~new~~ Transportation Plan Update was completed in 1991. The ~~most recent~~ Transportation element ~~has been~~ was revised substantially to reflect updates ~~changes~~ in the~~an updated new~~ Transportation System Plan (TSP), ~~begun in 2003 and completed~~ in ~~March~~ 2005 and 2014. The current adopted ~~newest~~ TSP is attached as an appendix and technical reference to this Comprehensive Plan, including an analysis of the existing transportation system, changes to the functional classification of streets, an update of various inventory and plan maps, and changes to the street design standards. NOTE: The following types of capital facilities are not present within the City: 1)	*References to the TSP are updated.*

Existing and <u>Proposed</u> Text	***Commentary***
air transportation, and 2) water transportation. Therefore, they are not addressed in this plan.	

Table 2: Draft Proposed Amendments to SECTION B - Goals, Policies, and Strategies

Existing and <u>Proposed</u> Text	***Commentary***
Goal 1: Provide a supportive transportation network to the land use plan that provides opportunities for transportation choices and the use of alternative modes serving all neighborhoods and businesses.	*This is an existing goal.*
Policy 1 – The City will ensure that public roads and streets are planned to provide safe, convenient, efficient and economic movement of persons, goods and services between and within the major land use activities. ~~Existing rights of way shall be classified and improved and new streets built based on the type, origin, destination and volume of current and future traffic.~~	*Deleted text has been moved to Strategies.*
Policy 2 – Through traffic shall be provided with routes that do not congest local streets and impact residential areas. Outside traffic destined for Sherwood business and industrial areas shall have convenient and efficient access to commercial and industrial areas without the need to use residential streets.	*This is an existing policy.*
Policy 3 – Local traffic routes within Sherwood shall be planned to provide convenient circulation between home, school, work, recreation and shopping. Convenient access to major out-of-town routes shall be provided from all areas of the city.	*This is an existing policy.*
Policy 4 – The City shall encourage the use of more energy-efficient and environmentally sound alternatives to the automobile by: • The designation and construction of bike paths and pedestrian ways; • The scheduling and routing of existing mass transit systems and the development of new systems to meet local resident needs; and	*This is an existing policy.*

Existing and Proposed Text	***Commentary***
• Encouraging the development of self-contained neighborhoods, providing a wide range of land use activities within a single area.	
Policy 6 – The City shall work to ensure the transportation system is developed in a manner consistent with state and federal standards for the protection of air, land and water quality, including the State Implementation Plan for complying with the Clean Air Act and the Clean Water Act.	*This is an existing policy.*
Policy 7 – The City ~~of Sherwood~~ shall foster transportation services to the transportation disadvantaged including the young, elderly, handicapped, and poor.	*This proposed change reflects a recommendation to make all references to the City [of Sherwood] consistent throughout this section.*
Policy 8 – The City ~~of Sherwood~~ shall consider infrastructure improvements with the least impact to the environment.	*This is an existing policy.*
Policy 9 – The City ~~of Sherwood~~ shall ~~develop a transportation demand management program to complement investments in infrastructure (supply).~~ manage the transportation system to improve reliability and maximize efficient use of existing facilities.	*The proposed modification provides a more general policy and minimizes redundancy with (existing) Strategy 6.*
Strategies	
1. Establish and maintain design standards for public rights of way in accordance with the Functional Street Classification System.	*Modified language is based on existing Policy 1.*
~~1.~~2. Make traffic safety a continuing effort through effective law enforcement and educational programs.	*This is an existing strategy.*
~~2.~~ 3. Design and manage the city street system to meet ~~Adopt~~ an acceptable ~~level of service~~ mobility standard for the roadway network that is consistent with regional transportation policies.	*The proposed change reflects the City's interest in having both level of service and volume to capacity (v/c) as measures by which to evaluate mobility and provide better context for decision making. The mobility standards will be in the adopted TSP*

Existing and Proposed Text	***Commentary***
	and implemented through development review and the traffic impact analysis requirements.
~~3.~~ 4. ~~Develop~~ Plan for an array of transportation assets and services to meet the needs of the transportation-disadvantaged.	*The proposed modification narrows the intent of this strategy to a system-level planning effort on the part of the City. Note that more specific policies regarding providing for the transportation disadvantaged can be found under Goal 5.*
~~4.~~ 5. Evaluate, identify, and map existing and future neighborhoods for potential small scale commercial businesses to primarily serve local residents.	*This existing strategy to integrate small-scale, neighborhood commercial uses into existing neighborhoods is related to Policy 4. Note that this existing strategy does not specify the level of analysis or proposed approach to implement such a study. This strategy should be reevaluated to ensure that it continues to be relevant and match the City's priorities.*
~~5.~~ 6. Adopt a strategy for reducing impacts of impervious surfaces to stormwater management.	*This is an existing strategy.*
~~6.~~ 7. Identify and adopt a transportation demand management strategy and program to provide Incentives to employers who develop transportation options for employees.	*This addition is consistent with modified Policy 9.*
8. Seek strategic opportunities to improve connectivity in the city, including measures such as mid-block crossings connecting to commercial areas.	*This language is based on comments from the Citizen Advisory Committee.*

Existing and Proposed Text	***Commentary***
Goal 2: 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.	*This is an existing goal.*
Policy 1 – The City shall implement the transportation plan based on the functional classification of streets shown in ~~Table 8-1~~ Figure 16 of the TSP.	*This is existing policy with amendments proposed for updating a TSP reference.*
Policy 2 – The City shall maintain a transportation plan map that shows the functional classification of all streets within the Sherwood urban growth area. Changes to the functional classification of streets must be approved through an amendment to the Sherwood Comprehensive Plan, Part 2, Chapter 6 - Transportation Element.	*This is an existing policy.*
Policy 3 – The Sherwood transportation system plan shall be consistent with the ~~c~~City's adopted land use plan and coordinated with transportation plans and policies of other local jurisdictions, especially Washington County, Clackamas County, the City of Wilsonville, and the City of Tualatin.	*This is an existing policy with a proposed modification that indicates that City plans do not have to mirror neighboring jurisdictions' plans, but should not be inconsistent with these plans.*
Policy 4 – The City will coordinate with Metro regarding implementation of the Regional Transportation Plan and ~~related transportation sections of~~ the Metro Regional Transportation Functional Plan.	*These edits are proposed for consistency with regional plans.*
Policy 5 – The City shall adopt and maintain a street classification system that is compatible with the Washington County Functional Classification System for areas inside the Washington County Urban Area Plan and with the Washington County 2020 Transportation Plan (Ordinance 588).	*The proposed edit signifies the City's ongoing commitment to coordination with Washington County.*
Policy 6 — The City will work with Metro and other regional transportation partners to implement regional transportation system ~~demand~~ management and operations programs where appropriate.	*The proposed modifications broaden the scope of this policy to transportation system management and operations (TSMO) programs, of which transportation demand*

Existing and <u>Proposed</u> Text	***Commentary***
	management (TDM) is a part.
Policy 7 — The City shall work cooperatively with the Port of Portland and local governments in the region to ensure sufficient air and marine passenger access for Sherwood residents.	*This is an existing policy.*
Policy 8 – <u>The City shall work to develop more transportation options within city limits to increase opportunities for walking, biking, and taking transit and to reduce single occupancy vehicle (SOV) trips.</u> ~~Establish local non-Single Occupant Vehicle (SOV) modal targets, subject to new data and methodology made available to local governments, for all relevant design types identified in the RTP. Targets must meet or exceed the regional modal targets for the 2040 Growth Concept land use design types as illustrated in the following table:~~ ~~2040 Regional Modal Targets~~ ~~Non-single Occupancy Vehicles~~	*Proposed amendments reflect a recommendation to replace the existing policy with a more general statement that commits the City to reduce SOV trips.*
Strategies	
1. Develop <u>and maintain</u> an intergovernmental agreement between Sherwood, Washington County and the City of Tualatin, consistent with ORS 195.065, to establish urban service boundaries and responsibilities for transportation facilities within and adjacent to the City of Sherwood.	*This is an existing strategy with amendments proposed for clarity only.*
2. Work cooperatively with ODOT, Washington County, and Metro to ~~develop an interchange area management plan for the Pacific Highway 99-W and Tualatin-Sherwood Highway intersection.~~ <u>improve regional mobility through such efforts as the Westside Solution Study and the I-5 to 99W Connector project.</u>	*Proposed language reflects the City's interests in regional transportation planning and the fact that planning for a grade-separated interchange is not an identified transportation need.*
3. Work cooperatively with ODOT, Metro, Washington	*Proposed language reflects the*

Existing and Proposed Text	***Commentary***
County, and Tualatin to develop a corridor management plan for Pacific Highway 99W and Tualatin-Sherwood Road ~~to preserve~~ that ▫ maintains access to the highway ~~for~~ from the ~~c~~City's arterial and collector streets and ▫ improves pedestrian and bicycle mobility, connectivity and safety in the vicinity of, and crossing, the highway.	*community's focus on Highway 99W and desire for enhancements related to non-motorized modes of transportation.*
4. Participate in regional planning efforts, including the development of the Regional Transportation Plan (RTP), to secure funding for safety and capacity improvements to the City of Sherwood's arterial and collector street system that are necessary to maintain acceptable levels of service for local and through traffic.	*This is an existing strategy.*
5. Define transportation corridors in advance through long range planning efforts.	*This is an existing strategy.*
6. Coordinate ~~the~~ local transportation network planning and improvements with adjacent governmental agencies, such as Washington County, Metro, and the State. Coordinate with ODOT in implementing their Six-Year Plan and the State Highway Improvement Program.	*This is an existing strategy with amendments proposed for clarity only.*
7. Adopt performance measures that are consistent with regional modal targets for non-single occupancy vehicles and track the City's progress with meeting adopted goals and policies each successive TSP update.	*This proposed new policy acknowledges regional targets, which are reflected in the performance measures in TSP.*
8. Accommodate car-sharing programs in the city.	*This adopted strategy from the Sherwood Town Center Plan (Strategy 9.4) has been modified to apply citywide.*
9. Promote development of transportation demand management programs by employers in the city. Focus on employers with 100 employees or less that are not	*The first part of this strategy is adopted Strategy 9.5 in the Sherwood Town Center Plan. The strategy has*

Existing and <u>Proposed</u> Text	***Commentary***
<u>subject to the Oregon Department of Environmental Quality's Employee Commute Options program requirements.</u>	*been modified to apply citywide. Additional language is based on comments from the Citizen Advisory Committee.*
<u>10. Support projects that remove regional through traffic from the local transportation system or allow through traffic to bypass Sherwood.</u>	*This proposed new strategy reflects a Citizen Advisory Committee recommendation.*

Existing and Proposed Text	***Commentary***
Goal 3: 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.	*This is an existing goal.*
Policy 1 – The City ~~of Sherwood~~ shall ~~adopt~~ require~~ments~~ that proposed ~~for~~ land developments ~~that~~ mitigate ~~the~~ adverse traffic impacts and ensure that all new development contributes a fair and proportionate share toward on-site and off-site transportation system improvement remedies.	*This is an existing policy with amendments proposed for clarity only.*
Policy 2 – The City ~~of Sherwood~~ shall require dedication of land for future streets when development is approved. The property developer shall be required to make full street improvements for their portion of the street commensurate with the proportional benefit that the improvement provides the development.	*This is an existing policy.*
Policy 3 – The City ~~of Sherwood~~ shall require applicable developments (as defined in the development code), to prepare a traffic impact analysis.	*This is an existing policy.*
Policy 4 – The City ~~of Sherwood~~ shall adopt and maintain a uniform set of design guidelines that provide one or more typical cross section associated with each functional street classification. For example, the City may allow for a standard roadway cross-section and a boulevard cross section for arterial and collector streets.	*This is an existing policy with amendments proposed to reflect existing city practices.*
Policy 5 – The City shall adopt and maintain roadway design guidelines and standards that ensure sufficient right-of-way is provided for necessary roadway, bikeway, and pedestrian improvements.	*This is an existing policy with amendments proposed to reflect existing city practices.*
Policy 6 – The City shall adopt and maintain roadway design guidelines and standards that ensure sidewalks and bikeways be provided on all arterial and collector streets for the safe and efficient movement of pedestrians and	*This is an existing policy with amendments proposed to reflect existing city practices.*

Existing and Proposed Text	***Commentary***
bicyclists between residential areas, schools, employment, commercial and recreational areas.	
Policy 7 – The City ~~of Sherwood~~ will generally favor granting property access from the street with the lowest functional classification, including alleys. Additional access to arterials and collectors for single family units shall be prohibited. ~~and~~ Residential uses should be encouraged to use access from frontage roads and local streets. Frontage roads shall be designed as local streets.	*This is an existing policy with amendments proposed for clarity only.*
Policy 8: – The City will adopt and maintain access control and spacing standards for all arterial and collector streets to improve safety and promote efficient through street movement. Access control measures shall be generally consistent with Washington County access guidelines to ensure consistency on city and county roads.	*This is an existing policy with amendments proposed to reflect city practices.*
Policy 9 – The City will establish and maintain guidelines and standards for the use of medians and islands for regulating access and providing pedestrian refuge on arterial and collector streets.	*This is an existing policy with amendments proposed to reflect city practices.*
Policy 10 – The City ~~of Sherwood~~ will establish and maintain a set of guidelines and standards for traffic calming measures to retrofit existing streets and as part of land use review.	*This is an existing policy with amendments proposed to reflect city practices.*
Policy 11 – The City will develop and maintain uniform traffic control device standards (signs, signals, and pavement markings) and uniformly apply them throughout the city.	*This is an existing policy with amendments proposed to reflect city practices.*
Policy 12 – ~~The City of Sherwood will adopt parking control regulations for streets as needed. On-street parking shall not be permitted on any street designated as an arterial, unless allowed by special provision within the Town Center (Old Town) area or through the road modifications process outlined in the Sherwood Development Code.~~ The City will support actions that provide sufficient parking for	*Proposed amendments reflect a recommendation to replace this policy with adopted Policy 9 from the Town Center Plan and the more specific Strategies from this plan (see proposed Strategies 11-18).*

Existing and Proposed Text	*Commentary*
businesses and residents, while maximizing the efficiency of parking areas.	
Policy 13 – The City ~~of Sherwood~~ shall ~~adopt new development codes~~ explore and adopt regulatory and financing tools to fill in gaps in existing sidewalks to achieve a consistent pedestrian system.	*These modifications reflect the fact that the City needs to first have a policy discussion regarding viable funding options before development requirements would be modified to be consistent with the preferred/adopted funding methods.*
Policy 14 – The City will implement transportation system improvements and standards that increase access between residences and civic, employment, and commercial uses within the Town Center boundary and that improve safety for all modes of transportation for people traveling to, within and adjacent to the Town Center.	*This is adopted Policy 7 in the Sherwood Town Center Plan.*
Policy 15 – The City will balance the need for vehicular mobility within and adjacent to the Town Center with the other transportation and land use goals and priorities identified in the Town Center Plan.	*This is adopted Policy 8 in the Sherwood Town Center Plan.*
Strategies	
1. Ensure consistency between the Transportation System Plan, development code requirements, and the ~~Incorporate typical street cross section~~ guidelines in the City's ~~public works~~ engineering design standards ~~that address~~ regarding street cross sections and other standards related to vehicular, bicycle, pedestrian, and transit needs.	*The existing strategy is a "one time" action; proposed modifications address the ongoing need to ensure consistency between City plans and codes.*
2. ~~Include a Road Modification Process~~ Maintain a process in the ~~Sherwood D~~development ~~C~~code ~~to provide a procedure for~~ that allows the City to grant~~ing~~ variances from street design standards for parking, pedestrian facilities, signals, and other roadway features.	*The proposed modification is consistent with existing Code language and City procedures.*

Existing and Proposed Text	*Commentary*
3. Consider the ~~Metro 2040~~ Regional Transportation Plan Regional System ~~Street~~ Design Concepts ~~Elements~~ when planning for improvements to City transportation facilities, including those built by ODOT or TriMet.	*The proposed modifications are consistent with the terms used in the RTP.*
4. ~~Incorporate~~ Continue to implement guidelines in the City's development code that establish when a local street refinement plan must be prepared and the process for preparing such a plan.	*The proposed modification is consistent with existing Code language and City procedures.*
5. Periodically review the development code, and ~~A~~amend ~~the city development code~~ as necessary, to ensure that ~~regulate~~ vehicular access, spacing, circulation, and parking continues to be regulated consistent with plan policies.	*The proposed modifications are consistent with the intent of the existing policy.*
~~6. Amend the city development code as necessary to include specific guidelines for determining the proportional benefit contribution associated with requirements for street dedication and the construction of off-site transportation improvements.~~	*Proposed code amendments include a new section addressing rough proportionality, so this strategy is no longer needed.*
~~7. Amend the development code to include standards and procedures for a transportation impact analysis (TIA). Refer to Appendix for example.~~	*Proposed code amendments include a new section addressing TIA thresholds and requirements, so this strategy is no longer needed.*
~~8.~~ 6. Develop a list to prioritize refinement plan needs, such as corridor plans and interchange area management plans.	*This is an existing strategy.*
~~9.~~ 7. ~~Amend development code to include provisions for implementing traffic calming mechanisms.~~ Allow for the implementation of traffic calming mechanisms through provisions in the development code.	*The proposed modification reflects existing code language.*
~~10.~~ 8. Create a map that identifies locations targeted for on-street parking, such as in neighborhood commercial areas and the town center that support multi-modal	*This is an existing strategy.*

Existing and Proposed Text	*Commentary*
options.	
~~11.~~ 9. Regularly review, and update as necessary, the development code to ensure consistency with regional parking requirements.	*This is an existing strategy; modification reflect city practices.*
~~12.~~ 10. Develop a "conceptual new streets plan" map for all contiguous areas of vacant and redevelopable parcels of 5 (five) or more acres planned or zoned for residential or mixed-use development, and adopt the map as part of the TSP.	*This is an existing strategy.*
11. Implement the parking strategies in the Sherwood Town Center Plan, including: ▫ Evaluate and monitor parking supply and demand in Old Town. ▫ Evaluate the parking needs for townhome developments in the Town Center. ▫ Evaluate the needs of commercial uses in the Langer Drive Commercial District.	*This proposed strategy incorporates and abbreviates adopted Strategies 9.1, 9.2, 9.3 and 9.6 from the Sherwood Town Center Plan.*
~~13.~~ 12. ~~Consider a "mixed-use" overlay zone in the development code that will apply to the Six Corners area. Include design standards that will encourage a vibrant, pedestrian-friendly environment through the implementation of boulevards, medians, mixed-use development and site design.~~ Support public or private development of the bicycle and pedestrian improvements shown on Map 2 of the Town Center Plan.	*The proposed amendment reflects a recommendation to replace existing Strategy 13 with adopted Strategies in the Town Center Plan. Underlined text is adopted Strategy 7.1 in the Sherwood Town Center Plan.*
13. Enhance Sherwood Boulevard for bicycle and pedestrian travel consistent with the key changes identified for this roadway in the Town Center Plan.	*This is adopted Strategy 7.2 in the Sherwood Town Center Plan.*
14. Enhance Langer Drive for pedestrian and bicycle travel to create a complete street that supports a	*This is adopted Strategy 7.3 in the*

Existing and Proposed Text	*Commentary*
vibrant mixed use district, consistent with the key changes identified for this roadway in the Town Center Plan.	*Sherwood Town Center Plan.*
15. Work with ODOT to provide safe pedestrian crossing movements for all directions at 99W intersections.	*This is adopted Strategy 7.4 in the Sherwood Town Center Plan.*
16. Identify and consider all funding sources appropriate and available to work with property owners to fill gaps in sidewalk system along neighborhood streets.	*This is adopted Strategy 7.5 in the Sherwood Town Center Plan.*
17. The City will support collaborative solutions that enhance access and improve safety for pedestrians and all other modes of transportation within, adjacent to and into the Town Center.	*This is adopted Strategy 7.6 in the Sherwood Town Center Plan.*
18. The City will work with the County, ODOT, and local stakeholders to enhance vehicular and pedestrian access from the Town Center to developments adjacent to the Town Center.	*This is adopted Strategy 8.4 in the Sherwood Town Center Plan; Strategies 8.2 and 8.3 included direction for the current TSP update process and have been addressed.*
19. The City will reexamine local street standards and will explore appropriate locations within the city and circumstances under which a narrower street standard may be permitted as part of new development.	*Reducing pavement width is a Transportation Planning Rule requirement. Benefits include minimizing impervious surface, diminishing run-off/pollution, freeing land for other uses, etc. The proposed strategy acknowledges that there may be situations where the City's existing local street width standard could be reduced in order to minimize impervious surface, diminish run-off/pollution, free land for other uses, etc. Because of issues regarding restricting parking and parking enforcement, among others, the City*

Existing and Proposed Text	*Commentary*
	needs more community discussion before a narrower local standard can be implemented; this policy commits the City to having this community conversation.

Existing and Proposed Text	***Commentary***
Goal 4: Develop complementary infrastructure for bicycles and pedestrian facilities to provide a diverse range of transportation choices for city residents.	*This is an existing goal.*
Policy 1 – The City ~~of Sherwood~~ shall provide a supportive transportation network to the land use plan that provides opportunities for transportation choices and the use of alternative modes.	*This is an existing policy.*
Policy 2 – Sidewalks and bikeways shall be provided on all arterial and collector streets for the safe and efficient movement of pedestrians and bicyclists between residential areas, schools, employment, commercial and recreational areas.	*This is an existing policy.*
Policy 3 – The City ~~of Sherwood~~ will pursue development of local and regional pedestrian trail facilities, especially a trail system connection between the city and the Tualatin National Wildlife Refuge.	*This is an existing policy.*
Policy 4—The City ~~of Sherwood~~ shall provide design standards for roadway ~~traffic calming~~ features ~~such as traffic circles, curb extensions, bulb-outs, and speed humps~~ that make roadways safer for walking and biking.	*This is an existing policy, with minor amendments proposed to broaden applicability; more specific action is in Strategy 8.*
Policy 5 – The City ~~of Sherwood~~ shall ~~include~~ require~~ments for the provision of~~ short-term and long-term bicycle parking ~~on large~~ be included as part of commercial, industrial, institutional, and multi-family residential projects.	*The TPR, RTP, and RTFP require bicycle parking for these uses in general, not just "large" projects.*
Policy 6 – The City ~~of Sherwood~~ will coordinate the bikeway system with adjacent jurisdictions, especially Tualatin, Wilsonville, Clackamas and Washington County.	*This is an existing policy.*
Policy 7 – The City will work to eliminate architectural barriers from buildings and public improvements, which limit elderly and handicapped use of the transportation system.	*This is an existing policy.*

Existing and Proposed Text	***Commentary***
Policy 8 – The City will require new development to accommodate bicyclists and pedestrians, and to provide non-motorized transportation facilities consistent with the proposed use and pursuant to applicable code requirements.	*This proposed new policy acknowledges private development's role in providing bicycle and pedestrian facilities.*
Strategies	
1. Include pedestrian and bike projects in the capital improvement plan to ensure investment in alternative modes~~;~~.	*This is an existing strategy.*
2. Use intergovernmental agreements with Tualatin and Washington County for the coordination of urban services per ORS 196.065 to coordinate the bikeway system and trail system~~;~~.	*This is an existing strategy.*
3. Include design standards for sidewalk and bikeway facilities in the ~~c~~City's roadway design guidelines~~;~~.	*This is an existing strategy.*
4. Include provisions for planning the location of pedestrian and bike routes for connecting residential, school, commercial, employment and recreational areas in the development code guidelines for preparing local street refinement plans~~;~~.	*This is an existing strategy.*
5. Include a system of bikeways along collector and arterial roadways ~~as illustrated on the Transportation Plan Map;~~.	*This is existing strategy with minor amendments proposed for accuracy. (The Transportation Plan Map shows recommended projects rather than bikeways along all collectors and arterials.)*
6. Include requirements in the development code for private development to provide bike and pedestrian facilities as are related and proportional to the projected impacts of the proposed development and that are consistent with ~~indicated on~~ the Transportation Plan Map in TSP Figures 12, 13, and 14~~;~~.	*These changes include updated references to the TSP.*

Existing and **Proposed** Text	*Commentary*
7. Include design standards for sidewalks and bicycle facilities in the City's roadway design guidelines~~;~~.	*This is an existing strategy.*
8. Pursue traffic calming techniques, such as traffic circles, curb extensions and speed humps, for neighborhood and local streets so as to provide safe passage for pedestrians and bicyclists, and a more pleasant neighborhood environment for residents.	*This is an existing strategy with proposed additions for clarity.*
9. Construct and install infrastructure, including storm drain inlets, which are pedestrian and bicycle-friendly.	*This is an existing strategy.*

Existing and Proposed Text	***Commentary***
Goal 5: Provide reliable convenient transit service to Sherwood residents and businesses as well as special transit options for the ~~c~~City's elderly and disabled residents.	*This is an existing goal.*
Policy 1 – The City shall support and encourage p~~P~~ublic transportation ~~shall be provided~~ as a~~n alternative~~ viable means of transportation in Sherwood.	*The policy has been re-written to reflect the City's supporting role in providing public transportation.*
Policy 2 – The City ~~of Sherwood~~ will work with Tri-Met to expand transit services to all parts of the City through additional routes, more frequent service, and transit oriented street improvements.	*This is an existing policy.*
Policy 3 – Park-and-ride facilities should be located with convenient access to the arterial system to facilitate rider transfer to transit and car pools.	*This is an existing policy.*
Policy 4 – The City will ~~E~~encourage the construction of bus shelters and park-n-ride lots in the vicinity of planned transit corridors.	*This is an existing policy.*
Policy 5 – The City ~~of Sherwood~~ will support the establishment of a "feeder" transit route from downtown Sherwood to Tualatin employment centers.	*This is an existing policy.*
Policy 6 – The City ~~of Sherwood~~ will support park and ride facilities that are sited for the maximum convenience of commuters and transit riders.	*This is an existing policy.*
Policy 7—The City ~~of Sherwood~~ will support regional efforts for the preservation and development of appropriate rail rights-of-way for passenger rail service, in particular for serving local and regional commuter rail needs in Washington County, Clackamas County, and Yamhill County.	*Review for consistency with the updated TSP recommendations. Note that this policy is related to new Strategy 5 (adopted Strategy 6.3 in the Sherwood Town Center Plan).*
Policy 8 – The City ~~of Sherwood~~ will encourage the provision of special transportation services (i.e., van pools, or car pools, dial-a-ride, etc.) to transportation disadvantaged by Tri-Met and community-based service	*This is an existing policy.*

Existing and Proposed Text	***Commentary***
providers.	
Policy 9 – ~~Fully integrate the City into the regional transit system by expanding hours and destinations served by transit providers.~~ The City supports transit service that serves the needs of the residents and businesses in and adjacent to the Town Center, including maintaining a robust local transit service network and planning for future local and high capacity transit service to neighboring cities.	*Deleted policy is somewhat redundant to Policy 2 and suggests that the City has authority to expand transit hours of service and routes. Proposed language is adopted Policy 6 in the Town Center Plan.*
Policy 10 – The City will meet RTP goals of providing a safe and convenient pedestrian circulation system.	*This is an existing policy.*
Policy 11 – The City will participate in and will support regional efforts that seek to improve multi-modal transportation options that benefit the residents and business in Sherwood.	*The proposed policy recognizes the City's participation in regional transportation projects such as the Southwest Corridor and Tonquin Trail projects.*
Policy 12 – The City will support providing and improving transit connections between Sherwood, Tualatin, and other communities in the region, particularly for work-related trips.	*This proposed policy language is based on comments from the Citizen Advisory Committee.*
Strategies	
1. In consultation with TriMet and consistent with their guidelines, ~~D~~develop and maintain design standards ~~to separate~~ for bus pullouts and stops on ~~buses from the~~ arterial roadways ~~while~~ to facilitate safe and efficient ~~transferring~~ passengers transfers. ~~Establish a bus turnout design for stops on arterial streets.~~	*Proposed modifications defer to TriMet regarding the preferred design for bus pullouts and stops.*
2. ~~Update development code to include design guidelines that require transit stops to be accessible to transit riders, especially the elderly and handicapped.~~ Ensure new development and redevelopment provide connections to transit streets and facilities, providing protected street crossings and bus stop amenities, if	*Existing Strategy is a "one time" action; proposed language is consistent with existing code requirements for new development in the vicinity of a transit stop.*

Existing and <u>Proposed</u> Text	***Commentary***
<u>needed.</u>	
~~3. Amend development code to require development on sites at major transit stops(defined by the City of Sherwood) to do the following:~~ ~~▫ Locate within 20 feet of (or provide a pedestrian plaza) at the major transit stop;~~ ~~▫ Provide reasonably direct pedestrian connections between the transit stop and building entrances on the site;~~ ~~▫ Provide a transit service passenger landing pad accessible to disabled persons;~~ ~~▫ Provide an easement or right-of-way dedication for a passenger shelter and underground utility connection from the new development to the transit amenity if requested by the public transit provider; and~~ ~~▫ Improve public safety by providing lighting at transit stops.~~	*Strategy is reflected in existing code requirements for new development in the vicinity of a transit stop and is no longer needed.*
~~4. Work with Tri-Met and Metro to extend transit options to Sherwood, which may include:~~ ~~▫ High capacity transit service along 99W terminating near Six Corners;~~ ~~▫ Potential extension of commuter rail line from Lake Oswego to Sherwood on the existing rail line with service to Newberg or McMinnville; and~~ ~~▫ Other regional transit service connections, such as frequent bus, interurban bus, as appropriate.~~ <u>3. Identify the ongoing transit needs within the community and work with Tri-Met and other transit providers to enhance services to address short and</u>	*This existing strategy has been updated; language proposed here is Strategy 6.1 in the Town Center Plan.*

Existing and Proposed Text	*Commentary*
long-term transit needs in the community.	
4. Work with Metro, as well as the cities of Tualatin and Tigard, to explore feasible modes and locations to provide high-capacity transit service to the Town Center and adjacent areas.	*This is adopted Strategy 6.2 in the Sherwood Town Center Plan.*
5. Periodically evaluate the feasibility of passenger service along the existing rail lines as the Town Center grows.	*This is adopted Strategy 6.3 in the Sherwood Town Center Plan.*
6. Continue to explore opportunities to achieve long-term transit supportive densities in the Town Center in order to increase the viability of high-capacity transit.	*This is adopted Strategy 6.4 in the Sherwood Town Center Plan.*

Existing and <u>Proposed</u> Text	***Commentary***
Goal 6: Provide a convenient and safe transportation network within and between the Sherwood Old Town ~~(Town Center)~~ and Six Corners area that enables mixed use development and provides multi-modal access to area businesses and residents.	*This goal and its policies and strategies are consistent with the adopted Town Center Plan, but it is proposed that references to the Town Center be removed because the Town Center now applies to an area larger than Old Town.*
Policy 1 – The City ~~of Sherwood~~ shall continue to refine and develop existing and new design guidelines and special standards for the Old Town and Six Corners areas to facilitate more pedestrian and transit friendly development.	*This is an existing policy.*
Policy 2 – The City ~~of Sherwood~~ shall work to provide connectivity, via the off-street trail system and public right-of-way acquisitions and dedications, to better achieve street spacing and connectivity standards.	*This is an existing policy.*
Strategies	
1. Provide handicap ramps at all intersections with landings connected to sidewalk improvements, especially within Six Corners and Old Town areas.	*This is an existing strategy.*
2. <u>Work with transit service providers to</u> ~~D~~<u>d</u>esign transit stops in- to meet ADA requirements for transit accessibility.	*This is an existing strategy with minor amendments proposed acknowledge the relationship with transit service providers in designing transit stops.*
3. Adopt design and development guidelines for the Old Town areas that facilitate pedestrian use and a mix of commercial and residential development.	*This is an existing strategy.*
~~4. Adopt parking guidelines for the Old Town areas that are compatible with the parking guidelines established in Title 2 of the Metro Urban Growth Management Functional Plan.~~	*It is recommended to replace this strategy with proposed Goal 3, Strategy 11, language that was developed as part of the Town Center Plan and reflects the need for a parking study*

Existing and **Proposed** Text	***Commentary***
	and strategy for Old Town.

Existing and Proposed Text	***Commentary***
Goal 7: Ensure that efficient and effective freight transportation infrastructure is developed and maintained to support local and regional economic expansion and diversification consistent with City economic plans and policies.	*This is an existing goal.*
Policy 1 — The City ~~of Sherwood~~ will collaborate with federal, state and neighboring local governments and private business to ensure the investment in transportation infrastructure and services deemed necessary by the City to meet current and future demand for industrial and commercial freight movement.	*This is an existing policy.*
Policy 2 — The City ~~of Sherwood~~ will adopt implementing regulations that provide for safe and convenient access to industrial and commercial areas for commercial vehicles, including freight loading and transfer facilities.	*This is an existing policy.*
Policy 3 — The City ~~of Sherwood~~ will work cooperatively with local, regional and state agencies to protect the viability of truck and freight service routes within, through, and around the City of Sherwood, especially for Pacific Highway 99-W, the Tualatin-Sherwood Highway, and the ~~planned~~multi-corridor I-5/Hwy 99-W Connector corridor strategy.	*This is an existing policy with minor amendments to acknowledge that multiple facilities will be involved in the I-5/Highway 99-W Connector.*
Policy 4 — The City ~~of Sherwood~~ will work cooperatively with local, regional and state governments to ensure there is adequate air transportation infrastructure to serve local needs at regional airport facilities, including the Hillsboro Airport and Portland International airport.	*This is an existing policy.*
Policy 5 — The City ~~of Sherwood~~ will strongly encourage the preservation of rail rights-of-way for future rail uses, and will work with appropriate agencies to ensure the availability of rail services to its industrial lands.	*This is an existing policy.*
Policy 6 — The City ~~of Sherwood~~ will cooperate with local, regional and state governments to provide for regional marine freight infrastructure sufficient to serve local needs.	*This is an existing policy.*

Existing and Proposed Text	***Commentary***
Policy 7 — The City ~~of Sherwood~~ will cooperate with the Portland Development Commission, Port of Portland, Washington County, and other economic development agencies to ensure the availability of inter-modal connectivity facilities deemed necessary to facilitate seamless freight transfer between all transport modes.	*This is an existing policy.*
Strategies	
1. Revise the ~~Sherwood~~ ~~D~~development ~~C~~code as necessary to include clear and objective standards for the provision of freight loading and handling facilities, such as restricted on-street parking, loading docks, truck access ways, and rail spurs, in all industrial and commercial development districts.	*Note that proposed development code revisions include provisions for on-street loading. [Proposed new Subsection C in Section 16.94.030 (Off-Street Loading Standards).]*
2. Participate in regional economic development planning efforts related to inter-modal transportation facilities.	*This is an existing strategy.*
3. Adopt appropriate standards to ensure the preservation of rail access corridors to ~~Sherwood~~ the City's industrial land base.	*This is an existing strategy.*

Existing and Proposed Text	***Commentary***
Goal 8: The ~~Sherwood~~ City's transportation network will be managed in a manner that ensures the plan is implemented in a timely fashion and is kept up to date with respect to local and regional priorities.	*This is an existing goal.*
Policy 1 – The City ~~of Sherwood~~ shall develop and pursue a systematic approach to implementing the transportation network.	*This is an existing policy with amendments proposed to reflect existing city practices.*
Policy 2 – The City ~~of Sherwood~~ shall pursue a diversified funding strategy to implement the transportation system plan including private, public and regional sources.	*This is an existing policy.*
Policy 3 – The City ~~of Sherwood~~ shall use its adopted capital improvement plan to prioritize and schedule transportation projects based upon need as shown in the Transportation System Plan. Incorporate the transportation system priorities from the TSP into the cCity's capital improvement planning process.	*This is an existing policy.*
Policy 4 – Project scheduling shall be performed in a systematic manner based on the priority rating process outlined in the Transportation System Plan and available financial resources.	*This is an existing policy.*
Policy 5 – The Transportation System Plan shall be periodically updated, preferably on a five-year cycle, to assure consistency with changing ideas, philosophies, and related policies.	*This is an existing policy.*
Strategies	
1. Participate in MPAC, JPACT and other Metro advisory bodies to promote ~~Sherwood~~ the City's transportation system improvements.	*This is an existing strategy.*
2. Local private financing resources will include right of way dedication and developer contributions to street improvements, and local improvement districts. Public resources will include local system development	*This is an existing strategy.*

Existing and Proposed Text	*Commentary*
charges and bonding authority. Regional sources will include Washington County Traffic Impact Fees (TIF) and projects bonded through the County MSTIP program. Regional sources will also include Metro Transportation Improvement Plan (MTIP) resources and other state and federal grant assistance programs.	
~~3. Adopt a comprehensive local system development charge (SDC) ordinance to either augment or replace CAPand collector street SDC.~~	*A SDC ordinance has been adopted, so this strategy is no longer needed.*
34. Develop a method for scheduling improvement projects based on priority and funding sources.	*This is an existing strategy.*
45. Assign ~~c~~City staff and elected officials to participate in regional transportation planning processes.	*This is an existing strategy.*
56. Secure intergovernmental agreements between ~~Sherwood~~ the City and adjoining communities and regional service providers that outline cooperative measures for coordinating transportation investment and regulation per ORS 195.065.	*This is an existing strategy.*
6. Continue to collaborate with Washington County and other regional partners on refinement planning related to Brookman Road, and update the Sherwood Transportation Plan to incorporate the agreed upon classification and design of this roadway.	*This is a new Strategy acknowledging the outstanding issues surrounding Brookman Road and articulating the need for a future amendment to the TSP.*

Table 3: Draft Proposed Amendments to SECTION C - The Transportation System Plan

Existing and Proposed Text	***Commentary***
The Transportation System Plan stresses the improvement of the existing system of transportation facilities through transportation system management before new facilities are built. Existing conditions have been analyzed in the Study Area (lands within UGB) and are contained in ~~Chapter 3 of~~ the TSP Appendix (Existing Conditions Report). Transportation analysis zones were created for each part of the city based on types of land use in the Comprehensive Plan Map. Future traffic volumes were projected based on expected ~~build-out~~ development of those zones and surrounding areas consistent with Metro's land use projections. ~~Future traffic volumes with trip origins or destinations in the Study Area were then calculated for selected subareas or zones in this case. Future locally generated traffic volumes were then distributed onto the street system based on assumption as to major directional movements. From this process future locally generated traffic volumes were calculated for major roads. Future traffic volumes within the Study Area represent only locally generated traffic. Reduction in traffic volumes over time on certain major streets assumes the progressive improvement of alternative major street routes, which have the effect of shifting traffic from existing to improved routes in satisfying major directional movements. To determine total volumes on major streets with significant through traffic (i.e. Highway 99W) locally generated volumes should be added to through traffic volumes determined by Washington County, Metro or ODOT.~~ ~~The above a~~Analysis of projected future traffic conditions taken together with the application of the goals, objectives and policies described in Section B were used in the development of Transportation System Plan. A map for each existing and planned transportation system is included in the TSP. ~~Each m~~Maps, ~~several~~ street classifications, and the above policies are~~were~~ updated as part of TSP updates~~as well~~. The TSP ~~(2005)~~ is a technical reference to the Transportation element of the Comprehensive Plan. ~~The following information is included in the TSP and is included below for reference. Table 1 is a list of functional classifications and definitions for each street followed by Figure 1 Transportation Plan Map that illustrates the location and functional classification of each street. Table 2 is a list of major transportation improvements planned for the next twenty years based on the transportation system analysis of expected traffic levels, a performance standard Level of Service "D", and projected costs. Generally, most of the improvements are upgrades and connections to existing streets while some improvements are proposed new streets.~~	*Specific references to the TSP are replaced with general references. It is recommended to remove functional classification maps and project lists from this section and generally simplify this section.*

Angelo planning group LAND USE PLANNING • TRANSPORTATION PLANNING • PROJECT MANAGEMENT

Memorandum

Date: May 6, 2014 ***Last revised June 23, 2014 to reflect text adopted June 17, 2014***

To: Brad Kilby, AICP, City of Sherwood

From: Darci Rudzinski and Shayna Rehberg, Angelo Planning Group

cc: Bob Galati, PE, City of Sherwood; Garth Appanaitis, DKS Associates

Re: Draft Proposed Implementation Language (Task 5.2)

This memorandum presents draft proposed amendments to the City of Sherwood Zoning and Community Development Code ("development code"), pursuant to Task 5.2.

Proposed policy and code amendments will be reviewed and considered for adoption in conjunction with the updated TSP, as they include amendments that implement recommendations from the updated City of Sherwood Transportation System Plan (TSP), create consistency between the TSP and other adopted local documents, and comply with state and regional transportation planning regulations. Proposed policy amendments are presented in a separate memorandum and proposed code amendments are presented below.

Proposed Development Code Amendments

Draft code amendments presented in this memorandum were developed according to findings of compliance with the Transportation Planning Rule (TPR) and Regional Transportation Functional Plan (RTFP).[1] Recommendations for potential code amendments to better address compliance with TPR and RTFP requirements were summarized in Table 6 of the Needs, Opportunities, Constraints and Tools Technical Report (Task 3.2). These recommendations were discussed with City staff in order to determine which issues would be pursued and developed into draft code amendments.

For reference, that summary table is included in this memorandum as Table A-1 in Attachment A, and includes commentary indicating which recommendations have been developed into proposed code amendments.

[1] Detailed and updated findings of compliance will be included in the City's staff report (Task 5.6).

Proposed code amendment text is presented in adoption-ready format in this memorandum. New language that is proposed to be added is underlined and proposed deletions are ~~struck through~~. The draft amendments are numbered consistent with the structure of the City development code, and are presented in the order of issues included in Table A-1.

Note: In addition to the amendments proposed in this memorandum, the entire development code should be checked to amend all references to the updated TSP, as needed.

Consistency of transportation facility standards (Recommendation DC-2 in Table A-1)

CHAPTER 16.106 TRANSPORTATION FACILITIES

16.106.010 Generally

A. Creation

Public streets shall be created in accordance with provisions of this Chapter. Except as otherwise provided, all street improvements and rights-of-way shall conform to standards for the City's functional street classification, as shown on the Transportation System Plan (TSP) Map (Figure 15) ~~and in Figure 1, of Chapter 6 of the Community Development Plan,~~ and other applicable City standards. The following table depicts the guidelines for the street characteristics.

[...]

16.106.040 Design

Standard cross sections showing street design and pavement dimensions are located in the ~~City of Sherwood Transportation System Plan, and~~ City of Sherwood's Engineering Design Manual.

Definitions of access way and shared-use path (Recommendation DC-3 in Table A-1)

CHAPTER 16.10 DEFINITIONS

16.10.020 SPECIFICALLY

[...]

Access: The way or means by which pedestrians and vehicles enter and leave property.

Access way: A pathway providing a connection for pedestrians and bicyclists between two streets, between two lots, or between a development and a public right-of-way. An access way is intended to provide access between a development and adjacent residential uses, commercial uses, public use such as schools, parks, and adjacent collector and arterial streets where transit stops or bike lanes are provided or designated. An access way may be a pathway for pedestrians and bicyclists (with no vehicle access), a pathway on public or private property (i.e., with a public access easement), and/or a facility designed to accommodate emergency vehicles.

Accessory Building/Use: A subordinate building or use which is customarily incidental to that of the principal use or building located on the same property.

[...]

Setback: The minimum horizontal distance between a public street right-of-way line, or side and rear property lines, to the front, side and rear lines of a building or structure located on a lot.

Shared-use path: A facility for non-motorized access conforming to City standards and separated from the roadway, either in the roadway right-of-way, independent public right-of-way, or a public access easement. It is designed and constructed to allow for safe walking, biking, and other human-powered travel modes.

Sidewalk: A pedestrian walkway with hard surfacing.

[...]

Traffic Impact Analysis (TIA) and rough proportionality requirements (Recommendation DC-4 in Table A-1)

CHAPTER 16.90 SITE PLANNING

16.90.030 Site Plan Modifications and Revocation

[...]

D. Required Findings

No site plan approval shall be granted unless each of the following is found:

[...]

6. ~~For developments that are likely to generate more than 400 average daily trips (ADTs)~~Pursuant to Section 16.106.080, or at the discretion of the City Engineer, the applicant shall provide adequate information, such as a traffic impact analysis (TIA) or traffic counts, to demonstrate the level of impact to the surrounding ~~street~~ transportation system. The developer shall be required to mitigate for impacts attributable to the project, pursuant to TIA requirements in Section 16.106.080 and rough proportionality requirements in Section 16.106.090. The determination of impact or effect and the scope of the impact study shall be coordinated with the provider of the affected transportation facility.

[...]

CHAPTER 16.106 TRANSPORTATION FACILITIES

16.106.020 Required Improvements

[...]

D. Extent of Improvements

1. Streets required pursuant to this Chapter shall be dedicated and improved consistent with Chapter 6 of the Community Development Plan, the TSP and applicable City specifications included in the City of Sherwood Construction Standards. Streets shall include curbs, sidewalks, catch basins, street lights, and street trees. Improvements shall also include any bikeways designated on the Transportation System Plan map. Applicant may be required to dedicate land for required public improvements only when the exaction is directly related to and roughly proportional to the impact of the development, pursuant to Section 16.106.090.

[...]

16.106.040 Design

[...]

K. Traffic Controls

1. ~~An application for a proposed residential development that will generate more than an estimated 200 average daily vehicle trips (ADT) must include a traffic impact analysis to determine the number and types of traffic controls necessary to accommodate anticipated traffic flow.~~

2. ~~For all other proposed developments including commercial, industrial or institutional uses with over an estimated 400 ADT~~Pursuant to Section 16.106.080, or as otherwise required by the City Engineer, ~~the~~ an application must include a traffic impact analysis to determine the number and types of traffic controls necessary to accommodate anticipated traffic flow.

[...]

16.106.080 Traffic Impact Analysis (TIA)

A. Purpose. The purpose of this section is to implement Sections 660-012-0045(2)(b) and -0045(2)(e) of the State Transportation Planning Rule (TPR), which require the City to adopt performance standards and a process to apply conditions to land use proposals in order to minimize impacts on

and protect transportation facilities. This section establishes requirements for when a traffic impact analysis (TIA) must be prepared and submitted; the analysis methods and content involved in a TIA; criteria used to review the TIA; and authority to attach conditions of approval to minimize the impacts of the proposal on transportation facilities.

This section refers to the TSP for performance standards for transportation facilities as well as for projects that may need to be constructed as mitigation measures for a proposal's projected impacts. This section also relies on the City of Sherwood's Engineering Design Manual to provide street design standards and construction specifications for improvements and projects that may be constructed as part of the proposal and mitigation measures approved for the proposal.

B. Applicability. A traffic impact analysis (TIA) shall be required to be submitted to the City with a land use application at the request of the City Engineer or if the proposal is expected to involve one or more of the following:

1. An amendment to the Sherwood Comprehensive Plan or zoning map.

2. A new direct property approach road to Highway 99W is proposed.

3. The proposed development generates 50 or more PM peak-hour trips on Highway 99W, or 100 PM peak-hour trips on the local transportation system.

4. An increase in use of any adjacent street or direct property approach road to Highway 99W by 10 vehicles or more per day that exceed the 20,000 pound gross vehicle weight.

5. The location of an existing or proposed access driveway does not meet minimum spacing or sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles are likely to queue or hesitate at an approach or access connection, thereby creating a safety hazard.

6. A change in internal traffic patterns that may cause safety problems, such as back up onto the highway or traffic crashes in the approach area.

C. Requirements. The following are typical requirements that may be modified in coordination with Engineering Staff based on the specific application.

1. Pre-application Conference. The applicant shall meet with the City Engineer prior to submitting an application that requires a TIA. This meeting will be coordinated with Washington County and ODOT when an approach road to a County road or Highway 99W serves the property, so that the TIA will meet the requirements of all relevant agencies.

2. Preparation. The TIA shall be prepared by an Oregon Registered Professional Engineer qualified to perform traffic engineering analysis and will be paid for by the applicant.

3. Typical Average Daily Trips and Peak Hour Trips. The latest edition of the Trip Generation Manual, published by the Institute of Transportation Engineers (ITE), shall be used to gauge PM peak hour vehicle trips, unless a specific trip generation study that is approved by the City Engineer indicates an alternative trip generation rate is appropriate.

4. Intersection-level Analysis. Intersection-level analysis shall occur at every intersection where the analysis shows that 50 or more peak hour vehicle trips can be expected to result from the development.

5. Transportation Planning Rule Compliance. The requirements of OAR 660-012-0060 shall apply to those land use actions that significantly affect the transportation system, as defined by the Transportation Planning Rule.

D. Study Area. The following facilities shall be included in the study area for all TIAs:

1. All site-access points and intersections (signalized and unsignalized) adjacent to the proposed development site. If the site fronts an arterial or collector street, the analysis shall address all intersections and driveways along the site frontage and within the access spacing distances extending out from the boundary of the site frontage.

2. Roads and streets through and adjacent to the site.

3. All intersections needed for signal progression analysis.

4. In addition to these requirements, the City Engineer may require analysis of any additional intersections or roadway links that may be adversely affected as a result of the proposed development.

E. Analysis Periods. To adequately assess the impacts of a proposed land use action, the following study periods, or horizon years, should be addressed in the transportation impact analysis where applicable:

1. Existing Year.

2. Background Conditions in Project Completion Year. The conditions in the year in which the proposed land use action will be completed and occupied, but without the expected traffic from the proposed land use action. This analysis should account for all City-approved developments that are expected to be fully built out in the proposed land use action horizon year, as well as all planned transportation system improvements.

3. Full Buildout Conditions in Project Completion Year. The background condition plus traffic from the proposed land use action assuming full build-out and occupancy.

4. Phased Years of Completion. If the project involves construction or occupancy in phases, the applicant shall assess the expected roadway and intersection conditions resulting from major development phases. Phased years of analysis will be determined in coordination with City staff.

5. 20-Year or TSP Horizon Year. For planned unit developments, comprehensive plan amendments or zoning map amendments, the applicant shall assess the expected future roadway, intersection, and land use conditions as compared to approved comprehensive planning documents.

F. Approval Criteria. When a TIA is required, a proposal is subject to the following criteria, in addition to all criteria otherwise applicable to the underlying land use proposal:

1. The analysis complies with the requirements of 16.106.080.C;

2. The analysis demonstrates that adequate transportation facilities exist to serve the proposed development or identifies mitigation measures that resolve identified traffic safety problems in a manner that is satisfactory to the City Engineer and, when County or State highway facilities are affected, to Washington County and ODOT;

3. For affected non-highway facilities, the TIA demonstrates that mobility and other applicable performance standards established in the adopted City TSP have been met; and

4. Proposed public improvements are designed and will be constructed to the street standards specified in Section 16.106.010 and the Engineering Design Manual, and to the access standards in Section 16.106.040.

5. Proposed public improvements and mitigation measures will provide safe connections across adjacent right-of-way (e.g., protected crossings) when pedestrian or bicycle facilities are present or planned on the far side of the right-of-way.

G. Conditions of Approval. The City may deny, approve, or approve a development proposal with conditions needed to meet operations and safety standards and provide the necessary right-of-way and improvements to ensure consistency with the future planned transportation system. Improvements required as a condition of development approval, when not voluntarily provided by the applicant, shall be roughly proportional to the impact of the development on transportation facilities, pursuant to Section 16.106.090. Findings in the development approval shall indicate how the required improvements are directly related to and are roughly proportional to the impact of development.

16.106.090 Rough Proportionality

A. Purpose. The purpose of this section is to ensure that required transportation facility improvements are roughly proportional to the potential impacts of the proposed development. The rough proportionality requirements of this section apply to both frontage and non-frontage improvements. A proportionality analysis will be conducted by the City Engineer for any proposed development that triggers transportation facility improvements pursuant to this chapter. The City Engineer will take into consideration any benefits that are estimated to accrue to the development property as a result of any required transportation facility improvements. A proportionality determination can be appealed pursuant to Section 16.76. The following general provisions apply whenever a proportionality analysis is conducted.

B. Mitigation of impacts due to increased demand for transportation facilities associated with the proposed development shall be provided in rough proportion to the transportation impacts of the proposed development. When applicable, anticipated impacts will be determined by the TIA in accordance with Section 16.106.080. When no TIA is required, anticipated impacts will be determined by the City Engineer.

C. The following shall be considered when determining proportional improvements:

1. Condition and capacity of existing facilities within the impact area in relation to City standards. The impact area is generally defined as the area within a one-half (1/2) mile radius of the proposed development. If a TIA is required, the impact area is the TIA study area.

2. Existing vehicle, bicycle, pedestrian, and transit use within the impact area.

3. The effect of increased demand on transportation facilities and other approved, but not yet constructed, development projects within the impact area that is associated with the proposed development.

4. Applicable TSP goals, policies, and plans.

5. Whether any route affected by increased transportation demand within the impact area is listed in any City program including school trip safety; neighborhood traffic management; capital improvement; system development improvement, or others.

6. Crash history within the impact area.

7. Potential increased safety risks to transportation facility users, including pedestrians and cyclists.

8. Potential benefit the development property will receive as a result of the construction of any required transportation facility improvements.

9. Other considerations as may be identified in the review process pursuant to Chapter 16.72.

Preferential carpool and vanpool parking (Recommendation DC-6 in Table A-1)

CHAPTER 16.94 OFF-STREET PARKING AND LOADING

16.94.010 General Requirements

[...]

E. Location

3. Vehicle parking is allowed only on improved parking shoulders that meet City standards for public streets, within garages, carports and other structures, or on driveways or parking lots that have been developed in conformance with this code. Specific locations and types of spaces (car pool, compact, etc.) for parking shall be indicated on submitted plans and located to the side or rear of buildings where feasible.

a. All new development with forty (~~20~~40) employees or more shall include preferential spaces for ~~either~~ car-pool ~~and~~/vanpool designation. Carpool and vanpool parking spaces shall be located closer to the main employee entrance than all other parking spaces with the exception of ADA parking spaces. Carpool/vanpool spaces shall be clearly marked as reserved for carpool/vanpool only.

Exemptions for structured parking and on-street parking (Recommendation DC-8 in Table A-1)

16.94.010 General Requirements

[...]

K. Structured parking and on-street parking are exempt from the parking space maximums in Section 16.94.020.A.

"Housekeeping" amendments, parking standards table footnotes (Recommendation DC-9 in Table A-1)

Section 16.94.020, Parking Standards Table

[1] Parking Zone A reflects the maximum number of permitted vehicle parking spaces allowed for each listed land use. Parking Zone A areas include those parcels that are located within one-quarter (¼) mile walking distance of bus transit stops, one-half (½) mile walking distance of light rail station platforms, or both, or that have a greater than 20 minute peak hour transit service.

[2] ~~Parking Zone B.~~ Parking Zone B reflects the maximum number of permitted vehicle parking spaces allowed for each listed land use. ~~Parking Zone B areas include those parcels that are located within one-quarter ¼ mile walking distance of bus transit stops, one-half ½ mile walking distance of light rail station platforms, or both, or that have a greater than 20 minute peak hour transit service.~~ Parking Zone B areas ~~also~~ include those parcels that are located at a distance greater than one-quarter (¼) mile walking distance of bus transit stops, one-half (½) mile walking distance of light rail station platforms, or both.

Transportation Planning Rule consistency requirements (Recommendation DC-11 in Table A-1)

CHAPTER 16.80 PLAN AMENDMENTS

16.80.030 Review Criteria

[...]

C. Transportation Planning Rule Consistency

1. The applicant shall demonstrate consistency with the Transportation Planning Rule, specifically by addressing whether the proposed amendment creates a significant effect on the transportation system pursuant to OAR 660-012-0060. If required, a Traffic Impact Analysis (TIA) shall be prepared pursuant to Section 16.106.080.

   ~~Review of plan and text amendment applications for effect on transportation facilities. Proposals shall be reviewed to determine whether it significantly affects a transportation facility, in accordance with OAR 660-12-0060 (the TPR). Review is required when a development application includes a proposed amendment to the Comprehensive Plan or changes to land use regulations.~~

~~2. "Significant" means that the transportation facility would change the functional classification of an existing or planned transportation facility, change the standards implementing a functional classification, allow types of land use, allow types or levels of land use that would result in levels of travel or access that are inconsistent with the functional classification of a transportation~~

~~facility, or would reduce the level of service of the facility below the minimum level identified on the Transportation System Plan.~~

~~3. Per OAR 660-12-0060, Amendments to the Comprehensive Plan or changes to land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the Transportation System Plan. This shall be accomplished by one of the following:~~

~~a. Limiting allowed uses to be consistent with the planned function of the transportation facility.~~

~~b. Amending the Transportation System Plan to ensure that existing, improved, or new transportation facilities are adequate to support the proposed land uses.~~

~~c. Altering land use designations, densities or design requirements to reduce demand for automobile travel and meet travel needs through other modes.~~

Major driveway connectivity requirements (Recommendation DC-13 in Table A-1)

CHAPTER 16.90 SITE PLANNING

16.90.030 Site Plan Modifications and Revocation

[...]

D. Required Findings

No site plan approval shall be granted unless each of the following is found:

[...]

9. Driveways that are more than 24 feet in width shall align with existing streets or planned streets as shown in the Local Street Connectivity Map in the adopted Transportation System Plan (Figure 17), except where prevented by topography, rail lines, freeways, pre-existing development, or leases, easements, or covenants.

CHAPTER 16.106 TRANSPORTATION FACILTIIES

16.106.030 Location

[...]

B. Street Connectivity and Future Street Systems

[...]

2. Connectivity Map Required. New residential, commercial, and mixed use development involving the construction of new streets shall be submitted with a site plan that implements, responds to and expands on the Local Street Connectivity map contained in the TSP.

[...]

d. Driveways that are more than 24 feet in width shall align with existing streets or planned streets as shown in the Local Street Connectivity Map in the adopted Transportation System Plan (Figure 17), except where prevented by topography, rail lines, freeways, pre-existing development, or leases, easements, or covenants.

On-street loading (Recommendation DC-14 in Table A-1)

CHAPTER 16.94 OFF-STREET PARKING AND LOADING

16.94.030 Off-Street Loading Standards

[...]

C. Exceptions and Adjustments. The review authority, through Site Plan Review, may approve loading areas within a street right-of-way in the Old Town Overlay District when all of the following conditions are met:

1. Short in duration (i.e., less than one hour);

2. Infrequent (less than three operations occur daily between 5:00 a.m. and 12:00 a.m. or all operations occur between 12:00 a.m. and 5:00 a.m. at a location that is not adjacent to a residential zone);

3. Does not unreasonably obstruct traffic; [or] Does not obstruct traffic during peak traffic hours;

4. Does not obstruct a primary emergency response route; and

5. Is acceptable to the applicable roadway authority.

Bicycle parking (Recommendation DC-15 in Table A-1)

CHAPTER 16.94 OFF-STREET PARKING AND LOADING

16.94.020 Off-Street Parking Standards

[...]

C. Bicycle Parking Facilities

~~1. Location and Design~~

~~a. Bicycle parking shall be conveniently located with respect to both the street right-of-way and at least one (1) building entrance (e.g., no farther away than the closest parking space). Bike parking may be located inside the main building or near the main entrance.~~

~~b. Bicycle parking in the Old Town Overlay District can be located on the sidewalk within the right- of-way. A standard inverted "U shaped" design is appropriate. Alternative, creative designs are strongly encouraged.~~

~~2. Visibility and Security. Bicycle parking shall be visible to cyclists from street sidewalks or building entrances, so that it provides sufficient security from theft and damage.~~

~~3. Options for Storage. Bicycle parking requirements for long-term and employee parking can be met by providing a bicycle storage room, bicycle lockers, racks, or other secure storage space inside or outside of the building.~~

~~4. Lighting. Bicycle parking shall be at least as well lit as vehicle parking for security.~~

~~5. Reserved Areas. Areas set aside for bicycle parking shall be clearly marked and reserved for bicycle parking only.~~

~~6. Hazards. Bicycle parking shall not impede or create a hazard to pedestrians. Parking areas shall be located so as to not conflict with vision clearance standards.~~

1. General Provisions

a. Applicability. Bicycle parking spaces shall be provided for new development, changes of use, and major renovations, defined as construction valued at 25% or more of the assessed value of the existing structure.

b. Types of Spaces. Bicycle parking facilities shall be provided in terms of short-term bicycle parking and long-term bicycle parking. Short-term bicycle parking is intended to encourage customers and other visitors to use bicycles by providing a convenient and readily accessible place to park bicycles. Long-term bicycle parking provides employees, students, residents, commuters, and others who generally stay at a site for at least several hours a weather-protected place to park bicycles.

c. Minimum Number of Spaces. The required total minimum number of bicycle parking spaces for each use category is shown in Table 4, Minimum Required Bicycle Parking Spaces. *[Note: Tables in Chapter 16.94 are not currently numbered, so it is recommended that the previous tables in the chapter be numbered Tables 1, 2, and 3.]*

d. Minimum Number of Long-term Spaces. If a development is required to provide eight (8) or more required bicycle parking spaces in Table 4, at least 25% shall be provided as long-term bicycle with a minimum of one long-term bicycle parking space.

e. Multiple Uses. When there are two or more primary uses on a site, the required bicycle parking for the site is the sum of the required bicycle parking for the individual primary uses.

2. Location and Design.

a. General Provisions

(1) Each space must be at least 2 feet by 6 feet in area, be accessible without moving another bicycle, and provide enough space between the rack and any obstructions to use the space properly.

(2) There must be an aisle at least 5 feet wide behind all required bicycle parking to allow room for bicycle maneuvering. Where the bicycle parking is adjacent to a sidewalk, the maneuvering area may extend into the right-of-way.

(3) Lighting. Bicycle parking shall be at least as well lit as vehicle parking for security.

(4) Reserved Areas. Areas set aside for bicycle parking shall be clearly marked and reserved for bicycle parking only.

(5) Bicycle parking in the Old Town Overlay District can be located on the sidewalk within the right- of-way. A standard inverted "U shaped" or staple design is appropriate. Alternative, creative designs are strongly encouraged.

(6) Hazards. Bicycle parking shall not impede or create a hazard to pedestrians. Parking areas shall be located so as to not conflict with vision clearance standards.

b. Short-term Bicycle Parking

(1) Provide lockers or racks that meet the standards of this section.

(2) Locate inside or outside the building within 30 feet of the main entrance to the building or at least as close as the nearest vehicle parking space, whichever is closer.

c. Long-term Bicycle Parking

(1) Provide racks, storage rooms, or lockers in areas that are secure or monitored (e.g., visible to employees or customers or monitored by security guards).

(2) Locate the outside bicycle parking spaces within 100 feet of the entrance that will be accessed by the intended users.

(3) All of the spaces shall be covered.

d. Covered Parking (Weather Protection)

(1) When required, covered bicycle parking shall be provided in one of the following ways: inside buildings, under roof overhangs or awnings, in bicycle lockers, or within or under other structures.

(2) Where required covered bicycle parking is not within a building or locker, the cover must be permanent and designed to protect the bicycle from rainfall and provide seven (7) foot minimum overhead clearance.

(3) Where required bicycle parking is provided in lockers, the lockers shall be securely anchored.

Table 4: Minimum Required Bicycle Parking Spaces

Use Categories	Minimum Required Spaces
Residential Categories	
Household living	Multi-dwelling — 2 or 1 per 10 auto spaces. All other residential structure types — None
Group living	1 per 20 auto spaces
Commercial Categories	

Retail sales/service office	2 or 1 per 20 auto spaces, whichever is greater
Drive-up vehicle servicing	None
Vehicle repair	None
Commercial parking facilities, commercial, outdoor recreation, major event entertainment	4 or 1 per 20 auto spaces, whichever is greater
Self-service storage	None
Industrial Categories~~/Service Categories~~	
~~Basic utilities~~ Industrial	2 or 1 per 40 spaces, whichever is greater
Public and Institutional Categories	
Park and ride facilities	2 or 1 per 20 auto spaces
Community service essential service providers parks and open areas	2 or 1 per 20 auto spaces, whichever is greater
Schools	High schools — 4 per classroom
	Middle schools — 2 per classroom
	Grade schools — 2 per 4th & 5th grade classroom
Colleges, medical centers, religious institutions, daycare uses	2 or 1 per 20 auto spaces whichever is greater

Map references (Recommendation DC-17 in Table A-1)

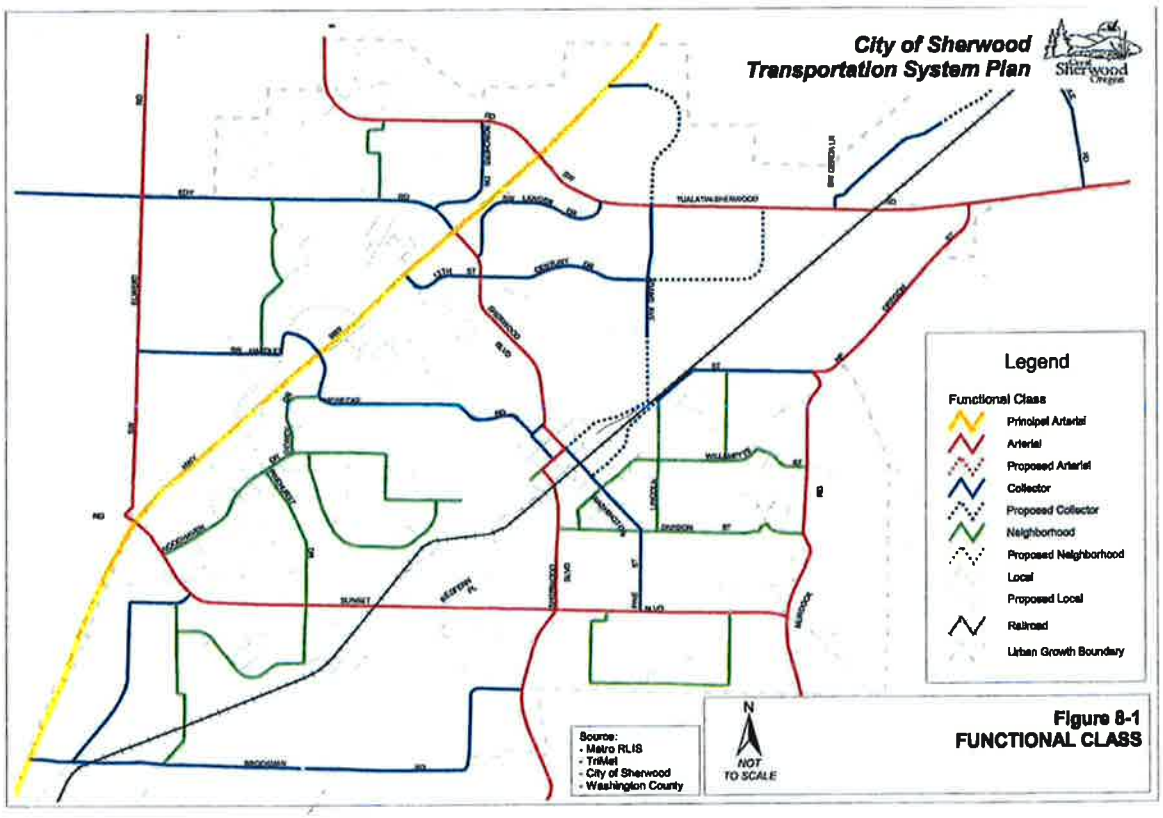
CHAPTER 16.106 TRANSPORTATION FACILITIES

16.106.020 Required Improvements

A. Generally

Except as otherwise provided, all developments containing or abutting an existing or proposed street, that is either unimproved or substandard in right-of-way width or improvement, shall dedicate the necessary right-of-way prior to the issuance of building permits and/or complete acceptable improvements prior to issuance of occupancy permits. ~~The following figure provides the depiction of the~~ Right-of-way requirements are based on functional classification of the street network as ~~found~~ established in the Transportation System Plan, Figure ~~8-1~~15.

[Delete following figure]



[...]

16.106.030 Location

[...]

B. Street Connectivity and Future Street Systems

1. Future Street Systems. The arrangement of public streets shall provide for the continuation and establishment of future street systems as shown on the Local Street Connectivity Map contained in the adopted Transportation System Plan (Figure ~~8-8~~16).

[Delete following figure]

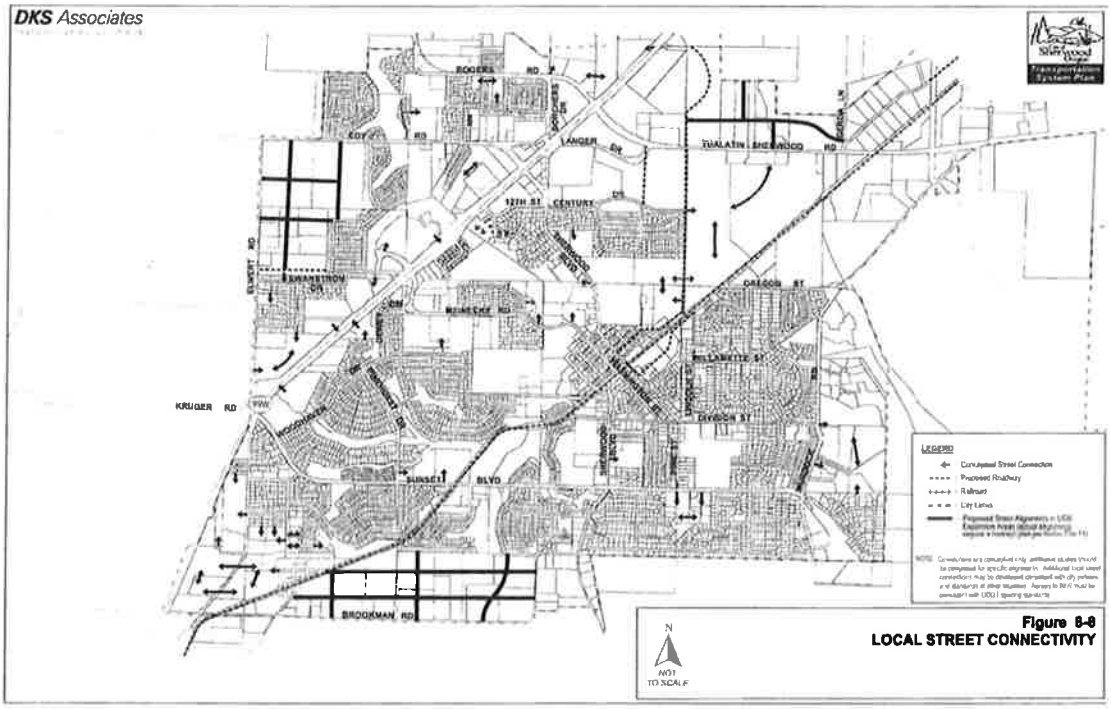


Figure 8-8
LOCAL STREET CONNECTIVITY

CAP program discontinuation (Recommendation DC-18 in Table A-1)

CHAPTER 16.106 TRANSPORTATION FACILITIES

~~16.106.070 Hwy. 99W Capacity Allocation Program (CAP)~~

~~A. Purpose - The purpose of the Highway 99W Capacity Allocation Program is to:~~

~~1. Prevent failure of Highway 99W through Sherwood.~~

~~2. Preserve capacity on Highway 99W over the next 20 years for new development within Sherwood.~~

~~3. Preserve land values in Sherwood by preventing failure of one of the City's key transportation links.~~

~~4. Insure improvements to Highway 99W and adjacent primary roadways are constructed at the time development occurs.~~

~~5. Minimize the regulatory burden on developments that have minimal impact on Highway 99W.~~

~~B. Exclusions~~

~~The following types of projects and activities are specifically excluded from the provisions of this program:~~

~~1. Churches.~~

~~2. Elementary, middle, and high schools.~~

~~3. Changes in use that do not increase the number of trips generated by the current use.~~

~~C. Definitions~~

~~1. "Base Application" means the site plan or conditional use application which invokes the provisions of this chapter.~~

~~2. "Capacity" means the maximum number of peak hour vehicle trips that Highway 99W through Sherwood may accommodate at the Level of Service Standard assuming full build-out of all land zoned for residential and industrial development in Sherwood.~~

~~3. "Full Access Intersections" means the following intersections on Highway 99W in Sherwood:~~

~~Sunset, Meinecke, Edy/N. Sherwood, Tualatin-Sherwood/Scholls-Sherwood (Roy Rogers Road, and Home Depot (Adams Street).~~

~~4. "ITE Manual" means the latest edition of the public titled "Trip Generation" by the Institute of Transportation Engineers.~~

~~5. "Level of Service (LOS) Standard" means the lowest acceptable level of service on a transportation corridor within Sherwood as stated in the Standard Requirements Section.~~

~~6. "Mitigation" means improvements to the transportation system that increase or enhance capacity.~~

~~7. "Net Trips" means the number of trips generated by a regulated activity during the PM Peak Hours. Net trips equal new trips, diverted trips, and trips from existing activities on a site that will remain. Net trips do not include: Pass-by trips, Internal trips, trips from existing facilities that will be removed, and Trips Reduced due to implementation of transportation demand strategies.~~

~~8. "Peak Hour" means a consecutive sixty (60) minute period during the twelve (12) PM hours of an average day, which experience the highest sum of traffic volumes on a roadway.~~

~~9. "Regulated Activity" means project(s) or activities proposed in the base application.~~

~~10. "Site Trip Limit" means the trip limit multiplied by the acreage of the site containing the regulated activity.~~

~~11. "Trip Allocation Certificate" means a certificate or letter from the City Engineer specifying that a regulated activity meets the trip limit and specifying any required mitigation.~~

~~12. "Trip Analysis" means a study or report that specifies the net trips from a regulated activity and analyzes the trip distribution and assignment from the activity.~~

~~13. "Trip Limit" means the maximum number of trips per acre from regulated activities that can be accommodated without violating the LOS Standard.~~

~~D. Standard Requirements~~

~~1. All regulated activities shall acquire a Trip Allocation Certificate prior to approval of their base application. Lack of a Trip Allocation Certificate shall be the basis for denial of a base application.~~

~~2. A Trip Analysis is required for all regulated activities prior to being considered for a Trip Allocation Certificate.~~

~~3. The Level of Service Standard for Highway 99W through Sherwood through the year 2020 is "E".~~

~~4. The trip limit for a regulated activity shall be forty-three (43) net trips per acre.~~

~~5. Mitigation to comply with the CAP shall not be required for regulated activities occurring on land zoned General Industrial (GI) or Light Industrial (LI) when the activity produces less than eight (8) net trips per acre.~~

~~E. Trip Analysis~~

~~1. Purpose~~

~~The first step in the process of seeking a Trip Allocation Certificate is preparation of a Trip Analysis by the applicant for the regulated activity. The purpose of the Trip Analysis is to evaluate whether the net trips from a regulated activity exceed the site trip limit.~~

~~2. Timing~~

~~The Trip Analysis shall be submitted with the relevant base application. Base applications without a Trip Analysis shall be deemed incomplete.~~

~~3. Format~~

~~At a minimum, the Trip Analysis shall contain all the following information:~~

~~a. The type and location of the regulated activity.~~

~~b. A tax map clearly identifying the parcel(s) involved in the Trip Analysis.~~

~~c. Square footage used to estimate trips, in accordance with methods outlined in the ITE Manual.~~

~~d. Description of the type of activity, especially as it corresponds to activities described in the ITE Manual.~~

~~e. Copy of the ITE Manual page used to estimate trips.~~

~~f. Acreage of the site containing the regulated activity calculated to two (2) decimal points.~~

~~g. Trip distributions and assignments from the regulated activity to all full access intersections impacted by ten (10) or more trips from the regulated activity with identification of the method used to distribute trips from the site.~~

~~h. Copies of any other studies utilized in the Trip Analysis.~~

~~i. Summary of the net trips generated by the regulated activity in comparison to the site trip limit.~~

~~j. Signature and stamp of a professional engineer, registered in the State of Oregon, with expertise in traffic or transportation engineering, who prepared the analysis.~~

~~4. Methods~~

~~a. The Trip Analysis and trip generation for an activity shall be based on the ITE Manual.~~

~~b. If a trip generation for the proposed use is not available in the ITE Manual or the applicant wishes to dispute the findings in the ITE Manual, the trip generation calculation may be based on an analysis of trips from five (5) sites with the same type of activity as that proposed.~~

~~5. Modification of Trip Analysis Requirements~~

~~The City Engineer may waive, in writing, some of the requirements of the Trip Analysis if:~~

~~a. The proposed regulated activity is part of a previously approved Trip Allocation Certificate that meets the requirements of this chapter and the applicant demonstrates, to the satisfaction of the City Engineer, that the applicable provisions of the previously approved Trip Allocation Certificate shall be met; or~~

~~b. The City Engineer determines, upon receipt of a letter of request from the applicant, that less information is required to accomplish the purposes of this chapter.~~

~~F. Trip Allocation Certificate~~

~~1. General~~

~~a. Trip Allocation Certificates shall be issued by the City Engineer.~~

~~b. Trip Allocation Certificates shall be valid for the same period as the land use or other city approval for the regulated activity.~~

~~c. The City Engineer may invalidate a Trip Allocation Certificate when, in the City Engineer's judgment, the Trip Analysis that formed the basis for award of the Trip Allocation Certificate no longer accurately reflects the activity proposed under the base application.~~

~~2. Approval Criteria~~

~~a. Upon receipt of a Trip Analysis, the City Engineer shall review the analysis. The Trip Analysis shall meet both of the following criteria to justify issuance of a Trip Allocation Certificate for the regulated activity:~~

~~(1) Adequacy of analysis; and~~

~~(2) Projected net trips less than the site trip limit.~~

~~b. Adequacy of Analysis~~

~~The City Engineer shall judge this criterion based on the following factors:~~

~~(1) Adherence to the Trip Analysis format and methods described in this chapter.~~

~~(2) Appropriate use of data and assumptions; and~~

~~(3) Completeness of the Trip Analysis.~~

~~3. Mitigation~~

~~a. The Trip Allocation Certificate shall specify required mitigation measures for the regulated activity.~~

~~b. Mitigation measures shall include improvements to Highway 99W and nearby transportation corridors that, in the judgment of the City Engineer, are needed to meet the LOS Standard and provide capacity for the regulated activity.~~

~~c. Engineering construction plans for required mitigation measures shall be submitted and approved in conjunction with other required construction plans for the regulated activity.~~

~~d. Mitigation measures shall be implemented in tandem with work associated with the regulated activity.~~

~~e. Failure to implement required mitigation measures shall be grounds for revoking the regulated activity's base application approval.~~

~~G. Other Provisions~~

~~1. Acreage Calculation for a Regulated Activity~~

~~a. Acreage calculations used to calculate net trips per acre in the Trip Analysis must use the entire area of the tax lot(s) containing the regulated activity, less 100-year floodplain area, in accordance with FIRM map for Sherwood.~~

~~b. If the site contains existing uses, the net trips generated by these uses shall be included in the calculation of net trips generated from the site.~~

~~2. Partial Development of a Site~~

~~a. If a regulated activity utilizes a portion of a vacant tax lot, such that the site could be further developed in the future, the applicant shall identify the potential uses for the vacant portion and reserve trips for that portion of the site in accordance with the uses identified. These reserve trips shall be included in the calculation of the net trips generated from the site.~~

~~b. The Trip Allocation Certificate shall not be issued if the proposed future uses of the vacant area and the reserve trips are unrealistic in the opinion of the City Engineer.~~

Bike path section update (Recommendation DC-19 in Table A-1)

16.106.0~~7~~80 Bike ~~Paths~~Lanes

If shown in ~~on the~~ Figure ~~6-1~~13 of the Transportation System Plan, bicycle ~~paths~~lanes shall be installed in public rights-of-way, in accordance with City specifications. Bike lanes shall be installed on both sides of designated roads, should be separated from the road by a twelve (12) inch stripe or other means approved by Engineering Staff~~, not a curb~~, and should be a minimum of five (5) feet wide. ~~Bike paths should not be combined with a sidewalk.~~

Attachment A

Table A-1: Summary of Recommended Potential Development Code Amendments and Corresponding Transportation Planning Rule (TPR) and Regional Transportation Functional Plan (RTFP) Requirements

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
DC-1	Identify and update all references to the TSP in the code.		This has been made into a note in the introductory text of this memorandum.
DC-2	Ensure that code requirements in Chapter 16.96 (On-site Circulation) and Chapter 16.106 (Transportation Facilities) related to access spacing/management and design of streets, bikeways, sidewalks, and accessways/paths are consistent with the standards established in the updated TSP.	• TPR Section -0045(2)(a) Access Control • TPR Section -0045(3)(b) On-site Pedestrian and Bicycle Circulation and Connections • TPR Section -0045(7) Minimizing Roadway Width • RTFP Section 3.08.110B Street System Design for Pedestrian and Bicycle Access	No amendments are needed to Chapter 16.96 and Chapter 16.106 related to access management and spacing standards; existing development code and the Draft TSP are consistent. The updated TSP does not include or otherwise modify existing street design standards in this chapter. Minor amendments are needed to Chapter 16.106 related to street design. Amendments proposed to Section .010 reflect deletions proposed for Chapter 6 of the Comprehensive Plan. Amendments proposed to Section .040 remove a reference to cross-sections in the TSP, which the updated TSP does not include. **Proposed code amendments to:** **Chapter 16.106**

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			Transportation Facilities, Section.010 Generally **Chapter 16.106 Transportation Facilities, Section.040 Design**
DC-3	Define the following terms and ensure consistency between the TSP, Development Code, and Engineering Design Manual: access way and shared-use path. *Note: The City Engineering Design Manual includes a reference to pedestrian and bicycle access ways that can be provided at a maximum spacing of 330 feet in lieu of a street in some cases.*	• TPR Section -0045(3)(b) On-site Pedestrian and Bicycle Circulation and Connections • RTFP Sections 3.08.110 B & E Street System Design	**Proposed code amendments to:** **Chapter 16.10 Definitions, Section .020 Specifically**
DC-4	Provide additional guidance regarding the applicability and preparation of traffic impact analyses (TIAs), including rough proportionality provisions.	TPR Section -0045(2)(b) Standards to Protect Roadways	**Proposed code amendments to:** • **Chapter 16.90 Site Planning, Section .030.D Required Findings** • **Chapter 16.106 Transportation Facilities, Section .020.D Extent of Improvements** • **Chapter 16.106 Transportation Facilities, Section .040.K Traffic Controls** • **Chapter 16.106 Transportation Facilities, Section .080**

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			Traffic Impact Analysis [new section] • **Chapter 16.106 Transportation Facilities, Section .090 Rough Proportionality** [new section]
DC-5	Given TPR requirements for coordinated review, consider whether inviting transportation facility and service providers to pre-application conferences would be helpful to the review process and thus would be language to include in the code (Section 16.70.010).	TPR Section -0045(2)(d) Coordinated Review of Land Use Decisions	The City already allows for this level of coordinated review, so code amendments are not necessary.
DC-6	Provide more direction about "preferential" carpool and vanpool parking spaces.	TPR Section -0045(4)(d) Employee Parking	**Proposed code amendments to:** **Chapter 16.94 Off-Street Parking and Loading, Section .010.E Location**
DC-7	Consider code changes if there are TDM program elements developed for the updated TSP that lend themselves to implementation in code.	TPR Section -0045(5)(b) Transportation Demand Management (TDM) Programs	TDM program elements In the Draft TSP will be reviewed. However, it is not anticipated that these will result in proposed code amendments.
DC-8	Allow exemptions from maximum parking space standards for structured parking and on-street parking.	TPR Section -0045(5)(d) Parking Management	**Proposed code amendments to:** **Chapter 16.94 Off-Street Parking and Loading, Section .010.K General Requirements** [new

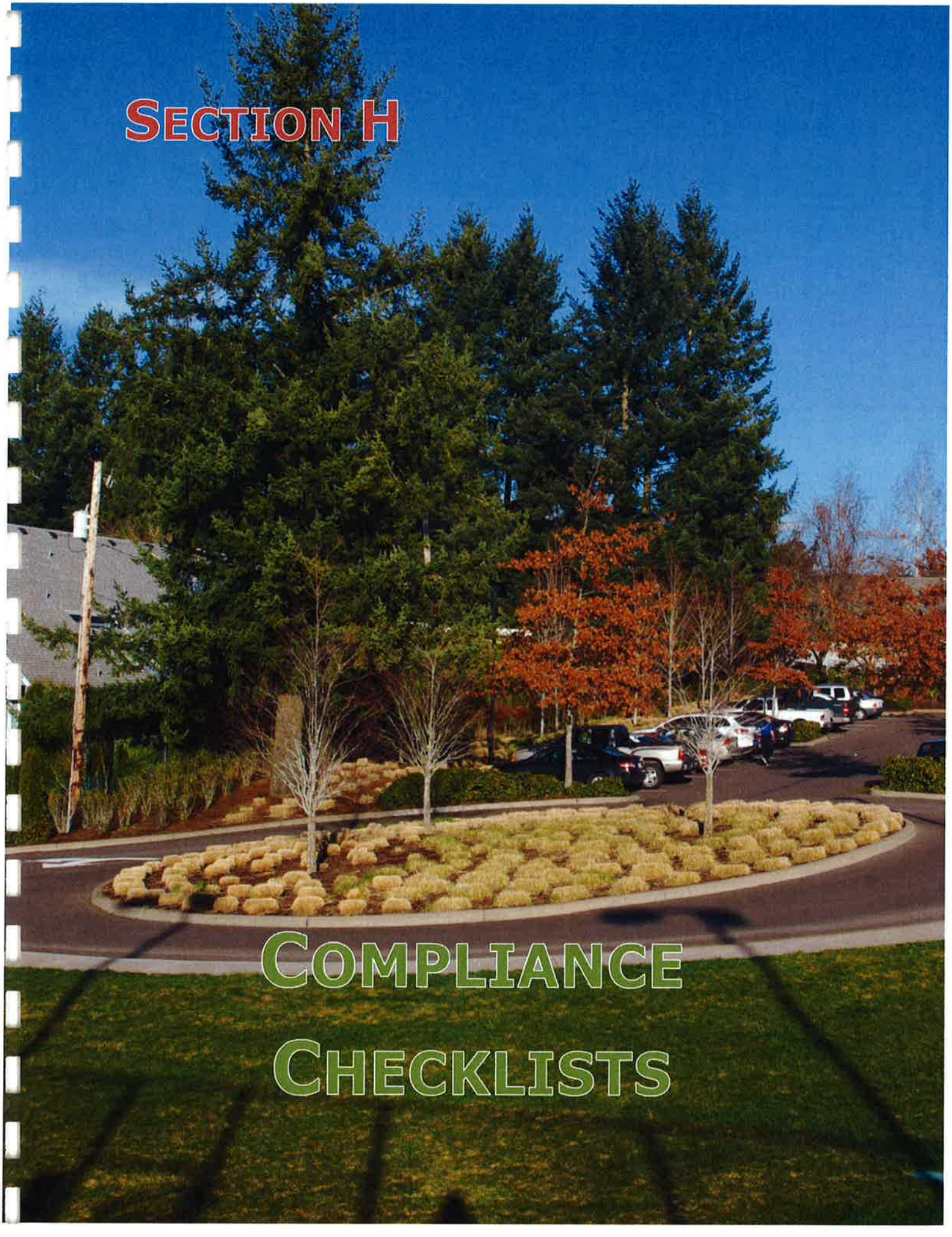
	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			subsection]
DC-9	Administrative/housekeeping amendments: Address typos and inconsistencies in the footnotes for the parking standards table.	TPR Section -0045(5)(d) Parking Management	**Proposed code amendments to:** **Chapter 16.94 Off-Street Parking and Loading, Section .020 Off-Street Parking Standards**
DC-10	Consider the feasibility of allowing a local street cross-section of 20-28 feet and under what conditions.	TPR Section -0045(7) Minimizing Roadway Width	This recommendation will be developed into proposed policy language.
DC-11	Modify the code provisions for plan and land use regulation amendments to make simpler reference to TPR Section -0060.	TPR Section -0060 Plan and Land Use Regulations Amendments	**Proposed code amendments to:** **Chapter 16.80 Plan Amendments, Section .030.C Transportation Planning Rule Consistency**
DC-12	Provide a variance process in Chapter 16.84 (Variances and Adjustments) and/or Chapter 16.94 (Off-Street Parking and Loading) that allows maximum parking standards to be exceeded.	RTFP Section 3.08.410 Parking Management	Section 16.94.010.A (Off-Street Parking Required) already refers to procedures in Chapter 16.84 for varying from minimum or maximum parking standards. No amendments are proposed.
DC-13	Require that major driveways that are proposed for mixed-use and residential developments align with existing and/or planned streets.	RTFP Section 3.08.410 Parking Management	**Proposed code amendments to:** • **Chapter 16.90 Site Planning, Section .030.D Required Findings** • **Chapter 16.106**

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			Transportation Facilities, Section .030.B.2.d Connectivity Map Required [new subsection]
DC-14	Add on-street loading provisions in an appropriate location such as Old Town, including specific conditions for when on-street loading would be permitted.	RTFP Section 3.08.410 Parking Management	**Proposed code amendments to:** **Chapter 16.94 Off-Street Parking and Loading, Section .030.C Off-Street Loading Standards** [new subsection]
DC-15	Provide more requirements and guidance regarding short-term and long-term bicycle parking.	RTFP Section 3.08.410 Parking Management	**Proposed code amendments to:** **Chapter 16.94 Off-Street Parking and Loading, Section 16.94.020.C Bicycle Parking Facilities**
DC-16	Consider whether having a hierarchy of management to capacity strategies (RTFP Section 3.08.220A) would be effective as part of traffic impact analysis and legislative decision conditions of approval.	RTFP Sections 3.08.510 A & B Comprehensive Plan and TSP Amendments	This was determined to not be an effective or necessary set of potential code amendments.
DC-17	Replace maps in the development code with references to the maps in the updated TSP.		Replacing maps with references can help avoid inconsistencies between the development code and TSP and make updates easier in the future. **Proposed code**

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			amendments to: • **Chapter 16.106 Transportation Facilities, Section .020 Required Improvements** • **Chapter 16.106 Transportation Facilities, Section .030 Location**
DC-18	Remove CAP program.		The CAP program is being discontinued given TIA requirements and mobility standards proposed for adoption as part of this TSP update. **Proposed code amendments to:** • **Chapter 16.106 Transportation Facilities, Section .070 Highway 99W Capacity Allocation Program (CAP)**
DC-19	Re-number the following section (Bike Paths) and update a reference to the TSP. Update the bike path section to address bike lanes.		The section on bike paths is updated to address bike lanes because bike path is are not a term that is used in the updated TSP or elsewhere in the code. **Proposed code amendments to:** • **Chapter 16.106**

	Recommended Potential Development Code Amendments	TPR and/or RTFP Requirements	Commentary
			Transportation Facilities, Section .080 Bike Paths

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SECTION H
COMPLIANCE
CHECKLISTS

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Oregon Transportation Planning Rule (TPR) and Metro Regional Transportation Functional Plan (RTFP) Compliance

This document presents findings related to compliance of the City of Sherwood's Zoning and Community Development Code ("development code"), Comprehensive Plan, and 2014 Transportation System Plan (TSP) with the Oregon Transportation Planning Rule (TPR) and Metro Regional Transportation Functional Plan (RTFP). The findings are presented in table format in the following tables:

- Table 1: TPR Compliance of Sherwood Development Code
- Table 2: RTFP Compliance of Sherwood Development Code
- Table 3: RTFP Compliance of Sherwood Comprehensive Plan
- Table 4: RTFP Compliance of Sherwood TSP Update

The TPR requirements included in Table 1 are those from Sections -0045 and -0060, which address how the TSP is implemented in the development code and how amendments to zoning, plan amendments, or other land use regulations are reviewed regarding potential impacts on transportation facilities.

Tables 2, 3, and 4 are based on a regulatory checklist prepared by Metro designed to help local jurisdictions demonstrate compliance with the RTFP.

The left column of the tables cites the TPR and RTFP requirements and the right column describes how the development code, comprehensive plan policies, and/or TSP are consistent with these requirements. There are several areas of overlap within and between the TPR and RTFP, and in those cases, other findings are referred to rather than duplicated.

Table 1: TPR Compliance of Sherwood Development Code

Transportation Planning Rule Requirement	Findings of Development Code Compliance
OAR 660-012-0045 **Implementation of the TSP**	
(1) Each local government shall amend its land use regulations to implement the TSP.	
(a) The following transportation facilities, services and improvements need not be subject to land use regulations except as necessary to implement the TSP and, under ordinary circumstances do not have a significant impact on land use: (A) Operation, maintenance, and repair of existing transportation facilities identified in the TSP, such as road, bicycle, pedestrian, port, airport and rail facilities, and major regional pipelines and terminals; (B) Dedication of right-of-way, authorization of construction and the construction of facilities and improvements, where the improvements are consistent with clear and objective dimensional standards; (C) Uses permitted outright under ORS 215.213(1)(m) through (p) and 215.283(1)(k) through (n), consistent with the provisions of 660-012-0065; and (D) Changes in the frequency of transit, rail and airport services.	**Existing code addresses this TPR provision.** Chapter 16.66 (Transportation Facilities and Improvements) permits transportation facilities and improvements identified in the TSP and defined in Section 16.10.020 in all City zoning districts.
(b) To the extent, if any, that a transportation facility, service, or improvement concerns the application of a comprehensive plan provision or land use regulation, it may be allowed without further land use review if it is permitted outright or if it is subject to standards that do not require interpretation or the exercise of factual, policy or legal judgment.	**Existing code addresses this TPR provision.** ***See findings for TPR Section -0045(1)(a).***
(c) In the event that a transportation facility, service or improvement is determined to have a significant impact on land use or requires interpretation or the exercise of factual, policy or legal judgment, the local government shall provide a review and approval process that is consistent with 660-012-0050. To facilitate implementation of the TSP, each local government shall amend regulations to provide for consolidated review of land use decisions required to permit a transportation project.	**Existing code addresses this TPR provision.** Section 16.66.010.B specifies that construction of transportation facilities and improvements that are either not designated in the adopted TSP or not designed and constructed as part of an approved subdivision or partition shall be subject to conditional use review. Conditional use approval criteria include those that apply specifically to transportation facilities and improvements (Section 16.82.020.C.9).

Table 1: TPR Compliance of Sherwood Development Code

Transportation Planning Rule Requirement	Findings of Development Code Compliance
(2) Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities, corridors, and sites for their identified functions.	
(a) Access control measures such as driveway, road, and signal spacing;	**Existing code addresses this TPR provision.** Subsection .040.M of Chapter 16.106 (Transportation Facilities) addresses access management, and establishes required minimum spacing between driveways and intersections for local roads, neighborhood routes, and collectors (25 feet, 50 feet, and 100 feet respectively). The same spacing standards are included in Section 8 (The Standards) of the 2014 TSP. Subsection .040.M also refers to the Engineering Design and Standard Details Manual for street standards. Section 120.2.A of the Engineering Design and Standard Details Manual refers to the City TSP and code for access regulations, and to the City Engineer, Washington County, and ODOT for authority to control access. Section 210.6.E of the manual establishes spacing between intersections and Section 210.8.A establishes spacing between driveways and intersections, based on roadway functional classifications. Code amendments are not needed to coordinate access standards in the development code with those in the engineering manual (Section 210.6 – Intersections) and the updated TSP because no change to access standards were developed or proposed as part of the TSP update.
(b) Standards to protect the future operations of roads and major transit corridors	**Existing and proposed code language is consistent with this TPR provision.** The 2014 TSP establishes mobility targets and the Roadway Element of the Washington County TSP establish level-of-service standards for both signalized and unsignalized intersections for roadways in the city. Sections 16.90.030.D and 16.106.040 include

Table 1: TPR Compliance of Sherwood Development Code

Transportation Planning Rule Requirement	Findings of Development Code Compliance
	general TIA requirements for development proposals based on the type of proposed development, whether they are subject to site plan review, and their projected average daily vehicle trips (ADT). Proposed traffic impact analysis (TIA) requirements in a new section, Section 16.106.080, provide additional guidance regarding the applicability requirements for TIAs and preparation and review of TIAs (TSP Volume 2, Section G). Proposed approval criteria include the provision that applicable performance measures be met.
(d) A process for coordinated review of future land use decisions affecting transportation facilities, corridors or sites	**Existing code is consistent with this TPR provision.** Written notice of Type II, III, IV, and V quasi-judicial and legislative actions is sent to ODOT, Metro, applicable transit service providers, and other affected or potentially affected agencies pursuant to Section 16.72.020.C). The City does not have a codified process for inviting agencies to a pre-application meeting, prior to a proposed project or amendment being submitted. Pre-application conferences addressed in existing code (Section 16.70.010) are an opportunity to coordinate with other transportation facility and service providers.
(e) Process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities, corridors or sites	**Existing code addresses this TPR provision.** Criteria applicable to development applications grant authority to the Hearing Authority and Appeal Authority to approve the application with conditions, pursuant to Section 16.72.010.C.1. Conditional use provisions specify that conditions may be imposed by the Hearings Authority "if necessary to fulfill the requirements of the adopted Comprehensive Plan, Transportation System Plan, or the Code" (Section 16.82.020.A.1). Conditional use approval criteria in Section 16.82.020.C.9 include those that apply specifically to transportation facilities and improvements.
(f) Regulations to provide notice to public agencies providing transportation facilities and services, MPOs, and ODOT of: land use applications that require public	**Existing code addresses this TPR provision.** ***See findings for TPR Section -0045(2)(d).***

Table 1: TPR Compliance of Sherwood Development Code

Transportation Planning Rule Requirement	Findings of Development Code Compliance
hearings, subdivision and partition applications, applications which affect private access to roads, applications within airport noise corridor and imaginary surfaces which affect airport operations.	
g) Regulations assuring amendments to land use designations, densities, design standards are consistent with the function, capacities, and levels of service of facilities designated in the TSP.	**Existing and proposed code language is consistent with this TPR provision.** ***See findings regarding traffic impact analyses in TPR Section -0045(2)(b) and plan and land use regulation amendments in TPR Section -0060.***
(3) Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth below.	
(a) Bicycle parking as part of new multifamily residential developments of 4 units or more, new retail, office and institutional developments, and all transit transfer stations and park-and-ride lots	**Existing code addresses this TPR provision.** Section 16.94.020.C requires bicycle parking for uses including multi-family housing, office and most other commercial uses, institutional uses, and park-and-ride facilities. The provisions also address location and design of bicycle parking.
(b) On-site facilities shall be provided which accommodate safe and convenient pedestrian and bicycle access from within new subdivisions, multi-family developments, planned developments, shopping centers, and commercial districts to adjacent residential areas and transit stops, and to neighborhood activity centers within one-half mile of the development. Single-family residential developments shall generally include streets and accessways. Pedestrian circulation through parking lots should generally be provided in the form of accessways. (A) "Neighborhood activity centers" includes, but is not limited to, existing or planned schools, parks, shopping areas, transit stops or employment centers; (B) Bikeways shall be required along arterials and major collectors. sidewalks shall be required along arterials, collectors and most local streets in urban areas except that sidewalks are not required along controlled access roadways, such as freeways; (C) Cul-de-sacs and other dead-end streets may be used as part of a development plan, consistent with the purposes set forth in this section;	**Existing and proposed code addresses this TPR provision.** • On-site circulation and connections – Chapter 16.96 (On-Site Circulation) establishes requirements for on-site pedestrian, bicycle, and vehicular circulation. Standards for residential and non-residential development require that a private pathway/sidewalk system extend throughout the site that connects existing development, building entrances, adjacent development, future phases of development, public rights-of-way, open space, and parking and storage areas. On-site pathway/sidewalk systems addressed in Chapter 16.96 require the system to connect to transit facilities within 500 feet of the site. This is reinforced by language in the transportation facilities section that requires site connections to transit streets, as designated in the TSP, pursuant to Section 16.106.040.J. • Parking lots – Section 16.96.020.B and Section

Table 1: TPR Compliance of Sherwood Development Code

Transportation Planning Rule Requirement	Findings of Development Code Compliance
(D) Local governments shall establish their own standards or criteria for providing streets and accessways consistent with the purposes of this section. Such measures may include but are not limited to: standards for spacing of streets or accessways; and standards for excessive out-of-direction travel; (E) Streets and accessways need not be required where one or more of the following conditions exist: (i) Physical or topographic conditions make a street or accessway connection impracticable. Such conditions include but are not limited to freeways, railroads, steep slopes, wetlands or other bodies of water where a connection could not reasonably be provided; (ii) Buildings or other existing development on adjacent lands physically preclude a connection now or in the future considering the potential for redevelopment; or (iii) Where streets or accessways would violate provisions of leases, easements, covenants, restrictions or other agreements existing as of May 1, 1995, which preclude a required street or accessway connection.	16.96.030.B require separation of pathways and sidewalks from vehicle traffic in parking lots. • Bikeways and sidewalks – Section 16.106.010 provides street design guidelines, including dimensions for sidewalks on all streets and bike lanes on all streets except downtown streets, commercial/industrial streets under 3,000 ADT, neighborhood routes, and local streets. Proposed amendments to Section 16.10.020 include providing a definition for shared-use paths (TSP Volume 2, Section G). • Street and access way layout – Street spacing is addressed in the Engineering Design and Standard Details manual and access spacing standards in Section 16.106.40.M and the 2014 TSP. Section 16.106.30 establishes maximum block lengths of 530 feet for new streets, except for arterials, which have a maximum block length requirement of 1,800 feet. Where full street crossings occur at distances of more 1,200 feet, bicycle and pedestrian crossings must be provided at an average of 530 feet. Section 16.106.30 also requires consistency with a local connectivity plan established in the TSP. Proposed amendments to Section 16.10.020 include providing a definition for access ways, a term already used in the City's development code (TSP Volume 2, Section G).
(c) Off-site road improvements are otherwise required as a condition of development approval, they shall include facilities accommodating convenient pedestrian and bicycle and pedestrian travel, including bicycle ways on arterials and major collectors.	**Existing code addresses this TPR provision.** ***See findings regarding authority to condition approval in TPR Section -0045(2)(e).***
(e) Internal pedestrian circulation within new office parks and commercial developments shall be provided through clustering of buildings, construction of accessways, walkways and similar techniques.	**Existing code addresses this TPR provision.** ***See findings regarding on-site circulation in TPR Section -0045(3)(b).***
(4) To support transit in urban areas containing a population greater than 25,000, where the area is already served by a public transit system or where a determination has been made that a public transit system is feasible, local	

Table 1: TPR Compliance of Sherwood Development Code

Transportation Planning Rule Requirement	Findings of Development Code Compliance
governments shall adopt land use and subdivision regulations as provided in (a)-(g) below:	
(a) Transit routes and transit facilities shall be designed to support transit use through provision of bus stops, pullouts and shelters, optimum road geometrics, on-road parking restrictions and similar facilities, as appropriate;	**Existing code addresses the elements of this TPR requirement that apply to the development code.** On-site pathway/sidewalk system provisions established in Chapter 16.96 require the system to connect to transit facilities within 500 feet of the site. Section 16.106.040.J (Transit Facilities) reinforces this requirement by also requiring site connections to transit streets, as designated in the TSP, and either proving or allowing for transit amenities and/or easements. Further, front/primary entrances of commercial, multi-family, institutional, and mixed-use development must be oriented to existing and planned transit facilities and be built with no or minimal setbacks according to underlying zoning and site plan provisions, pursuant to Section 16.90.030.D.7.
(b) New retail, office and institutional buildings at or near major transit stops shall provide for convenient pedestrian access to transit through the measures listed in (A) and (B) below. (A) Walkways shall be provided connecting building entrances and streets adjoining the site; (B) Pedestrian connections to adjoining properties shall be provided except where such a connection is impracticable as provided for in OAR 660-012-0045(3)(b)(E). Pedestrian connections shall connect the on site circulation system to existing or proposed streets, walkways, and driveways that abut the property. Where adjacent properties are undeveloped or have potential for redevelopment, streets, accessways and walkways on site shall be laid out or stubbed to allow for extension to the adjoining property;	**Existing code language is consistent with this TPR provision.** ***See the findings regarding on-site circulation in TPR Section -0045(3)(b).***
(C) In addition to (A) and (B) above, on sites at major transit stops provide the following: (i) Either locate buildings within 20 feet of the transit stop, a transit street or an intersecting street or provide a pedestrian plaza at the transit stop or a street intersection; (ii) A reasonably direct pedestrian connection between the transit stop and building entrances on the site;	**Existing code language is consistent with this TPR provision.** ***See the findings regarding site circulation and connections in TPR Sections -0045(3)(b) and -0045(4)(a).***

Table 1: TPR Compliance of Sherwood Development Code

Transportation Planning Rule Requirement	Findings of Development Code Compliance
(iii) A transit passenger landing pad accessible to disabled persons; (iv) An easement or dedication for a passenger shelter if requested by the transit provider; and (v) Lighting at the transit stop.	
(c) Local governments may implement (4)(b)(A) and (B) above through the designation of pedestrian districts and adoption of appropriate implementing measures regulating development within pedestrian districts. Pedestrian districts must comply with the requirement of (4)(b)(C) above;	**The City is not proposing to designate a pedestrian district at this time, so this TPR provision does not apply.**
(d) Designated employee parking areas in new developments shall provide preferential parking for carpools and vanpools;	**Existing and proposed code addresses this TPR provision.** Section 16.94.010.E.3.a requires all new development with at least 20 employees to provide preferential parking spaces for carpools and vanpools. Proposed amendments to Section 16.94.010.E define the term "preferential" (TSP Volume 2, Section G).
(e) Existing development shall be allowed to redevelop a portion of existing parking areas for transit-oriented uses, including bus stops and pullouts, bus shelters, park and ride stations, transit-oriented developments, and similar facilities, where appropriate;	**Existing code is consistent with this TPR provision.** Section 16.94.010.E.3.b allows redevelopment of portions of designated parking areas for multi-modal facilities (transit shelters, park and ride, and bicycle parking), subject to meeting all other applicable standards, including minimum space standards.
(f) Road systems for new development shall be provided that can be adequately served by transit, including provision of pedestrian access to existing and identified future transit routes. This shall include, where appropriate, separate accessways to minimize travel distances;	**Existing code addresses this TPR provision.** ***See the findings regarding transit access in TPR Sections -0045(3)(b) and -0045(4)(a).***
(g) Along existing or planned transit routes, designation of types and densities of land uses adequate to support transit.	**Adopted planning documents and current planning processes address this TPR provision.** The City has engaged in two significant planning processes – the Sherwood Town Center Plan and the Southwest Corridor Study – to examine future land use and transit service and routes. These

Table 1: TPR Compliance of Sherwood Development Code

Transportation Planning Rule Requirement	Findings of Development Code Compliance
	planning processes are summarized in the Plans and Policies Report prepared for this TSP update (TSP Volume 2, Section A, pp. 14-15 and 23-25). The Existing Conditions Report (TSP Volume 2, Section B, Figure 1 and Figure 7) shows existing zoning and existing transit routes in the city.
(5) In MPO areas, local governments shall adopt land use and subdivision regulations to reduce reliance on the automobile which:	
(a) Allow transit-oriented developments (TODs) on lands along transit routes;	**Existing code, adopted planning documents, and current planning processes address this TPR provision.** ***See the findings for TPR Sections -0045(4)(a) and (g).***
(b) Implements a demand management program to meet the measurable standards set in the TSP;	**Existing code and the updated TSP are consistent with this TPR provision.** ***See findings regarding pedestrian and bicycle facilities on streets, pedestrian and bicycle circulation on-site, shared-use access ways, transit access and amenities, and carpool/vanpool and bicycle parking in TPR Sections -0045(3)(a) and (b) and Sections -0045(4)(a), (d), (e), and (f).*** Transportation Demand Management (TDM) programs are addressed in Section 8 (The Standards) of the updated TSP.
(c) Implements a parking plan which: (A) Achieves a 10% reduction in the number of parking spaces per capita in the MPO area over the planning period. This may be accomplished through a combination of restrictions on development of new parking spaces and requirements that existing parking spaces be redeveloped to other uses; (B) Aids in achieving the measurable standards set in the TSP in response to OAR 660-012-0035(4) [reducing reliance on the automobile]; (C) Includes land use and subdivision regulations setting minimum and maximum parking requirements in appropriate locations, such as downtowns, designated regional or community centers, and transit oriented-	**A citywide parking plan is not being considered at this time, so this TPR provision does not apply.** ***Also see findings regarding alternative parking regulations in TPR Section -0045(5)(d).***

Table 1: TPR Compliance of Sherwood Development Code

Transportation Planning Rule Requirement	Findings of Development Code Compliance
developments; and (D) Is consistent with demand management programs, transit-oriented development requirements and planned transit service. ***OR***	
(d) As an alternative to (c) above, local governments in an MPO may instead revise ordinance requirements for parking as follows: (A) Reduce minimum off-street parking requirements for all non-residential uses from 1990 levels; (B) Allow provision of on-street parking, long-term lease parking, and shared parking to meet minimum off-street parking requirements; (C) Establish off-street parking maximums in appropriate locations, such as downtowns, designated regional or community centers, and transit-oriented developments; (D) Exempt structured parking and on-street parking from parking maximums; (E) Require that parking lots over 3 acres in size provide street-like features along major driveways (including curbs, sidewalks, and street trees or planting strips); and (F) Provide for designation of residential parking districts.	**Existing and proposed code addresses this TPR provision.** Existing off-street parking regulations allow for shared parking, blended parking rates, on-street parking credits, preferential carpool/vanpool parking, residential parking districts, and reduced parking requirements in environmentally sensitive areas (Section 16.94.010). • Minimum and maximum parking requirements – Section16.94.020.A establishes both minimum and maximum. Minimum parking standards comply with Metro standards, which were originally developed to reduce requirements from historic levels. • Parking credits and parking districts – Section 16.94.010 allows for shared parking, blended parking rates, on-street parking credits, preferential carpool/vanpool parking, residential parking districts, and reduced parking requirements in environmentally sensitive areas. • Structured parking and on-street parking maximums – Proposed amendments to parking standards specify that structured parking and on-street parking are exempt from parking space maximums (Section 16.94.010.K) (TSP Volume 2, Section G). On-street parking is not subject to minimum requirements and can be used to count toward meeting off-street requirements, pursuant to Section 16.94.010.B.5. • Large parking lots – Section 16.94.010.I (Parking and Loading Plan) requires parking lots

Table 1: TPR Compliance of Sherwood Development Code

Transportation Planning Rule Requirement	Findings of Development Code Compliance
	larger than one acre to provide street-like features.
(e) Require all major industrial, institutional, retail and office developments to provide either a transit stop on site or connection to a transit stop along a transit trunk route when the transit operator requires such an improvement.	**Existing code is consistent with this TPR provision.** ***See findings regarding transit provisions in TPR Section -0045(4)(a).***
(6) In developing a bicycle and pedestrian circulation plan as required by 660-012-0020(2)(d), local governments shall identify improvements to facilitate bicycle and pedestrian trips to meet local travel needs in developed areas. Appropriate improvements should provide for more direct, convenient and safer bicycle or pedestrian travel within and between residential areas and neighborhood activity centers (i.e., schools, shopping, transit stops). Specific measures include, for example, constructing walkways between cul-de-sacs and adjacent roads, providing walkways between buildings, and providing direct access between adjacent uses.	**The 2014 TSP includes pedestrian and bicycle plans and is consistent with this TPR provision.** ***Also see findings regarding pedestrian and bicycle facilities in TPR Section -0045(3)(b) and regarding pedestrian and bicycle connections in RTFP Section 3.08.110E.***
(7) Local governments shall establish standards for local streets and accessways that minimize pavement width and total ROW consistent with the operational needs of the facility. The intent of this requirement is that local governments consider and reduce excessive standards for local streets and accessways in order to reduce the cost of construction, provide for more efficient use of urban land, provide for emergency vehicle access while discouraging inappropriate traffic volumes and speeds, and which accommodate convenient pedestrian and bicycle circulation. Notwithstanding section (1) or (3) of this rule, local street standards adopted to meet this requirement need not be adopted as land use regulations.	**Existing code is consistent with this TPR provision.** Section 16.106.010 provides street design standards by street functional classification and traffic volume. The standards include those for a 28-foot-wide local street, with parking on one side and a shared travel lane.
OAR 660-012-0060 **Plan and Land Use Regulation Amendments**	
Amendments to functional plans, acknowledged comprehensive plans, and land use regulations that significantly affect an existing or planned transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility.	**Existing and proposed code is consistent with this TPR provision.** Section 16.80.030.C addresses TPR compliance. Proposed amendments to the section make simpler reference to Section -0060 in order to capture all of its requirements and allowances related to reviewing plan and land use regulation amendments (TSP Volume 2, Section G).

Table 2: RTFP Compliance of Sherwood Development Code

Regional Transportation Functional Plan Requirement	Findings of Development Code Compliance
Allow complete street designs consistent with regional street design policies **(Title 1, Street System Design Sec 3.08.110A(1))**	**Existing code is consistent with these RTFP provisions.** ***See findings regarding street design and transit facilities in TPR Sections -0045(3)(b), (4)(a), and (7).***
Allow green street designs consistent with federal regulations for stream protection **(Title 1, Street System Design Sec 3.08.110A(2))**	
Allow transit-supportive street designs that facilitate existing and planned transit service pursuant 3.08.120B **(Title 1, Street System Design Sec 3.08.110A(3))**	
Allow implementation of: • narrow streets (<28 ft curb to curb); • wide sidewalks (at least five feet of through zone); • landscaped pedestrian buffer strips or paved furnishing zones of at least five feet, that include street trees; • Traffic calming to discourage traffic infiltration and excessive speeds; • short and direct right-of-way routes and shared-use paths to connect residences with commercial services, parks, schools, hospitals, institutions, transit corridors, regional trails and other neighborhood activity centers; • opportunities to extend streets in an incremental fashion, including posted notification on streets to be extended. **(Title 1, Street System Design Sec 3.08.110B)**	**Existing and proposed code and proposed policy are consistent with this RTFP provision.** ***Also see findings regarding street design in TPR Section -0045(7).*** • Narrow streets – Existing street standards include a cross-section for a local residential street that is 28 feet curb to curb (Section 16.106.010). Proposed Strategy 19 under Goal 3 of the Transportation policies commits the City to reevaluate street design standards and to establish conditions under which narrower street standards would be permitted (TSP Volume 2, Section G). • Sidewalks, buffer strips, and traffic calming – Street design guidelines in Section 16.106.010 call for sidewalks of 6-12 feet on all streets but alleys. Buffer strips of at least five feet are called for also on all streets but alleys. Traffic calming is authorized for use on new and existing streets in Section 16.106.040. • Path and access way connections – Connections to adjacent sites and activity centers are addressed by the findings and recommendations for TPR Section -0045(3)(b). • Streets to be extended – Section 16.106.040.C requires notice be posted on dead-end streets that are planned for extension.

Table 2: RTFP Compliance of Sherwood Development Code

Regional Transportation Functional Plan Requirement	Findings of Development Code Compliance
Require new residential or mixed-use development (of five or more acres) that proposes or is required to construct or extend street(s) to provide a site plan (consistent with the conceptual new streets map required by Title 1, Sec 3.08.110D) that: • provides full street connections with spacing of no more than 530 feet between connections except where prevented by barriers • Provides a crossing every 800 to 1,200 feet if streets must cross water features protected pursuant to Title 3 UGMFP (unless habitat quality or the length of the crossing prevents a full street connection) • provides bike and pedestrian accessways 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 220 feet or having no more than 25 dwelling units **(Title 1, Street System Design Sec 3.08.110E)**	**Existing code is consistent with these RTFP provisions.** • Connections and crossings – Provisions in transportation facility standards (Section 16.106.030.B) and land division standards (Section 16.128.010.A) establish maximum block lengths of 530 feet for new streets, except for arterials, which have a maximum block length requirement of 1,800 feet. Section 16.106.30 also requires consistency with a local connectivity plan established in the TSP. The standards also specify that where full street crossings occur at distances of more 1,200 feet, bicycle and pedestrian crossings must be provided at an average of 530 feet. • Bike and pedestrian access ways – Connectivity provisions in Section 16.128.010.A.2 (Block Length) require that paved bike and pedestrian access ways be provided in easements or right-of-way consistent with Figure 7.401. Given maximum block length standards of 530 feet (except for arterials), these mid-block access ways can be assumed to be spaced at a maximum of 330 feet. • Cul-de-sacs and closed-end streets – Section 16.106.040.E.1 limits cul-de-sacs to 200 feet and 25 dwelling units, except when constrained by topography and existing development. Section 16.106.040.E.3 requires access ways to be provided in public easements, tracts, or right-of-way on cul-de-sacs or dead-end streets in order to connect streets.
Establish city/county standards for local street connectivity, consistent with Title 1, Sec 3.08.110E, that applies to new residential or mixed-use development (of less than five acres) that proposes or is required to construct or extend street(s). **(Title 1, Street System Design Sec 3.08.110F)**	**Existing code is consistent with this RTFP provision.** ***See findings for RTFP Section 3.08.110E; the standards apply regardless of site size.***
Applicable to both Development Code and TSP To the extent feasible, restrict driveway and street access in the vicinity of interchange ramp terminals, consistent with	**Proposed policy amendments address this RTFP provision.**

Table 2: RTFP Compliance of Sherwood Development Code

Regional Transportation Functional Plan Requirement	Findings of Development Code Compliance
Oregon Highway Plan Access Management Standards, and accommodate local circulation on the local system. Public street connections, consistent with regional street design and spacing standards, shall be encouraged and shall supersede this access restriction. Multimodal street design features including pedestrian crossings and on-street parking shall be allowed where appropriate. **(Title 1,Street System Design Sec 3.08.110G)**	***Also see findings regarding access management in TPR Section -0045(2)(a) and regarding street spacing in TPR Section -0045(3)(b) and RTFP Section 3.08.110E.*** Proposed amendments to Strategy 2 under Goal 2 in Transportation Policies commits the City to work with ODOT, Washington County, and Metro to improve regional mobility through such efforts as the Westside Solution Study and the I-5 to 99W Connector project (TSP Volume 2, Section G).
Include Site design standards for new retail, office, multi-family and institutional buildings located near or at major transit stops shown in Figure 2.15 in the RTP: • Provide reasonably direct pedestrian connections between transit stops and building entrances and between building entrances and streets adjoining transit stops; • Provide safe, direct and logical pedestrian crossings at all transit stops where practicable. At major transit stops, require the following: • Locate buildings within 20 feet of the transit stop, a transit street or an intersection street, or a pedestrian plaza at the stop or a street intersections; • Transit passenger landing pads accessible to disabled persons to transit agency standards; • An easement or dedication for a passenger shelter and an underground utility connection to a major transit stop if requested by the public transit provider; • Lighting to transit agency standards at the major transit stop; • Intersection and mid-block traffic management improvements as needed and practicable to enable marked crossings at major transit stops. **(Title 1, Transit System Design Sec 3.08.120B(2))**	**Existing code is consistent with this RTFP provision.** ***See findings regarding transit access and amenities in TPR Sections -0045(3)(b) and -0045(4)(a), and regarding crossings in RTFP Section 3.08.110E.***
(Could be in Comprehensive plan or TSP as well) As an alternative to implementing site design standards at major transit stops (section 3.08.120B(2), a city or county may establish pedestrian districts with the following elements: • A connected street and pedestrian network for the district; • An inventory of existing facilities, gaps and deficiencies in the network of pedestrian routes;	**An alternative to the site design standards is not needed and the City is not proposing to designate a pedestrian district at this time, so this RTFP provision does not apply.**

Table 2: RTFP Compliance of Sherwood Development Code

Regional Transportation Functional Plan Requirement	Findings of Development Code Compliance
• Interconnection of pedestrian, transit and bicycle systems; • Parking management strategies; • Access management strategies; • Sidewalk and accessway location and width; • Landscaped or paved pedestrian buffer strip location and width; • Street tree location and spacing; • Pedestrian street crossing and intersection design; • Street lighting and furniture for pedestrians; • A mix of types and densities of land uses that will support a high level of pedestrian activity. **(Title 1, Pedestrian System Design Sec 3.08.130B)**	
Require new development to provide on-site streets and accessways that offer reasonably direct routes for pedestrian travel. **(Title 1, Pedestrian System Design Sec 3.08.130C)**	**Existing code is consistent with this RTFP provision.** ***See findings for TPR Section -0045(3)(b).***
Establish parking ratios, consistent with the following: • No minimum ratios higher than those shown on Table 3.08-3. • Mo maximum ratios higher than those shown on Table 3.08-3 and illustrated in the Parking Maximum Map. If 20-minute peak hour transit service has become available to an area within a one-quarter mile walking distance from bus transit one-half mile walking distance from a high capacity transit station, that area shall be removed from Zone A. Cities and counties should designate Zone A parking ratios in areas with good pedestrian access to commercial or employment areas (within one-third mile walk) from adjacent residential areas. Establish a process for variances from minimum and maximum parking ratios that include criteria for a variance. Require that free surface parking be consistent with the regional parking maximums for Zones A and B in Table 3.08-3. Following an adopted exemption process and criteria, cities and counties may exempt parking structures; fleet parking; vehicle parking for sale, lease, or rent; employee car pool parking; dedicated valet parking; user-paid parking;	**Existing and proposed code is consistent with these RTFP provisions.** ***Also see findings regarding minimum/maximum parking standards, on-street parking credits, parking districts, and street-like features in large parking lots in TPR Section -0045(5)(d).*** • Variances process – Existing off-street parking regulations in Section 16.94.010 allow for reductions in parking requirements in environmentally sensitive areas. Section 16.84.030 (Types of Variances) establishes adjustments and Class B variances that allow for reductions in standards. • Blended parking rates – Existing off-street parking regulations in Section 16.94.010 allow for blended parking rates. • Major driveways – Driveways for residential and non-residential uses are addressed in

Table 2: RTFP Compliance of Sherwood Development Code

Regional Transportation Functional Plan Requirement	Findings of Development Code Compliance
market rate parking; and other high-efficiency parking management alternatives from maximum parking standards. Reductions associated with redevelopment may be done in phases. Where mixed-use development is proposed, cities and counties shall provide for blended parking rates. Cities and counties may count adjacent on-street parking spaces, nearby public parking and shared parking toward required parking minimum standards. Use categories or standards other than those in Table 3.08-3 upon demonstration that the effect will be substantially the same as the application of the ratios in the table. Provide for the designation of residential parking districts in local comprehensive plans or implementing ordinances. Require that parking lots more than three acres in size provide street-like features along major driveways, including curbs, sidewalks and street trees or planting strips. Major driveways in new residential and mixed-use areas shall meet the connectivity standards for full street connections in section 3.08.110, and should line up with surrounding streets except where prevented by topography, rail lines, freeways, pre-existing development or leases, easements or covenants that existed prior to May 1, 1995, or the requirements of Titles 3 and 13 of the UGMFP. Require on-street freight loading and unloading areas at appropriate locations in centers. Establish short-term and long-term bicycle parking minimums for: • New multi-family residential developments of four units or more; • New retail, office and institutional developments; • Transit centers, high capacity transit stations, inter-city bus and rail passenger terminals; and • Bicycle facilities at transit stops and park-and-ride lots. **(Title 4, Parking Management Sec 3.08.410)**	Sections 16.96.030 and 16.96.030. Section 16.106.30 also requires consistency with a local connectivity plan established in the TSP. Proposed amendments to site planning requirements in Section 16.90.030.D and connectivity requirements in Section 16.106.030.B.2.d define major driveways and set connectivity requirements for major driveways (TSP Volume 2, Section G). • On-street parking and loading – Proposed amendments to Section 16.94.030.C establish standards for on-street loading in the Old Town Overlay District (TSP Volume 2, Section G). • Bicycle parking Section 16.94.020.C requires bicycle parking for uses including multi-family housing, office and most other commercial uses, institutional uses, and park-and-ride facilities. The provisions address location and design of bicycle parking. Proposed amendments to this section set long-term bicycle parking requirements as well as provide additional guidance about parking location and design (TSP Volume 2, Section G).

Table 3: RTFP Compliance of Sherwood Comprehensive Plan

Regional Transportation Functional Plan Requirement	Findings of Comprehensive Plan Compliance
(Could be located in Development code or Comprehensive Plan) As an alternative to implementing site design standards at major transit stops (section 3.08.120B(2), a city or county may establish pedestrian districts with the following elements: • A connected street and pedestrian network for the district; • An inventory of existing facilities, gaps and deficiencies in the network of pedestrian routes; • Interconnection of pedestrian, transit and bicycle systems; • Parking management strategies; • Access management strategies; • Sidewalk and accessway location and width; • Landscaped or paved pedestrian buffer strip location and width; • Street tree location and spacing; • Pedestrian street crossing and intersection design; • Street lighting and furniture for pedestrians; • A mix of types and densities of land uses that will support a high level of pedestrian activity. **(Title 1, Pedestrian System Design Sec 3.08.130B)**	**An alternative to the site design standards is not needed and the City is not proposing to designate a pedestrian district at this time, so this RTFP provision does not apply.**
When proposing an amendment to the comprehensive plan or to a zoning designation, consider the strategies in subsection 3.08.220A as part of the analysis required by OAR 660-012-0060. If a city or county adopts the actions set forth in 3.08.230E (parking ratios, designs for street, transit, bicycle, pedestrian, freight systems, TSMO projects and strategies, and land use actions) and section 3.07.630.B of Title 6 of the UGMFP, it shall be eligible for an automatic reduction of 30 percent below the vehicular trip generation rates recommended by the Institute of Transportation Engineers when analyzing the traffic impacts, pursuant to OAR 660-012-0060, of a plan amendment in a Center, Main Street, Corridor or Station Community. **(Title 5, Amendments of City and County Comprehensive and Transportation System Plans Sec 3.08.510A,B)**	**Existing and proposed code addresses this RTPF provision.** ***See the findings in TPR Section -0060.*** As established in Section 2 (The Vision) of the 2014 TSP, the City considered transportation solutions in 3.08.220A as part of the TSP update process.
(Could be located in TSP or other adopted policy document) Adopt parking policies, management plans and regulations for Centers and Station Communities. Plans may be adopted	**Proposed policy language addresses this RTFP provision.**

Table 3: RTFP Compliance of Sherwood Comprehensive Plan

Regional Transportation Functional Plan Requirement	Findings of Comprehensive Plan Compliance
in TSPs or other adopted policy documents and may focus on sub-areas of Centers. Plans shall include an inventory of parking supply and usage, an evaluation of bicycle parking needs with consideration of *TriMet Bicycle Parking Guidelines*. Policies shall be adopted in the TSP. Policies, plans and regulations must consider and may include the following range of strategies: • By-right exemptions from minimum parking requirements; • Parking districts; • Shared parking; • Structured parking; • Bicycle parking; • Timed parking; • Differentiation between employee parking and parking for customers, visitors and patients; • Real-time parking information; • Priced parking; • Parking enforcement. **(Title 4, Parking Management Sec 3.08.410I)**	***Also refer to findings from the Town Center Plan.*** Proposed Strategy 11 under Goal 3 of the Transportation Policies commits the City to implement parking strategies from the Town Center Plan, including: evaluating and monitoring parking supply and demand in Old Town; evaluate the parking needs for townhome developments in the Town Center; and evaluating the needs of commercial uses in the Langer Drive Commercial District (TSP Volume 2, Section G).

Table 4: RTFP Compliance of Sherwood TSP Update

Regional Transportation Functional Plan Requirement	Findings of TSP Compliance
Include, to the extent practicable, a network of major arterial streets at one-mile spacing and minor arterials or collectors at half-mile spacing, considering: • existing topography; • rail lines; freeways; pre-existing development, leases, easements or covenants; • requirements of Metro's Urban Growth Management Functional Plan Title 3 (Water Quality and Flood plains) and Title 13 (Nature in Neighborhoods), such as streams, rivers, flood plains, wetlands, riparian and upland fish and wildlife habitat areas. • arterial design concepts in chapter 2 of RTP • best practices and designs as set forth in regional state or local plans and best practices for protecting natural resources and natural areas **(Title 1, Street System Design Sec 3.08.110C)**	Yes – Included The TSP update reviewed the system's connectivity and spacing of arterials and collectors. Volume 2, Section C, pages 31-32.
Include a conceptual map of new streets for all contiguous areas of vacant and re-developable lots and parcels of five or more acres that are zoned to allow residential or mixed-use development. The map shall identify street connections to adjacent areas and should demonstrate opportunities to extend and connect new streets to existing streets, provide direct public right-of-way routes and limit closed-end street designs consistent with Title 1, Sec 3.08.110E **(Title 1, Street System Design Sec 3.08.110D)**	Yes – Included The TSP update includes a "functional class" and a "local street connectivity" map showing conceptual locations for future street connections, as shown in TSP. Volume 1, Section 8, page 54 (Figure 17).
To the extent feasible, restrict driveway and street access in the vicinity of interchange ramp terminals, consistent with Oregon Highway Plan Access Management Standards, and accommodate local circulation on the local system. Public street connections, consistent with regional street design and spacing standards, shall be encouraged and shall supersede this access restriction. Multimodal street design features including pedestrian crossings and on-street parking shall be allowed where appropriate. **(Title 1,Street System Design Sec 3.08.110G)**	Yes - Not applicable There are no interchanges within the City of Sherwood.
Include investments, policies, standards and criteria to provide pedestrian and bicycle connections to all existing transit stops and major transit stops designated in Figure 2.15 of the RTP. **(Title 1, Transit System Design Sec 3.08.120A)**	Yes – Included Gaps in pedestrian and bicycle connections to transit stops are identified in Volume 2, Section C, pages 6 to 11. Solutions are displayed in Volume 1, Section 7, pages 42 and 43, and listed in Volume 2, Section E.
Include a transit plan consistent with transit functional classifications shown in Figure 2.15 of the RTP that shows the locations of major transit stops, transit centers, high capacity transit stations, regional bike-transit facilities, inter-city bus and rail passenger terminals designated in the RTP, transit-priority treatments such as signals, park-and-ride facilities, and bicycle and pedestrian	Yes – Included The TSP update inventoried and evaluated the City's transit network, including identifying gaps for pedestrian and bicycle

Table 4: RTFP Compliance of Sherwood TSP Update

Regional Transportation Functional Plan Requirement	Findings of TSP Compliance
routes, consistent with sections 3.08.130 and 3.08.140, between essential destinations and transit stops. **(Title 1, Transit System Design Sec 3.08.120B(1))**	connections to transit. Volume 2, Section B, pages 15 to 16 present the existing transit system. Transit projects in the TSP are listed in Volume 2, Section E.
Include a pedestrian plan, for an interconnected network of pedestrian routes within and through the city or county. The plan shall include: • An inventory of existing facilities that identifies gaps and deficiencies in the pedestrian system; • An evaluation of needs for pedestrian access to transit and essential destinations for all mobility levels, including direct, comfortable and safe pedestrian routes; • A list of improvements to the pedestrian system that will help the city or county achieve the regional Non-SOV modal targets in Table 3.08-1 of the RTFP, and other targets established pursuant to section 3.08.230; • Provisions for sidewalks along arterials, collectors and most local streets, except that sidewalks are not required along controlled roadways, such as freeways; • Provision for safe crossings of streets and controlled pedestrian crossings on major arterials **(Title 1, Pedestrian System Design Sec 3.08.130A)**	Yes – Included Existing pedestrian facilities and gaps are presented in Volume 2, Section C, pages 6 to 8. Pedestrian improvements are displayed in Volume 1, Section 7, page 42, and listed in Volume 2, Section E.
Include a bicycle plan for an interconnected network of bicycle routes within and through the city or county. The plan shall include: • An inventory of existing facilities that identifies gaps and deficiencies in the bicycle system; • An evaluation of needs for bicycle access to transit and essential destinations, including direct, comfortable and safe bicycle routes and secure bicycle parking, considering *TriMet Bicycle Parking Guidelines*; • A list of improvements to the bicycle system that will help the city or county achieve the regional Non-SOV modal targets in Table 3.08-1 of the RTFP and other targets established pursuant to section 3.08.230; • Provision for bikeways along arterials, collectors and local streets, and bicycling parking in centers, at major transit stops shown in Figure 2.15 in the RTP, park-and-ride lots and associated with institutional uses; • Provision for safe crossing of streets and controlled bicycle crossings on major arterials **(Title 1, Bicycle System Design Sec 3.08.140)**	Yes – Included Existing bicycle facilities and gaps are presented in Volume 2, Section C, pages 9 to 10. Biking improvements are displayed in Volume 1, Section 7, page 43, and listed in Volume 2, Section E.
Include a freight plan for an interconnected system of freight networks within and through the city or county. The plan shall include: • An inventory of existing facilities that identifies gaps and deficiencies in the	Yes – Included Existing freight facilities are presented in Volume 2, Section C, pages 17 to 18. The TSP

Table 4: RTFP Compliance of Sherwood TSP Update

Regional Transportation Functional Plan Requirement	Findings of TSP Compliance
freight system; • An evaluation of freight access to freight intermodal facilities, employment and industrial areas and commercial districts; • A list of improvements to the freight system that will help the city or county increase reliability of freight movement, reduce freight delay and achieve targets established pursuant to section 3.08.230. **(Title 1, Freight System Design Sec 3.08.150)**	identifies existing and future truck routes, along with their classifications, in Volume 1, Section 8, pages 56 to 57. Capacity improvements needed along the freight system are discussed in Volume 2, Section C, pages 14 to 16. Improvements to the freight system are displayed in Volume 1, Section 7, page 41 and are listed in Volume 2, Section E.
Include a transportation system management and operations (TSMO) plan to improve the performance of existing transportation infrastructure within or through the city or county. A TSMO plan shall include: • An inventory and evaluation of existing local and regional TSMO infrastructure, strategies and programs that identifies gaps and opportunities to expand infrastructure, strategies and programs • A list of projects and strategies, consistent with the Regional TSMO Plan, based upon consideration of the following functional areas: ○ Multimodal traffic management investments ○ Traveler Information investments ○ Traffic incident management investments ○ Transportation demand management investments **(Title 1, Transportation System Management and Operations Sec 3.08.160)**	Yes – Included TSMO solutions were prioritized to address transportation system needs (see requirements to address **(Title 2, Sec 3.08.220 Transportation Solutions)).** In addition to these specific projects, general TSMO strategies are contained in Volume 1, Section 8, page 58.
Incorporate regional and state transportation needs identified in the 2035 RTP as well as local transportation needs. The determination of local transportation needs based upon: • System gaps and deficiencies identified in the inventories and analysis of transportation system pursuant to Title 1; • Identification of facilities that exceed the Deficiency Thresholds and Operating Standards in Table 3.08-2 or the alternative thresholds and standards established pursuant to section 3.08.230; • Consideration and documentation of the needs of youth, seniors, people with disabilities and environmental justice populations within the city or county, including minorities and low-income families. A local determination of transportation needs must be consistent with the following elements of the RTP: • The population and employment forecast and planning period of the RTP, except that a city or county may use an alternative forecast for the city or county, coordinated with Metro, to account for changes to comprehensive	Yes – Included System needs and gaps are identified in Volume 2, Section B and Section C.

Table 4: RTFP Compliance of Sherwood TSP Update

Regional Transportation Functional Plan Requirement	Findings of TSP Compliance
plan or land use regulations adopted after adoption of the RTP; • System maps and functional classifications for street design, motor vehicles, transit, bicycles, pedestrians and freight in Chapter 2 of the RTP; • Regional non-SOV modal targets in Table 3.08-1 and the Deficiency Thresholds and Operating Standards in Table 3.08-2. When determining its transportation needs, a city or county shall consider the regional needs identified in the mobility corridor strategies in Chapter 4 of the RTP. **(Title 2, Transportation Needs Sec 3.08.210)**	
Consider the following strategies in the order listed, to meet the transportation needs determined pursuant to section 3.08.210 and performance targets and standards pursuant to section 3.08.230. The city or county shall explain its choice of one or more of the strategies and why other strategies were not chosen: • TSMO, including localized TDM, safety, operational and access management improvements; • Transit, bicycle and pedestrian system improvements; • Traffic-calming designs and devices; • Land use strategies in OAR 660-012-0035(2) • Connectivity improvements to provide parallel arterials, collectors or local streets that include pedestrian and bicycle facilities, consistent with the connectivity standards in section 3.01.110 and design classifications in Table 2.6 of the RTP, • Motor vehicle capacity improvements, consistent with the RTP Arterial and Throughway Design and Network Concepts in Table 2.6 and Section 2.5.2 of the RTP, only upon a demonstration that other strategies in this subsection are not appropriate or cannot adequately address identified transportation needs A city or county shall coordinate its consideration of the above strategies with the owner of the transportation facility affected by the strategy. Facility design is subject to the approval of the facility owner. If analysis under subsection 3.08.210A (Local Needs determination) indicates a new regional or state need that has not been identified in the RTP, the city or county may propose one of the following actions: • Propose a project at the time of Metro review of the TSP to be incorporated into the RTP during the next RTP update; or • Propose an amendment to the RTP for needs and projects if the amendment is necessary prior to the next RTP update. **(Title 2, Sec 3.08.220 Transportation Solutions)**	Yes – Included Transportation system needs were addressed with project solutions following the hierarchy of strategies Volume 2, Section D, pages 19 to 20.

Table 4: RTFP Compliance of Sherwood TSP Update

Regional Transportation Functional Plan Requirement	Findings of TSP Compliance
Demonstrate that solutions adopted pursuant to section 3.08.220 (Transportation Solutions) will achieve progress toward the targets and standards in Tables 3.08-1, and 3.08-2 and measures in subsection D (local performance measures), or toward alternative targets and standards adopted by the city or county. The city or county shall include the regional targets and standards or its alternatives in its TSP. A city or county may adopt alternative targets or standards in place of the regional targets and standards upon a demonstration that the alternative targets or standards: • Are no lower than the modal targets in Table 3.08-1 and no lower than the ratios in Table 3.08-2; • Will not result in a need for motor vehicle capacity improvements that go beyond the planned arterial and throughway network defined in Figure 2.12 of the RTP and that are not recommended in, or are inconsistent with, the RTP; and • Will not increase SOV travel to a degree inconsistent with the non-SOV modal targets in Table 3.08-1. If the city or county adopts mobility standards for state highways different from those in Table 3.08-2, it shall demonstrate that the standards have been approved by the Oregon Transportation Commission. Each city and county shall also include performance measures for safety, vehicle miles traveled per capita, freight reliability, congestion, and walking, bicycling and transit mode shares to evaluate and monitor performance of the TSP. To demonstrate progress toward achievement of performance targets in Tables 3.08-1 and 3.08-2 and to improve performance of state highways within its jurisdiction as much as feasible and avoid their further degradation, the city or county shall adopt the following: • Parking minimum and maximum ratios in Centers and Station Communities consistent with subsection 3.08.410A; • Designs for street, transit, bicycle, freight and pedestrian systems consistent with Title 1: and • TSMO projects and strategies consistent with section 3.08.160; and • Land use actions pursuant to OAR 660-012-0035(2). **(Title 2, Performance Targets and Standards Sec 3.08.230)**	Yes – Included Progress towards the targets and standards in the RTFP are discussed in Volume 1, Section 9, pages 61 to 64. Mobility targets for facilities in Sherwood are discussed in Volume 1, Section 8, pages 55 to 56.
Specify the general locations and facility parameters, such as minimum and maximum ROW dimensions and the number and width of traffic lanes, of planned regional transportation facilities and improvements identified on general location depicted in the appropriate RTP map. Except as otherwise provided in the TSP, the general location is as follows: • For new facilities, a corridor within 200 feet of the location depicted on the	Yes – Included Planned regional facilities are shown in Volume 1, Section 7, page 41 (Figure 12). A description of the planned facilities can be found in Volume

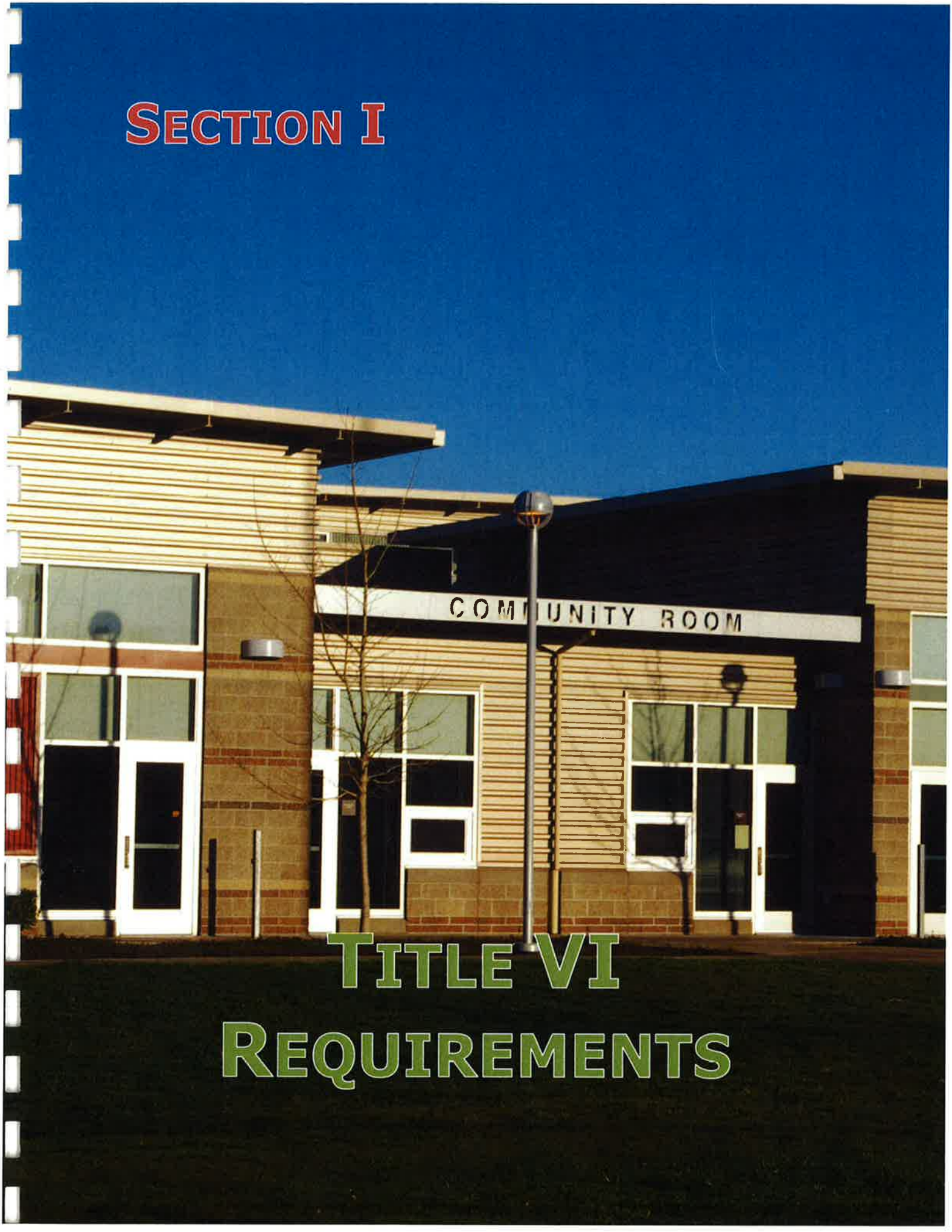
Table 4: RTFP Compliance of Sherwood TSP Update

Regional Transportation Functional Plan Requirement	Findings of TSP Compliance
appropriate RTP map; • For interchanges, the general location of the crossing roadways, without specifying the general location of connecting ramps; • For existing facilities planned for improvements, a corridor within 50 feet of the existing right-of-way and • For realignments of existing facilities, a corridor within 200 feet of the segment to be realigned as measured from the existing right-of-way depicted on the appropriate RTP map. A City or county may refine or revise the general location of a planned regional facility as it prepares or revises impacts of the facility or to comply with comprehensive plan or statewide planning goals. If, in developing or amending its TSP, a city or county determines the general location of a planned regional facility or improvement is inconsistent with its comprehensive plan or a statewide goal requirement, it shall: • Propose a revision to the general location of the planned facility or improvement to achieve consistency and, if the revised location lies outside the general location depicted in the appropriate RTP map, seek an amendment to the RTP; or • Propose a revision to its comprehensive plan to authorize the planned facility or improvement at the revised location. **(Title 3, Defining Projects in Transportation System Plan Sec 3.08.310)**	2, Section E.
(Could be adopted in TSP or other adopted policy document) Adopt parking policies, management plans and regulations for Centers and Station Communities. Plans may be adopted in TSPs or other adopted policy documents and may focus on sub-areas of Centers. Plans shall include an inventory of parking supply and usage, an evaluation of bicycle parking needs with consideration of *TriMet Bicycle Parking Guidelines*. Policies shall be adopted in the TSP. Policies, plans and regulations must consider and may include the following range of strategies: • By-right exemptions from minimum parking requirements; • Parking districts; • Shared parking; • Structured parking; • Bicycle parking; • Timed parking; • Differentiation between employee parking and parking for customers, visitors and patients; • Real-time parking information; • Priced parking; • Parking enforcement.	Yes – Other Policy Document Existing parking policy is included in Development Code Chapter 16.94. In addition, the TSP update identifies that a future study will prepare a parking management plan for the Town Center, as discussed in Volume 1, Section 9, page 66.

Table 4: RTFP Compliance of Sherwood TSP Update

Regional Transportation Functional Plan Requirement	Findings of TSP Compliance
(Title 4, Parking Management Sec 3.08.410I)	
If a city or county proposes a transportation project that is not included in the RTP and will result in a significant increase in SOV capacity or exceeds the planned function or capacity of a facility designated in the RTP, it shall demonstrate consistency with the following in its project analysis: • The strategies set forth in subsection 3.08.220A(1-5) (TSMO, Transit/bike/ped system improvements, traffic calming, land use strategies, connectivity improvements) • Complete street designs consistent with regional street design policies • Green street designs consistent with federal regulations for stream protection. If the city or county decides not to build a project identified in the RTP, it shall identify alternative projects or strategies to address the identified transportation need and inform Metro so that Metro can amend the RTP. This section does not apply to city or county transportation projects that are financed locally and would be undertaken on local facilities. **(Title 5, Amendments of City and County Comprehensive and Transportation System Plans Sec 3.08.510C)**	Yes – Included The TSP includes strategies and projects that focus on improving multimodal travel opportunities and improved efficiency of the existing system. The projects included in the TSP would not result in a significant disproportionate increase in SOV capacity. Projects identified in the plan are shown in Volume 1, Figures 12, 13, and 14. Capacity projects on regional facilities are consistent with prior plans.

Section I



Title VI Requirements

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TITLE VI REQUIREMENTS

The City's plan for meeting Title VI requirements was to provide an on-going outreach notification program to identified minority groups within the City populace. To accomplish this task, the City identified the largest minority group within the City (Hispanic) and provided dual language notifications of City processes and meetings.

The City's project webpage included a translated version of current public notices of events and project information. In addition the City placed notification ads within the local Spanish language newspaper. Both of these actions are supported by the following section, which established the notifications and translation.

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☐ scanned: T/8070
☐ for your binder 198 - 19-57-0-8070 (misc. purchased services)

PO 34257
Approved: [signature] 3.3.14



Dinora C. Zamora
301 E. Columbia Drive #55
Newberg, Oregon 97132
503 380-3448
Stephaniez2@netzero.net

INVOICE

Invoice Number: 001

Invoice Date: 03-03-14

Customer Information:

Billing Address:	
Company:	**City of Sherwood**
Name:	**Bob Galati**
Address:	**22560 SW Pine Street**
City/State/Zip	**Sherwood, Oregon 97140**

Services Information: $40.00 per hour – Two hours minimum

Date	Service Description	Total hours	Total
03-03-2014	Translation of Transportation System Plan Update Project document	3 hrs	$ 120.00
		Grand total:	$120.00

Esta información también se proporciona en español a continuación.

Sherwood está actualizando el plan de sistema de transporte de la ciudad (TSP) Para atender las necesidades de la comunidad y necesidades regionales. El TSP proporciona un marco de vista a largo plazo del sistema de transporte de Sherwood e incluye estrategias y proyectos de mejora previstos para una variedad de modalidades (peatón, bicicleta, auto, tránsito). Además de abordar las necesidades locales, el plan también debe ser consistente con las políticas estatales y regionales, como el Plan de Transporte de Oregon (OTP), Plan Regional de Transporte del Metro (RTP), Plan Regional de Transporte Funcional del Metro (RTFP), y complementar otros planes locales, tales como el Condado de Washington PTS.

Sherwood ha experimentado muchos cambios (crecimiento, desarrollo de concepto de planes, ha completado proyectos de transporte, y varias enmiendas en el texto original TSP) desde que el actual TSP de Sherwood fue adoptado en 2005. El actualizado TSP incluirá estos cambios, así como un plan actualizado de las condiciones y necesidades para el año 2035. Al mismo tiempo, la actualización del TSP cumplirá con los requisitos del Plan Regional de Transporte Funcional del Metro (RTFP) (como prioridad a las mejoras relacionadas a la administración del sistema). A medida que los planes estatales y regionales sean actualizados, se podrán tener en cuenta y reflejar cambios en el TSP de Sherwood (tales como listas de planes de proyectos y cumplimiento de objetivos).

La actualización del TSP está siendo financiada a través de un subsidio de la Administración de Transporte y Crecimiento estatal (TGM) que fue otorgado a Sherwood. Con aportes del público, empleados de la Ciudad y consejeros actualizarán el plan en los próximos meses. Preguntas elementales que se abordaran durante el proceso incluyen:

- Cómo es el sistema de transporte hoy en día? (Condiciones existentes)
- Qué necesidades hay presentes hoy y en el futuro? (Evaluación de necesidades)
- Cómo podemos atender las necesidades? (Opciones de proyecto)
- Estamos abordando las necesidades locales y regionales? (Actualización de TSP y proceso de adopción)

Habrá varios lugares disponibles al público para ayudar a darle forma al plan mediante el proceso de planificación.

- Comité Asesor Ciudadano (CAC) - un grupo de ciudadanos designados por el Consejero de la Ciudad para revisar productos de trabajo cuando acontezcan cambios mayores a través del proceso.
- Sitio Web - esto incluirá avisos, documentos de proyecto, y un correo electrónico para enviar sus comentarios y preguntas.
- Casas Abiertas - eventos comunitarios se llevarán a cabo para mostrar productos de trabajo para revisión y discusión pública.
- Proceso de Adopción - un proceso de audiencia, con la Comisión de Planificación y el Consejero de la ciudad, se llevara a cabo para revisar el contenido del TSP y finalizar el plan actualizado para su adopción.

Se insta a las partes interesadas a participar en las primeras fases del proceso para ayudar a guiar y crear el resultado del plan y hacerlo un éxito. Por favor contacte a Bob Galati, Ingeniero de la Cuidad, al numero (503) 925-2303 o galatib@sherwoodoregon.gov si usted tiene preguntas o comentarios. Además, si desea recibir un mensaje de correo electrónico cuando se publique nueva información acerca de este proyecto en este sitio, por favor envíenos un correo electrónico a engineering@sherwoodoregon.gov para que se le añada a la lista.

Stephanie Guediri

From: Stephanie Guediri
Sent: Thursday, February 27, 2014 9:16 AM
To: Lisa Layne
Cc: Bob Galati; Julie Blums
Subject: Spanish Translation Needed on TSP Web Page Info (Doc Attached)
Attachments: TSP Web Page.docx

Hi Lisa,

I was advised by Bob, via Julie, to send you an email with an attached document of text that we need to have Dinorah translate in to Spanish by March 4th is possible. We prefer it as an e-doc as the translation will be copied and pasted directly to our project web page.

I'm not sure if Dinorah invoices the city for her services. If so, she can direct her bill to Bob and we'll make sure to get her promptly paid. Please let me know if you have any questions – thank you!

Sincerely,

Stephanie

Stephanie Guediri
Engineering Permit Specialist
City of Sherwood Engineering Department
22560 SW Pine Street
Sherwood, OR 97140
☎ 503.925.2309 | Fax 503.625.0629
✉ guediris@sherwoodoregon.gov
www.sherwoodoregon.gov

This information is also provided in Spanish below.

Sherwood is currently updating the City's Transportation System Plan (TSP) to address community needs and regional requirements. The TSP provides a framework for the long-term vision of Sherwood's transportation system and includes strategies and planned improvement projects for a variety of travel modes (pedestrian, bike, auto, and transit). In addition to addressing local needs, the plan must also be consistent with state and regional policies, such as the Oregon Transportation Plan (OTP), Metro's Regional Transportation Plan (RTP) , Metro's Regional Transportation Functional Plan (RTFP), and complement other local plans, such as the Washington County TSP.

Sherwood has experienced numerous changes (growth, development of concept plans, completion of transportation projects, and several amendments to the original TSP) since the current Sherwood TSP was adopted in 2005. The updated TSP will include these changes as well as an updated plan for conditions and needs for year 2035. In addition, the update will bring the TSP into compliance with the latest requirements of Metro's Regional Transportation Functional Plan (RTFP) (such as prioritizing improvements related to system management). As statewide and regional plans are updated, they may take into account and reflect changes in the Sherwood TSP (such as planned project lists and performance targets).

The TSP update is being funded through a state Transportation and Growth Management (TGM) grant that was awarded to Sherwood. With public input, City staff and consultants will update the plan over the next several months. Key questions to be addressed during the process include:

- How is the transportation system today? (Existing conditions)
- What needs are present today and in the future? (Needs assessment)
- How do we address the needs? (Project options)
- Are we addressing local needs and regional requirements? (TSP update and adoption process)

There will be several venues available to the public to help shape the plan throughout the planning process.

- Citizen Advisory Committee (CAC) – a group of citizens appointed by the City Council to review work products at major milestones through the process.
- Website – this will include notices, draft documents, and a contact email to submit comments and questions.
- Open Houses – community events will be held to display work products for public review and discussion.
- Adoption Process – a hearing process with the Planning Commission and City Council will be held to review the content of the TSP and finalize the updated plan for adoption.

Interested parties are encouraged to participate early in the process to help guide and shape the outcome of the plan and to make it a success. Please contact Bob Galati, City Engineer, at (503) 925-2303 or galatib@sherwoodoregon.gov If you have any questions or comments. In addition, if you would like to receive an email when new information about this project is posted to this site, please email engineering@sherwoodoregon.gov to be added to the list.

6430-19-57-0-8070 (printing & advertising) Bob J Aalst 3-4-14

Stephanie Guediri

From: service@paypal.com
Sent: Wednesday, March 05, 2014 10:07 AM
To: Stephanie Guediri
Subject: Your payment to El Hispanic News

✓scanned to T:/8070
✓for your binder

PayPal <https://www.paypal.com/us>
<http://images.paypal.com/en_US/i/scr/pixel.gif>
<http://images.paypal.com/en_US/i/scr/scr_emailTopCorners_580wx13h.gif>
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El Plan de Sistema de Transporte de La Ciudad de Sherwood

Contact Information
Contact Stephanie Guediri
Location : Sherwood, Oregon
More Information
La Ciudad de Sherwood está actualizando el plan de sistema de transporte de la ciudad (TSP) para atender las necesidades de la comunidad y necesidades regionales. El TSP proporciona un marco de vista a largo plazo del sistema de transporte de Sherwood e incluye estrategias y proyectos de mejora previstos para una variedad de modalidades (peatón, bicicleta, auto, tránsito). Además de abordar las necesidades locales, el plan también debe ser consistente con las políticas estatales y regionales, como el Plan de Transporte de Oregon (OTP), Plan Regional de Transporte del Metro (RTP), Plan Regional de Transporte Funcional del Metro (RTFP), y complementar otros planes locales, tales como el Condado de Washington TSP.

Se insta a las partes interesadas a participar en las primeras fases del proceso para ayudar a guiar y crear el resultado del plan y hacerlo un éxito. Por favor visita el sitio web a www.sherwoodoregon.gov/engineering/project/transportation-system-plan-tsp-update-project, o contacte a Bob Galati, Ingeniero de la Cuidad, al numero (503) 925-2303 o galatib@sherwoodoregon.gov si usted tiene preguntas o comentarios. Además, si desea recibir un mensaje de correo electrónico cuando se publique nueva información acerca de este proyecto, por favor envíenos un correo electrónico a engineering@sherwoodoregon.gov para que se le añada a la lista.

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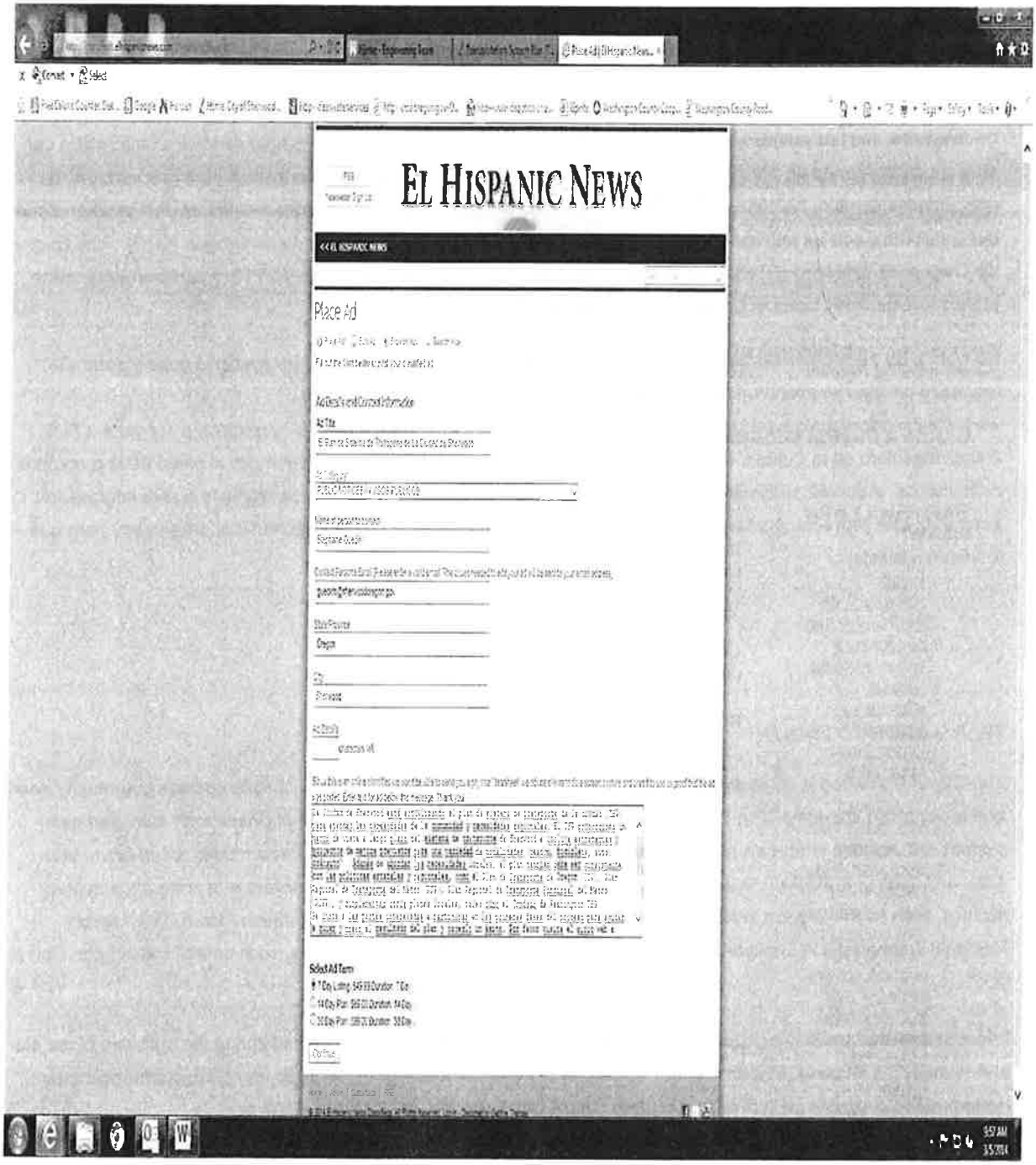
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TRANSLATION TO ENGLISH

The City of Sherwood is currently updating the City's Transportation System Plan (TSP) to address community needs and regional requirements. The TSP provides a framework for the long-term vision of Sherwood's transportation system and includes strategies and planned improvement projects for a variety of travel modes (pedestrian, bike, auto, and transit). In addition to addressing local needs, the plan must also be consistent with state and regional policies, such as the Oregon Transportation Plan (OTP), Metro's Regional Transportation Plan (RTP), Metro's Regional Transportation Functional Plan (RTFP), and complement other local plans, such as the Washington County TSP.

Interested parties are encouraged to participate early in the process to help guide and shape the outcome of the plan and to make it a success. Please visit the website at www.sherwoodoregon.gov/engineering/project/transportation-system-plan-tsp-update-project or contact Bob Galati, City Engineer, at (503) 925-2303 or galatib@sherwoodoregon.gov if you have any questions or comments. In addition, if you would like to receive an email when new information about this project is posted, please email engineering@sherwoodoregon.gov to be added to the list.


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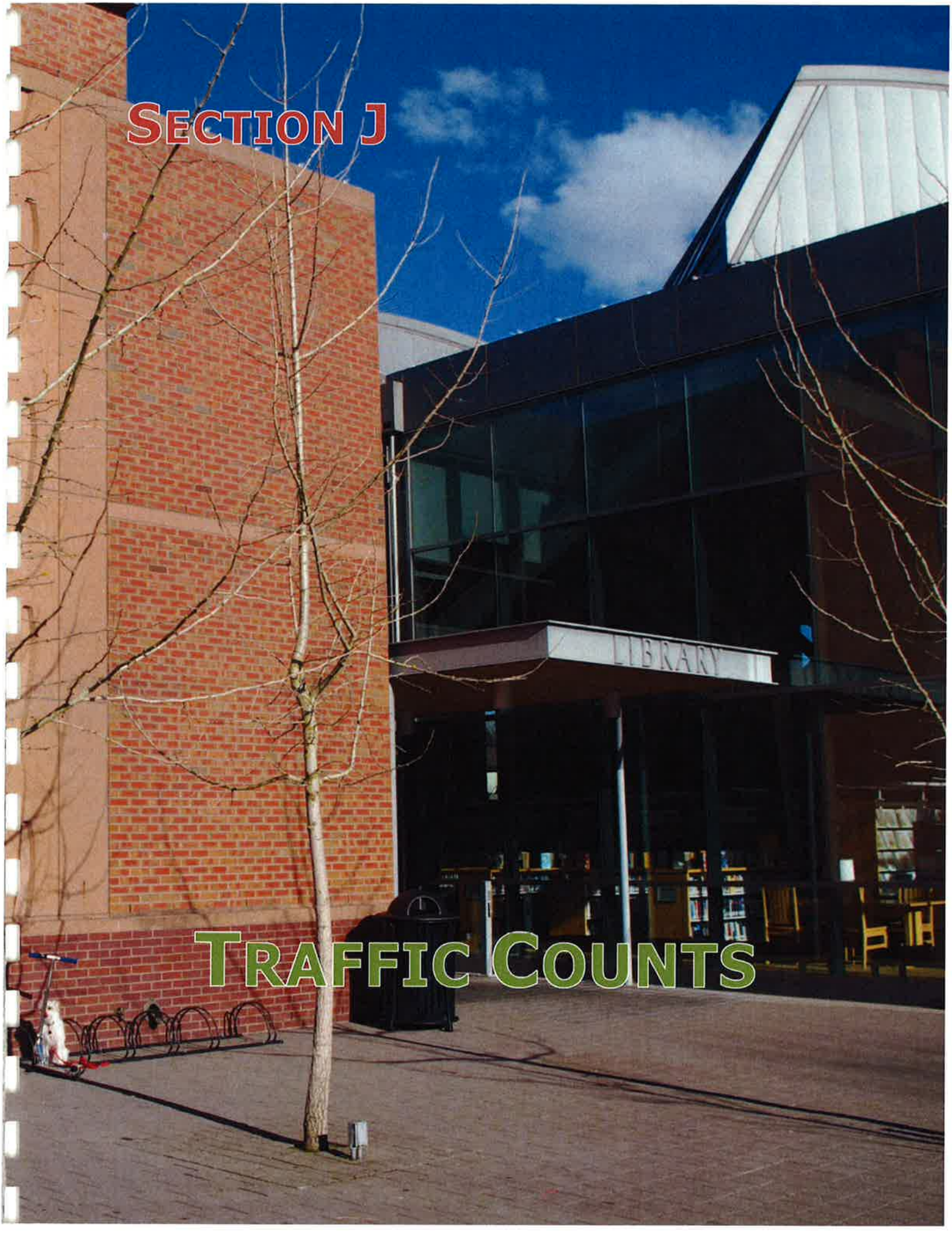
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SECTION J

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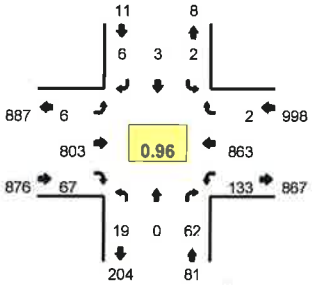
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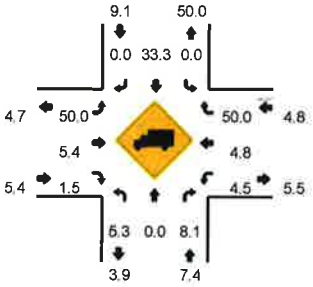
Method for determining peak hour: Total Entering Volume

LOCATION: SW Langer Farms Pkwy -- SW Tualatin Sherwood Rd
CITY/STATE: Sherwood, OR

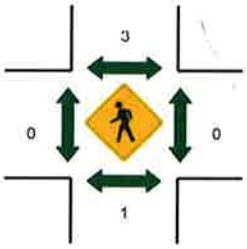
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DATE: Thu, Sep 05 2013

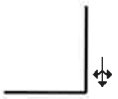
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

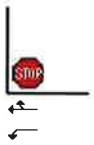


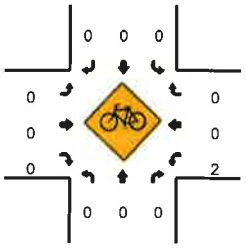


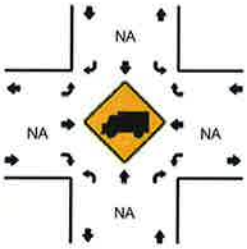
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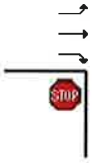


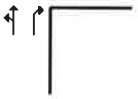


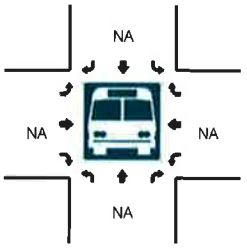












5-Min Count Period Beginning At	SW Langer Farms Pkwy (Northbound)				SW Langer Farms Pkwy (Southbound)				SW Tualatin Sherwood Rd (Eastbound)				SW Tualatin Sherwood Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	0	10	0	0	1	2	0	0	53	5	0	9	62	1	0	144	
4:05 PM	2	0	5	0	0	0	0	0	0	57	10	0	13	71	0	0	158	
4:10 PM	0	0	7	0	0	0	0	0	0	66	4	0	6	61	0	0	144	
4:15 PM	2	0	9	0	0	0	0	0	0	66	5	0	10	63	1	0	156	
4:20 PM	2	0	5	0	0	0	1	0	2	39	5	0	7	69	0	0	130	
4:25 PM	1	0	5	0	0	0	0	0	0	53	1	0	6	77	1	0	144	
4:30 PM	0	0	7	0	0	1	0	0	0	64	7	0	13	64	0	0	156	
4:35 PM	0	0	4	1	0	1	0	0	2	69	5	0	8	83	0	0	173	
4:40 PM	2	0	5	0	0	0	0	0	0	70	7	0	12	72	0	0	168	
4:45 PM	2	0	2	0	0	1	1	0	0	61	2	0	5	84	0	0	158	
4:50 PM	1	0	1	0	0	0	0	0	2	76	5	0	10	67	0	0	162	
4:55 PM	3	0	4	0	0	0	0	0	0	74	13	0	9	74	0	0	177	1870
5:00 PM	2	0	9	0	0	0	0	0	0	65	5	0	10	69	0	0	160	1886
5:05 PM	0	0	9	0	0	0	0	0	0	80	3	0	10	65	0	0	167	1895
5:10 PM	4	0	8	0	0	0	0	0	1	60	5	0	26	77	2	0	183	1934
5:15 PM	2	0	3	0	0	0	1	0	0	71	2	0	17	68	0	0	164	1942
5:20 PM	2	0	6	0	0	0	3	0	0	53	8	0	5	68	0	0	145	1957
5:25 PM	0	0	4	0	2	0	1	0	1	60	5	0	8	72	0	0	153	1966
5:30 PM	1	0	6	0	0	0	0	0	0	51	6	0	9	65	0	0	138	1948
5:35 PM	1	0	5	0	0	0	1	0	0	50	5	0	17	65	0	0	144	1919
5:40 PM	1	0	3	0	0	0	0	0	0	70	3	0	5	60	0	0	142	1893
5:45 PM	1	0	2	0	0	0	0	0	0	63	11	0	10	62	0	0	149	1884
5:50 PM	2	0	4	0	0	0	0	0	0	63	7	0	18	62	0	0	156	1878
5:55 PM	0	0	1	0	0	0	0	0	0	62	3	0	14	71	0	0	151	1852

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	24	0	80	0	0	0	4	0	4	844	40	0	212	840	8	0	2056
Heavy Trucks	0	0	8		0	0	0		4	28	0		4	56	4		104
Pedestrians		4				4				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

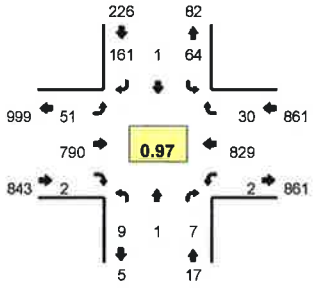
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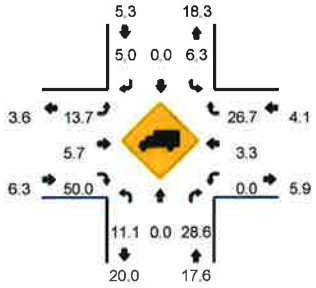
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

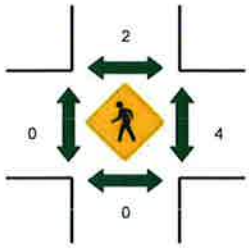
LOCATION: SW Gerda Ln -- SW Tualatin Sherwood Rd | **QC JOB #:** 11224712

CITY/STATE: Sherwood, OR | **DATE:** Thu, Sep 05 2013

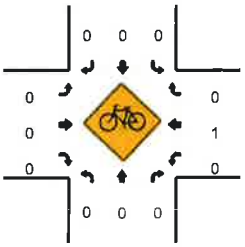


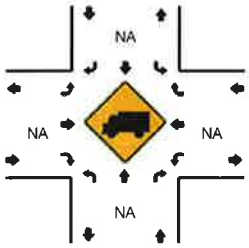
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Peak 15-Min: 5:00 PM -- 5:15 PM



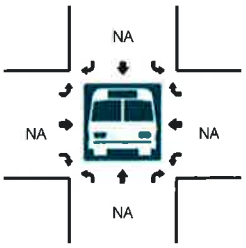












5-Min Count Period Beginning At	SW Gerda Ln (Northbound)				SW Gerda Ln (Southbound)				SW Tualatin Sherwood Rd (Eastbound)				SW Tualatin Sherwood Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	7	0	8	0	6	52	1	0	0	55	5	0	134	
4:05 PM	1	0	0	0	5	0	11	0	5	61	0	0	0	76	4	0	163	
4:10 PM	0	0	0	0	3	0	10	0	3	52	0	0	1	58	7	0	134	
4:15 PM	0	0	0	0	5	0	16	0	8	73	0	0	0	58	0	0	160	
4:20 PM	1	1	1	0	4	1	13	0	3	56	0	0	0	77	2	0	159	
4:25 PM	0	0	0	0	4	0	12	0	5	60	0	0	0	76	6	0	163	
4:30 PM	1	0	1	0	8	0	17	0	8	62	1	0	0	70	2	0	170	
4:35 PM	1	0	0	0	12	0	15	0	2	56	1	0	0	59	4	0	150	
4:40 PM	0	0	1	0	3	0	16	0	3	66	0	0	0	75	6	0	170	
4:45 PM	3	0	0	0	8	0	16	0	8	67	0	0	0	65	2	0	169	
4:50 PM	0	0	0	0	2	0	6	0	4	72	0	0	0	73	3	0	160	
4:55 PM	0	0	2	0	2	0	9	0	3	60	0	0	0	67	1	0	144	1876
5:00 PM	2	0	0	0	7	0	10	0	2	84	0	0	1	60	3	0	169	1911
5:05 PM	0	0	1	0	6	0	16	0	2	71	0	0	1	70	1	0	168	1916
5:10 PM	1	0	1	0	3	0	15	0	3	63	0	0	0	79	0	0	165	1947
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5:55 PM	1	0	0	0	0	0	5	0	1	63	0	0	0	66	0	0	136	1803

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	0	8	0	64	0	164	0	28	872	0	0	8	836	16	0	2008
Heavy Trucks	0	0	0		4	0	12		8	24	0		0	36	8		92
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

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Type of peak hour being reported: Intersection Peak

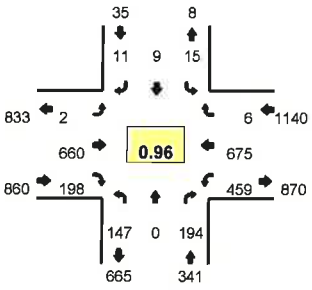
Method for determining peak hour: Total Entering Volume

LOCATION: SW Oregon St -- SW Tualatin Sherwood Rd

CITY/STATE: Sherwood, OR

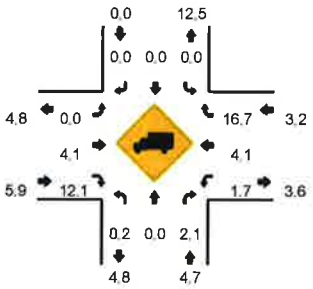
QC JOB #: 11224711

DATE: Wed, Sep 11 2013

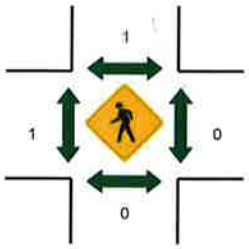


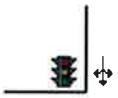
Peak-Hour: 4:55 PM -- 5:55 PM

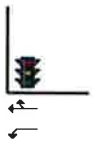
Peak 15-Min: 5:15 PM -- 5:30 PM

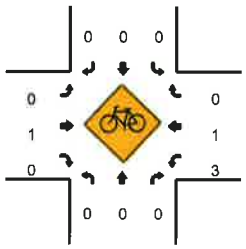


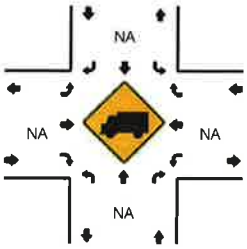
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

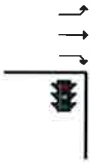


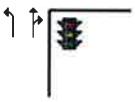


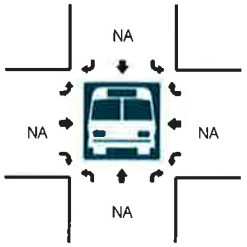












5-Min Count Period Beginning At	SW Oregon St (Northbound)				SW Oregon St (Southbound)				SW Tualatin Sherwood Rd (Eastbound)				SW Tualatin Sherwood Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	8	0	20	0	2	0	0	0	1	37	14	0	34	52	0	0	168	
4:05 PM	13	0	27	0	0	1	0	0	1	54	17	0	24	68	0	0	205	
4:10 PM	14	0	25	0	0	1	1	0	0	39	13	0	26	66	1	0	186	
4:15 PM	16	0	10	0	1	0	0	0	0	45	10	0	31	57	1	0	171	
4:20 PM	9	1	10	0	0	1	0	0	0	50	11	0	28	63	0	0	173	
4:25 PM	16	0	11	0	1	0	0	0	2	52	13	0	20	54	0	0	169	
4:30 PM	9	0	8	0	0	1	0	0	1	54	19	0	32	69	0	0	193	
4:35 PM	10	0	16	0	1	0	0	0	1	48	22	0	26	58	2	0	184	
4:40 PM	8	0	27	0	1	0	0	0	1	56	12	0	38	56	0	0	199	
4:45 PM	20	0	13	0	4	0	0	0	0	50	15	0	33	42	3	0	180	
4:50 PM	14	0	12	0	0	0	1	0	0	44	10	0	30	56	0	0	167	
4:55 PM	9	0	18	0	1	1	1	0	0	46	21	0	41	63	2	0	203	2198
5:00 PM	9	0	13	0	3	1	3	0	0	49	18	0	40	55	0	0	191	2221
5:05 PM	20	0	26	0	3	2	2	0	0	43	13	0	38	44	0	0	191	2207
5:10 PM	11	0	15	0	2	3	0	0	0	65	13	0	38	51	0	0	198	2219
5:15 PM	18	0	17	0	2	1	1	0	1	68	14	0	36	41	1	0	200	2248
5:20 PM	10	0	19	0	3	0	1	0	0	55	18	0	42	68	1	0	217	2292
5:25 PM	15	0	14	0	0	0	1	0	1	54	16	0	40	62	0	0	203	2326
5:30 PM	14	0	9	0	0	1	0	0	0	52	16	0	35	68	1	0	196	2329
5:35 PM	9	0	20	0	0	0	1	0	0	64	17	0	42	57	0	1	211	2356
5:40 PM	9	0	16	0	1	0	1	0	0	59	18	0	34	56	1	0	195	2352
5:45 PM	11	0	13	0	0	0	0	0	0	57	22	0	38	49	0	0	190	2362
5:50 PM	12	0	14	0	0	0	0	0	0	48	12	0	34	61	0	0	181	2376
5:55 PM	12	0	7	0	0	0	1	0	0	41	12	0	33	65	0	0	171	2344

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	172	0	200	0	20	4	12	0	8	708	192	0	472	684	8	0	2480
Heavy Trucks	4	0	0		0	0	0		0	28	16		0	32	0		80
Pedestrians		0				4				4				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 9/17/2013 1:32 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

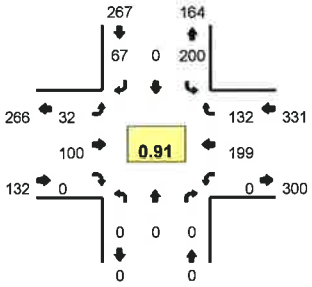
Method for determining peak hour: Total Entering Volume

LOCATION: SW Langer Farms Pkwy -- SW Oregon St

QC JOB #: 11224709

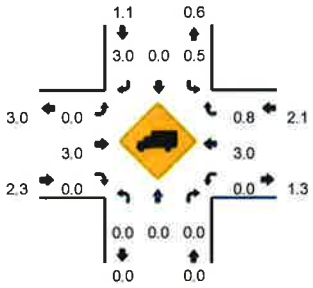
CITY/STATE: Sherwood, OR

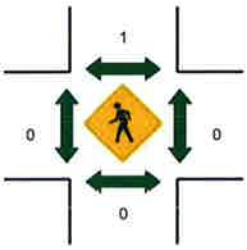
DATE: Thu, Sep 05 2013



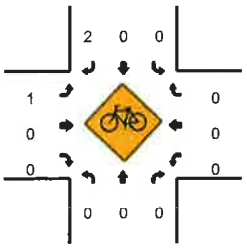
Peak-Hour: 5:00 PM -- 6:00 PM

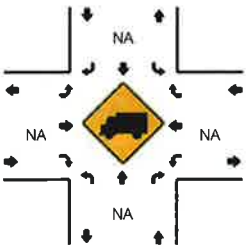
Peak 15-Min: 5:45 PM -- 6:00 PM



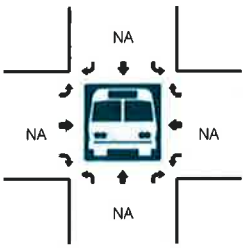












5-Min Count Period Beginning At	SW Langer Farms Pkwy (Northbound)				SW Langer Farms Pkwy (Southbound)				SW Oregon St (Eastbound)				SW Oregon St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	11	0	5	0	2	10	0	0	0	23	17	0	68	
4:05 PM	0	0	0	0	19	0	3	0	0	4	0	0	0	12	11	0	49	
4:10 PM	0	0	0	0	4	0	5	0	4	8	0	0	0	16	11	0	48	
4:15 PM	0	0	0	0	8	0	3	0	2	5	0	0	0	10	7	0	35	
4:20 PM	0	0	0	0	10	0	4	0	4	7	0	0	0	16	9	0	50	
4:25 PM	0	0	0	0	12	0	3	0	4	0	0	0	0	17	11	0	47	
4:30 PM	0	0	0	0	17	0	6	0	4	6	0	0	0	12	9	0	54	
4:35 PM	0	0	0	0	21	0	3	0	3	11	0	0	0	12	9	0	59	
4:40 PM	0	0	0	0	13	0	5	0	2	11	0	0	0	14	6	0	51	
4:45 PM	0	0	0	0	19	0	3	0	3	8	0	0	0	10	14	0	57	
4:50 PM	0	0	0	0	9	0	3	0	6	11	0	0	0	18	15	0	62	
4:55 PM	0	0	0	0	14	0	2	0	6	10	0	0	0	17	7	0	56	636
5:00 PM	0	0	0	0	20	0	3	0	2	11	0	0	0	13	7	0	56	624
5:05 PM	0	0	0	0	17	0	5	0	3	7	0	0	0	15	11	0	58	633
5:10 PM	0	0	0	0	15	0	7	0	2	8	0	0	0	31	18	0	81	666
5:15 PM	0	0	0	0	14	0	9	0	1	5	0	0	0	13	7	0	49	680
5:20 PM	0	0	0	0	13	0	4	0	4	6	0	0	0	13	12	0	52	682
5:25 PM	0	0	0	0	22	0	3	0	1	7	0	0	0	16	11	0	60	695
5:30 PM	0	0	0	0	13	0	4	0	2	13	0	0	0	15	11	0	58	699
5:35 PM	0	0	0	0	17	0	10	0	2	5	0	0	0	9	12	0	55	695
5:40 PM	0	0	0	0	12	0	6	0	1	8	0	0	0	19	15	0	61	705
5:45 PM	0	0	0	0	19	0	6	0	4	7	0	0	0	25	12	0	73	721
5:50 PM	0	0	0	0	19	0	7	0	6	12	0	0	0	12	6	0	62	721
5:55 PM	0	0	0	0	19	0	3	0	4	11	0	0	0	18	10	0	65	730

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	228	0	64	0	56	120	0	0	0	220	112	0	800
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	8	0		8
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	2		0	0	0		0	0	0		2
Railroad Stopped Buses																	

Comments:

Report generated on 9/17/2013 1:32 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SW 3rd St -- SW Washington St

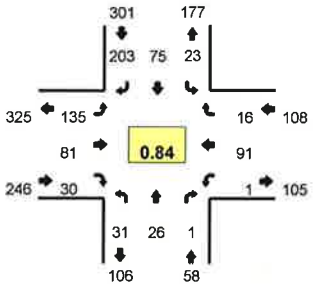
CITY/STATE: Sherwood, OR

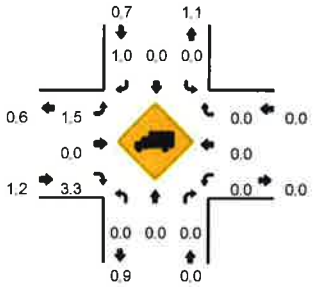
QC JOB #: 11224708

DATE: Thu, Sep 05 2013

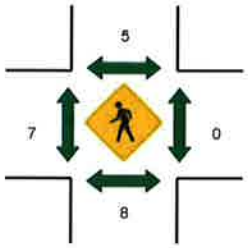
Peak-Hour: 5:00 PM -- 6:00 PM

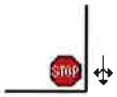
Peak 15-Min: 5:45 PM -- 6:00 PM

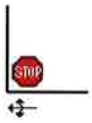


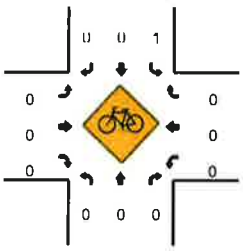


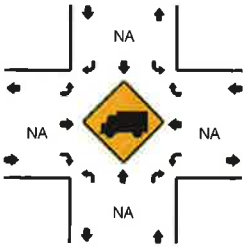
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES



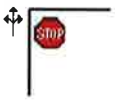


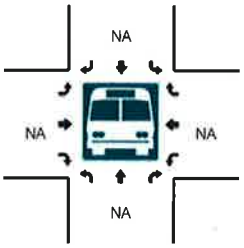












5-Min Count Period Beginning At	SW 3rd St (Northbound)				SW 3rd St (Southbound)				SW Washington St (Eastbound)				SW Washington St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	2	0	0	1	4	14	0	5	4	1	0	0	9	0	0	41	
4:05 PM	2	3	0	0	2	6	8	0	2	4	0	0	0	4	1	0	32	
4:10 PM	1	1	1	0	0	4	12	0	3	2	0	0	0	6	0	0	30	
4:15 PM	1	3	0	0	3	6	8	0	5	2	3	0	0	5	1	0	37	
4:20 PM	4	0	0	0	2	7	8	0	6	4	0	0	0	3	1	0	35	
4:25 PM	1	3	0	0	0	8	7	0	9	6	1	0	0	11	1	0	47	
4:30 PM	2	4	0	0	1	3	11	0	11	10	0	0	0	6	0	0	48	
4:35 PM	0	3	0	0	4	5	12	0	7	6	0	0	1	5	2	0	45	
4:40 PM	0	1	0	0	4	7	12	0	11	5	4	0	0	5	0	0	49	
4:45 PM	1	2	0	0	2	5	12	0	6	5	3	0	0	1	0	0	37	
4:50 PM	4	1	0	0	1	8	18	0	8	5	1	0	0	4	2	0	52	
4:55 PM	0	5	0	0	1	8	14	0	15	5	4	0	0	7	1	0	60	513
5:00 PM	7	0	0	0	2	4	15	0	10	4	3	0	0	9	1	0	55	527
5:05 PM	3	1	0	0	4	7	12	0	13	7	2	0	0	6	1	0	56	551
5:10 PM	1	2	0	0	2	7	19	0	11	7	4	0	0	13	1	0	67	588
5:15 PM	1	4	1	0	2	5	15	0	7	4	0	0	0	9	2	0	50	601
5:20 PM	1	3	0	0	1	5	19	0	8	2	1	0	0	7	0	0	47	613
5:25 PM	1	2	0	0	2	6	22	0	8	4	1	0	1	5	1	0	53	619
5:30 PM	2	3	0	0	1	5	24	0	13	9	2	0	0	3	2	0	64	635
5:35 PM	0	1	0	0	1	7	13	0	7	3	1	0	0	13	2	0	48	638
5:40 PM	1	0	0	0	1	7	21	0	10	5	6	0	0	9	0	0	60	649
5:45 PM	4	1	0	0	2	6	17	0	18	11	1	0	0	5	1	0	66	678
5:50 PM	5	3	0	0	3	11	15	0	23	14	3	0	0	3	3	0	83	709
5:55 PM	5	0	0	0	2	5	11	0	7	11	6	0	0	9	2	0	64	713

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	56	40	0	0	28	88	172	0	192	144	40	0	0	68	24	0	852
Heavy Trucks	0	0	0		0	0	0		0	0	4		0	0	0		4
Pedestrians		8				0				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 9/17/2013 1:32 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

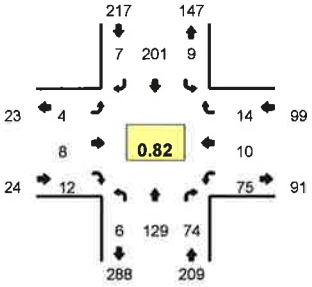
Method for determining peak hour: Total Entering Volume

LOCATION: SW Main St -- SW Railroad St

QC JOB #: 11224707

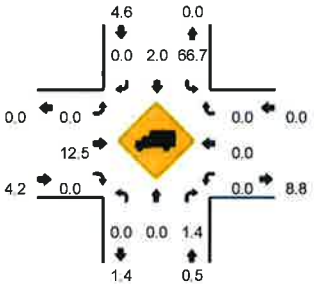
CITY/STATE: Sherwood, OR

DATE: Thu, Sep 05 2013

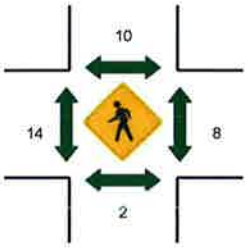


Peak-Hour: 5:00 PM -- 6:00 PM

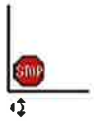
Peak 15-Min: 5:45 PM -- 6:00 PM



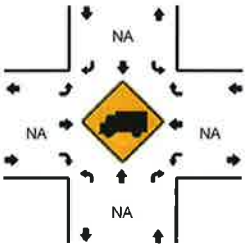
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES



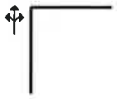


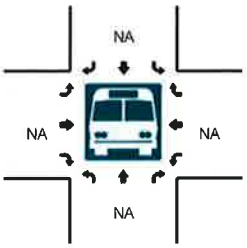












5-Min Count Period Beginning At	SW Main St (Northbound)				SW Main St (Southbound)				SW Railroad St (Eastbound)				SW Railroad St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	11	6	0	0	14	0	0	1	0	1	0	3	1	1	0	38	
4:05 PM	1	7	2	0	1	11	0	0	0	0	0	0	5	0	1	0	28	
4:10 PM	1	4	8	0	1	6	0	0	1	1	1	0	5	1	1	0	30	
4:15 PM	2	5	4	0	1	10	1	0	1	1	2	0	7	0	0	0	34	
4:20 PM	0	10	5	0	0	14	2	0	0	2	1	0	4	3	0	0	41	
4:25 PM	3	14	4	0	1	11	1	0	1	0	1	0	2	0	1	0	39	
4:30 PM	1	12	1	0	0	7	0	0	2	1	1	0	11	0	1	0	37	
4:35 PM	1	4	5	0	1	12	1	0	0	0	1	0	5	0	0	0	30	
4:40 PM	0	5	5	0	1	18	0	0	0	3	0	0	6	0	2	0	40	
4:45 PM	0	7	3	0	0	21	0	0	0	1	0	0	3	0	0	0	35	
4:50 PM	0	18	4	0	2	10	0	0	0	0	1	0	3	0	0	0	38	
4:55 PM	1	6	7	0	2	20	1	0	0	1	1	0	3	1	0	0	43	433
5:00 PM	0	12	4	0	0	13	0	0	1	2	1	0	9	0	2	0	44	439
5:05 PM	0	8	4	0	0	18	2	0	0	0	1	0	8	0	0	0	41	452
5:10 PM	0	12	8	0	0	18	0	0	0	0	1	0	3	0	2	0	44	466
5:15 PM	0	12	5	0	0	13	0	0	0	2	0	0	5	0	0	0	37	469
5:20 PM	3	11	3	0	2	8	1	0	0	2	1	0	7	0	1	0	39	467
5:25 PM	2	12	6	0	2	11	2	0	1	0	0	0	5	1	1	0	43	471
5:30 PM	0	9	11	0	0	18	0	0	0	0	1	0	8	1	0	0	48	482
5:35 PM	0	8	7	0	0	22	0	0	0	1	0	0	4	0	0	0	42	494
5:40 PM	1	5	7	0	2	22	0	0	0	0	1	0	1	3	2	0	44	498
5:45 PM	0	13	3	0	2	13	2	0	1	0	3	0	8	2	0	0	47	510
5:50 PM	0	15	10	0	1	25	0	0	0	0	1	0	7	0	4	0	63	535
5:55 PM	0	12	6	0	0	20	0	0	1	1	2	0	10	3	2	0	57	549

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	160	76	0	12	232	8	0	8	4	24	0	100	20	24	0	668
Heavy Trucks	0	0	0		8	4	0		0	0	0		0	0	0		12
Pedestrians		4				0				4				12			20
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 9/17/2013 1:32 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

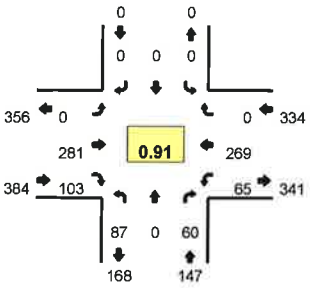
Type of peak hour being reported: Intersection Peak

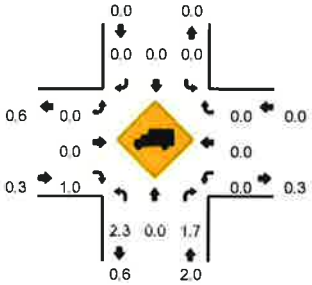
Method for determining peak hour: Total Entering Volume

LOCATION: SW Timbrel Ln -- SW Sunset Blvd
CITY/STATE: Sherwood, OR

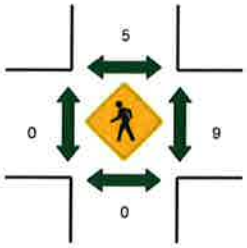
QC JOB #: 11224705
DATE: Thu, Sep 05 2013

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:40 PM -- 5:55 PM

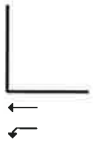


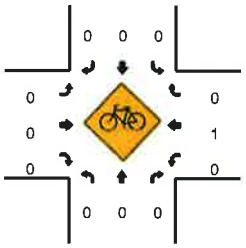


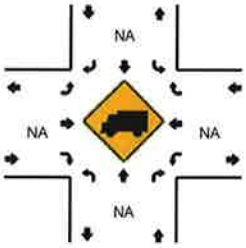
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

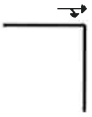




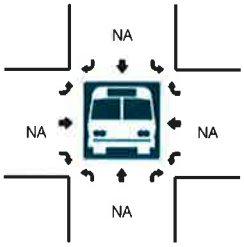












5-Min Count Period Beginning At	SW Timbrel Ln (Northbound)				SW Timbrel Ln (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	0	2	0	0	0	0	0	0	12	6	0	1	16	0	0	42	
4:05 PM	8	0	2	0	0	0	0	0	0	26	3	0	1	14	0	0	54	
4:10 PM	3	0	2	0	0	0	0	0	0	15	3	0	5	18	0	0	46	
4:15 PM	3	0	0	0	0	0	0	0	0	15	6	0	2	19	0	0	45	
4:20 PM	1	0	1	0	0	0	0	0	0	20	8	0	1	20	0	0	51	
4:25 PM	1	0	2	0	0	0	0	0	0	16	2	0	1	19	0	0	41	
4:30 PM	0	0	3	0	0	0	0	0	0	20	2	0	6	18	0	0	49	
4:35 PM	8	0	3	0	0	0	0	0	0	16	8	0	3	17	0	0	55	
4:40 PM	4	0	3	0	0	0	0	0	0	26	7	0	2	12	0	0	54	
4:45 PM	3	0	2	0	0	0	0	0	0	27	10	0	5	22	0	0	69	
4:50 PM	12	0	3	0	0	0	0	0	0	20	7	0	6	19	0	0	67	
4:55 PM	7	0	1	0	0	0	0	0	0	19	8	0	7	19	0	0	61	634
5:00 PM	6	0	3	0	0	0	0	0	0	29	5	0	6	23	0	0	72	664
5:05 PM	5	0	3	0	0	0	0	0	0	19	11	0	5	18	0	0	61	671
5:10 PM	7	0	4	0	0	0	0	0	0	25	6	0	5	24	0	0	71	696
5:15 PM	6	0	9	0	0	0	0	0	0	20	11	0	4	26	0	0	76	727
5:20 PM	3	0	2	0	0	0	0	0	0	22	6	0	4	22	0	0	59	735
5:25 PM	6	0	6	0	0	0	0	0	0	26	11	0	4	22	0	0	73	767
5:30 PM	7	0	3	0	0	0	0	0	0	28	6	0	7	18	0	0	69	787
5:35 PM	9	0	9	0	0	0	0	0	0	15	9	0	2	30	0	0	74	806
5:40 PM	8	0	1	0	0	0	0	0	0	33	11	0	7	18	0	0	78	830
5:45 PM	12	0	9	0	0	0	0	0	0	18	6	0	8	24	0	0	77	838
5:50 PM	9	0	5	0	0	0	0	0	0	22	13	0	6	28	0	0	83	854
5:55 PM	10	0	7	0	0	0	0	0	0	24	8	0	7	16	0	0	72	865

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	116	0	60	0	0	0	0	0	0	292	120	0	84	280	0	0	952
Heavy Trucks	4	0	4		0	0	0		0	0	0		0	0	0		8
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/17/2013 1:32 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SW Main St -- SW Sunset Blvd

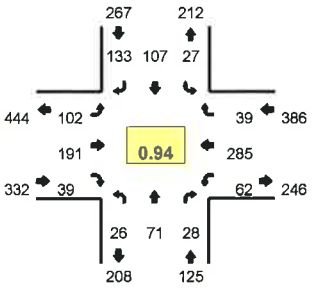
CITY/STATE: Sherwood, OR

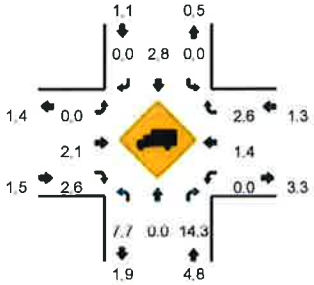
QC JOB #: 11224704

DATE: Thu, Sep 05 2013

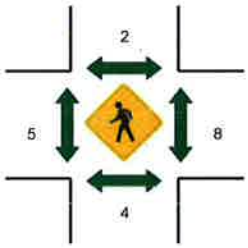
Peak-Hour: 5:00 PM -- 6:00 PM

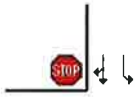
Peak 15-Min: 5:45 PM -- 6:00 PM

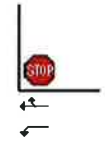


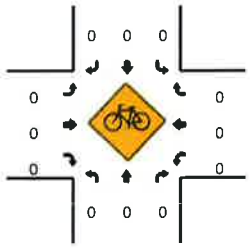


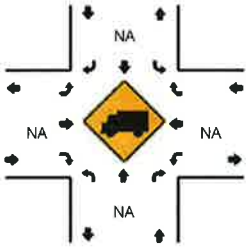
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES



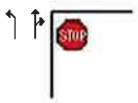


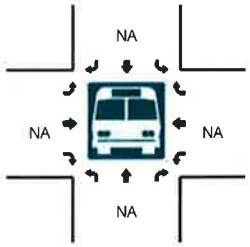












5-Min Count Period Beginning At	SW Main St (Northbound)				SW Main St (Southbound)				SW Sunset Blvd (Eastbound)				SW Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	6	1	0	0	8	5	0	10	11	3	0	4	22	1	0	71	
4:05 PM	1	4	4	0	3	6	3	0	3	6	1	0	3	14	1	0	49	
4:10 PM	2	5	1	0	1	5	8	0	6	10	2	0	4	15	0	0	59	
4:15 PM	1	2	3	0	1	8	6	0	4	11	1	0	5	22	5	0	69	
4:20 PM	6	4	2	0	0	9	6	0	7	6	2	0	4	16	1	0	63	
4:25 PM	2	3	2	0	1	4	10	0	7	15	0	0	4	25	4	0	77	
4:30 PM	4	6	1	0	3	9	10	0	8	14	2	0	2	23	2	0	84	
4:35 PM	1	3	2	0	1	8	9	0	8	11	2	0	10	17	3	0	75	
4:40 PM	4	5	3	0	5	6	7	0	4	16	4	0	4	22	0	0	80	
4:45 PM	4	8	1	0	4	10	8	0	7	22	1	0	4	27	1	0	97	
4:50 PM	2	8	2	0	2	8	7	0	8	17	3	0	6	28	2	0	93	
4:55 PM	2	5	2	0	2	6	10	0	6	6	3	0	1	28	3	0	74	891
5:00 PM	1	2	3	0	1	14	14	0	7	18	1	0	6	22	6	0	95	915
5:05 PM	2	9	3	0	0	15	10	0	5	14	4	0	4	32	1	0	99	965
5:10 PM	4	4	5	0	4	7	10	0	10	13	2	0	3	26	4	0	92	998
5:15 PM	2	6	1	0	5	10	7	0	6	12	6	0	8	19	3	0	85	1014
5:20 PM	3	4	5	0	2	5	10	0	10	17	0	0	4	25	3	0	88	1039
5:25 PM	2	9	0	0	0	8	9	0	6	16	2	0	4	26	2	0	82	1044
5:30 PM	3	7	2	0	2	7	9	0	9	21	2	0	10	20	4	0	96	1056
5:35 PM	0	5	2	0	3	10	16	0	4	13	6	0	7	23	8	0	97	1078
5:40 PM	0	5	0	0	3	5	15	0	7	16	2	0	2	23	2	0	80	1078
5:45 PM	4	9	4	0	1	3	11	0	7	21	2	0	5	26	1	0	94	1075
5:50 PM	5	6	3	0	3	9	11	0	17	13	8	0	3	20	4	0	102	1084
5:55 PM	0	5	0	0	3	16	11	0	14	17	4	0	6	23	1	0	100	1110

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	36	80	28	0	28	112	132	0	152	204	56	0	56	276	24	0	1184
Heavy Trucks	0	0	8		0	4	0		0	0	0		0	0	0		12
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 9/17/2013 1:32 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

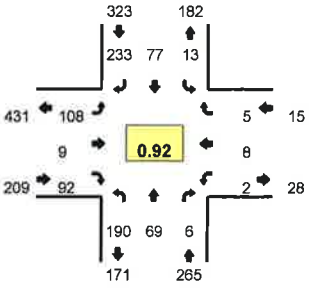
LOCATION: SW Murdock Rd/SW Baker Rd -- SW Sunset Blvd/ SW McKinley Dr

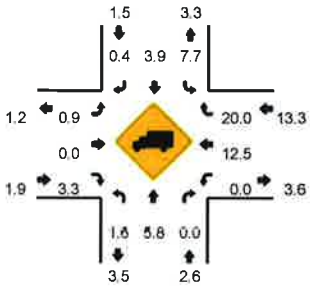
QC JOB #: 11224703

CITY/STATE: Sherwood, OR

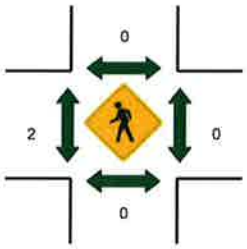
DATE: Thu, Sep 05 2013

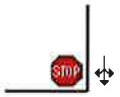
Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 5:25 PM -- 5:40 PM



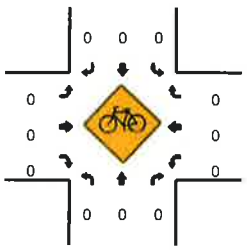


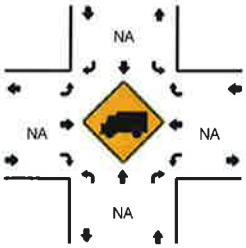
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

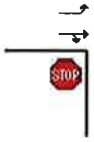


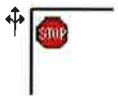


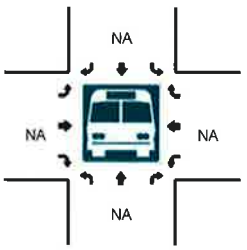












5-Min Count Period Beginning At	SW Murdock Rd/SW Baker Rd (Northbound)				SW Murdock Rd/SW Baker Rd (Southbound)				SW Sunset Blvd/ SW McKinley Dr (Eastbound)				SW Sunset Blvd/ SW McKinley Dr (Westbound)				DrTotal	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	10	3	0	0	1	3	10	0	6	1	7	0	0	3	1	0	45	
4:05 PM	11	3	0	0	0	8	8	0	6	0	5	0	0	1	0	0	42	
4:10 PM	14	5	1	0	0	6	23	0	6	2	3	0	1	1	2	0	64	
4:15 PM	11	2	0	0	0	1	20	0	8	0	4	0	0	1	0	0	47	
4:20 PM	14	6	0	0	1	4	22	0	2	0	5	0	0	0	0	0	54	
4:25 PM	18	6	0	0	1	7	26	0	8	2	5	0	1	0	1	0	75	
4:30 PM	5	6	0	0	1	5	21	0	7	0	4	0	0	1	1	0	51	
4:35 PM	13	7	0	0	1	7	16	0	5	0	4	0	0	1	0	0	54	
4:40 PM	13	8	1	0	1	9	19	0	8	0	9	0	1	0	1	0	70	
4:45 PM	11	7	1	0	2	6	30	0	9	1	7	0	0	1	1	0	76	
4:50 PM	19	6	0	0	1	6	17	0	8	0	11	0	1	2	1	0	72	
4:55 PM	16	3	0	0	2	8	18	0	3	1	4	0	0	1	0	0	56	706
5:00 PM	20	4	0	0	0	8	22	0	13	1	6	0	0	0	0	0	74	735
5:05 PM	21	6	0	0	0	5	20	0	10	1	5	0	0	1	0	0	69	762
5:10 PM	18	4	1	0	2	4	17	0	8	2	7	0	0	1	0	0	64	762
5:15 PM	15	2	1	0	1	5	13	0	9	0	6	0	0	0	0	0	52	767
5:20 PM	17	6	0	0	0	5	14	0	9	1	7	0	0	0	0	0	59	772
5:25 PM	16	10	0	0	2	5	21	0	9	0	10	0	0	1	2	0	76	773
5:30 PM	11	5	1	0	1	7	21	0	10	1	10	0	0	1	0	0	68	790
5:35 PM	13	8	1	0	1	9	21	0	12	1	10	0	0	0	0	0	76	812
5:40 PM	18	3	1	0	3	5	16	0	8	1	6	0	0	2	0	0	63	805
5:45 PM	10	8	0	0	1	5	17	0	5	3	10	0	0	0	1	0	60	789
5:50 PM	13	7	0	0	1	3	16	0	8	1	7	0	1	0	2	0	59	776
5:55 PM	11	4	0	0	5	13	19	0	8	1	13	0	0	0	2	0	76	796

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	160	92	8	0	16	84	252	0	124	8	120	0	0	8	8	0	880
Heavy Trucks	4	4	0		0	0	0		0	0	8		0	0	4		20
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/17/2013 1:32 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

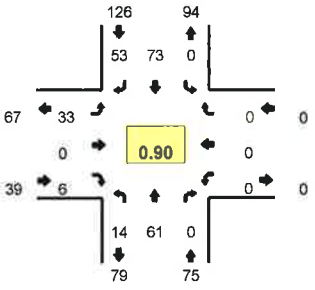
Type of peak hour being reported: Intersection Peak

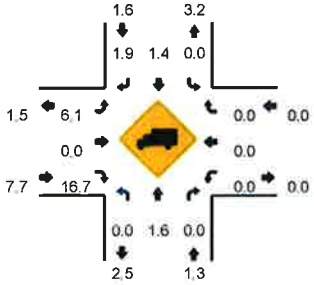
Method for determining peak hour: Total Entering Volume

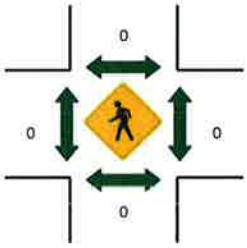
LOCATION: SW Ladd Hill Rd -- SW Brookman Rd
CITY/STATE: Sherwood, OR

QC JOB #: 11224702
DATE: Thu, Sep 05 2013

Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 5:25 PM -- 5:40 PM

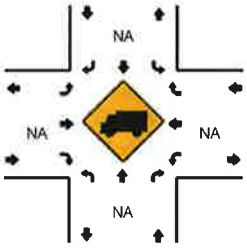




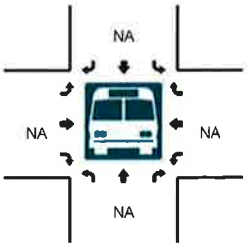












5-Min Count Period Beginning At	SW Ladd Hill Rd (Northbound)				SW Ladd Hill Rd (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	2	0	0	0	5	5	0	2	0	2	0	0	0	0	0	16	
4:05 PM	0	3	0	0	0	2	3	0	3	0	1	0	0	0	0	0	12	
4:10 PM	0	1	0	0	0	5	3	0	3	0	0	0	0	0	0	0	12	
4:15 PM	1	5	0	0	0	6	3	0	1	0	0	0	0	0	0	0	16	
4:20 PM	2	5	0	0	0	3	3	0	2	0	3	0	0	0	0	0	18	
4:25 PM	1	1	0	0	0	3	4	0	1	0	0	0	0	0	0	0	10	
4:30 PM	0	5	0	0	0	8	1	0	1	0	0	0	0	0	0	0	15	
4:35 PM	2	3	0	0	0	3	1	0	3	0	1	0	0	0	0	0	13	
4:40 PM	0	8	0	0	0	5	4	0	3	0	1	0	0	0	0	0	21	
4:45 PM	0	6	0	0	0	3	5	0	6	0	0	0	0	0	0	0	20	
4:50 PM	2	6	0	0	0	4	5	0	2	0	0	0	0	0	0	0	19	
4:55 PM	1	6	0	0	0	3	4	0	0	0	0	0	0	0	0	0	14	186
5:00 PM	2	3	0	0	0	12	4	0	1	0	1	0	0	0	0	0	23	193
5:05 PM	2	4	0	0	0	6	7	0	6	0	0	0	0	0	0	0	25	206
5:10 PM	0	7	0	0	0	4	1	0	2	0	0	0	0	0	0	0	14	208
5:15 PM	1	2	0	0	0	9	9	0	2	0	0	0	0	0	0	0	23	215
5:20 PM	2	3	0	0	0	4	2	0	3	0	0	0	0	0	0	0	14	211
5:25 PM	2	6	0	0	0	4	4	0	2	0	0	0	0	0	0	0	18	219
5:30 PM	2	7	0	0	0	6	7	0	3	0	2	0	0	0	0	0	27	231
5:35 PM	0	3	0	0	0	13	1	0	3	0	2	0	0	0	0	0	22	240
5:40 PM	2	2	0	0	0	5	2	0	2	0	1	0	0	0	0	0	14	233
5:45 PM	0	5	0	0	0	4	2	0	4	0	0	0	0	0	0	0	15	228
5:50 PM	1	3	0	0	0	5	4	0	0	0	0	0	0	0	0	0	13	222
5:55 PM	0	4	0	0	0	9	5	0	1	0	0	0	0	0	0	0	19	227

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	16	64	0	0	0	92	48	0	32	0	16	0	0	0	0	0	268
Heavy Trucks	0	0	0		0	0	4		4	0	0		0	0	0		8
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 9/17/2013 1:32 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

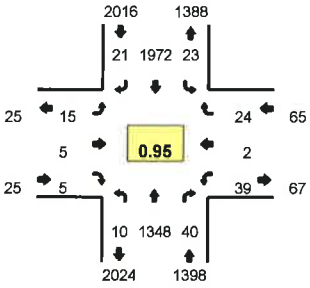
Type of peak hour being reported: Intersection Peak

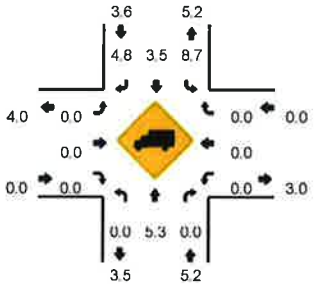
Method for determining peak hour: Total Entering Volume

LOCATION: 99W -- SW Brookman Rd
CITY/STATE: Sherwood, OR

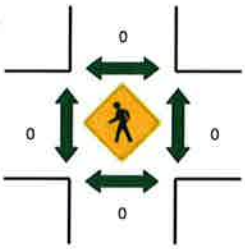
QC JOB #: 11224701
DATE: Thu, Sep 05 2013

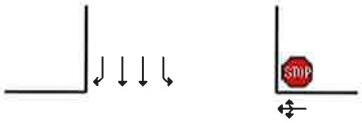
Peak-Hour: 4:20 PM -- 5:20 PM
Peak 15-Min: 4:40 PM -- 4:55 PM

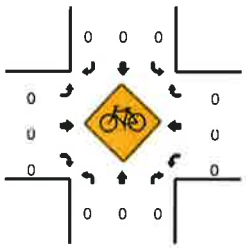


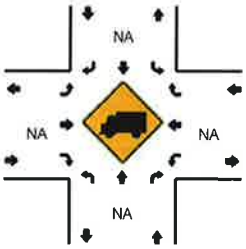


Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

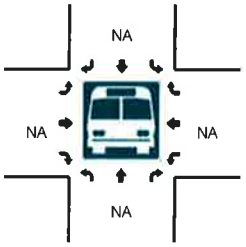












5-Min Count Period Beginning At	99W (Northbound)				99W (Southbound)				SW Brookman Rd (Eastbound)				SW Brookman Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	90	1	2	0	116	2	1	0	1	1	0	3	1	0	0	218	
4:05 PM	1	81	0	1	2	180	0	0	2	0	1	0	1	0	1	0	270	
4:10 PM	0	121	4	0	2	158	2	0	2	0	1	0	3	0	2	0	295	
4:15 PM	1	101	6	0	0	147	2	1	0	0	0	0	3	0	2	0	263	
4:20 PM	0	110	4	0	1	186	1	0	0	0	0	0	0	0	3	0	305	
4:25 PM	0	100	2	0	1	138	3	0	2	0	0	0	4	0	1	0	251	
4:30 PM	0	106	5	3	3	146	0	0	0	0	0	0	0	0	1	0	264	
4:35 PM	0	117	5	1	3	140	1	0	0	0	0	0	0	1	2	0	270	
4:40 PM	0	125	5	1	2	180	2	1	5	1	1	0	2	1	2	0	328	
4:45 PM	0	107	6	1	3	162	1	0	0	1	0	0	6	0	2	0	289	
4:50 PM	0	120	2	1	1	172	2	0	2	0	0	0	3	0	1	0	304	
4:55 PM	0	134	1	0	1	171	2	0	1	0	0	0	4	0	2	0	316	3373
5:00 PM	0	96	3	0	3	186	3	0	0	0	1	0	5	0	2	0	299	3454
5:05 PM	2	104	2	1	0	176	4	0	1	1	0	0	7	0	3	0	301	3485
5:10 PM	0	118	2	0	1	137	0	0	4	2	3	0	5	0	3	0	275	3465
5:15 PM	0	111	3	0	3	178	2	0	0	0	0	0	3	0	2	0	302	3504
5:20 PM	0	104	3	1	4	129	4	0	2	0	0	0	3	1	2	0	253	3452
5:25 PM	1	96	6	0	2	149	1	0	2	0	0	0	4	0	2	0	263	3464
5:30 PM	0	127	6	1	3	129	0	0	1	0	1	0	4	2	2	0	276	3476
5:35 PM	0	103	2	2	4	150	3	0	0	1	0	0	5	0	0	0	270	3476
5:40 PM	0	120	3	0	3	158	1	1	2	0	1	0	3	0	0	0	292	3440
5:45 PM	1	117	0	0	5	135	2	0	2	2	0	0	2	1	1	0	268	3419
5:50 PM	0	109	1	0	4	141	0	1	0	0	0	0	4	0	1	0	261	3376
5:55 PM	0	84	3	0	4	143	2	0	6	1	0	0	4	0	2	0	249	3309

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1408	52	12	24	2056	20	4	28	8	4	0	44	4	20	0	3684
Heavy Trucks	0	72	0		0	48	0		0	0	0		0	0	0		120
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 9/17/2013 1:32 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

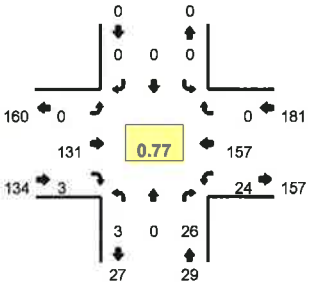
Type of peak hour being reported: Intersection Peak

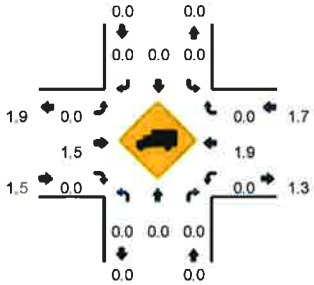
Method for determining peak hour: Total Entering Volume

LOCATION: SW Copper Terr -- SW Edy Rd
CITY/STATE: Sherwood, OR

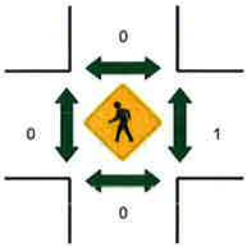
QC JOB #: 10871808
DATE: Wed, Dec 19 2012

Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:20 PM -- 5:35 PM

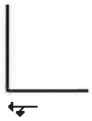


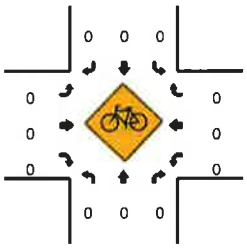


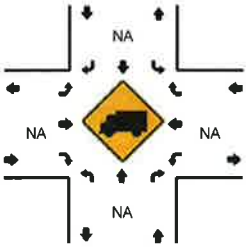
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES



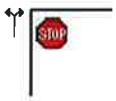


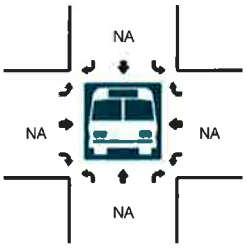












5-Min Count Period Beginning At	SW Copper Terr (Northbound)				SW Copper Terr (Southbound)				SW Edy Rd (Eastbound)				SW Edy Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	3	0	0	0	0	0	0	11	0	0	0	12	0	0	26	
4:05 PM	0	0	4	0	0	0	0	0	0	9	0	0	2	6	0	0	21	
4:10 PM	0	0	3	0	0	0	0	0	0	3	0	0	1	2	0	0	9	
4:15 PM	0	0	1	0	0	0	0	0	0	5	0	0	1	8	0	0	15	
4:20 PM	1	0	0	0	0	0	0	0	0	10	1	0	4	11	0	0	27	
4:25 PM	1	0	3	0	0	0	0	0	0	14	0	0	3	18	0	0	39	
4:30 PM	1	0	6	0	0	0	0	0	0	9	0	0	1	16	0	0	33	
4:35 PM	1	0	4	0	0	0	0	0	0	11	0	0	1	16	0	0	33	
4:40 PM	0	0	1	0	0	0	0	0	0	4	1	0	0	12	0	0	18	
4:45 PM	1	0	6	0	0	0	0	0	0	9	0	0	2	6	0	0	24	
4:50 PM	0	0	1	0	0	0	0	0	0	15	0	0	2	9	0	0	27	
4:55 PM	0	0	0	0	0	0	0	0	0	15	0	0	4	8	0	0	27	299
5:00 PM	0	0	5	0	0	0	0	0	0	10	0	0	2	17	0	0	34	307
5:05 PM	1	0	0	0	0	0	0	0	0	10	1	0	3	8	0	0	23	309
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5:25 PM	0	0	4	0	0	0	0	0	0	8	0	0	1	20	0	0	33	332
5:30 PM	0	0	3	0	0	0	0	0	0	18	0	0	2	22	0	0	45	344
5:35 PM	0	0	2	0	0	0	0	0	0	14	3	0	1	7	0	0	27	338
5:40 PM	1	0	2	0	0	0	0	0	0	4	0	0	1	12	0	0	20	340
5:45 PM	0	0	1	0	0	0	0	0	0	8	0	0	2	11	0	0	22	338
5:50 PM	0	0	1	0	0	0	0	0	0	14	0	0	1	10	0	0	26	337
5:55 PM	0	0	0	0	0	0	0	0	0	12	1	0	2	12	0	0	27	337

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	28	0	0	0	0	0	0	168	0	0	20	232	0	0	448
Heavy Trucks	0	0	0		0	0	0		0	8	0		0	0	0		8
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 9/27/2013 5:17 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

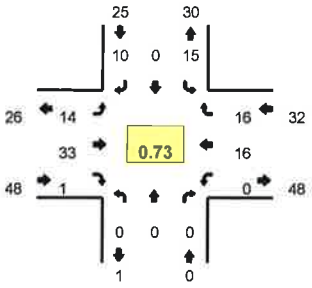
Type of peak hour being reported: Intersection Peak

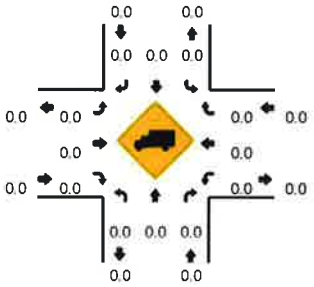
Method for determining peak hour: Total Entering Volume

LOCATION: SW Copper Terr -- SW Handley St
CITY/STATE: Sherwood, OR

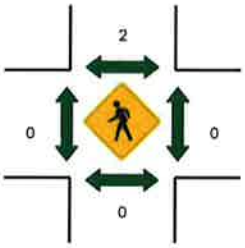
QC JOB #: 10871802
DATE: Wed, Dec 19 2012

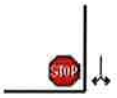
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:20 PM -- 5:35 PM

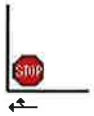


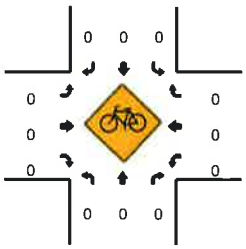


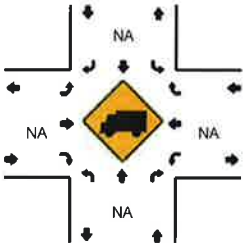
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES





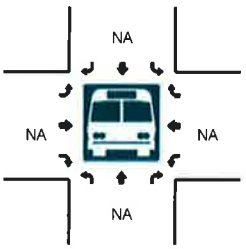












5-Min Count Period Beginning At	SW Copper Terr (Northbound)				SW Copper Terr (Southbound)				SW Handley St (Eastbound)				SW Handley St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	4	
4:05 PM	0	0	0	0	2	1	0	0	1	1	0	0	0	0	1	0	6	
4:10 PM	0	0	0	0	0	0	1	0	1	2	0	0	0	0	1	0	5	
4:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	
4:20 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2	
4:25 PM	0	0	0	0	0	0	1	0	1	3	0	0	0	0	0	0	5	
4:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	2	
4:35 PM	0	0	0	0	2	0	0	0	0	2	0	0	0	1	2	0	7	
4:40 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	2	3	0	6	
4:45 PM	0	0	0	0	1	0	0	0	1	2	0	0	0	3	0	0	7	
4:50 PM	0	0	0	0	1	0	1	0	0	4	0	0	0	4	0	0	10	
4:55 PM	0	0	0	0	0	0	2	0	0	1	0	0	0	0	1	0	4	60
5:00 PM	0	0	0	0	1	0	1	0	0	2	0	0	0	0	1	0	5	61
5:05 PM	0	0	0	0	1	0	1	0	1	2	0	0	0	2	1	0	8	63
5:10 PM	0	0	0	0	2	0	0	0	2	0	0	0	0	0	1	0	5	63
5:15 PM	0	0	0	0	1	0	1	0	0	2	0	0	0	0	0	0	4	65
5:20 PM	0	0	0	0	1	0	2	0	3	1	0	0	0	3	3	0	13	76
5:25 PM	0	0	0	0	0	0	0	0	4	3	0	0	0	1	3	0	11	82
5:30 PM	0	0	0	0	2	0	1	0	3	3	0	0	0	0	3	0	12	92
5:35 PM	0	0	0	0	3	0	3	0	0	2	0	0	0	2	3	0	13	98
5:40 PM	0	0	0	0	1	0	0	0	0	7	0	0	0	3	0	0	11	103
5:45 PM	0	0	0	0	2	0	0	0	0	4	0	0	0	1	1	0	8	104
5:50 PM	0	0	0	0	1	0	1	0	1	3	0	0	0	2	0	0	8	102
5:55 PM	0	0	0	0	0	0	0	0	0	4	1	0	0	2	0	0	7	105

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	12	0	12	0	40	28	0	0	0	16	36	0	144
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				8				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 9/27/2013 5:17 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

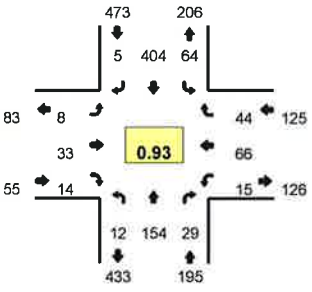
Method for determining peak hour: Total Entering Volume

LOCATION: Elwert Rd -- Edy Rd

CITY/STATE: Sherwood, OR

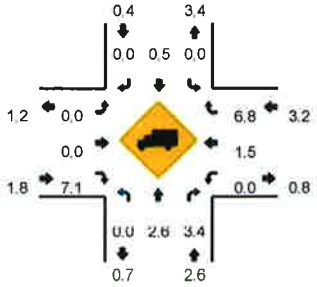
QC JOB #: 10781226

DATE: Tue, Jun 26 2012

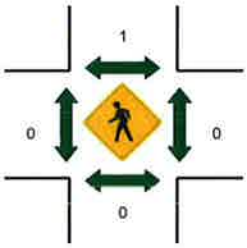


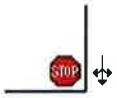
Peak-Hour: 5:00 PM -- 6:00 PM

Peak 15-Min: 5:05 PM -- 5:20 PM

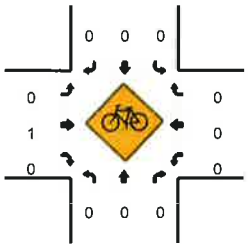


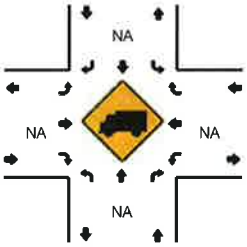
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES



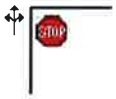


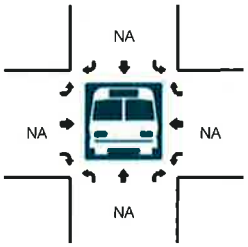












5-Min Count Period Beginning At	Elwert Rd (Northbound)				Elwert Rd (Southbound)				Edy Rd (Eastbound)				Edy Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	6	1	0	4	24	0	0	3	3	0	0	2	1	4	0	48	
4:05 PM	1	12	0	0	7	14	0	0	1	6	1	0	3	5	4	0	54	
4:10 PM	2	12	0	0	2	20	0	0	0	2	2	0	2	5	1	0	48	
4:15 PM	0	8	2	0	0	21	0	0	0	2	0	0	0	4	1	0	38	
4:20 PM	0	10	1	0	3	26	0	0	0	2	0	0	0	2	4	0	48	
4:25 PM	0	14	2	0	1	31	1	0	0	1	0	0	1	7	4	0	62	
4:30 PM	0	5	2	0	4	29	0	0	0	4	1	0	1	5	2	0	53	
4:35 PM	1	14	2	0	4	17	3	0	0	0	1	0	1	4	2	0	49	
4:40 PM	0	11	1	0	5	39	1	0	1	3	0	0	2	9	3	0	75	
4:45 PM	0	6	4	0	6	29	0	0	0	4	1	0	1	7	2	0	60	
4:50 PM	1	17	1	0	6	34	0	0	1	3	1	0	2	8	1	0	75	
4:55 PM	1	9	3	0	2	32	1	0	0	1	2	0	2	10	3	0	66	676
5:00 PM	0	11	2	0	8	35	1	0	0	1	1	0	0	6	4	0	69	697
5:05 PM	1	11	3	0	3	46	0	0	0	5	0	0	0	6	3	0	78	721
5:10 PM	2	16	2	0	4	33	0	0	3	3	2	0	1	5	4	0	75	748
5:15 PM	0	12	0	0	9	35	0	0	0	5	0	0	1	7	5	0	74	784
5:20 PM	0	12	2	0	4	31	1	0	2	5	0	0	1	4	5	0	67	803
5:25 PM	1	12	1	0	8	40	1	0	0	2	5	0	2	4	2	0	78	819
5:30 PM	2	12	4	0	5	25	0	0	0	0	0	0	0	4	5	0	57	823
5:35 PM	1	7	6	0	8	39	0	0	0	2	0	0	1	6	2	0	72	846
5:40 PM	1	16	2	0	3	25	1	0	0	1	0	0	4	4	5	0	62	833
5:45 PM	2	14	2	0	4	18	0	0	0	2	2	0	1	6	4	0	55	828
5:50 PM	1	13	4	0	3	41	1	0	2	4	2	0	1	10	3	0	85	838
5:55 PM	1	18	1	0	5	36	0	0	1	3	2	0	3	4	2	0	76	848

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	156	20	0	64	456	0	0	12	52	8	0	8	72	48	0	908
Heavy Trucks	0	8	0		0	4	0		0	0	0		0	4	0		16
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	1	0		0	0	0		1
Railroad Stopped Buses																	

Comments:

Report generated on 9/27/2013 5:17 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

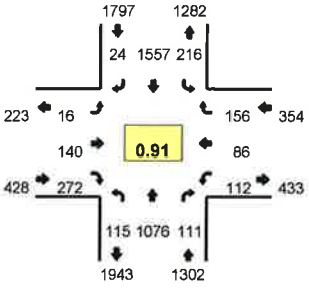
Type of peak hour being reported: Intersection Peak

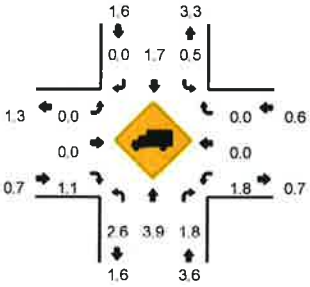
Method for determining peak hour: Total Entering Volume

LOCATION: Hwy 99W -- Sunset Blvd
CITY/STATE: Sherwood, OR

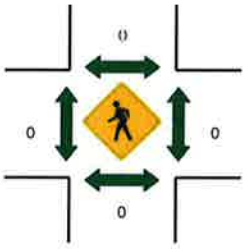
QC JOB #: 10781224
DATE: Tue, Jun 26 2012

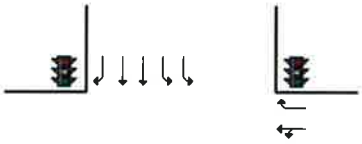
Peak-Hour: 4:55 PM -- 5:55 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

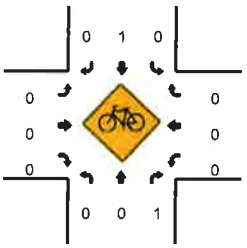


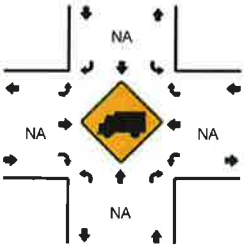


Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

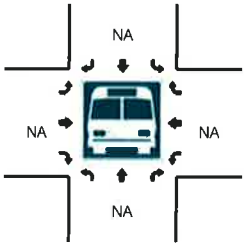












5-Min Count Period Beginning At	Hwy 99W (Northbound)				Hwy 99W (Southbound)				Sunset Blvd (Eastbound)				Sunset Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	87	5	0	12	118	1	3	0	2	9	0	10	5	10	0	267	
4:05 PM	8	94	5	0	7	112	1	0	0	5	19	0	14	9	7	0	281	
4:10 PM	7	106	11	0	9	158	2	2	1	8	13	0	5	5	15	0	342	
4:15 PM	6	66	10	0	11	110	2	3	0	4	16	0	18	2	22	0	270	
4:20 PM	9	107	13	0	14	108	3	1	1	7	15	0	18	10	9	0	315	
4:25 PM	8	120	9	0	9	148	1	1	1	6	21	0	7	1	11	0	343	
4:30 PM	10	84	10	0	19	120	2	3	1	6	29	0	13	5	9	0	311	
4:35 PM	10	84	5	0	14	156	1	4	1	6	17	0	8	3	9	0	318	
4:40 PM	8	75	8	0	15	136	2	2	0	5	17	0	13	3	9	0	293	
4:45 PM	8	65	15	0	11	106	1	0	2	15	30	0	14	6	14	0	287	
4:50 PM	11	105	7	0	15	90	1	2	1	15	25	0	10	8	11	0	301	
4:55 PM	7	76	10	0	12	125	0	1	1	11	26	0	9	11	10	0	299	3627
5:00 PM	3	73	11	0	17	115	3	2	0	13	30	0	13	9	7	0	296	3656
5:05 PM	20	100	6	1	15	127	4	3	3	9	22	0	10	7	8	0	335	3710
5:10 PM	7	101	12	0	19	179	4	3	0	6	21	0	7	2	17	0	378	3746
5:15 PM	9	94	14	0	15	146	1	3	1	12	24	0	12	6	17	0	354	3830
5:20 PM	14	101	8	0	12	110	0	4	1	13	27	0	6	7	12	0	315	3830
5:25 PM	7	86	6	0	10	142	1	2	1	7	18	0	5	14	8	0	306	3793
5:30 PM	10	92	14	0	19	129	5	5	0	16	24	0	5	4	14	0	337	3819
5:35 PM	2	65	9	1	18	119	1	3	1	14	18	0	18	8	18	0	295	3796
5:40 PM	15	115	11	0	14	107	3	1	6	14	22	0	10	6	15	0	339	3842
5:45 PM	9	94	4	0	8	137	1	2	1	14	14	0	10	7	17	0	318	3873
5:50 PM	10	79	7	0	23	121	1	5	1	11	26	0	7	5	13	0	309	3881
5:55 PM	12	93	6	0	16	94	2	5	3	10	29	0	7	8	12	0	297	3879

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	144	1180	128	4	196	1808	36	36	16	108	268	0	116	60	168	0	4268
Heavy Trucks	8	48	8		0	24	0		0	0	4		0	0	0		92
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 9/27/2013 5:17 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

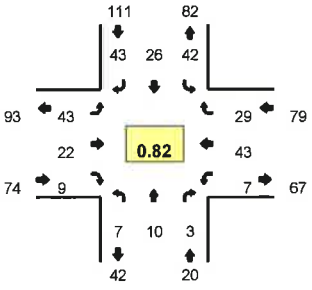
Method for determining peak hour: Total Entering Volume

LOCATION: SW Baler Way -- SW Century Dr

QC JOB #: 10702329

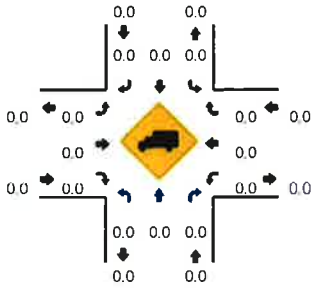
CITY/STATE: Sherwood, OR

DATE: Tue, Jan 24 2012

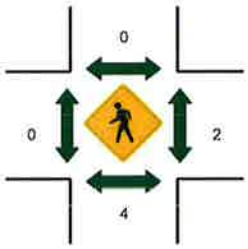


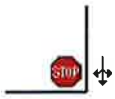
Peak-Hour: 4:35 PM -- 5:35 PM

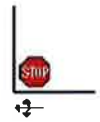
Peak 15-Min: 4:35 PM -- 4:50 PM

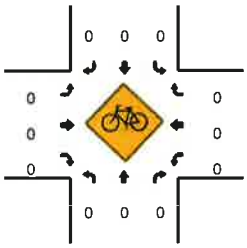


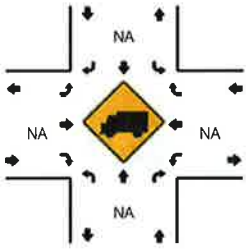
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES



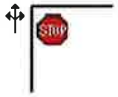


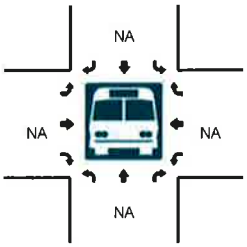












5-Min Count Period Beginning At	SW Baler Way (Northbound)				SW Baler Way (Southbound)				SW Century Dr (Eastbound)				SW Century Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	0	0	0	3	1	2	0	0	1	0	0	1	4	2	0	15	
4:05 PM	1	0	0	0	3	7	2	0	1	1	1	0	0	3	0	0	19	
4:10 PM	0	1	0	0	0	1	3	0	2	2	0	0	0	2	2	0	13	
4:15 PM	1	1	1	0	2	3	4	0	2	1	0	0	0	3	5	0	23	
4:20 PM	0	0	0	0	3	3	2	0	4	1	0	0	1	4	1	0	19	
4:25 PM	1	1	0	0	2	3	2	0	3	1	0	0	0	2	2	0	17	
4:30 PM	1	0	0	0	1	2	1	0	4	2	1	0	0	1	3	0	16	
4:35 PM	1	2	0	0	5	0	1	0	4	1	0	0	0	6	2	0	22	
4:40 PM	1	0	0	0	7	1	5	0	6	5	1	0	1	4	1	0	32	
4:45 PM	3	4	1	0	0	1	6	0	4	2	2	0	2	3	5	0	33	
4:50 PM	0	2	0	0	3	0	4	0	4	0	1	0	0	0	1	0	15	
4:55 PM	0	0	1	0	7	5	5	0	3	2	0	0	0	1	4	0	28	252
5:00 PM	0	2	0	0	3	1	3	0	4	2	1	0	2	7	6	0	31	268
5:05 PM	0	0	0	0	3	1	2	0	1	2	0	0	1	6	0	0	16	265
5:10 PM	1	0	1	0	3	4	5	0	6	4	0	0	1	4	2	0	31	283
5:15 PM	0	0	0	0	1	3	2	0	3	0	1	0	0	2	3	0	15	275
5:20 PM	0	0	0	0	2	4	7	0	4	1	0	0	0	3	1	0	22	278
5:25 PM	0	0	0	0	4	3	1	0	2	0	1	0	0	2	3	0	16	277
5:30 PM	1	0	0	0	4	3	2	0	2	3	2	0	0	5	1	0	23	284
5:35 PM	1	1	0	0	1	1	4	0	5	5	0	0	0	2	0	0	20	282
5:40 PM	1	2	0	0	4	2	3	0	3	2	1	0	0	0	1	0	19	269
5:45 PM	0	0	0	0	2	1	1	0	2	1	0	0	0	1	1	0	9	245
5:50 PM	0	0	0	0	2	1	3	0	2	4	2	0	1	2	2	0	19	249
5:55 PM	1	2	0	0	3	1	1	0	7	4	0	0	1	3	1	0	24	245

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	24	4	0	48	8	48	0	56	32	12	0	12	52	32	0	348
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				8			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 9/27/2013 5:17 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

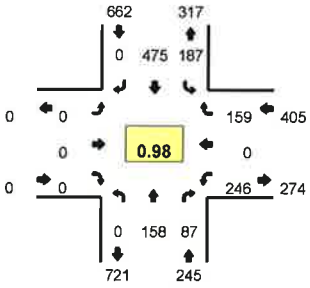
Type of peak hour being reported: Intersection Peak

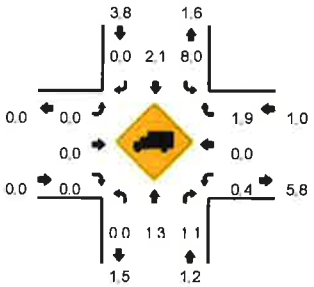
Method for determining peak hour: Total Entering Volume

LOCATION: SW Oregon St -- SW Tonquin Rd
CITY/STATE: Sherwood, OR

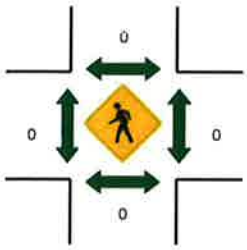
QC JOB #: 10562836
DATE: Tue, Dec 07 2010

Peak-Hour: 4:40 PM -- 5:40 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

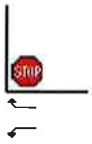


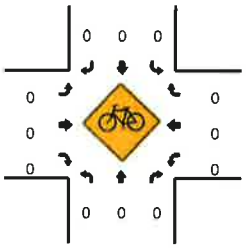


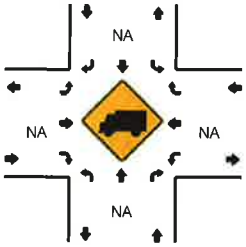
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES



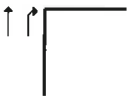


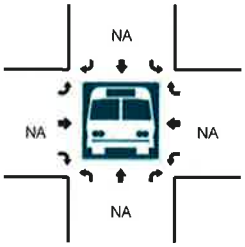












5-Min Count Period Beginning At	SW Oregon St (Northbound)				SW Oregon St (Southbound)				SW Tonquin Rd (Eastbound)				SW Tonquin Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:10 PM	0	17	6	0	15	37	0	0	0	0	0	0	11	0	15	0	101	
4:15 PM	0	13	8	0	13	23	0	0	0	0	0	0	25	0	9	0	91	
4:20 PM	0	5	5	0	14	34	0	0	0	0	0	0	19	0	10	0	87	
4:25 PM	0	10	5	0	9	32	0	0	0	0	0	0	20	0	6	0	82	
4:30 PM	0	22	6	0	17	29	0	0	0	0	0	0	15	0	7	0	96	
4:35 PM	0	15	2	0	14	24	0	0	0	0	0	0	22	0	14	0	91	
4:40 PM	0	17	7	0	16	40	0	0	0	0	0	0	18	0	16	0	114	
4:45 PM	0	13	7	0	17	53	0	0	0	0	0	0	21	0	11	0	122	
4:50 PM	0	6	7	0	19	31	0	0	0	0	0	0	19	0	10	0	92	
4:55 PM	0	12	8	0	16	42	0	0	0	0	0	0	24	0	18	0	120	1168
5:00 PM	0	14	12	0	11	29	0	0	0	0	0	0	23	0	13	0	102	1199
5:05 PM	0	13	8	0	20	44	0	0	0	0	0	0	15	0	10	0	110	1208
5:10 PM	0	15	5	0	13	38	0	0	0	0	0	0	17	0	17	0	105	1212
5:15 PM	0	12	7	0	13	33	0	0	0	0	0	0	23	0	19	0	107	1228
5:20 PM	0	18	7	0	21	31	0	0	0	0	0	0	18	0	11	0	106	1247
5:25 PM	0	14	5	0	10	52	0	0	0	0	0	0	15	0	12	0	108	1273
5:30 PM	0	14	9	0	15	38	0	0	0	0	0	0	26	0	12	0	114	1291
5:35 PM	0	10	5	0	16	44	0	0	0	0	0	0	27	0	10	0	112	1312
5:40 PM	0	19	5	0	13	32	0	0	0	0	0	0	21	0	13	0	103	1301
5:45 PM	0	14	3	0	10	41	0	0	0	0	0	0	18	0	14	0	100	1279
5:50 PM	0	19	8	0	9	35	0	0	0	0	0	0	18	0	14	0	103	1290
5:55 PM	0	7	4	0	17	38	0	0	0	0	0	0	11	0	9	0	86	1256
6:00 PM	0	13	8	0	13	46	0	0	0	0	0	0	17	0	9	0	106	1260
6:05 PM	0	17	8	0	5	34	0	0	0	0	0	0	17	0	7	0	86	1236

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	124	88	0	208	504	0	0	0	0	0	0	256	0	156	0	1336
Heavy Trucks	0	0	4		20	12	0		0	0	0		0	0	8		44
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad Stopped Buses																	

Comments:

Report generated on 9/27/2013 5:17 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

LOCATION: #445 Cipole Rd 0.1 N of Tualatin-Sherwood Rd
QC JOB #: 10719736
SPECIFIC LOCATION: 0 ft from
DIRECTION: SB
CITY/STATE: Washington County, OR
DATE: Mar 08 2012 - Mar 08 2012

Start Time	Mon	Tue	Wed	Thu 08-Mar-12	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM				2		2			2	
1:00 AM				1		1			1	
2:00 AM				3		3			3	
3:00 AM				2		2			2	
4:00 AM				7		7			7	
5:00 AM				22		22			22	
6:00 AM				50		50			50	
7:00 AM				110		110			110	
8:00 AM				88		88			88	
9:00 AM				82		82			82	
10:00 AM				97		97			97	
11:00 AM				**119**		**119**			**119**	
12:00 PM				128		128			128	
1:00 PM				124		124			124	
2:00 PM				135		135			135	
3:00 PM				181		181			181	
4:00 PM				180		180			180	
5:00 PM				**182**		**182**			**182**	
6:00 PM				109		109			109	
7:00 PM				53		53			53	
8:00 PM				34		34			34	
9:00 PM				20		20			20	
10:00 PM				10		10			10	
11:00 PM				14		14			14	
Day Total				1753		1753			1753	
% Weekday Average				100.0%						
% Week Average				100.0%		100.0%				
AM Peak Volume				11:00 AM 119		11:00 AM 119			11:00 AM 119	
PM Peak Volume				5:00 PM 182		5:00 PM 182			5:00 PM 182	

Comments: NA

Type of report: Tube Count - Volume Data

LOCATION: #445 Cipole Rd 0.1 N of Tualatin-Sherwood Rd
SPECIFIC LOCATION: 0 ft from
CITY/STATE: Washington County, OR

QC JOB #: 10719736
DIRECTION: NB
DATE: Mar 08 2012 - Mar 08 2012

Start Time	Mon	Tue	Wed	Thu 08-Mar-12	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM				2		2			2	
1:00 AM				2		2			2	
2:00 AM				3		3			3	
3:00 AM				6		6			6	
4:00 AM				30		30			30	
5:00 AM				33		33			33	
6:00 AM				128		128			128	
7:00 AM				**143**		**143**			**143**	
8:00 AM				114		114			114	
9:00 AM				94		94			94	
10:00 AM				70		70			70	
11:00 AM				94		94			94	
12:00 PM				130		130			130	
1:00 PM				97		97			97	
2:00 PM				104		104			104	
3:00 PM				**155**		**155**			**155**	
4:00 PM				119		119			119	
5:00 PM				93		93			93	
6:00 PM				48		48			48	
7:00 PM				24		24			24	
8:00 PM				9		9			9	
9:00 PM				14		14			14	
10:00 PM				10		10			10	
11:00 PM				7		7			7	
Day Total				1529		1529			1529	
% Weekday Average				100.0%						
% Week Average				100.0%		100.0%				
AM Peak Volume				7:00 AM 143		7:00 AM 143			7:00 AM 143	
PM Peak Volume				3:00 PM 155		3:00 PM 155			3:00 PM 155	

Comments: NA

Quality Counts

Report generated on 9/27/2013 5:15 PM

LOCATION: #421 Tualatin-Sherwood Rd 0.1 E of Cipole Rd
QC JOB #: 10719719
SPECIFIC LOCATION: 0 ft from
DIRECTION: WB
CITY/STATE: Washington County, OR
DATE: Mar 08 2012 - Mar 08 2012

Start Time	Mon	Tue	Wed	Thu 08-Mar-12	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM				74		74			74	
1:00 AM				55		55			55	
2:00 AM				50		50			50	
3:00 AM				55		55			55	
4:00 AM				131		131			131	
5:00 AM				236		236			236	
6:00 AM				454		454			454	
7:00 AM				677		677			677	
8:00 AM				671		671			671	
9:00 AM				683		683			683	
10:00 AM				681		681			681	
11:00 AM				**774**		**774**			**774**	
12:00 PM				811		811			811	
1:00 PM				832		832			832	
2:00 PM				836		836			836	
3:00 PM				969		969			969	
4:00 PM				**1022**		**1022**			**1022**	
5:00 PM				916		916			916	
6:00 PM				984		984			984	
7:00 PM				649		649			649	
8:00 PM				550		550			550	
9:00 PM				441		441			441	
10:00 PM				314		314			314	
11:00 PM				172		172			172	
Day Total				13037		13037			13037	
% Weekday Average				100.0%						
% Week Average				100.0%		100.0%				
AM Peak Volume				11:00 AM 774		11:00 AM 774			11:00 AM 774	
PM Peak Volume				4:00 PM 1022		4:00 PM 1022			4:00 PM 1022	

Comments: NA

Quality Counts

Type of report: Tube Count - Volume Data

LOCATION: #421 Tualatin-Sherwood Rd 0.1 E of Cipole Rd
SPECIFIC LOCATION: 0 ft from
CITY/STATE: Washington County, OR

QC JOB #: 10719719
DIRECTION: EB
DATE: Mar 08 2012 - Mar 08 2012

Start Time	Mon	Tue	Wed	Thu 08-Mar-12	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM				72		72			72	
1:00 AM				43		43			43	
2:00 AM				86		86			86	
3:00 AM				72		72			72	
4:00 AM				237		237			237	
5:00 AM				437		437			437	
6:00 AM				951		951			951	
7:00 AM				**1088**		**1088**			**1088**	
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9:00 AM				693		693			693	
10:00 AM				780		780			780	
11:00 AM				799		799			799	
12:00 PM				851		851			851	
1:00 PM				810		810			810	
2:00 PM				838		838			838	
3:00 PM				**886**		**886**			**886**	
4:00 PM				882		882			882	
5:00 PM				836		836			836	
6:00 PM				712		712			712	
7:00 PM				550		550			550	
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% Week Average				100.0%		100.0%				
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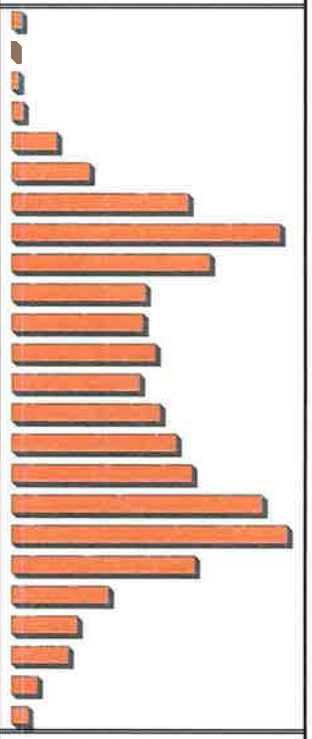
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SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

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SPECIFIC LOCATION: 750 ft from
CITY/STATE: Sherwood, OR

QC JOB #: 10936805
DIRECTION: SB
DATE: Apr 11 2013 - Apr 11 2013

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1:00 AM				14		14			14	
2:00 AM				20		20			20	
3:00 AM				33		33			33	
4:00 AM				128		128			128	
5:00 AM				222		222			222	
6:00 AM				504		504			504	
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10:00 AM				375		375			375	
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12:00 PM				365		365			365	
1:00 PM				424		424			424	
2:00 PM				470		470			470	
3:00 PM				515		515			515	
4:00 PM				716		716			716	
5:00 PM				**788**		**788**			**788**	
6:00 PM				523		523			523	
7:00 PM				277		277			277	
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% Week Average				100.0%		100.0%				
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Comments:

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

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SPECIFIC LOCATION: 750 ft from
CITY/STATE: Sherwood, OR

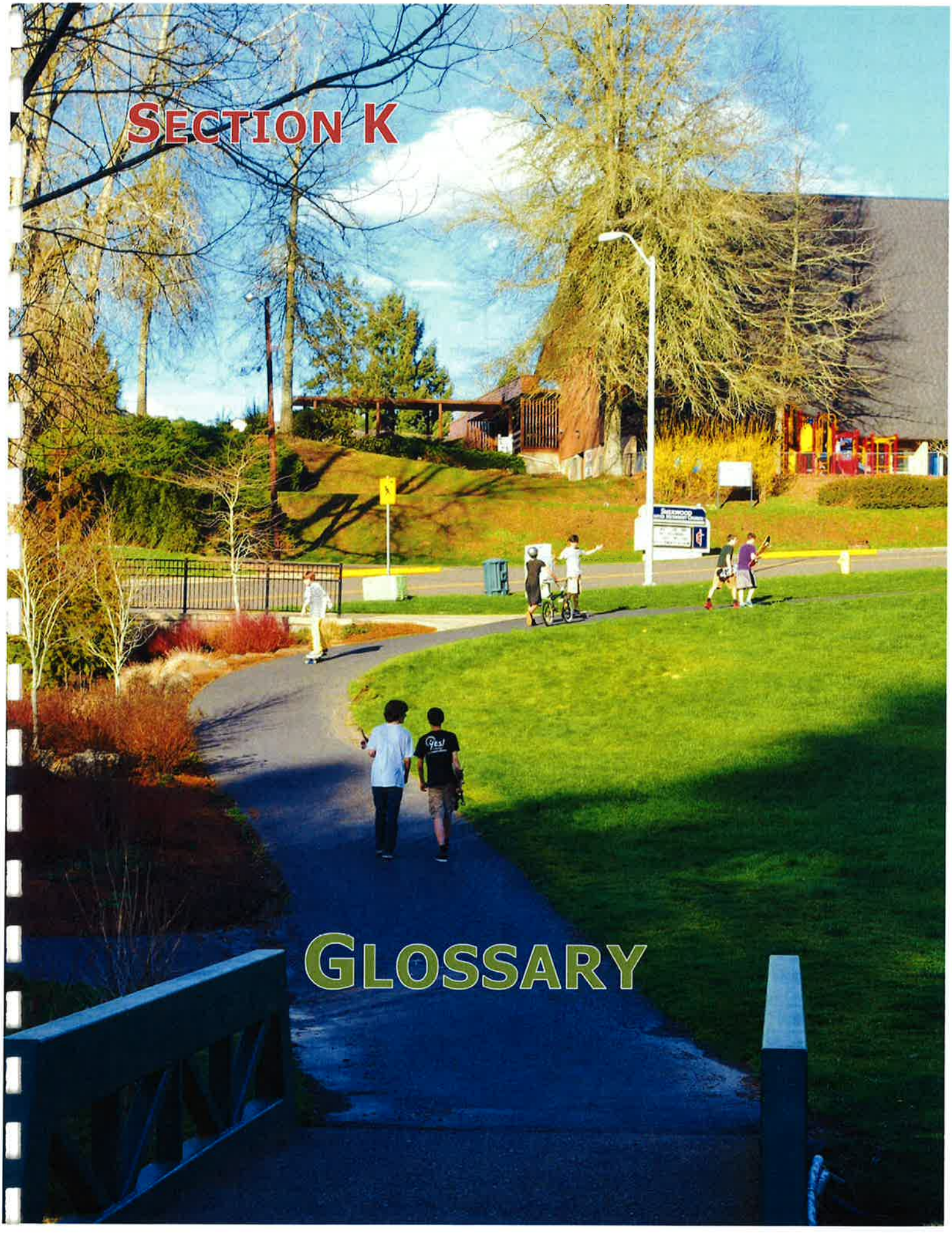
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1:00 AM				14		14			14	
2:00 AM				28		28			28	
3:00 AM				20		20			20	
4:00 AM				48		48			48	
5:00 AM				122		122			122	
6:00 AM				452		452			452	
7:00 AM				**759**		**759**			**759**	
8:00 AM				701		701			701	
9:00 AM				438		438			438	
10:00 AM				349		349			349	
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1:00 PM				391		391			391	
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3:00 PM				716		716			716	
4:00 PM				822		822			822	
5:00 PM				**830**		**830**			**830**	
6:00 PM				562		562			562	
7:00 PM				315		315			315	
8:00 PM				321		321			321	
9:00 PM				180		180			180	
10:00 PM				129		129			129	
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% Week Average				100.0%		100.0%				
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PM Peak Volume				5:00 PM 830		5:00 PM 830			5:00 PM 830	

Comments:

Quality Counts

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SECTION K

GLOSSARY

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Access Management: Refers to measures regulating access to streets, roads and highways from public roads and private driveways. Measures may include but are not limited to restrictions on the type and amount of access to roadways, and use of physical controls such as signals and channelization including raised medians, to reduce impacts of approach road traffic on the main facility.

Alternative Modes: Transportation alternatives other than single-occupant automobiles such as rail, transit, bicycles and walking.

Arterial (Street): A street designated in the functional class system as providing the highest amount of connectivity and mostly uninterrupted traffic flow through an urban area.

Aspirational Plan: The entire set of investments in the TSP if funding were not a constraint.

Bicycle Facility: Any facility provided for the benefit of bicycle travel, including bikeways and parking facilities.

Bicycle Network: A system of connected bikeways that provide access to and from local and regional destinations.

Bike Lane: Area within street right-of-way designated specifically for bicycle use

Capacity: The maximum number of vehicles or individuals that can traverse a given segment of a transportation facility with prevailing roadway and traffic conditions.

Capacity Allocation Program (CAP): A trip density limit set by Sherwood for new development to preserve the mobility of Highway 99W.

Collector (Street): A street designated in the functional class system that provides connectivity between local and neighborhood streets with the arterial streets serving the urban area. Usually shorter in distance than arterials, designed with lower traffic speeds and has more traffic control devises than the arterial classification.

Community Advisory Committee (CAC): A committee of stakeholders in Sherwood who met regularly with the project team to give input for the production of the TSP.

Conservatively Fundable Plan: The set of investments in the TSP that could be funded assuming a funding level of $11.3 million through 2035. The $11.3 million funding level is based on historic growth in the Sherwood area.

Crosswalk: Portion of a roadway designated for pedestrian crossing and can be either marked or unmarked. Unmarked crosswalks are the national extension of the shoulder, curb line or sidewalk.

Grade: A measure of the steepness of a roadway, bikeway or walkway, usually expressed in a percentage form of the ratio between vertical rise to horizontal distance. (e.g., a 5% grade means that the facility rises 5 feet in height over a length of 100 feet.)

Grade Separation: The vertical separation of conflicting travelways.

Level of Service (LOS): A qualitative measure describing the perception of operation conditions within a traffic steam by motorists and or passengers. An LOS rating of "A" to "F" describes the traffic flow on streets and at intersections, ranging from LOS A, representing virtually free flow conditions and no impedance to LOS F representing forced flow conditions and congestion.

Local (Street): A street designated in the functional class system that's primary purpose is to provide access to land use as opposed to enhancing mobility. These streets typically have low volumes and are very short in relation to collectors and arterials.

Major Streets Transportation Improvement Program (MSTIP): MSTIP is a local property tax in Washington County that funds transportation improvements.

Metropolitan Transportation Improvement Program (MTIP): The list of projects selected by Metro to receive regional funding assistance.

Mobility Targets: The level of congestion the corresponding jurisdiction has defined as acceptable. Mobility targets are in the form of LOS or v/c ratios.

Multi-Modal: Involving several modes of transportation including bus, rail, bicycle, motor vehicle etc.

National Highway System (NHS): The National Highway System is interconnected urban and rural principal arterial and highways that serve major population centers, ports, airports and other major travel destinations, meet national defense requirements and serve interstate and interregional travel.

Neighborhood Greenway: improvements to local roads to provide sidewalks and/or shared lane bicycle markings. These improvements are also known as "bicycle boulevards" and "family-friendly bikeways."

Neighborhood (Street): A street designated in the functional class system that's primary purpose is to provide access to land use, but provides more mobility than a local street. These streets typically have moderate volumes and are shorter in relation to collectors and arterials.

Oregon Highway Plan (OHP): The document that establishes long range policies and investment strategies for the state highway system in Oregon

Peak Period or Peak Hour: The period of the day with the highest number of travelers. This is normally between 4-6 PM on weekdays.

Pedestrian Connection: A continuous, unobstructed, reasonability direct route between two points that is intended and suitable for pedestrian use. These connections could include sidewalks, walkways, stairways, and pedestrian bridges.

Pedestrian Facility: A facility provided for the benefit of pedestrian travel, including walkways, crosswalks, signs, signals and benches.

Projected Fundable Plan: The set of investments in the TSP that could be funded assuming a funding level of $60 million through 2035. The $60 million funding level is based on levels of growth seen in the areas surrounding Sherwood.

Reduction of Vehicle-Carrying Capacity: A permanent reduction in the horizontal or vertical clearance of a highway section.

Reduction Review Routes: State highways where all proposed actions along the facility require review prior to determination of a potential reduction of vehicle-carrying capacity is determined.

Regional Transportation Functional Plan (RTFP): Part of Metro's code, the RTFP establishes the criteria cities and counties in the Metro area need to follow to comply with the Metro RTP.

Regional Transportation Plan (RTP): The transportation plan for the Portland Metro region

Right-Of-Way (ROW): A general term denoting publicly-owned land or property upon which public facilities and infrastructure is placed.

Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU): A funding and authorization bill that governed U.S. federal surface transportation spending.

Safety Priority Index System (SPIS): An indexing system used by Oregon Department of Transportation to prioritize safety improvements based on crash frequency and severity on state facilities.

Shared Street: Roadways where bicyclists and autos share the same travel lane. Shared streets may include a wider outside lane and/or bicycle boulevard treatment (e.g., sharrows, wayfinding).

Shared-Use Path: Off-street route (typically recreationally focused) that can be used by several transportation modes, including bicycles, pedestrians and other non-motorized modes (i.e. skateboards, roller blades, etc.)

Single Occupancy Vehicle (SOV): A vehicle containing only a single occupant, the driver.

Technical Advisory Committee (TAC): A group of transportation professionals in the public sector who represent an agency with transportation system elements in Sherwood (e.g., city, county, state, and TriMet staff). This group met regularly with the project team to give input for the production of the TSP.

Traffic Calming: Traffic control devices typically used in residential neighborhoods to slow traffic or possibly reduce the volume of traffic.

Traffic Impact Analysis (TIA): A study that evaluates the potential impacts a project may have on the transportation system, and determines mitigations required to meet transportation standards. These are necessary for projects to be approved (e.g., proposed developments, roadway extensions, zone changes).

Transportation Analysis Zone (TAZ): A geographic sub-area used to assess travel demands using a travel demand forecasting model, and is often defined by the transportation network and US Census blocks.

Transportation Demand Management (TDM): A policy tool as well as any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods.

Transportation Growth and Management (TGM): Grants that fund projects that address both land use and transportation planning, provided through a partnership between the Department of Land Conservation and Development and the Oregon Department of Transportation.

Transportation Planning Rule (TPR): Section 660-012 of the Oregon Administrative Rules. This section implements Statewide Planning Goal 12 (Transportation).

Transportation System Management (TSM): Management strategies such as signal improvements, traffic signal coordination, traffic calming, access management, local street connectivity, and intelligent transportation systems

Transportation System Management and Operations (TSMO): Strategies and policies that work towards improving mobility through cost-effective methods, and can be categorized as transportation system management or transportation demand management.

Transportation System Plan (TSP): Is a comprehensive plan that is developed to provide a coordinated, seamless integration of continuity between modes at the local level as well as integration with the regional transportation system.

Urban Area: The area immediately surrounding an incorporated city or rural community that is urban in character, regardless of size.

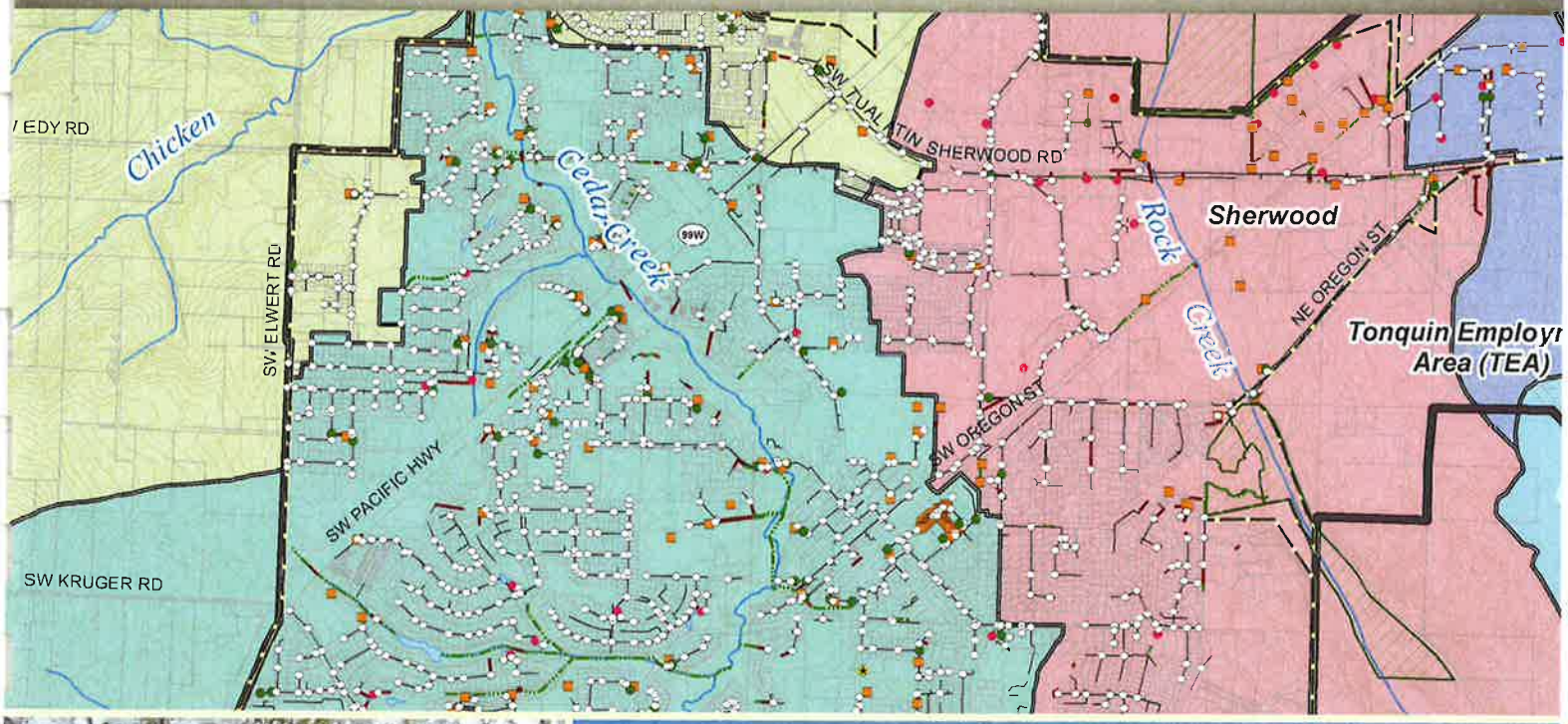
Urban Growth Boundary (UGB): The regional boundary that encompasses zoning designations in an urban area.

Vehicle Hours of Delay (VHD): The cumulative amount of time vehicles are delayed in a system.

Vehicle Miles Traveled (VMT): The cumulative distance a vehicle travels, regardless of number of occupants

Volume-to-Capacity (v/c) ratio: A decimal representation (between 0.00 and 1.00) of the proportion of capacity that is being used. It is determined by dividing the peak hour traffic volume by the hourly capacity of a given turn movement, approach leg, or intersection. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced. At 1.00, demand is greater than capacity and the turn movement, approach leg, or intersection is oversaturated—this results in excessive queues and long delays.

MSA MURRAY, SMITH & ASSOCIATES, INC.
ENGINEERS | PLANNERS







CITY OF SHERWOOD
STORMWATER MASTER PLAN

AUGUST 2016

City of Sherwood Oregon

Ordinance 2016-015, Attachment 2
October 18, 2016

STORMWATER MASTER PLAN

FOR

CITY OF SHERWOOD, OREGON

AUGUST 2016

Prepared by:

MURRAY, SMITH & ASSOCIATES, INC.
Engineers/Planners
121 SW Salmon, Suite 900
Portland, Oregon 97204

15-1637

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EXECUTIVE SUMMARY

INTRODUCTION

The purpose of this Stormwater Master Plan (SWMP) is to update the City of Sherwood's (City) previous SWMP adopted in June 2007. The primary goals of this SWMP include: (1) presentation of criteria required for evaluating the system; (2) identification of current and future system deficiencies and description of recommended improvements to correct them, and; (3) provision of planning-level cost information for general budgeting and the development of a prioritized Capital Improvement Program (CIP).

STUDY AREA

The study area for this SWMP is illustrated in Figure ES-1 and encompasses the current Urban Growth Boundary (UGB), including the Brookman Concept Area and the Tonquin Employment Area (TEA). This study is limited to the stormwater system within the UGB.

The study area is comprised of roughly 3,391 acres and is currently 62 percent developed. Existing developable land use is made up of 39 percent Residential, 6 percent Commercial, 22 percent Industrial, 5 percent Institutional and Public, and 28 percent is deemed non-developable (e.g., Open Space, Wetland, Roadway, and Floodplain).

The City's population was reported at 18,194 during the 2010 census and has historically experienced steady growth (i.e., 6.2 percent average historical growth rate). Population is projected to reach 23,390 at full build-out of the UGB. Portland State University's (PSU) Population Research Center projects a 1 percent growth rate resulting in full build-out by 2036, whereas the historical 6.2 percent reaches capacity by 2019. Population forecasts were based on Metro land use data and population projections (*Certified Population Estimates*, Portland State University, www.pdx.edu/prc/population-reports-estimates; *Regional Forecast Distribution Methodology & Assumptions, Population and Employment, 2010-40 TAZ Forecast Distribution "Gamma Scenario,"* METRO, 2012).

STORMWATER SYSTEM

Management responsibilities for publicly-owned stormwater collection and conveyance facilities are shared through an Intergovernmental Agreement (IGA) between the City and Clean Water Services (CWS). CWS is responsible for the "District Wide Program" and the City is responsible for the "Local Program." The existing stormwater network is comprised of pipes, open channels, and culverts before discharging to a receiving surface water. Natural drainages through the City consist of 8.60 cumulative miles of creeks. Inventory of stormwater system data yielded approximately 71 miles of existing stormwater drainage piping, 5.0 miles of open channel conveyance, 278 culverts for a total length of 4.23 miles, 256 stormwater outfalls, 44 extended dry detention ponds, 166 swales, 2 retention basins, 1 Low Impact Development Approach (LIDA), and 89 water quality manholes. The City lies within five streamsheds, drained by Cedar Creek, Chicken Creek, Hedges Creek, Rock Creek, and Upper Coffee Lake Creek, that are tributary to the Tualatin River and Willamette River. The basins and the stormwater infrastructure are illustrated in Figure ES-1.

FIGURE ES-1

CITY OF SHERWOOD

STORMWATER MASTER PLAN
EXISTING SYSTEM MAP

MSA Murray, Smith & Associates, Inc. Engineers/Planners

AUGUST 2016

SW EDY RD
SW ELWERT RD
SW PACIFIC HWY
SW KRUGER RD
SW SUNSET BLVD
SW BROOKMAN RD
SW TUALATIN SHERWOOD RD
SW OREGON ST
NE OREGON ST
SW BAKER RD
SW AVE

Chicken Creek
Cedar Creek
Rock Creek
Goose Creek
Coffee Lake Creek
Rock Creek

Sherwood
Tonquin Employment Area (TEA)
Brookman Concept Area

99W

STORMWATER FACILITIES:
- MANHOLE
- WATER QUALITY MANHOLE
- EXTENDED DETENTION POND
- LIDA
- RETENTION BASIN
- SWALE
- DITCH
- CULVERT
- CITY STORM SEWER LINE

TUALATIN RIVER NATIONAL WILDLIFE REFUGE
CITY BOUNDARY
STUDY AREA*
BASIN BOUNDARY
ROCK CREEK BASIN
CEDAR CREEK BASIN
CHICKEN CREEK BASIN
COFFEE LAKE CREEK BASIN
HEDGES CREEK BASIN

* STUDY AREA = UGB

0 0.25 0.5 Miles

N W E S

August 2016 15-1637

The overall stormwater network is in good condition, though deficiencies from the previous SWMP still exist, as verified through interviews with City staff. These constraints include an undersized pipe in Ladd Hill Road south of Sunset Boulevard, surcharging of a 36-inch diameter culvert crossing under SW Sunset Boulevard near Eucalyptus Terrance, and drainage issues caused by long-term or recurring maintenance problems. The latter includes silted ditches along West Division Street, a repeatedly blown out swale near Columbia Street and Southern Pacific Railroad, a substandard functioning roadside swale along the east side of Ladd Hill Road which drains to a water quality facility located on the west side of Ladd Hill Road, and various open channel conveyances where vegetation control or removal of invasive species is needed.

With respect to water quality facilities, there are areas throughout the UGB lacking treatment. Areas lacking stormwater treatment generally fall into two categories and are good candidates for future stormwater quality improvements:

- Commercial and industrial facilities: Older commercial and industrial developments along Highway 99W and north of Tualatin-Sherwood Road were likely constructed without stormwater treatment facilities. Runoff from these types of development can have significant detrimental impact to surface water quality in locations of high motor vehicle-dependent activities, activities which require large ground disturbances and where materials storage is performed uncovered.

- Older developed residential areas: Two relatively large drainage basins in the southeast portion of the City, west of Murdock Road and south of Oregon Street, drain untreated to Rock Creek. Also, along Cedar Creek, there are several small residential basins that drain directly to the creek with no treatment.

REGULATIONS & POLICIES

The City is ultimately responsible for management and operation of infrastructure under its jurisdiction in accordance with all known Federal, State, and local regulations. Historic legislation such as the Clean Water Act (CWA), Endangered Species Act (ESA), and National Flood Insurance Act all bear influence on current regulations administrated by the City and CWS within the UGB. These federal mandates, in addition to local planning policies and statutes, form the basis of the current regulatory context for stormwater within the City.

Stormwater regulations have become increasingly stringent since enactment of the CWA, with great strides having been made in pollution reduction from point sources. While point source pollution has been regulated, the root of further surface water degradation can be attributed to non-point source pollution, such as urban stormwater runoff. Federal and State agencies are working to improve the stormwater policies and regulations that address non-point source pollution.

Oregon Department of Environmental Quality (DEQ) recently issued Clean Water Services the renewal to their Municipal Separate Storm Sewer System (MS4) permit. The new requires that post-construction runoff flow control policies address hydromodification of

downstream receiving waters through mimicry of natural hydrology, utilization of green infrastructure (GI) or low impact development (LID), and treatment of 80 percent of the annual average runoff volume. Flow control strategies to address hydromodification have been adopted by the EPA, which require continuous simulation modeling to match the pre-development channel forming discharge or on-site retention of the 90th percentile storm. This storm is close to or less than the water quality storm established in Western Oregon jurisdictions. A detailed memorandum, provided in Appendix B, outlines the policies that are currently effective in protecting stream health, the municipal permit requirements that are likely to come into effect with the recent permit renewal, and recommendations for how the City can best meet these requirements.

SYSTEM ANALYSIS

The stormwater analysis consisted of hydrologic and hydraulic components, including estimation and routing of the peak flow rates and volumes of stormwater runoff from the drainage areas and throughout the network. A computer model of the stormwater system and drainage basins was developed to evaluate the capacity of the various system components for a range of precipitation events employing the NRCS 24-hour, Type 1A theoretical rainfall distribution. Runoff estimation was determined with the NRCS Dimensionless Unit Hydrograph Method, which uses the runoff curve number, basin hydraulic length, average basin slope, and time of concentration to estimate runoff potential. To maximize the qualitative and quantitative accuracy of the analysis, the model was calibrated by simulating existing precipitation events and verifying with firsthand accounts of locations of known deficiencies.

The model was used to characterize the system sensitivity to precipitation and to provide an overall range of capacity- and quality-related improvements anticipated to be necessary as the City develops towards build-out. The system analysis identified components which do not meet minimum criteria, as defined by the City's *Engineering Design and Standard Details Manual (2010)* and CWS's *Design and Construction Standards (2007)*. As per CWS standards, the 25-year, 24-hour rainfall event served as the design storm and was used to establish adequate conveyance. The build-out analysis considered stormwater management within the existing UGB. Risk of flooding and the need for improvement were determined by calculating the available freeboard. These quantities were then used to establish categories of risk, including:

- Critical: Freeboard $\leq$ 0 feet – Improvement needed in all cases.
- High: 0 feet < Freeboard $\leq$ 1 feet – Improvement needed in most cases.
- Moderate: 1 feet < Freeboard $\leq$ 5 feet – Improvement not needed.
- Low: > 5 feet – Improvement not needed.

For conveyance capacity, deficient pipes were identified by examining the maximum flow class result for each pipe segment, with the following classes: free surface, backwater, or exceeds capacity. Free surfaces indicates additional capacity and, during maximum flow conditions, the pipe is not completely full. Backwater identifies one or more pipes downstream of the pipe in question have a flow rate that exceeds the flow capacity and, therefore, pushes water upstream in the network. For backwater conditions, the pipeline

HGL profile was investigated to determine the location causing the backup. A pipe exceeding capacity cannot accommodate the flow entering the upstream node of a pipe segment and is deficient; however, if the deficient pipe has sufficient depth and available freeboard, then the deficiency may not warrant replacement. This was determined on a pipe-by-pipe basis.

Results of the system analysis found no conduits experience backwater conditions that would result in flooding of the upstream manholes under either the existing or build-out conditions. A number of high to moderate risk locations were identified, stemming from conservative runoff characteristics (e.g., limited ponding), flat conveyance slopes, and minimal freeboard. These results are consistent with firsthand accounts of flooding that has occurred for events with returns equivalent to the two year storm. Most of the system deficiencies are caused by deficient pipes in the stormwater system and not necessarily undersized outfall pipes.

Existing regional stormwater quality and quantity facilities were found to be adequately sized to the standards at the time of implementation. It is recommended that the City focus efforts on operations and maintenance of these existing facilities to ensure their continued functionality (i.e., peak flow attenuation, minimization of flooding potential). In instances where the need for facilities was identified though none were currently present, the Tualatin River Urban Stormwater Tool (TRUST) was used to size facilities for the range of precipitation events. TRUST is a tool, developed for CWS, that analyzes the hydromodification impacts of land development projects and sizing solutions to mitigate the related increases in runoff.

RIPARIAN CORRIDOR EVALUATION

Field investigations were conducted of the City's streams for their general susceptibility to erosion, or hydromodification. The study focused on local stream conditions for the primary surface waters within the Cedar Creek, Chicken Creek, Hedges Creek, Rock Creek, and Upper Coffee Lake Creek streamsheds. All streams were found to be generally healthy and resilient to erosion in conjunction with the City's current stormwater management policies. Of note, however, is the susceptibility of native soils to erosion when exposed to stream velocities exceeding the cohesive and shear strength bounds for extended durations. These results are summarized in a technical memorandum, located in Appendix C.

An analysis of regulatory trends shows that there is increasing attention paid to addressing impacts of hydromodification caused by urbanization. CWS' NPDES MS4 permit, recently renewed by DEQ, includes a requirement that CWS perform a watershed-level hydromodification assessment, then develop, implement and enforce a program that addresses deficiencies. Also, in 2016, a Biological Opinion was issued by National Marine Fisheries Service (NMFS) stating that hydromodification of regulatory floodplains may be in conflict with the Endangered Species Act.

It is anticipated that future regulations will seek to further restrict development within the floodplain, to further reduce impacts to the floodplain and riparian areas due to existing stormwater discharges, and to require post-construction runoff strategies that mimic natural hydrologic processes and treat 80 percent of the annual average runoff volume using green

infrastructure (GI) or low impact development (LID). Recommendations for stormwater management policies and hydromodification reduction strategies are provided in Appendix C to position the City to proactively anticipate future regulatory requirements in a cost-effective manner.

CAPITAL IMPROVEMENT PROGRAM

The capacity and condition improvement analysis was used to develop a 20-year CIP. The CIP provides a blueprint for forecasting capital expenditures and aids in community development and financial planning. Improvements were analyzed at a planning level of accuracy, categorized according to project type (Condition, Stormwater Management, or Planning), assigned a project driver (Pipe & Manhole Condition, Regulatory, or UGB-Infill), and prioritized into three timeframes. This resulted in priorities for short-term (0-5 years), medium-term (6-10 years), and long-term (11-20 years) planning.

All improvements are funded by utility revenues generated from stormwater rates and are allocated through the City's Stormwater Operating Fund. Capital improvements for future development (i.e., growth) are funded through Sewer Development Charges (SDCs), as dictated by Oregon Revised Statute 223.297 through 223.314 and allocated by the City's Stormwater SDC Fund. The total costs for all City improvements are summarized and presented in Table ES-1 and equate to $4,525,000 over the 20-year planning horizon (in 2015 dollars). Capital improvement projects are illustrated in Figure ES-2.

Table ES-1 Capital Improvement Program Summary (Estimated Total Costs)[1,2,3]

Category	Time Frame (Cost)			Total Cost
	0-5 Years	6-10 Years	11-20 Years	
Condition	$0	$370,000	$1,740,000	$2,110,000
Stormwater Management	$320,000	$580,000	$1,134,000	$2,034,000
Planning	$6,000	$125,000	$250,000	$381,000
Total	$326,000	$1,075,000	$3,124,000	$4,525,000

Table ES-1 summarizes CIP costs by improvement category with the following notes:

Note 1. Cost estimates represent a Class 5 budget estimate, as established by the American Association of Cost Engineers. This preliminary estimate class is used for conceptual screening and assumes project definition maturity level below two percent. The expected accuracy range is -20 to -50 percent on the low end, and +30 to +100 percent on the high end, meaning the actual cost should fall in the range of 20 percent below the estimate to 100 percent above the estimate. The cost estimates are consistent with the definition of OAR 660-011-0005(2) and OAR 660-011-035. They are intended to be used as guidance in establishing funding requirements based on information available at the time of the estimate.

Note 2. Cost estimates for new infrastructure improvements assume unit costs for new materials and construction. Cost estimates for pipe upsizing and condition based improvements assume unit costs for replacement materials and construction. All cost estimates include markups for construction contingency, owner administrative costs, and contract costs. Right-of-way acquisition costs, property purchase, and legal condemnation fees are excluded from the estimates.

Note 3. All improvements are sized for build-out of the upstream service area at a planning level of accuracy based on land use assumptions described in Section 5 of this document. Improvement sizing is limited to service within the existing Urban Growth Boundary. Prior to implementation, each project should undergo standard engineering design phases to finalize improvement sizing and location.

FIGURE ES-2

City of Sherwood Oregon

CITY OF SHERWOOD

STORMWATER MASTER PLAN
CAPITAL IMPROVEMENT PROGRAM

MSA Murray, Smith & Associates, Inc. Engineers/Planners

AUGUST 2016

Note:
Future Concept Plan Facilities were delineated based on Concept Plan locations for the Brookman Concept Area and Tonquin Employment Area.

Call-outs represent Improvement Project IDs. The brown dashed outline approximates the project bounds for Project 20.

SW EDY RD
SW FILWERT RD
SW PACIFIC HWY
SW KRUGER RD
SW SUNSET BLVD
SW BROOKMAN RD
SW TUALATIN SHERWOOD RD
SW MAIN ST
SW BAKER RD
NE OREGON ST

Chicken Creek
Cedar Creek
Rock Creek
Goose Creek
Coffee Lake
Rock Creek

Sherwood
Tonquin Employment Area (TEA)
Brookman Concept Area

99W

1 2 3 4 5 6 7A, 7B 8 9 10 11 12 13 14 15 16 17 18 19 20

- FUTURE CONCEPT PLAN FACILITY
- PROPOSED FACILITY
- WATER QUALITY MANHOLE
- MANHOLE
- EXTENDED DETENTION POND
- SWALE
- RETENTION BASIN
- LIDA
- DITCH
- CULVERT
- CITY STORM SEWER LINE
- CONDITION PROJECT
- CITY BOUNDARY
- STUDY AREA
- TAXLOT
- WATER BODY
- STREAM
- WETLAND

N W E S

0 0.5 Mile

August 2016 15-1637

G:\PDX_Projects\1611638_Sherwood_Sanitary_Sewer_MP\GIS\MXD\FIGURE 7-1_11x17_A.mxd 8/10/2016 8:36:55 AM Thomas.Welsh

SECTION 1 | INTRODUCTION

INTRODUCTION

This Stormwater Master Plan (SWMP) is an update to the City of Sherwood's (City's) previous SWMP adopted in June of 2007.

This SWMP:

- Summarizes basic information describing the stormwater system.
- Describes how the system components function.
- Presents technical criteria required for evaluating the system.
- Identifies current system deficiencies and describes recommended improvements to correct them.
- Identifies future system needs to accommodate future growth.
- Contains planning-level cost information for general budgeting and the development of a prioritized Capital Improvement Program (CIP).
- Provides a reference document for City leaders, technical staff, consultants, customers and other interested parties about the existing system and future recommended improvements.
- Incorporates community values and priorities through input from a public open house process.
- Facilitates logical planning decisions and utility coordination relative to other City projects and programs.

PURPOSE

This SWMP provides a valuable tool to facilitate timely, orderly and efficient management of the City's stormwater collection system over the next 20 years. This document serves as a "Public Facilities Plan" for stormwater collection systems according to Oregon Administrative Rule (OAR) 660, Division 11. This OAR stipulates that facility plans be developed as support documents for the City's Comprehensive Plan.

How This Plan Should Be Used

This SWMP serves as the guiding document for future stormwater system improvements, and should:

- Be reviewed annually to prioritize and budget needed improvements.
- Have its mapping updated regularly to reflect ongoing development and construction.
- Specific system improvement recommendations should be regarded as conceptual.

  The location, size and timing of projects may change as additional site-specific details and potential alternatives are investigated in the preliminary engineering phase of design.
- Be updated and refined as preliminary engineering and final project designs are completed.

STUDY AREA

The study area encompasses approximately 3,390 acres and includes the current City Urban Growth Boundary (UGB).

SCOPE

Murray, Smith and Associates, Inc. (MSA) was authorized by the City on January 21, 2015 to provide municipal master planning services related to stormwater collection.

MSA worked closely with the City to develop a Scope of Work that provides the necessary guidance for both current and future stormwater management decisions. The Scope of Work includes the following elements:

- Compile and review maintenance reports, condition assessments, maps, record drawings, aerial photography, topography, system base maps, City standards and other information pertaining to the physical stormwater system.
- Review City-furnished information relating to service study area, hydrologic basins, and land use.
- Develop criteria for analysis of existing stormwater collection systems and the design of future improvements.
- Document current Federal, State and local rules and regulations that relate to the City's stormwater system. Provide a discussion on future anticipated regulations.
- Develop stormwater attributes including soil types, topography, vegetation and other pertinent characteristics for each basin.
- Conduct a hydraulic analysis of existing storm sewer mains.
- Determine existing deficiencies with respect to ultimate service requirements.
- Based on system deficiencies identified, review stormwater system needs and alternatives to meet current and future stormwater flow conditions.
- Develop a CIP which prioritizes short-term and long-term improvements to meet the City's anticipated system needs.
- Develop budget-level cost estimates for those projects identified in the CIP. Funding alternatives will be identified which may be utilized by the City to finance the projects.
- Develop a stormwater facilities plan map showing both existing and proposed stormwater facilities.
- Develop methodology and rate analysis for System Development Charges (SDCs).
- Prepare a SWMP document which describes and illustrates the results of the study.

ORGANIZATION OF THE STORMWATER MASTER PLAN

This master plan report is organized into sections as described in Table 1-1. Detailed technical information and supporting documents for Sections 4 thru 7 are included in the appendices.

Table 1-1 | SWMP Organization

Section Number	Section Title	Description
ES	Executive Summary	Summarizes the wider report for readers to rapidly become acquainted the City's stormwater system; includes background information, concise analysis and conclusions of service needs over the study period.
Section 1	Introduction	Explains the purpose and scope of the Stormwater Collection System Master Plan; Provides a summary of each section and overall recommendations.
Section 2	Study Area Characteristics	Outlines the study area characteristics, including geography, topography, climate, general soil conditions, and land use designations within the City.
Section 3	Existing System Description	Presents an overview of the existing system and key facilities, and describes the existing service area and extents of the current urban growth boundary (UGB).
Section 4	Regulations & Policies	Describes applicable policies and guidelines for stormwater collection systems are summarized from Federal, State, and local governance.
Section 5	System Analysis	Provides a summary of the methodology and results of the system analysis, and the alternatives assessment used to identify capital improvements.
Section 6	Riparian Corridor Evaluation	Assesses extent of stream erosion within the City and recommends corrective strategies.
Section 7	Capital Improvement Program	Presents a proposed Capital Improvement Program (CIP) consisting of a prioritized list of recommended improvements to be conducted over the study period.
Appendix A	CWS IGA	Includes the current Intergovernmental Agreement (IGA) between the City of Sherwood and Clean Water Services (CWS).
Appendix B	Anticipated MS4 Permit Requirements	Outlines existing CWS permit requirements and policies relevant to this SWMP update.
Appendix C	Hydromodification Technical Memorandum	Summarizes existing stream information and guides strategies to address hydromodification.
Appendix D	Basis of Opinion of Probable Costs	Presents unit cost tables used to develop estimates for projects and the final CIP budgets associated with Section 7.
Appendix E	FEMA Letter, National Flood Insurance Act	Letter from the Federal Emergency Management Agency (FEMA) identifying regulations re floodplain protection in part through the National Flood Insurance Act.

SECTION 2 | STUDY AREA CHARACTERISTICS

INTRODUCTION

This section of the Stormwater Master Plan (SWMP) outlines the study area characteristics including geography, topography, climate, general soil conditions, and land use designations within the City of Sherwood (City). Land use designations are of particular interest when planning stormwater system infrastructure, as the stormwater runoff from these areas is highly dependent on land use category and density. The City's socioeconomic conditions are also documented within this section, including a discussion on the major sources of commerce within the City and the existing population.

GEOGRAPHY

The City is located along Highway 99 in Oregon's Tualatin River Valley, within the southeast corner of Washington County (see Figure 2-1). This location places the City on the southwest edge of the Portland metropolitan area, approximately 16 miles from downtown Portland. Neighboring cities are Beaverton to the north, Tigard to the northeast, Tualatin to the east, and Wilsonville to the southeast. Newberg, in Yamhill County, is approximately 9 miles southwest, along Highway 99.

Figure 2-1 | Vicinity Map



Source: Mapquest, www.mapquest.com, 2015.

STUDY AREA

The study area encompasses approximately 3,391 acres and includes the current City Urban Growth Boundary (UGB). The UGB includes the current city limits, the Tonquin Employment Area (TEA), and the Bookman Concept Area. While the study area defines the expected stormwater service boundary over the study period, drainage basins extending upstream of this boundary contribute runoff to the City's five receiving waters. Therefore, information pertaining to these drainage basins is provided throughout this SWMP, as shown in Figure 2-2.

LAND USE AND ZONING

By state law, Metro is responsible for establishing the Portland metropolitan area's UGB, which includes Sherwood. Metro is a regional government serving nearly 1.5 million people in Clackamas, Multnomah and Washington Counties. The agency was formed to administer growth, infrastructure and development policies that cross local jurisdictional boundaries. Land uses and densities inside the UGB are selected to support urban services such as police and fire protection, roads, schools, and water and sewer systems. Understanding land use and demographic characteristics within the study area is particularly important in stormwater system planning. This is primarily because the land use determines the amount of impervious area within a basin, and stormwater runoff increases with urbanization.

All parcels within the City have land use designations, which involve various categories of commercial, industrial, institutional and residential land uses with specific zoning designations within these broader uses. City zoning is summarized in Table 2-1 for the UGB, which also includes the Brookman Concept Area and the TEA. City zoning is also shown in Figure 2-2.

Residential Land Use

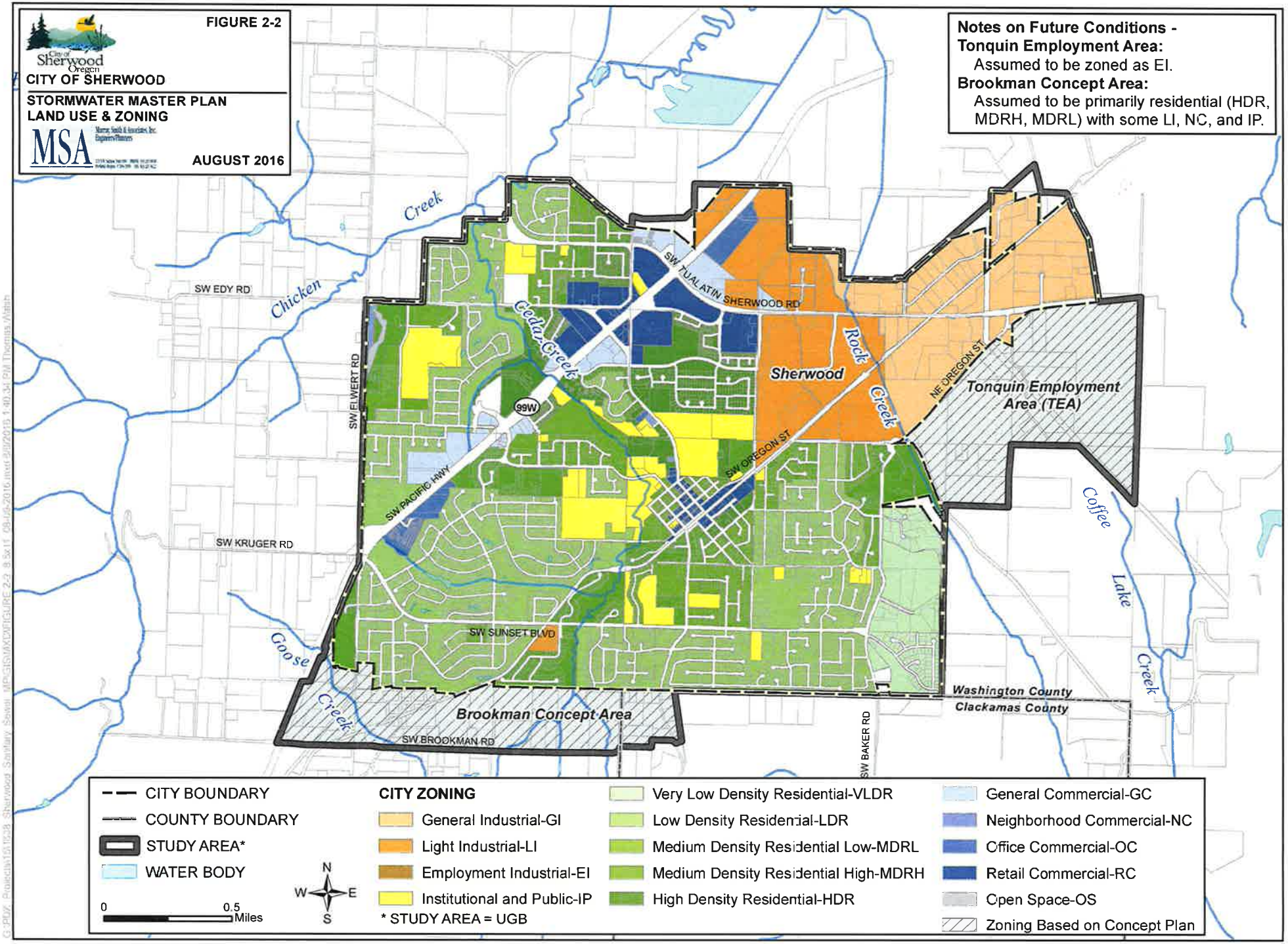
Table 2-2 provides density categories for residential land development within the UGB by land use designation. While Low Density Residential (LDR - 1/5 acre lots) is the dominant residential zoning classification within the City limits, residential zoning classifications are generally spread evenly throughout the City. The southeast corner of the City is zoned Very Low Density Residential (VLDR - 1 acre minimum lot size). Medium Density Residential (MDR) and High Density Residential (HDR) zoning is located between low density residential use zones and commercial use zones. MDR and HDR zoning can also be found toward the center of the City.

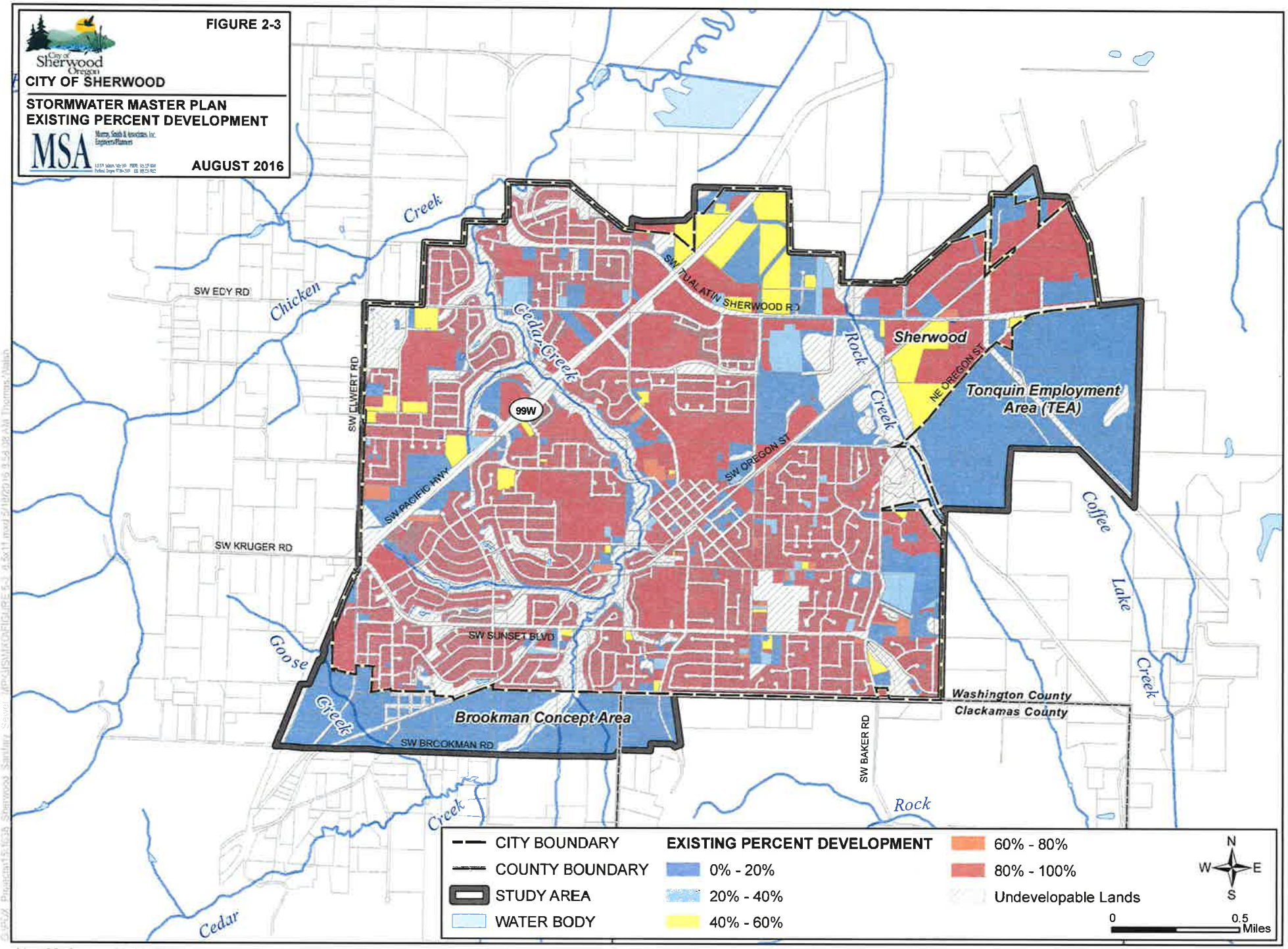
Within each of these residential zones are undeveloped, or vacant, areas. The City's vacancy and buildable lands inventory datasets establish the potential for in-fill development within these areas. The resulting existing percent development, by parcel, is presented in Figure 2-3. Approximately 331 acres of the UGB and Concept Plan Areas' residentially zoned 1,314 acres are currently undeveloped (25%). This undeveloped land is composed of approximately 49 acres zoned as VLDR, 40 acres zoned as LDR, 205 acres zoned as

Medium Density Residential (MDRL and MDRH), and 37 acres zoned as High Density Residential (HDR).

Table 2-1 | Zoning and Planning Area Summary				
Zoning Category	Existing City Limits	Brookman Concept Area	Tonquin Employment Area	Total
Developable Land (gross acres)				
General Commercial (GC)	66	0	0	66
Neighborhood Commercial (NC)	1	0	0	1
Office Commercial (OC)	29	7	0	36
Retail Commercial (RC)	101	0	0	101
Institutional and Public (IP)	169	4	0	173
General Industrial (GI)	230	0	0	230
Light Industrial (LI)	198	30	0	228
Employment Industrial (EI)	0	0	281	281
Very Low Density Residential (VLDR)	96	0	0	96
Low Density Residential (LDR)	590	0	0	590
Medium Density Residential Low (MDRL)	185	139	0	325
Medium Density Residential High (MDRH)	147	7	0	154
High Density Residential (HDR)	135	15	0	150
Subtotal – Developable Land	**1,947**	**202**	**281**	**2,429**
Non-developable Land (gross acres)[1]				
Open Space (OS)	238	0	0	238
Wetland	63	0	4	67
Roadway	485	32	20	537
Floodplain	102	17	1	120
Subtotal - Non-developable Land	**888**	**49**	**25**	**962**
TOTAL - Developable + Non-developable	**2,835**	**251**	**306**	**3,391**
Developable Land - Developed vs. Vacant Summary (gross acres)				
Subtotal – Developed Land	1,508	0	0	1,508
Subtotal - Vacant Land	439	202	281	922

Note 1. Non-developable Land refers to lands in the study area that have a City zoning designation of Open Space (OC), or have been otherwise categorized by Metro RLIS as Wetlands, Roadway, or Floodplain. These additional categories are defined as follows: Wetlands – As identified by Metro RLIS GIS, this includes land in the 1998 National Wetlands Inventory, finished and in-progress local wetland inventories conducted by local jurisdictions, and information/documentation collected during the development of Metro's Title 13 Nature in Neighborhoods Program. Roadway - Land not part of a taxlot, considered to be dedicated to public rights-of-way. These include streets, highways, and railroads. Floodplain - Land in the 100-year floodplain, as delineated by FEMA. Current as of August 2016.


FIGURE 2-2
City of Sherwood Oregon
CITY OF SHERWOOD
STORMWATER MASTER PLAN
LAND USE & ZONING
MSA
AUGUST 2016
Notes on Future Conditions -
Tonquin Employment Area:
Assumed to be zoned as EI.
Brookman Concept Area:
Assumed to be primarily residential (HDR, MDRH, MDRL) with some LI, NC, and IP.
Chicken Creek
Cedar Creek
Rock Creek
Coffee Lake Creek
Goose Creek
SW EDY RD
SW ELWERT RD
SW TUALATIN SHERWOOD RD
SW PACIFIC HWY
99W
SW OREGON ST
NE OREGON ST
SW KRUGER RD
SW SUNSET BLVD
SW BROOKMAN RD
SW BAKER RD
Sherwood
Tonquin Employment Area (TEA)
Brookman Concept Area
Washington County
Clackamas County
CITY BOUNDARY
COUNTY BOUNDARY
STUDY AREA*
WATER BODY
0
0.5
Miles
N
W
E
S
CITY ZONING
General Industrial-GI
Light Industrial-LI
Employment Industrial-EI
Institutional and Public-IP
Very Low Density Residential-VLDR
Low Density Residential-LDR
Medium Density Residential Low-MDRL
Medium Density Residential High-MDRH
High Density Residential-HDR
General Commercial-GC
Neighborhood Commercial-NC
Cffice Commercial-OC
Retail Commercial-RC
Cpen Space-OS
Zoning Based on Concept Plan
* STUDY AREA = UGB



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Table 2-2 | Residential Density Ranges	
Land Use	Density Range (dwellings/acre)
Low-Density Residential	4-9
Medium-Density Residential	6-18
High-Density Residential	12-35
Overall Average Residential	7

Commercial Land Use

Commercially zoned land is primarily located along Highway 99W and within the downtown commercial district. While most of the commercial zoning classification is general and retail, some office commercial zoning is located on the south side of Highway 99W, north of Sunset Boulevard. Within the UGB plus Concept Plan Areas, a total of 204 acres is classified as commercial land uses (GC, NC, OC, and RC). Of these, 79 acres are currently undeveloped.

Industrial Land Use

The primary industrial zoned area is located along Highway 99W north of Roy Rogers Road/Tualatin-Sherwood Road and along Tualatin-Sherwood Road east of Highway 99W. A single industrial zone is located adjacent to the Southern Pacific Railroad line south of Sunset Boulevard. Within the UGB, 739 acres are classified as industrial land use, with 435 acres as General Industrial and 304 acres as Light Industrial. Of this total, there is approximately 65 percent that is currently undeveloped (484 acres).

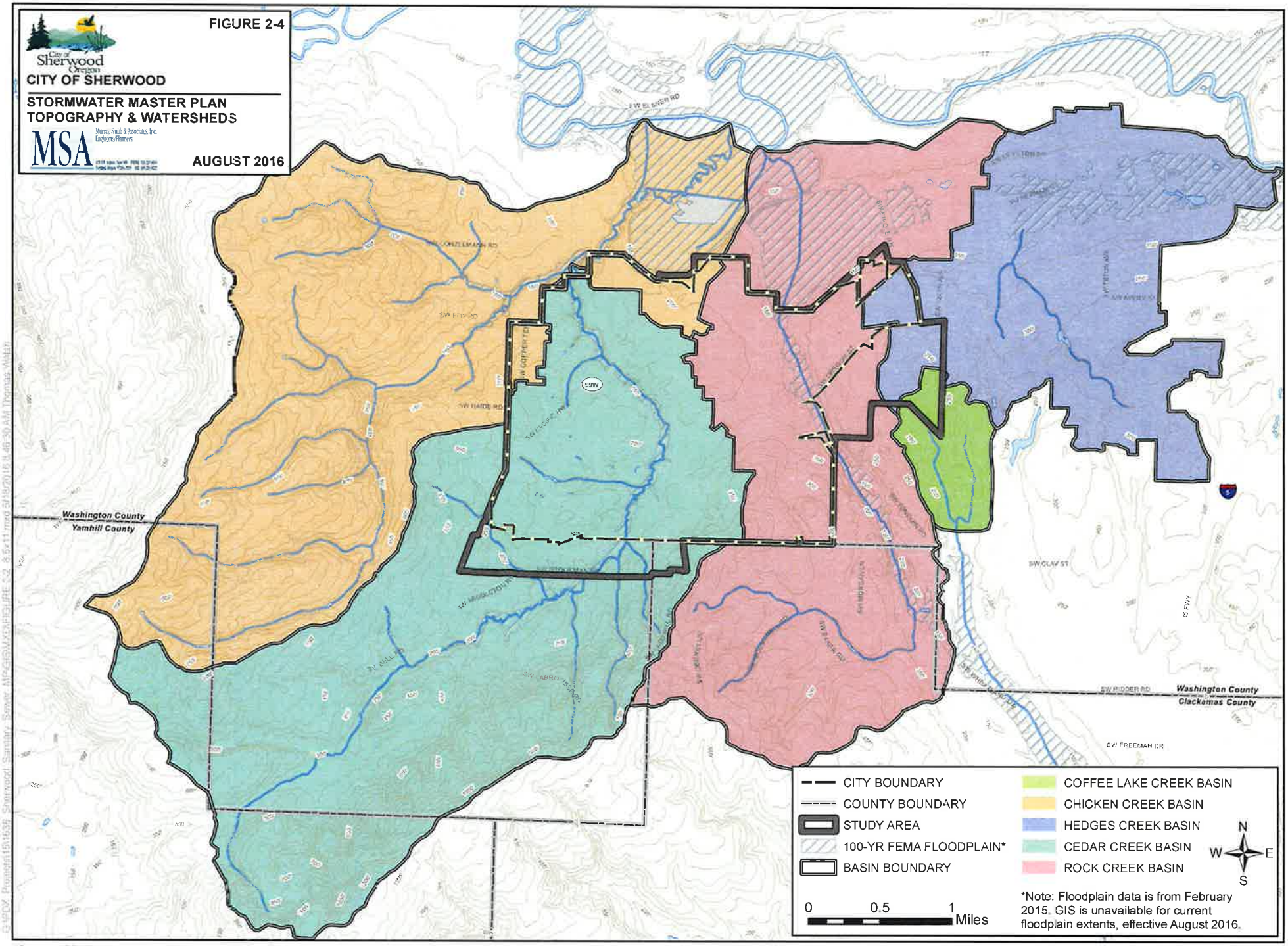
Employment Industrial (EI) – This zoning classification is identified for future growth areas of the Tonquin Employment area (306 acres) and includes primarily employment related to industry, but excludes process water typically associated with wet industry applications.

TOPOGRAPHY

The ground elevations within the City range from approximately 140 feet above mean sea level (MSL) to approximately 420 feet above MSL, with the majority of development occurring between the elevations of 180 to 260 feet above MSL. In general, the elevations are lowest in the northern portions of the City nearing the Tualatin River, and highest in the hilly areas of the southern portions of the City. Elevation change throughout the City is gradual, with typical slopes up to 6 percent. However, some steep slopes, which range up to 25 percent, are located near hills and creek banks. Topographic mapping is shown in Figure 2-4.

CLIMATE

The City is in the Marine West Coast Climate Zone. Temperatures are moderate year-round due to a marine influence from the Pacific Ocean that produces generally warm, dry



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FUTURE GROWTH AREAS

Future growth areas include a total of 557 acres of land within the study area. Concept planning efforts have been completed for the TEA and Brookman Concept Area within the UGB, with summaries of each described below.

Brookman Concept Area

The Brookman Concept Area is a proposed 251-acre residential, commercial, office and light industrial development zoned tract of land within the southern portion of the City's UGB. There are currently 49 acres of roadway, wetlands, and floodplains designated in the area.

The planning effort for this area was undertaken by the City in 2009. It is primarily located in unincorporated Washington County, with a minor eastern section located in unincorporated Clackamas County where Brookman Road deviates from an east-west alignment at the county border. The area is bound by Brookman Road and the UGB to the south, the existing City limits to the north, Highway 99 to the west, and the UGB to the east. The timeline for actual development within this planning area is anticipated to begin within the next 5 years, and reach saturation at 20 years.

Tonquin Employment Area (TEA)

The TEA is an Employment Industrial zoned 306-acre area on the eastern portion of the City's UGB. Currently, there are 25 acres of roadway, wetlands, and floodplains within the area. The planning effort for this area was undertaken by the City in 2010. It is fully located in unincorporated Washington County. The area is bound by the UGB to the south, the existing City limits to the north and west, and the UGB to the east along SW 124th Avenue. The timeline for actual development within this planning area is anticipated to begin within the next 5 years, and reach saturation after 20 years.

GEOLOGY, SOILS, AND GROUNDWATER

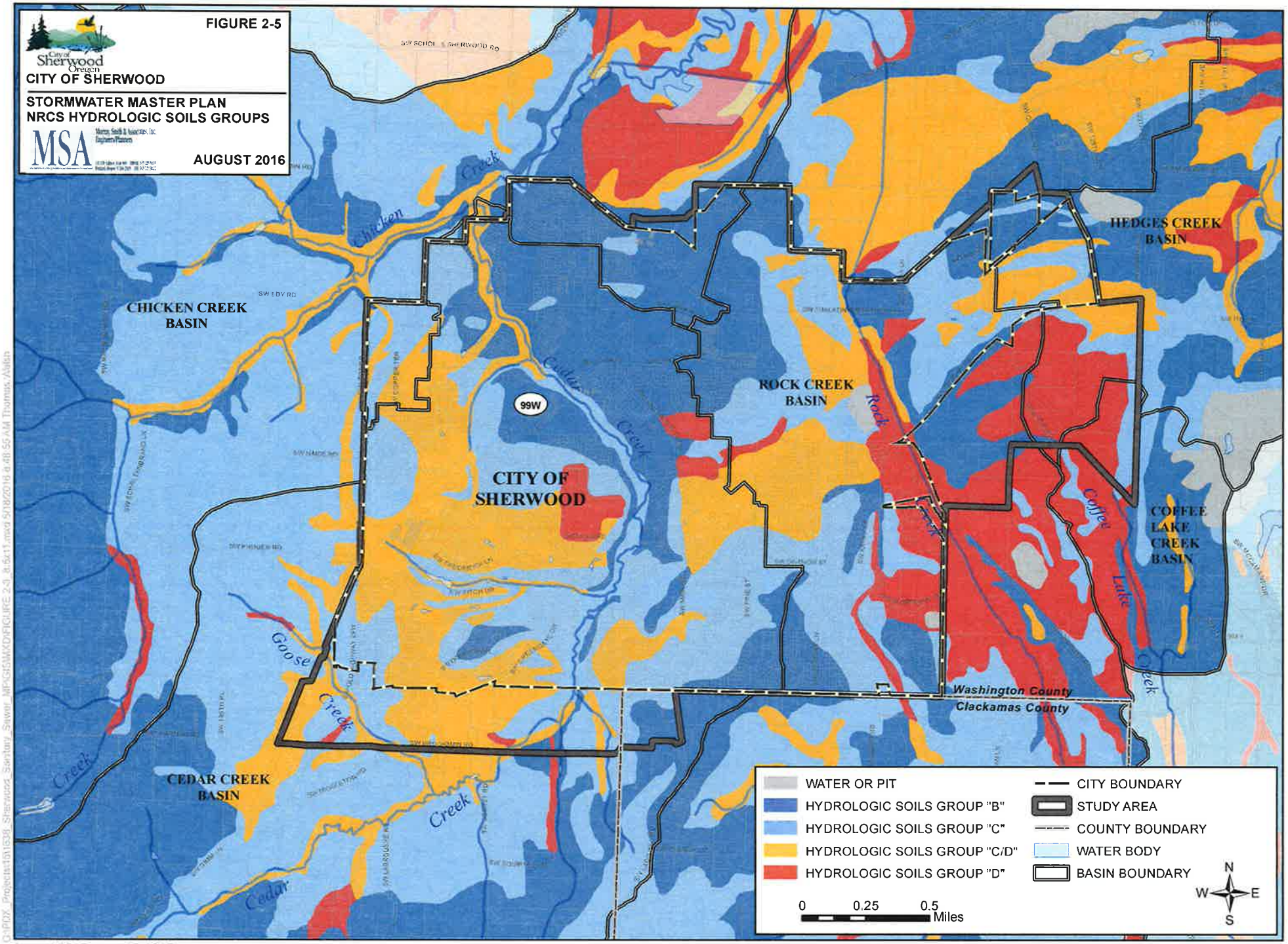
Detailed information on the soils found throughout the entire study area is summarized in the U.S. Soil Conservation Service's *Soil Survey of Washington County, Oregon* (1982), *Clackamas County, Oregon* (1985), and *Survey of Yamhill Area, Oregon* (1974). These surveys identify the soil types for construction considerations and potential runoff response to precipitation. In general, the soils within the study area produce a moderate to high response to rainfall in terms of stormwater runoff. Conversely, these soils typically infiltrate rainfall at a low to moderate rate. The Natural Resources Conservation Service (NRCS) hydrologic soils group classifications are summarized for the study area and presented in Table 2-3. Soils with a percent area less than 0.1 were omitted. The spatial distribution of soils in the study area is exhibited in Figure 2-5.

Table 2-3 | Study Area Hydrologic Soils Groups		
Hydrologic Soils Group Classification	Details	Percent of Study Area
B	Moderately low runoff potential when thoroughly wet. Typically 10%-20% clay and 50%-90% sand, with loamy sand or sandy loam textures.	24%
C	Moderately high runoff potential when thoroughly wet. Typically 20%-40% clay and <50% sand, with loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures.	42%
C/D	Dual characteristics of soil groups C and D. Soils type C characteristics under drained conditions and type D characteristics under undrained conditions.	21%
D	High runoff potential when thoroughly wet. Typically >40% clay and <50% sand, with clayey textures.	13%
	Total	100%

The NRCS hydrologic soils classification system is used to determine a soil's associated runoff curve number, along with land use, management practices, and hydrologic conditions. The runoff curve number is applied to quantify the direct runoff from rainfall. There are four basic soils groups, represented by A, B, C, and D, and are differentiated by runoff potential. The least potential for runoff is with group A soils, whereas group D soils have the greatest runoff potential. When soil groups are split for an area, as in C/D, the first class applies to the drained condition, while the second applies to the undrained condition. This is a function of the seasonally high groundwater level, within 24 inches of the surface.

The NRCS indicates locations within the study that contain bedrock at the ground surface. This information is supported by well logs referenced from the Oregon Water Resources Department with mixed results. There are several domestic water wells within the study area that report encountering rock within 10 feet of the ground surface. City staff indicate that encountering rock during trench excavation is uncommon within the study area.

Surface water hydrology is relatively consistent within the study area, and is influenced by seasonal rainfall. Generally, groundwater is well below the surface and does not normally impact construction. However, there are some areas in the City where seasonally high groundwater may impact construction during the wet weather season. It is recommended that groundwater investigations be undertaken prior to construction in these areas to identify and address groundwater issues. Two perennial streams, Cedar Creek and Rock Creek, flow through the City. Areas along Cedar Creek and Rock Creek are located within the 100-year flood plain boundary, as defined by the Federal Emergency Management Agency (FEMA). Several tributaries to these creeks are also within the 100-year flood plain. North of the City limits, much of the Tualatin River National Wildlife Refuge (Refuge) is within the 100-year flood plain. The soils in this area are typically saturated year round.



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DRAINAGE BASINS

The City lies within four major subbasins of the Tualatin River drainage basin, and one major subbasin of the Willamette River (as shown in Figure 2-4). These basins are areas of land where surface water from precipitation converges to a single, low-lying elevation to join another water body. The drainage basin acts as a funnel, channeling runoff towards downstream water bodies (e.g., rivers, creeks, and streams). Each drainage basin is hydrologically defined by a perimeter of surrounding topographical barriers, such as mountain ridges, hills, or earthworks. The contributing basin areas for the five receiving waters (Chicken, Cedar, Rock, Hedges, and Upper Coffee Lake creeks) included in this study are tabulated in Table 2-4.

Assessment of basin areas was completed using Geographic Information System (GIS) software and related tools. Data related to hydrologic soils groups were broken down according by drainage basins as presented in Figure 2-6. A brief description of each basin follows.

Figure 2-6 | Hydrologic Soils Breakdown by Basin and City UGB

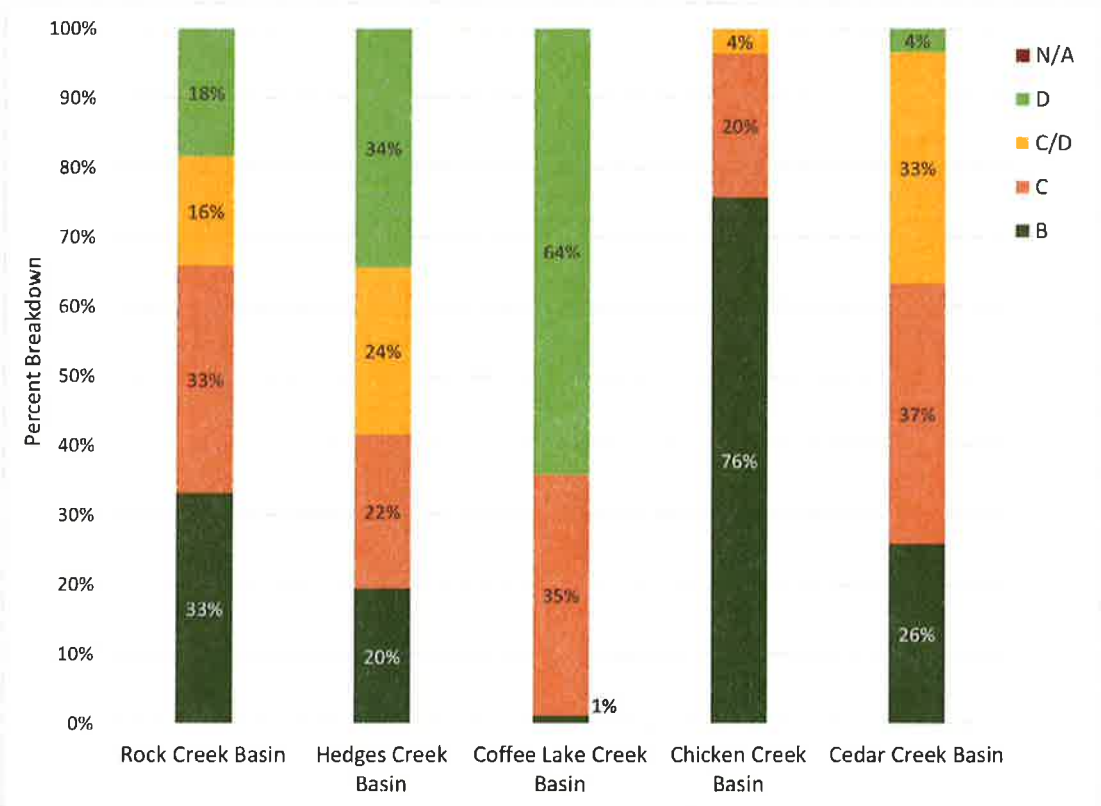


Table 2-4 | Drainage Basin Area Summary			
Basin Name	Total Basin Area (acres)	Area within City UGB (acres)	Percent of City's Drainage Area
Cedar Creek	5,753	1,785	53 %
Chicken Creek	4,875	211	6 %
Hedges Creek	2,634	222	7 %
Rock Creek	4,055	1,125	33 %
Upper Coffee Lake Creek	367	48	1 %
Totals	**17,684**	**3,391**	**100%**

Cedar Creek Basin

Cedar Creek meanders northward through the City and serves as the main tributary to Chicken Creek, converging northwest of the City. The creek is the dominant feature of the stormwater conveyance system for the western portion of the City, draining roughly 53 percent of the City UGB's 3,391 acres. The Cedar Creek Basin also includes the Brookman Concept Area. The entire Brookman Concept Area, at 251 acres, is drained by Cedar Creek. Cedar Creek is shallow and narrow, flowing through wide, flat floodplains.

The 5,753-acre Cedar Creek Basin includes 1,785 acres of the western half of the City. Within the City UGB, much of the area is developed and encompasses many land uses. Land use within the basin includes a large range of residential densities, including all of the City's High Density Residential zoning. The basin includes public lands such as Sherwood High School and Stella Olsen Memorial Park. Much of the commercially zoned land in the City is located within the basin, including the Old Town district and the commercial area along Highway 99W south of Sherwood Boulevard. A single industrial zone is located in the basin at the intersection of Sunset Boulevard and Greengate Drive. The southwest corner of the Brookman Concept Area includes a small assignment of industrial land. The remaining two-thirds of the basin located outside of the City UGB extends southwest from the City and is largely undeveloped and lightly forested.

The soils in the basin are largely comprised of Group C outside of the City UGB (see Figure 2-5). Within the City UGB, the southern portion of the basin is largely comprised of Group C soils while B soils comprise the majority of the north, with small areas of Group D soils. Within the UGB, slopes are generally less than 10 percent except near the creek where they are approximately 10 percent. Higher slopes, approaching 25 percent, are common in the basin's headwaters. The headwaters of the Cedar Creek basin reach into Yamhill County.

Chicken Creek Basin

Chicken Creek is largely located north and west of the City limits, passing along the northwestern edge of the City. Chicken Creek itself flows northeasterly and feeds into the Tualatin River, draining a total of 4,875 acres. Of that, 6 percent or 211 acres, is contributed directly from within the City's UGB. Of the 211 acres located within the City UGB,

approximately 75 percent of the area has been developed. Roughly half of the basin within the City UGB is a mix of low and medium density residential land uses. The other half is a mix of commercial land uses. Outside of the City UGB, the basin is generally undeveloped and lightly forested.

The hydrologic soils groups in Chicken Creek are largely classified as C beyond the City UGB and B within the City UGB (see Figure 2-5). Within the UGB, slopes are generally less than 10 percent except near the creek where they are approximately 10 percent. Higher slopes, approaching 25 percent, are common in the basin's headwaters. The headwaters of the Chicken Creek basin reach into Yamhill County. Chicken Creek ends at the confluence of Cedar Creek near the northwest edge of the City, due west of SW Roy Rogers Road.

Hedges Creek Basin

The Hedges Creek Basin includes the northeast portion of the City along Tualatin-Sherwood Road. The topography within the City UGB is gently sloping to the northeast, away from the center of the City. The 2,634-acre basin drains roughly 7 percent of the 3,391 acres within the City UGB, covering 222 acres of northeastern Sherwood. Hedges Creek conveys runoff eastward, through the City of Tualatin, before discharging to the Tualatin River. Within the City, the contributing area along Tualatin-Sherwood Road is zoned as commercial and industrial land. A large portion of the basin within the City UGB includes a large number of rock quarries which are zoned for industrial uses. The Hedges Creek Basin is also responsible for draining 38 percent (117 acres) of the TEA. The remaining 2,412 acres of the Hedges Creek Basin are located to the north and east of the City and include developed portions of the City of Tualatin.

The soils in the basin, both within and outside of the City UGB, are a mix of soil groups B, C, and D (see Figure 2-5). Soil groups B and C predominate in the headwaters, with increasing group D soils downstream. The southwestern corner of the basin, which is within the City UGB, is primarily comprised of Group C and Group D soils. The ground slopes within the basin are relatively flat, with slopes generally 10 percent or less over the entire basin.

Rock Creek Basin

Rock Creek flows north by northwest through the City to the Tualatin River. Rock Creek is the dominant surface water feature for the eastern portion of the City, and drains 33 percent of the 3,391 acres within the City UGB. The Rock Creek Basin also encompasses portions of the TEA (140 acres, or 46 percent).

The 4,055-acre Rock Creek Basin includes 1,125 acres within the City UGB. The basin is generally developed within the City limits, and zoned residential in the southern portion with industrial and commercial zoning in the northern portion. The remaining 2,930 acres are located outside of the City UGB, with roughly 1,000 acres located between the City UGB and the Tualatin River (north) and 1,940 acres to the south of the City UGB (partially in Clackamas County).

Soils in the basin are a mix of Groups B, C, and D, with a small percent of unclassified (e.g., water, pits). Group C and B soils are concentrated south of the UGB (see Figure 2-5), with a uniform distribution of soils B, C, and D throughout the UGB. Group D soils are concentrated along the creek, especially north of the UGB and southeast of the Southern Pacific Railroad. The ground has slopes near 10 percent in the regions of the headwaters. The headwaters of the Rock Creek basin extend into Clackamas County. Within the UGB, the slopes are relatively flat except near the creek where they are approximately 10 percent. Some steep slopes of 25 percent or greater are associated with the hills in the southern part of the City.

Rock Creek is shallow and narrow, and flows through wide, flat floodplains. Under severe dry weather conditions, the creek exhibits periods of negligible base flow.

Upper Coffee Lake Creek Basin

The greater Coffee Lake Creek Basin is a large basin, draining 14,765 acres, with a small portion (1%) of its headwaters located in the southeastern portion of the City UGB (367 acres). Coffee Lake Creek is a tributary to the Willamette River and is the only receiving water for the City that is not a tributary to the Tualatin River in the north. Coffee Lake Creek flows southerly from the City and through the City of Wilsonville prior to discharging into the Willamette River. The study area for the basin includes only this small section, which is referred to as the Upper Coffee Lake Creek Basin. Due to the hydrology of this basin, the majority of it is downstream of the study area and was therefore excluded from analysis. Only areas of the basin within the study area were analyzed.

The 367-acre Upper Coffee Lake Creek Basin includes roughly 48 acres within the City UGB, all within the TEA. None of the contributing area within the City UGB is currently served by the existing municipal stormwater system.

The soils in the portion of the basin within the UGB are dominated by Group D in the western third of the basin. Beyond the UGB, the soils are generally classified as Group B (see Figure 2-5). Ground slopes in the Upper Coffee Lake Creek Basin vary from being virtually flat in the northwest corner to being up to and greater than 25 percent over the rest of the basin.

NATURAL RESOURCE AREAS

Natural resources include air, water, plants, animals and soil. The Tualatin River Valley and its tributary streams provide significant natural resources, as documented in the *Comprehensive Plan* (Ord. 2009-009). There are numerous natural resource areas within and surrounding the study area, as can be seen in Figure 2-7, with descriptions below.

Historically, the City has managed natural resources through the establishment of "Open Spaces" and by inventories of environmental assets. State and federal requirements have resulted in both independent and cooperative identification and inventory of natural resource

areas by multiple Federal, State, and local agencies. The U.S. Fish and Wildlife Service manages the 3,060-acre Tualatin River National Wildlife Refuge roughly located to the north and east of the City. The Refuge was established as an urban refuge providing wetland, riparian, and upland habitats for migratory birds, threatened and endangered species, fish, other resident wildlife, and as a scenic area.

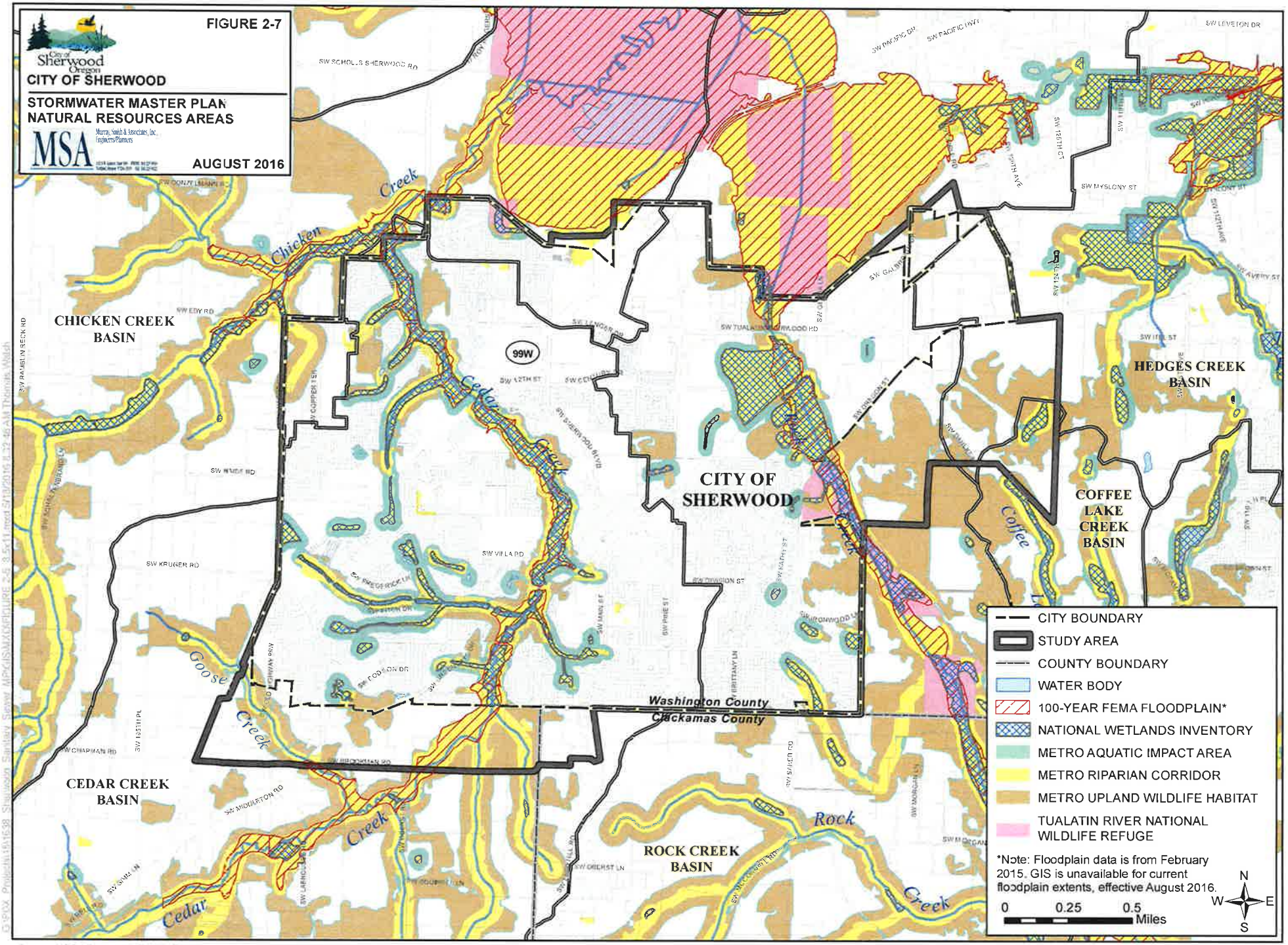
Metro and its member cities also protect other regionally significant natural resources such as the Tonquin Scablands Geologic Area, and other Metro-identified and classified riparian corridors, upland wildlife habitats and aquatic habitats. The majority of these Metro-identified natural resource areas are located alongside or adjacent to creeks, the Refuge, and the Tualatin River. Furthermore, though not formally mapped, Clean Water Services (CWS) *Design and Construction Standards* require a vegetated corridor, or riparian buffer, to be provided and maintained around natural water features upon urban development. The CWS buffer requirement is critical to maintaining and protecting these Metro-identified natural resource areas.

The Metro-identified resources have been recognized in the City's *Comprehensive Plan* (2006) as environmental resources requiring planning and management. The City's *Comprehensive Plan* also identifies a ponderosa pine forest located east of the intersection of Harrison and Middleton streets for preservation. Other City efforts include the acquisition of 300 acres of stream corridor and floodplain for protection from further development. These corridors, in addition to providing protection from flooding, support the functions of the Refuge.

In addition to the statutory recognition of environmentally sensitive areas, grass roots organizations such as the Tualatin Riverkeepers, and Friends of the Tualatin River National Wildlife Refuge have formed to advocate watershed stewardship in the Sherwood area. The City also recognizes that it is located in an area with generally good water quality and riparian habitat, and that the urban footprint can have a large impact on the local environment. Consequently, the City has formed partnerships with several of these organizations to provide educational outreach, stream enhancement projects, and assist in efforts to protect and improve the overall health of the nearby natural resources.

Surface Water

Also at the local level, CWS and its member cities provide for water quality management within the Tualatin River Basin. A large scale inventory and environmental study, the *Watersheds 2000 Program*, was conducted within the urbanized basin in support of cost-effective water quality and environmental management. The *Healthy Streams Plan* (2005) provides general descriptions of watershed areas, and describes the headwaters of Cedar Creek and Chicken Creek as generally undeveloped and in good condition. The plan further identifies that preserving the condition of the headwaters is important to the health of the downstream surface waters and overall watershed, and that development should be managed to protect these upper reaches of the watersheds. Additionally, Chicken, Cedar, and Rock creeks have been identified by the U.S. Environmental Protection Agency (EPA) as



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providing habitat for anadromous fish that are listed as threatened under the Federal Endangered Species Act (ESA).

Floodplain

A floodplain is an area of land adjacent to a river or stream that experiences inundation during periods of high discharge (i.e., exceeding the bank full conditions) and serves as a natural place for floodwaters to dissipate energy. To protect the integrity of these benefits from urbanized encroachment and to protect health and human safety during flood events, the City and Washington County have enacted restrictions on development within the floodplains under their jurisdiction.

New regulations are expected in Oregon that will require all floodplain development to comply with the Endangered Species Act (ESA). The City can comply with these new regulations by protecting the floodplains from development and where development must occur, ensuring that it does not impact endangered species. The broad vegetated floodplains adjacent to Sherwood streams have protected the channels from down cutting due to hydromodification.

The Flood Insurance Study (FIS) conducted by the Federal Emergency Management Agency (FEMA) in 1988 indicates that some areas along Chicken, Cedar, and Rock creeks and their tributaries are at risk of flooding during a 1% exceedance (100-year) flood event. While the floodplains largely overlap existing wetlands and creek beds, some individual developed lots lie within the floodplain. North of the City limits, much of the Refuge lies within the 100-year floodplain of the Tualatin River that extends south from the river to the City limits.

Due to the development and growth experienced by the City since the FEMA maps were produced in 2012, FEMA has updated the floodplain maps across Washington County, including the City. These updated FEMA floodplain maps were finalized in 2016, with an effective date of November 4, 2016.

Protecting natural and beneficial functions of floodplains within urban areas provides the following benefits;

- Protects health and human safety during floods,
- Reduces damages to public and provide infrastructure during floods,
- Provides flow storage and attenuation reducing flood risk downstream,
- Protects channel downcutting and erosion,
- Provides critical habitat for fish, wildlife, and birds,
- Improves FEMA Community Rating System score which reduces the cost of flood insurance for constituents.

HAZARD AREAS

According to the *Washington County Natural Hazards Mitigation Plan* (University of Oregon Community Service Center, 2006), the area surrounding the City is at risk for several types of natural disasters. This plan describes historical impacts, general location, extent, and severity of past natural hazard events, and the probability of future events. Table 2-5 summarizes all the hazards for which the City is at risk, however in terms of the stormwater conveyance system, susceptibility to flood is the greatest concern.

The Natural Hazard Risk Assessment probability scores address the likelihood of a future major emergency or disaster within a specific period of time, as follows:

- High = One incident likely within a 10- to 35-year period.
- Moderate = One incident likely within a 35- to 75-year period.
- Low = One incident likely within a 75- to 100-year period.

The vulnerability scores address the percentage of population or region assets likely to be affected by a major emergency or disaster, as follows:

- High = More than 10% affected.
- Moderate = 1%-10% affected.
- Low = Less than 1% affected.

Table 2-5 | Probability and Vulnerability Assessment – Washington County

Hazard	Probability	Vulnerability
Drought	Moderate	Low
Earthquake	Low	High
Extreme Heat	Moderate	Moderate
Fires	Moderate	Moderate
Flood	High	Moderate
Landslides	High	Low
Volcano	Low	High
Wind Storm	Moderate	Low
Winter Storm	High	Moderate

MUNICIPAL WASTEWATER COLLECTION SYSTEM

Developed areas within the City are presently served by publicly owned wastewater collection and conveyance facilities, operated through an Intergovernmental Agreement (IGA) between the City and CWS. Under the IGA, the City owns, maintains, and operates the wastewater collection and conveyance system within the City limits. All of the wastewater collection facilities within the City limits flow by gravity; there are no pumps or pressurized pipes in the system. The stormwater system is operated as a Municipal Separate Storm Sewer System (MS4), and interconnections between the stormwater and sanitary sewer systems are not allowed.

SOCIOECONOMIC ENVIRONMENT

Economic Conditions and Trends

The City is located between Oregon's "Wine County" and the Portland metropolitan area. Sherwood's *Economic Development Strategy* (2006) finds that the City of Sherwood is highly suited to support the following industries: small to mid-size light manufacturing; specialty contractors and construction firms; creative services; amusement, recreation, sporting and lodging hospitality; educational facilities; and nursing and health care support services and facilities.

Sherwood's Economic Development Department reports that the City exceeds several economic and educational metrics, as follows:

- Data from 2012 reports show that the City's median household income of $79,209 exceed Oregon's average of $49,850.
- The percentage of the City's (25 and older) population who have a bachelor's degree or higher is 43.4 percent. This surpasses the State of Oregon's average metric of 29.7 percent.

The City's education system is primarily served by the Sherwood School District 88J, which currently serves 5,119 students and 477 staff in 7 schools (retrieved August 9, 2016, from www.sherwood.k12.or.us/district/fast-facts). The School District's boundary extends past the study area of this SWMP, serving students in less populated areas between Tualatin and Wilsonville.

Historic and Future Population Data

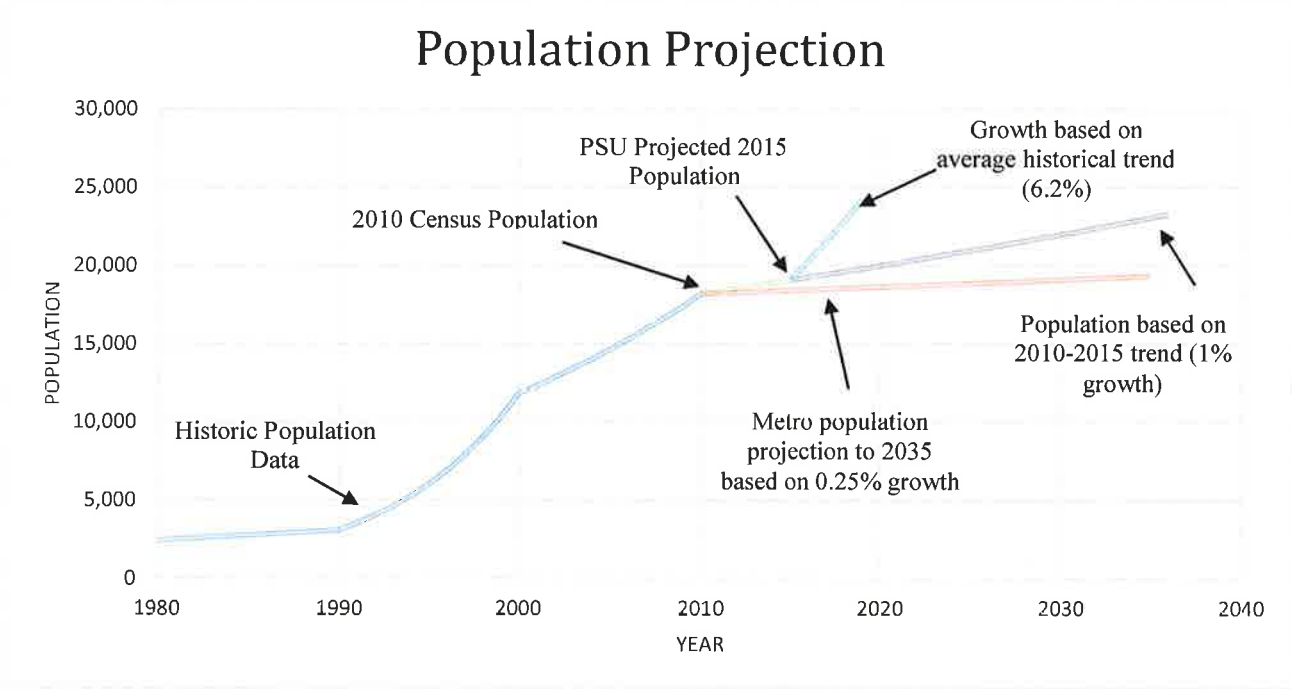
In projecting future growth and associated land use impacts, the SWMP relies upon several sources of historical and projected population data, such as the United States (U.S.) Census Bureau data, Portland State University (PSU) certified population estimates, and Metro population projections. Additional discussion on population and land use is provided in Section 5 – System Analysis, which explains how these factors affect stormwater runoff characteristics.

Historic data and the U.S. Census demonstrate that the City's population has experienced steady growth over time, with a reported population of 18,194 for the 2010 census. The growth rates vary by decade with 2.4% growth in the 1980's, 14.3% growth in the 1990's, and 4.4% growth in the 2000's.

Metro's projected annual populations for Oregon cities is applied to growth estimates through 2035 as shown in Figure 5-1. The growth rate between 2010 and 2035 based on the Metro 2035 population projection of 19,342 is approximately 0.25% and significantly lower than the 6.2% average historical rate of growth for the City (*Certified Population Estimates*, Portland State University, www.pdx.edu/prc/population-reports-estimates; *Regional Forecast Distribution Methodology & Assumptions, Population and Employment, 2010-40 TAZ Forecast Distribution "Gamma Scenario,"* METRO, 2012).

The population at build-out of the UGB is estimated at 23,390. This projection is based on in-fill of all residential tax lots assuming average housing densities by zoning classification and the Metro projected number of 2.66 people per household. Portland State University (PSU) Population Research Center's certified population estimates for 2015 indicate a growth rate of approximately 1% between 2010 and 2015 with a 2015 population estimate of 19,080. Extrapolating growth to build-out at the 1% growth rate results in build-out occurring around 2036. Extrapolating growth to build-out at the average historic rate of 6.2% results in build-out occurring around 2019. The *Sherwood Housing Needs Analysis, 2015 to 2035* (Draft March 2015), concludes that growth projections require development of the Brookman Concept Area and potential UGB expansion. The Brookman Concept Area is included in the SWMP population projections. UGB expansion is not considered in the SWMP.

Figure 2-8 | Population Projections for the City



Sources: *Certified Population Estimates*, Portland State University, www.pdx.edu/prc/population-reports-estimates; *Regional Forecast Distribution Methodology & Assumptions, Population and Employment, 2010-40 TAZ Forecast Distribution "Gamma Scenario,"* METRO, 2012.

SECTION 3 | EXISTING SYSTEM DESCRIPTION

INTRODUCTION

This section provides an overview of the City of Sherwood's (City's) existing storm drainage system, location, general management, and physical infrastructure. An inventory of the existing stormwater conveyance system under the City's jurisdiction is provided below. The inventory includes pipes, open channel conveyances, culverts, water quality and quantity management features.

UTILITY MANAGEMENT STRUCTURE

Developed areas within the City are presently served by publicly owned stormwater collection and conveyance facilities. Ownership, capital financing and maintenance responsibilities for these facilities is defined through an Intergovernmental Agreement (IGA) between the City and Clean Water Services (CWS). Under the IGA (see Appendix A) the City owns, maintains, and operates the "Local Program" stormwater collection and conveyance system within the City limits. The Local Program elements generally consist of stormwater conveyance piping, open channels and regional surface treatment or control facilities managing runoff from less than one acre. While the IGA stipulates that while the City maintains the public creeks and open channels, CWS remains responsible for water quality within the creeks.

CWS is responsible for the "District Wide Program" elements defined under the IGA. This program pertains to regional surface treatment or control facilities where the tributary area is equal to, or greater than, one acre. CWS also maintains roadside ditches and stormwater piping systems outside the City limits with financing provided by Washington County. The IGA places ownership of existing or future stormwater culverts exceeding 36 inches in diameter with either Washington County or the Oregon Department of Transportation (ODOT), depending on the road authority. In addition, Washington County currently owns and maintains a water quantity facility (pond) located northwest of the intersection of Tualatin-Sherwood Road and Highway 99W. ODOT operates a facility just northwest of the intersection of Kruger/Elwert Roads and Highway 99W.

Operating within the Public Works Department, the City's stormwater collection system provides utility service to its customer accounts. The Department's Operations Supervisor and maintenance staff members are responsible for conducting stormwater collection system operation and maintenance.

STORMWATER CONVEYANCE SYSTEM OVERVIEW

The existing stormwater conveyance system is illustrated in Figure 3-1. This infrastructure network is a gravity system and does not contain lift stations, force mains, flow control weirs or sanitary sewer interconnections. Stormwater runoff is collected from residential, commercial, industrial and institutional lands via catch basins, roof and area drains, and ditch inlets. The stormwater runoff is then conveyed through a collection of stormwater piping,

FIGURE 3-1

CITY OF SHERWOOD

STORMWATER MASTER PLAN
EXISTING SYSTEM MAP

Murray, Smith & Associates, Inc.
Engineers/Planners

AUGUST 2016

SW EDY RD
Chicken Creek
SW ELWERT RD
Cedar Creek
99W
SW TUALATIN SHERWOOD RD
Rock Creek
Sherwood
NE OREGON ST
Tonquin Employment Area (TEA)
SW AVE
SW PACIFIC HWY
SW OREGON ST
SW KRUGER RD
SW SUNSET BLVD
Coffee Lake Creek
Goose Creek
Brookman Concept Area
SW BROOKMAN RD
SW BAKER RD
Rock Creek

STORMWATER FACILITIES:
- MANHOLE
- WATER QUALITY MANHOLE
- EXTENDED DETENTION POND
- LIDA
- RETENTION BASIN
- SWALE
- DITCH
- CULVERT
- CITY STORM SEWER LINE

- TUALATIN RIVER NATIONAL WILDLIFE REFUGE
- CITY BOUNDARY
- STUDY AREA*
- BASIN BOUNDARY
- ROCK CREEK BASIN
- CEDAR CREEK BASIN
- CHICKEN CREEK BASIN
- COFFEE LAKE CREEK BASIN
- HEDGES CREEK BASIN

* STUDY AREA = UGB

0 0.25 0.5 Miles

N W E S

open channels, and culverts before discharging to a receiving surface water. Receiving waters include the natural creek and pond systems, as well as manmade detention facilities.

In numerous locations throughout the City, stormwater runoff is treated by a water quality facility prior to discharge from the storm drainage system. In general, all developments built since 1991 include water quality facilities and, in some cases, water quantity or detention facilities.

EXISTING DRAINAGE FACILITIES

The planning area is presently drained by a system of natural features, as previously discussed in Section 2, in combination with piped storm sewers, roadside open channels, culverts and swales. Drainage throughout the City is dominated by the cumulative 8.60 miles of natural creek present within the City, including the Cedar Creek (6.40 linear miles), Chicken Creek (0.50 linear miles), Rock Creek (1.06 linear miles), Upper Coffee Lake Creek (0.14 linear miles), and a tributary of Cedar Creek (0.51 linear miles). An inventory of stormwater system data, provided by the City, includes approximately 71 miles of existing storm drainage piping, 5.0 miles of open channel conveyance, a total of 121 vegetated swales, 278 culverts for a total length of 4.23 miles, and 256 stormwater outfalls.

The historic development of stormwater conveyance throughout the majority of the City has followed modern standards through the construction of curbs, gutters, and centralized storm sewers as property was developed.

While this SWMP reflects the City's ongoing effort to record and document stormwater infrastructure, data gaps still exist relative to the City's better defined water and sewer utility systems. These gaps primarily pertain to open channel conveyances, such as creeks, pipe age and material. There are a handful of system locations of unknown pipe sizes and slopes. Interviews with City staff were conducted to help fill in some of the missing information where feasible. The City intends to continue to add to and refine the stormwater GIS over time.

Gravity Pipelines and Other Infrastructure

Construction materials in the existing storm water system vary. Generally, pipes and culverts are either concrete or plastic. Summaries of stormwater pipe materials and sizes found within the planning area are shown in Tables 3-1 and 3-2.

Open Channel Conveyance

There are numerous roadside ditches, creeks, ponds, and streams within the study area, comprising approximately 11 miles of stormwater conveyance. While these natural and constructed open channels are significant in terms of overall length and capacity, the effort to survey and model these channels was excluded from the scope of this SWMP.

Table 3-1 | Existing Storm Sewer Pipeline Materials Summary			
Pipe Material	Length (feet)	Length (miles)	Percent of System
Circular Concrete (CSP, RCP or RCSP)	102,594	19.4	27%
Cylindrical Concrete (CCP)	23,535	4.5	6.3%
Aluminum	153	0.0	0.0%
Corrugated Metal Pipe (CMP)	616	0.1	0.2%
Ductile Iron Pipe (DIP)	6,806	1.3	1.8%
Plastic*	210,953	40	56%
Perforated Pipe	6,326	1.2	1.7%
Other (CDP, RMCP, VSP)	3,496	0.7	0.9%
Unreported	21,666	4.1	5.8%
Total	376,181	71.2	100%

*Note: Plastic includes the following pipe materials: ABS, ADS, C-900, CPP, HDPE, PPP, and PVC.

Table 3-2 | Existing Storm Sewer Pipeline Size Summary			
Pipe Diameter (inches)	Length (feet)	Length (miles)	Percent of System
72	153	0.0	0.04%
60	190	0.0	0.05%
54	60	0.0	0.02%
48	255	0.0	0.07%
42	1,328	0.3	0.35%
36	6,451	1.2	1.7%
30	10,729	2.0	2.9%
27	2,668	0.5	0.71%
24	31,704	6.0	8.4%
21*	1,867	0.4	0.50%
18	35,603	6.7	9.5%
15**	35,794	6.8	9.5%
12	180,631	34	48%
10	22,850	4.3	6.1%
Less than 10***	29,814	5.6	7.9%
Unreported	16085	3.0	4.3%
Total	376,181	71.2	100%

*Note: This includes pipes with reported diameters of 21 and 20 inches.
**Note: This includes pipes with reported diameters of 15 and 16 inches.
***Note: This includes pipes with reported diameters of 8, 6, and 4 inches.

Water Quality Facilities

Water quality treatment of stormwater typically refers to the physical, chemical, and/or biological removal of pollutants from surface water runoff. These pollutants consist of sediments; sand, silt and other suspended solids; dissolved metals, such as copper, lead, and zinc; nutrients, such as nitrogen and phosphorus; pathogens, such as bacteria; and organic matter, such as petroleum, hydrocarbons, and pesticides. Facility design and implementation is a function of many parameters, including the targeted pollutant(s), the land use, the topography, and the characteristics of the site. Such systems can rely on more natural processes for pollutant removal, such as with an engineered wetlands, or they can employ manufactured or precast infrastructure, such as separators placed within vaults.

There are currently 166 vegetated swales and 44 extended dry detention ponds mapped throughout the City that provide collection and treatment for approximately 408 acres of tributary area[1]. Of these, the City owns and maintains approximately 122 of the vegetated swales and 21 of the extended dry detention ponds. The City inspects, but does not maintain, another 18 facilities owned by homeowner associations and other private ownership interests. Also, as development occurs within the City, some facilities have their operations responsibilities transferred from the developers and owners to the City after a two-year warranty and vegetation establishment period.

Table 3-3 | Existing Storm Detention & Treatment Infrastructure Summary

Type(s)	Ownership	Number	Percent of Type
Extended Dry Detention Pond	City	21	15%
	Private	23	
Swale	City	122	55%
	Private	44	
Retention Basin	Private	2	<1%
Low Impact Development Approaches (LIDA)	Private	1	<1%
Unknown	Private	1	<1%
Water Quality Manhole	City	68	29%
	Private	21	
Total		303	100%

In addition to the existing stormwater ponds that the City inspects, there are a total of 71 private facilities operated and maintained by the facility owner. Most of these private facilities were constructed after 1991 when new development standards were adopted. While the City does not possess detailed structural information for these facilities, it does maintain the location, ownership, year built, service life, and total site area (acres) for the units.

Of the 89 water quality manholes within the City, 21 are owned and maintained by multiple stakeholders, including the Oregon Department of Transportation (1), Washington County (6), and private entities (14). The City also owns and maintains 68 water quality manholes.

[1] *Stormwater Annual Report* (November 2014). Clean Water Services.

In most cases, these manholes are installed prior to vegetated water quality facilities to provide pre-treatment by sedimentation per CWS standards.

Flow Control Facilities

The City currently maintains a total of 21 stormwater extended dry detention ponds as part of its stormwater collection system. There are also two locations where stormwater detention is provided in underground, oversized storm sewer pipes, located on Smith Road and west of Murdock Road.

The City-inspected water quality and quantity facilities and City-owned water quality manholes are shown on Figure 3-1.

STORMWATER SYSTEM CONDITION

Conveyance System Condition Assessment

Conveyance system condition assessment is based on previous master plan CIP lists, input from City staff and TV inspection of portions of the system utilizing NASSCO ratings. The NASSCO rating system is described below.

NASSCO Ratings-

- Structural and Operation/Maintenance scores are calculated for each pipe segment based on the number and severity of defects. Expresses a weighted score for each pipe segment based on the individual defects within a given pipe.

$$NASSCO\ Rating\ for\ Pipe\ X = \frac{\sum_{Defect\ 1}^{Defect\ n}(Defect\ 1 * Defect\ 1\ Score\ ) \ldots (Defect\ n * Defect\ n\ Score)}{Total\ Number\ of\ Defects\ in\ Pipe\ Segment}$$

- Defect grades range from 1 to 6, with 6 being the most severe. This range is used for both structural and operational/maintenance (O&M) defects. The severity of defects is documented during TV inspection of pipelines.
- Structural Defects include cracks, fractures, holes, deformations, collapses, joint and surface defects and failure of linings or previous repairs. In the Sherwood system documented structural defects range from grade 1 to 4 and include pipe defects (bulges), surface spalling, joint offsets, longitudinal and circumferential cracks and joint separation.
- Documented O&M defects in the Sherwood system range from grade 1 to 5 and include gushing and running infiltration, protruding objects, root intrusion, and deposits including sand and gravel.

Figure 3-2 documents system condition projects that have been identified and includes NASCCO ratings where they are available. The ratings have been grouped into the following categories:

- Rating 1 – 2: Lowest priority
- Rating 3 – 4: Moderate priority
- Rating 5 – 6: Highest priority

Figure 3-2 also documents the location of known condition issues provided by City staff. Table 3-4 summarizes condition based projects by pipe length and diameter.

FIGURE 3-2

CITY OF SHERWOOD

STORMWATER MASTER PLAN
EXISTING SYSTEM - CONDITION

Murray, Smith & Associates, Inc.
Engineers/Planners

AUGUST 2016

SW EDY RD
SW ELWERT RD
SW ROY ROGERS RD
SW PACIFIC HWY
99W
SW MEINECKE RD
SW KRUGER RD
SW CHAPMAN RD
SW BROOKMAN RD
SW SUNSET BLVD
SW MAIN ST
SW BAKER RD
SW TUALATIN SHERWOOD RD
SW OREGON ST
NE OREGON ST

Sherwood

Tonquin Employment Area (TEA)

Brookman Concept Area

Creek
Cedar Creek
Rock Creek
Goose Creek
Coffee Lake Creek
Lake Creek
Rock Creek

1
2
3
4
5
6

OM Rating
- Lowest Priority
- Moderate Priority

STR Rating
- Lowest Priority
- Moderate Priority
- Highest Priority
- CITY BOUNDARY
- STUDY AREA
- STREAM
- CITY STORM SEWER LINE
- ROCK CREEK BASIN
- CEDAR CREEK BASIN
- CHICKEN CREEK BASIN
- COFFEE LAKE CREEK BASIN
- HEDGES CREEK BASIN

Note:
"OM" refers to operational and maintenance issues.
"STR" refers to structural defects.
Call-outs identify the Project ID.

0 0.25 Miles

N W E S

August 2016 13-1537

Table 3-4 I Condition Improvements					
Project ID	Project Description	Basin(s)	Driver	Improvement Length (feet)	Improvement Diameter (inch)
1	SW Willamette St & SW Norton Ave, & SW Martin Ct, & SW Lincoln St & SW Oregon St	Rock Creek	Pipe & Manhole Condition	962	10 - 24
2	SW Merryman St, North to SW Oregon St (beneath properties)	Rock Creek	Pipe & Manhole Condition	2,102	10 - 36
3	SW Lower Roy St to SW Oregon St, SW Hall Street & SW Merryman St, & SW Lower Roy St & SW Brickyard Dr, & SW Hall St, SW Nottingham Ct to SW Oregon St	Rock Creek	Pipe & Manhole Condition	1,252	8 - 36
4	SW Galbreath Dr, Northeast of 13910 SW Galbreath Dr, & SW Tualatin Sherwood Rd & SW Dahlke Ln	Rock Creek	Pipe & Manhole Condition	398	10 - 12
5	16956 SW Meinecke Rd (beneath property), & SW Meinecke Rd & SW Lee Dr, & 16956 SW Meinecke Rd (beneath property)	Cedar Creek	Pipe & Manhole Condition	291	12
6	SW Sherwood Blvd & SW Langer Dr, & SW Jonquil Ter, Across from 20649 SW Jonquil Ter, & SW Roy Rogers Rd, Behind 7438 SW Roosevelt St	Cedar Creek, Chicken Creek	Pipe & Manhole Condition	683	12 - 30

Pipeline Improvement Techniques

The following discussion summarizes common pipeline improvement techniques that may be applied to the City's condition-based improvements.

Chemical Grouting - Chemical grouting is commonly used to seal leaking joints in structurally sound pipe and manholes. The equipment consists of a sealing packer and television camera pulled inside the conveyance pipe with cables and winches. Because the sealing is done inside the pipe, excavation is not required unless unique problems develop.

The chemical grouts typically used are acrylamide, acrylate, or urethane gel. The chemicals necessary to form the gels are usually mixed in two separate tanks and pumped through separate hoses to the joint to be sealed. One tank is used to mix and dispense the grouting chemical and the other tank is used to mix and dispense a catalyst. The catalyst initiates a chemical reaction when mixed with the chemical grout. The materials are injected simultaneously into a leaking joint, a gel is formed and the leak is stopped. Urethane gel differs from acrylamide and acrylate gels in that water is the catalyst for the urethane gel material.

Chemical grouting does not improve the structural strength of the pipeline. This rehabilitation technology should not be used on pipes that are broken or deteriorated. If the ground water table drops below the level of the pipe, the chemical grout may become dehydrated and its useful life shortened. When used appropriately, rehabilitation by chemical grouting has a useful life of 10 to 15 years.

The costs for chemical grouting vary depending upon the number of grouting locations and the quality of sealant used. The chemical grouting process generally includes pipelines cleaning, television inspection, testing all joints, sealing deficient joints, and sealing leaking manholes where needed. The television inspection will occasionally locate a section of pipe not repairable by chemical grouting. A point excavation is required to repair such a leak.

Grouting must be repeated approximately every 10 years because of the limited life of chemical grout. For portions of the system conducive to chemical grouting, one application performed initially and at the end of 10 years should effectively seal the pipeline during the planning period.

Conventional Pipe Replacement - Pipeline replacement by conventional, open-cut excavation and backfill is normally done when the existing pipeline is deteriorated so badly that other methods of rehabilitation are not feasible. Replacement provides the opportunity to correct misalignments, increase the hydraulic capacity of the line by increasing the pipe diameter, repair service connections, and eliminate sags or stormwater entry points. Replacing pipelines can also remove any "incidental" minor leaks that would not be cost-effective to remove. A rehabilitation alternative that is similar to complete pipe replacement is point repairs or spot repairs, which involve excavation, backfill, and pipe replacement for selected areas.

The advantage of pipe replacement is that service life with modern materials and methods is generally greater than 50 years. The cost of replacement is generally high. The replacement has associated inconveniences, and restoration requirements that may be costly in developed areas.

Pipe Bursting - Pipe bursting consists of expanding and breaking in-ground pipe and towing in segments of new polyethylene (PE) or polyvinyl chloride (PVC) pipe. For the pipe cracking operation, a modified soil displacement hammer is pulled through a pipe run via an above-ground winching system. Cutting blades of different size are fixed on the hammer to break the existing pipe. An expander fitted on the rear of the hammer enlarges the original bore so that pipe of equal or larger diameter can be pulled behind the pipe cracking process. The new pipe is fitted into the trailing end of the hammer unit. As the hammer advances through the old main, it cracks the pipe and the fragments are displaced laterally. Simultaneously, the new liner/pipe is then towed in. If a liner is required, the new conduit pipe is then towed in after the entire length of old main has been cracked and lined.

Pipe bursting is most often used under highways, railroads, and other structures where excavation is not possible or cost-effective. The service life is virtually identical to a new sewer pipe (50 years), since new pipe is actually being installed. Spot excavations are required to connect service laterals. Sliplining is not typically used for gravity pipelines where pipe slopes are relatively flat. This is due to high likelihood of creating "bellies", or localized low spots, in the pipe invert where solids can deposit.

Sliplining - Sliplining involves inserting a slightly smaller new flexible pipeline, usually polyethylene, into the existing pipe. This method is typically used where the existing pipes are extensively cracked such as in areas with unstable soil conditions, where the lines are badly deteriorating, or in lines with relatively flat grades. Sliplining will reduce the inside diameter of pipe and reduce its flow capacity. Sliplining is generally used on mainlines larger than 8 inches in diameter.

Slip lining involves minimum excavation and accompanying dewatering work. Excavations are required only at insertion pits and for service lateral re-connections. For this reason, sliplining is advantageous in inaccessible or difficult areas, or under landscaping or structures. Sliplining can be installed in existing pipelines having moderate horizontal or vertical deflections. Flows within the pipe may be allowed to continue while sliplining operations occur.

The liner pipe is commonly pulled through the existing pipe with a winch assembly placed at a manhole and the liner pipe fed into the existing pipe through an insertion pit. The pipe is pulled by steel cable with the cable attached to a pulling head at the pipe end. The polyethylene pipe will stretch during pulling (one foot per 100 feet is common) and a relax procedure is required after pulling and before connection at manholes. Increased temperatures will also tend to stretch the pipe.

The service life of a sliplined sewer is similar to a new sewer replaced by conventional trench excavation and backfill, which is about 50 years. The new liner pipe is a pressure-

capable pipe itself. A disadvantage of sliplining is that excavations are required at service laterals. This is often times consuming, labor intensive, and correspondingly expensive.

Inversion Lining - Inversion lining installs a flexible lining material against the existing pipe that is thermally hardened and requires access to the sewer pipe at a manhole. The liner is fed through the manhole and into the sewer pipe by filling the pipe and manhole with water. As water is pumped into the manhole, the flexible fabric is pushed through the pipe and inverted into place. The water is heated to cure and harden the thermo-setting resins.

Inversion lining is appropriate for pipelines requiring minor structural repair or with misalignments and for correcting corrosion problems. Because this method of rehabilitation does not require excavations, it may be used under highways and buildings. A television inspection of the existing sewer typically precedes the inversion lining work. Video inspection during a period of high groundwater table should be performed following lining to make sure laterals are not leaking or other small holes were not introduced into the side of the liner during lateral cutting. The life of an inversion lined pipe has been claimed by the lining manufacturers to be 50 years. Installations with almost 30 years of service are known to exist.

The inversion lining will reduce the inside diameter of an 8-inch pipe by up to ¾-inch depending on the service requirements. Flow capacity of the pipe may be reduced by the reduced pipe cross-sectional area, or increased by smoothing the flow channel.

SECTION 4 | REGULATIONS AND POLICIES

INTRODUCTION

The City of Sherwood (City) is ultimately responsible for management and operation of infrastructure under its jurisdiction in accordance with all known Federal, State, and local regulations. This section summarizes the regulations applicable to the conveyance system and serves as the basis for the content and recommendations in this Stormwater Master Plan (SWMP).

FEDERAL STATUES, REGULATIONS AND PERMITS

Clean Water Act

The Clean Water Act (CWA) is the principal Federal law in the United States governing water pollution and provides the basis for the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) permit program. This program regulates pollutants discharged from point sources into waters of the United States through water quality based effluent limits. Other regulations related to the mission of the NPDES program include the Safe Drinking Water Act, Endangered Species Act, National Environmental Policy Act, National Historic Preservation Act, Coastal Zone Management Act, Wild and Scenic Rivers Act, Fish and Wildlife Coordination Act, and Essential Fish Habitat Provisions.

The Clean Water Act Section 404 Permit requires studies into wetland delineation, impact assessment, and mitigation plans for projects including filling or dredging existing wetlands. Through Section 404, the U.S. Army Corps of Engineers (USACE) also has jurisdiction over the construction of utility crossings such as culverts through navigable waters and wetlands. Final construction of projects within the City through wetlands and waterways will need to be coordinated with the USACE.

NPDES Phase I Stormwater Permits

The Oregon Department of Environmental Quality (DEQ) administers the state's NPDES permit program on behalf of the federal government. Under Phase I of the NPDES Stormwater Permit Program, certain cities within Oregon are required to obtain a permit on their stormwater conveyance system for discharging runoff into state waters. These conveyances, referred to as Municipal Separate Storm Sewer Systems (MS4), consist of roads with drainage systems, municipal streets, catch basins, curbs, gutters, manmade channels, and storm drains. Phase I targets areas primarily within the Portland metropolitan region with populations exceeding 100,000.

Clean Water Services (CWS) is the NPDES permit holder for the region within Washington County draining to the Tualatin River. Being the permit holder, CWS is ultimately responsible under NPDES Permit No's 101141, 101142, 101143, 01144 and MS4 (File No. 108014) manage stormwater flows from Municipal Separate Storm Sewer Systems within its jurisdiction. The permit was renewed in 2016, and will be in effect until May 31, 2021.

Similar to the previous permit, the new NPDES permit requires that post-construction runoff strategies be implemented to mimic natural hydrology, utilize green infrastructure (GI) or low impact development (LID), and treat 80% of the annual average runoff volume. The permit also requires retrofit of several stormwater outfalls that currently do not have appropriate post-construction controls. CWS will coordinate with the City of Sherwood and the other jurisdictions under this permit to select and construct appropriate retrofit projects.

In addition to these provisions, the permit also includes a new requirement to address hydromodification. The permit requires CWS to first complete a watershed-level hydrmodification assessment, and then develop, implement and enforce a program to control post-construction stormwater runoff based on the findings of the assessment.

National Flood Insurance Act

The Federal Emergency Management Agency (FEMA) regulates floodplain protection in part through the National Flood Insurance Act. FEMA's Region X, located in Bothell, Washington, has regulatory oversight over the City. The agency facilitates the National Flood Insurance Program (NFIP), which provides federally subsidized insurance to properties within flood hazard areas.

In response to a lawsuit filed against FEMA in 2009, the National Marine Fisheries Service (NMFS) performed a Biological Opinion (BiOp) regarding impacts the NFIP was having on Endangered Species Act-listed species. This BO was provided by NMFS in April 2016, and documented in a letter to the City of Sherwood, dated June 13, 2016 (See Appendix). The letter states that NMFS has concluded that the implementation of the NFIP in Oregon jeopardizes the continued existence of 18 ESA-listed species and adversely modifies their critical habitat. NMFS considers the issuance of floodplain development permits that do not avoid or compensate for detrimental impacts to ESA-listed species or their critical habitat as noncompliant with the ESA. NMFS identifies certain private floodplain development activities as harmful to listed species, including the addition of fill, structures, levees and dikes, the addition of impervious surfaces, removal of vegetation, and bank armoring. As a result of the BiOp, FEMA is implementing significant revisions to the NFIP to ensure compliance with ESA. It is anticipated that the City of Sherwood will implement those changes into the City's development code to retain full compliance with the FEMA NFIP so that the community's eligibility in the program is maintained.

With specific regards to stormwater regulations, NFIP will include provisions for minimizing stormwater and hyporheic impacts of the floodplain from impervious surfaces installed with development. This will mainly be accomplished through a number of strategies already being utilized, such as Low Impact Development Approaches (LIDA), Green Infrastructure (GI), minimizing net impervious area, and enhancement of riparian vegetation. Since all of the City's stormwater is ultimately discharged to the 100-year floodplain of the Tualatin River or its tributaries, the new NFIP requirements will likely widen the breadth of use of these approaches for future development in the City. The City is recommended to work closely with CWS in development and refinement of stormwater facilities design to ensure compliance with NPDES as well as NFIP requirements.

Endangered Species Act

Endangered and threatened species can be found in this study area. These include:

- Bald eagle, *Haliaeetus leucocephalus* (threatened; proposed delisted)
- Chinook salmon, *Oncorhynchus tshawytscha* (threatened; Upper Willamette River Evolutionary Significant Unit)
- Steelhead, *Oncorhynchus mykiss* (threatened; Upper Willamette River Evolutionary Significant Unit)

Construction in the 100-year floodplain and/or within listed species habitat may require a Biological Assessment, and appropriate construction windows will need to be determined to minimize potential impacts to salmon spawning and/or to eagle nesting periods. The primary consideration for construction around Chicken Creek, Cedar Creek, Rock Creek and the Tualatin River will be allowing adequate lead time to coordinate with regulatory agencies and establish appropriate construction periods.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) is the principal federal law in the United States intended to ensure safe drinking water for the public. Pursuant to the act, the EPA is authorized to regulate underground injection of stormwater to safeguard drinking water quality. The Oregon DEQ's Underground Injection Control (UIC) Program regulates injection wells that place fluids underground for storage or disposal under the SDWA.

OREGON STATUTES, REGULATIONS AND PERMITS

Oregon Drainage Law

Oregon court rulings have been largely responsible for developing Oregon's drainage law. While no legislative action has been passed putting a particular law into effect, court decisions dictate that:

- Adjoining landowners are entitled to have the normal course of natural drainage maintained.
- Owners of low-lying land must accept water that naturally drains onto their land from higher elevations, but are entitled not to have the normal drainage changed or substantially increased.
- Owners of low-lying land may not obstruct the runoff from the higher-elevated land, if the landowner of the higher-elevated land has properly discharged the water.

Like any private landowner, the City must comply with Oregon drainage laws. Any public projects, such as roadway embankments, municipal developments, storm drainage systems,

or culverts would be required to maintain the same natural flow pattern of runoff as before development occurred.

OAR 141, Division 85 and 86

This Oregon Administrative Rule (OAR) contains Oregon's Removal-Fill Law, which requires developers who plan to remove or fill material in state waters to obtain a permit from the Department of State Lands (DSL). Drainage projects conducted within the City may be subject to the oversight of this law if the project involves 50 cubic yards of fill or excavation to occur within a regulatory waterway. Projects conducted within essential salmon habitat are required to obtain a permit, regardless of the quantity of earthwork. Several waterways within the City's boundary meet this designation, such as Cedar Creek, Chicken Creek, Hedges Creek and Rock Creek. Due to overlapping jurisdictional boundaries with the USACE pertaining to work within waters of the state, these permits are typically called Joint Permit Applications and are administrated by both the DSL and USACE.

OAR 340, Division 40

The CWA and SDWA are the basis for this OAR, which assigns the DEQ numerous responsibilities pertaining to regulating State waters. The DEQ designates beneficial uses and establishes Total Maximum Daily Loads (TMDLs) for watersheds falling under these rules. It also outlines the requirements for UIC facilities as they relate to groundwater quality protection. Presently, the DEQ has documentation for 9 properties with UIC installations within the City.

DEQ is authorized to establish TMDLs for local rivers and streams under this rule, which in turn prohibits such activities as discharging waste from industrial and commercial activities without a permit. Pollutant monitoring and testing conducted by the DEQ has resulted in the listing of several surface waters within the City's urban growth boundary (UGB) as quality impaired. These impaired streams and their pollutants are summarized in Table 4-1. The pollutants within these streams originate from sources such as animal wastes, chemical fertilizers, pesticides, and urban development.

In addition to establishing TMDLs, this OAR outlines the DEQ's responsibility for issuing NPDES discharge permits intended to limit the release of pollutants to levels the receiving water can sustain. Construction stormwater permits (1200-C), and industrial stormwater permits (1200-Z) are authorized through the NPDES program.

Both the construction and industrial permits require site operators to implement stormwater best-management practices and ensure that stormwater runoff leaving their site does not violate in-stream water quality standards.

Table 4-1 | 303(d) Water-Quality Impaired Surface Waters					
Pollutant/Source	Cedar Creek	Chicken Creek	Hedges Creek	Rock Creek	Tualatin River
Arsenic				●	
Ammonia		●		●	●
Aquatic weeds/algae					●
Biological Criteria	●		●	●	●
Chlorophyll-a	●			●	●
Copper					●
Dissolved Oxygen	●	●	●	●	●
Fecal coliform or E. Coli	●	●	●	●	●
Iron		●		●	●
Lead		●		●	●
Mercury					●
Phosphorus	●	●	●	●	●
Temperature	●		●	●	●
Zinc					●

OAR 635, Division 412

This rule states that no obstruction may be placed across state waters that are currently or historically inhabited by native migratory fish without providing passage for these fish.

For existing culverts, additional verbiage under this rule stipulates that if over 50 percent of an existing fish passage barrier within, below, or above a channel is cumulatively removed, replaced, filled, or added to through time, the existing barrier (i.e., culvert) will require replacement to current standards. This condition should be evaluated for relevancy on a case-by-case basis for any future road widening project lead by the City.

OAR 660, Division 10

This state rule establishes Statewide Planning Goals (goals 5 through 7) to be carried out by the Department of Land Conservation and Development. These goals, structured to protect natural resources and conserve scenic and historical areas and open spaces, are summarized as follows:

- Goal 5 - Local governments shall adopt programs that will protect natural resources and conserve scenic, historic, and open space resources for present and future generations. Stream flow and water levels should be protected and managed at a level adequate for fish, wildlife, pollution abatement, recreation, aesthetics and agriculture.
- Goal 6 - All waste and process discharges from development shall not threaten, degrade or violate applicable environmental quality statutes, rules and standards.

- Goal 7 - Local governments shall adopt comprehensive plans to reduce risk to people and property from natural hazards, including floods. Local governments should consider programs to manage stormwater runoff as a means to help address flood and landslide hazards.

OAR 660, Division 11

OAR 660 requires Oregon's cities and counties to adopt pubic facility plans for any UGB areas with a population greater than 2,500. A public facility plan (PFP) helps assure that development within the UGB is guided and supported by the types and levels of urban facilities and services appropriate for the needs and requirements of the areas to be served, and that those facilities and services are provided in a timely, orderly and efficient arrangement, as required by Goal 11 and its implementing administrative rule at OAR 660-011. This SWMP has been developed in conformance with this rule and will act as a supporting document for the City's Comprehensive Plan.

Oregon Revised Statute 223

This Oregon Revised Statute (ORS) allows the City to recover the costs of a new development's share of the system capacity by collecting system development charges (SDCs). Under this statute, new developments must pay a proportional share of expenses to meet the increased demands that they place on the system. SDC fees can be imposed to offset the expense of any system accommodations made necessary by the new development.

LOCAL ORDINANCES, AGREEMENTS AND RELATED PLANNING POLICIES

Metro 2040 Regional Framework Plan

The City's planning programs are required to support Metro's (formerly Metropolitan Service District) 2040 Regional Framework Plan, a document intended to direct and control the region's urban growth and development. This plan was adopted by Metro council in 1995. This SWMP aids the City in meeting Metro's requirements for infrastructure planning, necessary before an area can be added to the official UGB.

Washington County

Washington County lacks any specific regulation or rule that would apply towards the stormwater system within the City.

Clean Water Services

CWS is a water resources management utility serving more than 551,000 customers within Washington County and small portions of Clackamas and Multnomah Counties. This agency is committed to protecting water resources in the Tualatin River Watershed so that its customers may enjoy clean water and healthy rivers and streams. The health of the watershed is upheld by CWS through their wastewater and stormwater services, flood management projects, water quality enhancement projects, and fish habitat protection.

CWS has developed several planning policies and standards in meeting with their NPDES Permit requirements. The City has adopted these standards and applies them as enforcement tools for developers seeking building permits within their jurisdiction. These policies and standards include the current *Design and Construction* Standards (DCS), *Low Impact Development Approaches (LIDA) Handbook*, and the Outfall Retrofit Program. Proposed regional facilities within the Capital Improvement Plan (CIP) section of this SWMP can be used to meet the regulatory requirements of the Outfall Retrofit Program when treating previously untreated impervious area. Detailed information summarizing CWS current policies and standards applicable to the City in Appendix B.

City of Sherwood, Comprehensive Plan

The Sherwood Comprehensive Plan is an official statement of the goals, policies, implementation measures and physical plans for the City's development. A partial plan revision was adopted by City Council Ordinance 2009-009 to include a number of amending ordinances, as summarized below.

City of Sherwood, Stormwater Master Plan (June 2007)

This document, prepared by Murray, Smith & Associates, Inc., (MSA) serves as an important starting point for development of this new SWMP, as it summarizes all of the previous stormwater planning efforts to date. The report contains the current Capital Improvement Program (CIP) for the stormwater system and details the analysis used in developing recommended improvements.

City of Sherwood, Brookman Addition Concept Plan (June 2009)

The Brookman Addition Concept Plan is a guide to the creation of a new 250-acre community in southwest Sherwood. The central theme of the plan is to create a livable community that is an extension of existing Sherwood. To realize this vision, the document outlines the general location and intensity of future land uses to include residential, mixed use commercial, employment, parks and open space. Basic infrastructure systems to support these land uses are integrated into the planning effort for transportation, trails, utilities and stormwater management.

The concept plan indicates a local network of stormwater facilities will be needed to completely serve the Brookman Addition. Stormwater management strategies under the concept plan include conveying runoff from properties to piped systems within the right-of-way. These conveyances will then direct runoff towards six regional detention and treatment systems located along Cedar Creek, and will use the creek as the ultimate discharge point for stormwater runoff originating within the area.

City of Sherwood, Tonquin Employment Area Preferred Concept Plan

The Tonquin Employment Area (TEA) Preferred Concept Plan is intended to guide future employment needs within the concept plan area and within Sherwood. The Preferred Concept Plan identifies the anticipated employment types this area will best accommodate, the associated number of jobs, and the key infrastructure needs that will support this future employment population.

The TEA is within the Hedges Creek, Rock Creek and Upper Coffee Lake Creek drainage basins. Stormwater management described under this plan includes estimation of runoff flowrates and sizing of three regional water quality treatment facilities. Each of the three drainage basins will be served by a regional treatment facility. A central assumption of this concept plan is that developers will provide water quantity detention on-site, therefore the regional facilities were designed for treatment purposes only.

City of Sherwood, Municipal Code

Titles 13, 15 and 16 of the Municipal Code form the basis of drainage policy within the City. These sections adopt CWS standards and allow the City to collect fees, or system development charges (SDCs) from residents for drainage and flood control infrastructure.

Title 16 of the City's Municipal Code is typically referred to as the "Zoning and Community Development Code," but is also known as the Development Code or Zoning Code. It is enacted to promote the general public welfare by ensuring procedural due process in the administration and enforcement of the City's Comprehensive Plan, zoning, design review, land division, and development standards.

City of Sherwood, Development Standards

Drainage standards have been adopted by the City to set forth uniform material and workmanship criteria applicable to infrastructure under the City's jurisdiction. Implementing standards streamlines the administration and construction of drainage facilities and also minimizes maintenance by unifying the materials and equipment used for repairs. These standards are documented in the City's *Engineering Design and Standard Details Manual (2010).*

Chapter VI of this manual pertains specifically to the storm drainage design and construction standards applicable within the City, which have been adopted from CWS *Design and Construction Standards*. These standards outline the City's requirements for: engineering; design; reporting; material, technical and construction specifications; and testing procedures for storm sewers.

Intergovernmental Agreements

The City has an intergovernmental agreement (IGA) with CWS for the operation of sanitary sewer and surface water facilities. This IGA summarizes responsibilities for maintenance, capital improvement funding and revenue collection. Specific noteworthy elements of the

City-CWS IGA with respect to the stormwater system and capital improvements are highlighted below. Appendix A contains the full text of the IGA.

- CWS is the NPDES permit holder for the MS4, and ultimately responsible for its operational conformance with all laws and regulations. Compliance with all CWS orders, standards, specifications, work programs, reporting requirements and performance criteria (CWS Standards) shall be absolute defense to any stormwater regulatory related claim made against the City, provided these CWS Standards are enforced. Inadequate funding shall not constitute a justification for the City's failure to comply with the CWS Standards.
- Both CWS and the City may set rates and charges to finance their respective District Wide and Local Programs. Each shall establish separate accounts for stormwater and wastewater programs for the purposes of accounting.
- The City may issue no new permit for the construction within, or modification to, a wetland, floodway or floodplain without first receiving he written approval by CWS.
- The City is responsible for maintenance of all stormwater system piping within its assigned service area, with the exception of the culverts exceeding 36-inch diameter that are maintained by Washington County.
- CWS is responsible for components classified under the District Wide Program, such are regional surface treatment or control facilities where the treatment area is 1 acre or larger.

FUTURE REGULATIONS

Since enactment of the CWA, stormwater regulations are becoming more stringent, and great strides have been made in pollution reduction from point sources. While point pollution sources have been regulated, the growing source of degradation of surface waters can typically be attributed to non-point pollution sources such as urban stormwater runoff. To address these non-point sources, Federal, and State agencies are working to improve their stormwater policies and regulations; current efforts applicable to the City are noted below.

Federal Regulation Considerations

The EPA announced in the spring of 2014 that it would postpone issuance of new national stormwater rules in an attempt to overhaul the federal stormwater program. The agency had previously indicated that the rules would expand the NPDES program and adopt a retention-based national performance standard for new development and redevelopment.

Instead, the EPA will direct its attention on strengthening partnerships with other federal agencies, promoting nationwide stormwater education, and bolstering existing incentive programs and greater enforcement of the current MS4 NPDES program.

Cities often struggle to finance construction of new stormwater infrastructures while concurrently rehabilitating aging stormwater systems. To assist in this challenge, the EPA is

promoting integrated planning practices as a method of demonstrating compliance with the requirements of the CWA while keeping in mind the cities' limited financial resources. In some instances, SDWA expenditures have been able to qualify for relief from obligations under the CWA through the integrated planning process.

The EPA is currently initiating a pilot project for five communities to receive technical assistance in establishing integrated planning policies, with the aim of identifying efficiencies and prioritizing capital improvements that will better promote objectives of the CWA. Results from the pilot project will help develop practical examples for how to implement steps in developing an integrated plan. More information pertaining to this topic can be found at the EPA's website: http://www.epa.gov/.

State Regulation Considerations

In addition to the federal government enacting retention-based stormwater management standards promulgated by the Energy Independence and Security Act, 18 states have legislated stormwater standards aimed at requiring a retention-based metric. While the federal stormwater rulemaking has been deferred, many states are imposing stricter stormwater standards. The DEQ has yet to indicate its position on enacting a retention-based standard, making these types of requirements within the state uncertain.

Local Agency Regulation Considerations

A detailed memorandum provided in Appendix B outlines what policies are currently effective in protecting stream health, what MS4 permit requirements are likely to come into effect with the next permit renewal, and recommendations for how the City can best meet these requirements. A summary of this memorandum is provided below.

Recent MS4 permits in Oregon have required that post-construction runoff flow control policies address hydromodification of downstream receiving waters through mimicry of natural hydrology, utilization of green infrastructure (GI) or low impact development (LID), and treatment of 80% of the annual average runoff volume. Flow control strategies being adopted by the EPA to address hydromodification require continuous simulation modeling to match the pre-development channel forming discharge or on-site retention of the 90th percentile storm. This storm is close to or less than the water quality storm in Western Oregon jurisdictions.

During the next NPDES Permit renewal, CWS' LIDA Handbook could be updated to meet future hydromodification flow control requirements using a percentile storm approach. This approach is unlikely to require any increase in GI or LID facility design since the sizing factor used by CWS currently meets the updated EPA's National Stormwater Calculator requirements for rain gardens in cohesive soils. Analysis would be necessary to demonstrate that GI or LID facilities designed under the LIDA Handbook can meet these hydromodification flow control requirements, however the resulting information could reduce the pressure to adopt continuous simulation detention strategies.

Hydromodification assessments require analysis of regional hydrology, soils, topography and stream erodability to determine susceptibility of streams to hydromodification impacts and identify tools to address such impacts. Additional analysis measuring the City's stream erodibility and modeling runoff with various flow control methods (percentile storm retention using LIDA vs detention using continuous simulation) could be compared with existing HEC RAS models to determine the risk of erosion. Stream resiliency methods such as protected floodplains and riparian vegetation could also be compared.

SECTION 5 | SYSTEM ANALYSIS

INTRODUCTION

This section describes the analysis methodology used to develop and model the City of Sherwood (City) stormwater system under existing and future build-out conditions and summarizes the findings of analyses performed. The analysis methodology used in the SWMP is consistent with the requirements of the City's *Engineering Design and Standard Details Manual* (2010) and Clean Water Services' (CWS) *Design and Construction Standards* (2007). Analysis results are summarized for the hydraulic model, conveyance system deficiencies (via City observations), and water quality facilities. The results from this analysis are used to guide the improvement recommendations presented in Section 7 – Capital Improvement Plan.

EXISTING STORMWATER PROBLEM AREAS

Conveyance System Deficiencies

Existing system deficiencies were identified qualitatively through consultation with previous planning documents and interviews with City staff. The existing conveyance constraints revealed through this process were used to calibrate the model. These constraints are listed below.

- Under certain significant storm events, an undersized storm sewer pipe in Ladd Hill Road just south of Sunset Boulevard has caused the conveyance system to surcharge, and forced the manhole cover to be lifted off its frame.

- A 36-inch diameter culvert crossing under SW Sunset Boulevard near Eucalyptus Terrace appears to surcharge under larger storm events.

- Known areas where drainage problems are caused by long-term or recurring maintenance problems include:

  - Silted in ditches along West Division Street
  - Repeatedly blown out swale near Columbia Street and Southern Pacific Railroad
  - Non-functional swale southwest of the intersection of Ladd Hill Road and Sunset Boulevard
  - Various open channel conveyances where vegetation control or removal of invasive species is needed

City staff have also indicated that there is one known location where a public storm drainage pipe is located under a private residence. This pipe is located along Park Street near 1st Street.

Developed Areas Lacking Water Quality Facilities

In 1991, CWS began requiring stormwater management facilities for treatment of runoff from impervious surfaces prior to discharge to any surface water. A significant portion of the City has been developed since 1991, and it is assumed that runoff from these areas is routed through stormwater treatment facilities in accordance with CWS rules at that time. Those portions of the City developed prior to 1991 generally lack treatment of stormwater before discharging to surface waters. These areas were identified as part of this master planning effort, and are shown in Figure 5-1.

Generally, the developed portions of the City currently lacking stormwater treatment fall into two categories:

- Commercial and industrial facilities: Older commercial and industrial developments along Highway 99W and north of Tualatin-Sherwood Road were likely constructed without stormwater treatment facilities. Runoff from these types of development can have significant detrimental impact to surface water quality in locations of high motor vehicle-dependent activities, activities which require large ground disturbances and where materials storage is performed uncovered.

- Older developed residential areas: Two relatively large drainage basins in the southeast portion of the City, west of Murdock Road and south of Oregon Street, drain untreated to Rock Creek. Also, along Cedar Creek, there are several small residential basins that drain directly to the creek with no treatment.

These untreated areas are good candidates for future stormwater quality improvement projects. Although few data sets are available specifically from the City, studies across the United States have correlated urbanization to increases in the types and quantities of pollutants in receiving waters. Regardless of the climatic setting, development within urbanized areas such as roadway pavements and industrial, commercial, and residential construction can contain many different pollutants. Each of these activities can be generalized as follows:

- Pavement runoff is contaminated with pollutants such as oil and grease from motorized vehicles, polynuclear aromatic hydrocarbons (PAHs), lead, zinc, copper, cadmium, sediments (soil particles), road salts, and other anti-icers. Pavements also generate runoff flows that have short, intense peaks.

- Residential areas contribute the same pavement-based pollutants to runoff, as well as herbicides, pesticides, nutrients (from fertilizer and animal waste), bacteria, viruses, and other pathogens (from animal wastes). Residential areas contain a higher percentage of pervious landscaped area compared to industrial and commercial areas, with runoff characteristics of longer, less intense peak flows.

- Runoff from industrial areas typically contains heavy metals, sediments, and a variety of man-made organic pollutants, including phthalates, PAHs and other petroleum

hydrocarbons. Since industrial areas typically consist of a large percentage of impervious area, runoff can be characterized with short, intense peak flows.

- Runoff from commercial areas contains concentrated pavement-based pollutant runoff and may also contain other contaminants typical of industrial and/or residential areas. Commercial areas typically consist of a large percentage of impervious area, and runoff can be characterized with short, intense peak flows.

FIGURE 5-1

CITY OF SHERWOOD

STORMWATER MASTER PLAN
AREAS LACKING WATER QUALITY FACILITIES

MSA Murray, Smith & Associates, Inc. Engineers/Planners

AUGUST 2016

SW EDY RD
SW ELWERT RD
SW KRUGER RD
SW PACIFIC HWY
SW TUALATIN SHERWOOD RD
SW OREGON ST
NE OREGON ST
SW SUNSET BLVD
SW BROOKMAN RD
SW BAKER RD
99W

Chicken Creek
Cedar Creek
Rock Creek
Goose Creek
Coffee Lake
Rock Creek

Sherwood
Tonquin Employment Area (TEA)
Brookman Concept Area

Washington County
Clackamas County

STORMWATER FACILITIES:
- WATER QUALITY MANHOLE
- MANHOLE
- EXTENDED DETENTION POND
- SWALE
- RETENTION BASIN
- LIDA
- CITY STORM SEWER LINE
- DITCH
- CULVERT

- CITY BOUNDARY
- COUNTY BOUNDARY
- STUDY AREA*
- AREAS LACKING WATER QUALITY TREATMENT
- WATER BODY
- FACILITIES ESTABLISHED IN CONCEPT PLAN

*STUDY AREA = UGB

0 0.5 Miles

N W E S

May 2016 15-1637

HYDROLOGIC ANALYSIS METHODOLOGY

Once the land uses and existing deficiencies for the planning area have been defined, the hydrologic analysis of the stormwater system begins through definition of runoff characteristics. These characteristics are used to estimate the volume and peak flow rate of stormwater runoff entering the stormwater conveyance system as a function of rainfall events (e.g., intensity and duration), basin characteristics (e.g., topography, soil type, and impervious area), and flow routing (e.g., overland, channels, and pipes).

Runoff Estimation Method

The Natural Resources Conservation Service (NRCS) Method was selected to estimate runoff due to its widespread use and its acceptance by CWS as a viable planning and design tool. Additionally, basin characteristics data required for the NRCS Method was readily available.

To perform the hydrologic analysis, the Innovyze InfoSWMM™ software (version 14) was utilized. InfoSWMM™ uses the U.S. Environmental Protection Agency (EPA) software, Storm Water Management Model (SWMM), as its hydrologic engine. SWMM is a CWS accepted program and is widely used for the purposes of stormwater simulation and analysis. The runoff model used in this study is the NRCS Dimensionless Unit Hydrograph, which uses the runoff curve number, basin hydraulic length, average basin slope, and time of concentration to estimate runoff potential (time to peak and peak flow rate).

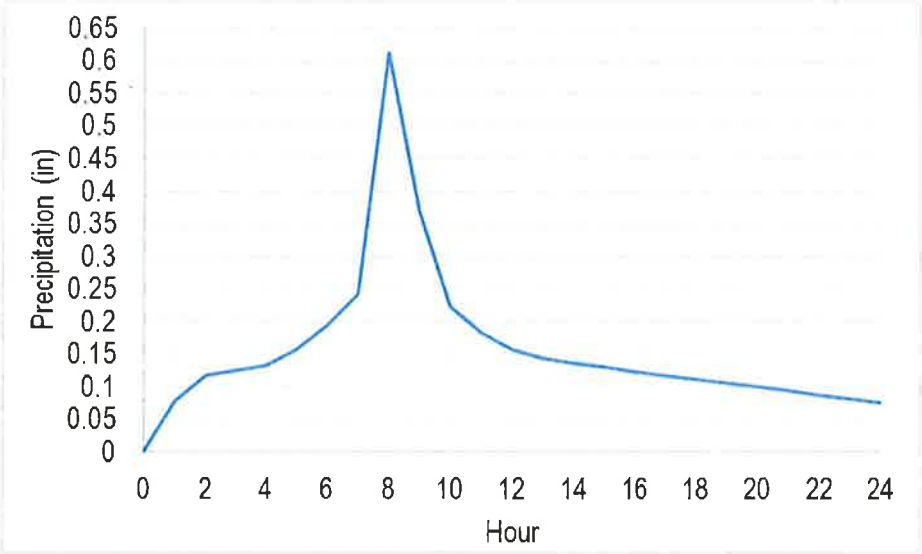
Precipitation

Storm event depth, intensity, and time distribution drive the generation of runoff. CWS standards prescribe total rainfall depths for 24-hour events spanning the 2- to 100-year recurrence intervals. These depths, as a function of recurrence interval, are summarized for the City in Table 5-1.

The NRCS 24-hour, Type 1A theoretical rainfall distribution is specified by CWS standards for application of the NRCS Method and is indicative event rainfall distributions in the Tualatin River Valley. The Type 1A storm is characterized by a peak rainfall intensity at approximately eight hours over the 24 hour range. Figure 5-2 exhibits the hourly rainfall distribution for the 25-year, 24-hour event depth of 3.90 inches. For this study, the 2-year, 25-year, and 100-year, 24-hour design storm events were simulated.

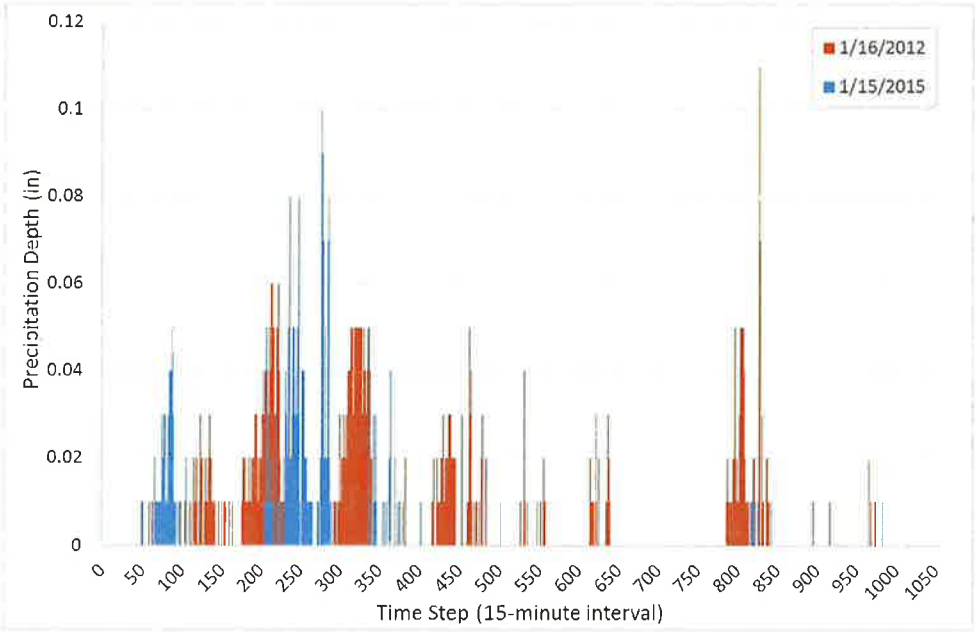
Table 5-1 | Rainfall Event Depths for 24-Hour Durations	
Recurrence Interval (years)	24-Hour Rainfall Depth (inches)
2	2.50
5	3.10
10	3.45
25	3.90
50	4.20
100	4.50

Figure 5-2 | 25-year, 24-hour Design Storm, NRCS Type 1A Distribution



To assess the system's response under actual precipitation events and to calibrate the model to City staff comments, a total of two historical events were simulated. These continuous, ten day events, at 15-minute time step intervals, commenced on 1/16/2012 and 1/15/2015. Simulations were allowed to proceed for ten days following the start date. These events' hyetographs are presented in Figure 5-3.

Figure 5-3 | Historical Storm Simulation Hyetographs



Basin Characteristics

The primary drainage basin boundaries within the City are documented in Section 2, "Study Area Characteristics" (see Figure 2-4). These basins are divided into 405 subbasins used to construct a model that receives runoff at key locations within the City's conveyance system. Attributes impacting the hydrologic response of a subbasin include the area, overland flow path width, percent imperviousness, average ground slope, land cover, depression storage, and infiltration potential of soils. The subbasins range in size from 0.21 acres to 171.6 acres, with the average subbasin size being 8.54 acres.

The NRCS classifies soil hydrologic groups through the assignment of runoff curve numbers (CN). Weighted CN values were calculated for each subbasin relative to the land use type, the development percent, hydrologic soils group, soils conditions, and overall area. For residential land uses, the density of development (i.e., dwelling units per gross acre) were applied in extracting a CN. Table 5-2 shows the percent imperviousness assigned to each land use type for this study, and the associated CN for each hydrologic soils group for that type of land use. Generic zoning includes Commercial, Industrial, Open Space, and Residential. CN values were published in the *Urban Hydrology for Small Watersheds* Technical Release (TR-55) referenced by CWS standards. The OS land use category is assigned to areas zoned as public parks, open space, and undeveloped or undevelopable areas.

Table 5-2 | Percent Imperviousness and NRCS Curve Number by Land Use						
City Land Use(s)	Generic Zoning	Percent Imperviousness; Soil Condition	Curve Numbers for Hydrologic Soils Groups			
			A	B	C	D
GC, NC, OC, OC – PUD, RC, RC – PUD, OC/LI, NC/LI, NC/LI/HDR	Commercial	85%; N/A	89	92	94	95
GI, IP, I I, I I – PUD	Industrial	72%; N/A	81	88	91	93
OS, Floodplain	Open Space	0%; Poor	68	79	86	89
		0%; Fair	49	69	79	84
		0%; Good	39	61	74	80
VLDR, VLDR – PUD	Residential	20%; Good	51	68	79	84
LDR, LDR – PUD		45%; Good	64	78	86	89
MDRL, MDRL – PUD		65%; Good	77	85	90	92
MDRL/MDRH		68%; Good	79	86	91	93
MDRH		70%; Good	81	87	91	93
HDR, HDR – PUD		87%; Good	87	93	96	98

HYDRAULIC ANALYSIS METHODOLOGY

Following definition of hydrologic characteristics for each subbasin, a hydraulic analysis was conducted for both existing and build-out conditions for the existing Urban Growth Boundary (UGB). The hydraulic component routes the stormwater runoff from the hydrologic analysis through the conveyance system. The hydraulic analysis is dependent upon conveyance geometry (e.g., size, shape, and slope) and other characteristics of the pipe and channel system to estimate capacity. Through the use of these defining system parameters, the analysis considers the capacity of system infrastructure to pass a storm event and is used to identify potential areas prone to flooding or surcharging. Conveyance constraints are dynamically calculated in the model and take into account backwater effects, manhole losses, surcharging (i.e., pressurization) in pipes, and channel storage.

In accordance with CWS standards, the 25-year, 24-hour rainfall event was used as the design storm to establish adequate conveyance. Thus, the total depth of 3.90 inches was applied to the NRCS 24-hour, Type 1A rainfall distribution to yield precipitation as a function of individual time step intervals (e.g., 1 hour). Pipe capacity during this storm event was used as the primary deficiency criteria. Risk of flooding and the need for improvement were determined by calculating the available freeboard, with the following categories:

- Critical: Freeboard $\leq$ 0 feet – Improvement needed in all cases
- High: 0 feet < Freeboard $\leq$ 1 feet – Improvement needed in most cases
- Moderate: 1 feet < Freeboard $\leq$ 5 feet – Improvement not needed
- Low: > 5 feet – Improvement not needed

Conveyance Facility Characteristics

Conveyance facilities within the study area include pipes and open channel constituents. The City and CWS provided conveyance system data, including: pipe invert elevation, diameter, material, and connectivity. When datasets were incomplete for network components, such as node inverts and pipe conditions, data gaps were interpolated where possible. When data neither existed nor could be interpolated, assumptions based on CWS minimum velocity design standards established invert elevations in conjunction with outlet elevations and ground surface elevations. If the application of the minimum slope was found to result in inadequate capacity, the ground surface slope was commonly used to estimate the pipe slope.

CWS design standards prescribe a Manning's roughness coefficient, n, of 0.013 for all storm pipe materials. Open channels, including ditches, were analyzed when connecting upstream and downstream pipes using an n value of 0.020. Due to the topography of the receiving surface waters, the City's stormwater outfalls are outside of the 100-year flood plain elevations. As a result, this study assumed that the City's outfalls would be assigned a free discharge condition, with no backwater effects caused by the receiving surface water bodies.

Manhole surcharging and overflows can identify pipes where flow exceeds capacity. This was one factor used to assess potentially problematic pipe sections, though many assumptions were made regarding pipe depth and, therefore, manhole depth. Ultimately, deficient pipe sections were identified by examining the hydraulic grade line through pipe sections.

For the detailed InfoSWMM™ model, deficient pipes were identified by examining the maximum flow class result for each pipe segment. Three classes are used: free surface, backwater, and exceeds capacity. Free surface indicates additional capacity within the pipe; during maximum flow conditions, the pipe is not completely full.

A backwater condition identifies that one or more pipes downstream of the given location has a flow rate that exceeds the pipe's flow capacity and as a result, water is backing up in the system. For pipes tagged with this flow condition, the pipeline HGL profile is investigated to determine the location causing the backup. A pipe exceeding capacity cannot accommodate the flow entering the upstream node of a pipe segment and is deficient, but if the deficient pipe has sufficient depth and available freeboard, the deficiency may not warrant replacement. This was determined on a pipe-by-pipe basis.

Surface Waters and Floodplains

All runoff entering the conveyance system ultimately discharges to one of the City's five surface water features (i.e., creeks, floodplains, wetlands). These surface water features and hydraulically connected culverts are under the jurisdiction of CWS and would be modeled by that agency. Thus, a hydraulic analysis of the surface water system was not included in the scope of this study.

Model Calibration

Hydraulic and hydrologic models are typically calibrated to verify that the model produces results consistent with the physical system. For this system, no measured flow data was available. Thus, the calibration was based on comparing model results to firsthand accounts of the system during rain events occurring between 1/16/2012 – 1/27/2012 (5.96 inches) and 1/15/2015 – 1/26/2015 (2.97 inches). These events provided a significantly large amount of continuous rainfall, as well as a more recent result for City staff to have documented. During these events, several areas experienced overflow caused by either manhole flooding or lack of drainage from surfaces due to the system being at capacity.

Measured rainfall data from the calibration events was loaded into the model, and results were compared to the firsthand accounts provided by the City. Initial loss, CN and subcatchment delineation, and loading distribution were adjusted until the model results provided a reasonable approximation of the actual system performance during the calibrated rain event. A comparison between model results and the flooding locations from the January 2012 rain event is shown in Figure 5-4.

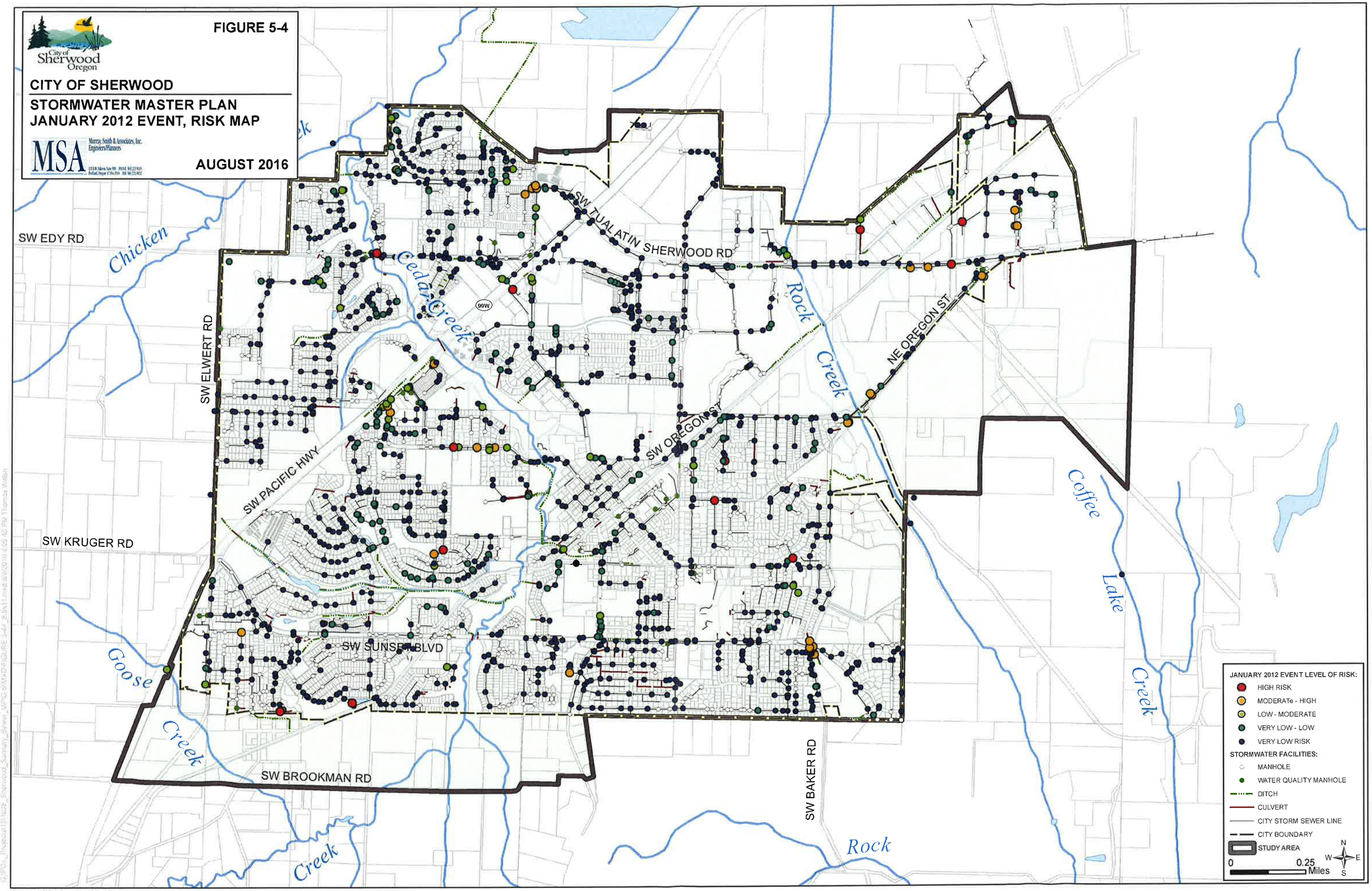
FIGURE 5-4

CITY OF SHERWOOD

STORMWATER MASTER PLAN
JANUARY 2012 EVENT, RISK MAP

MSA Murray, Smith & Associates, Inc. Engineers/Planners

AUGUST 2016



August 2016 15-1637

Water Quality and Flow Control Facilities

As documented in Section 3, "Existing System Description," numerous water quantity and quality facilities throughout the study area are both privately and publicly owned. These facilities have an impact on storage and, therefore, the attenuation of peak runoff rates. Where deficiencies were found to exist in conjunction with a lack of water quality or flow control facilities being present, the Tualatin River Urban Stormwater Tool (TRUST), version data 2015/11/6, was used.

TRUST is a tool, developed for CWS, that analyzes the hydromodification impacts of land development projects and sizing solutions to mitigate the related increases in runoff. TRUST was used to size the proposed regional facilities based on the predeveloped (i.e., existing conditions) and the mitigated (i.e., future conditions) scenarios. TRUST uses a range of historical precipitation events, continuously simulated, to assess the ability of the facility to mitigate events' rates and durations from 50 percent of the 2-year flow (e.g., water quality event) up to the 100-year peak flow. These regional facilities and their resultant sizes, from TRUST, can be found in the CIP.

ANALYSIS RESULTS

Results of the hydraulic analysis showed that a significant portion of the City's existing stormwater facilities are adequate to convey the 25-year, 24-hour storm event under both existing and future, build-out conditions. The hydraulic modeling identified numerous locations where existing water quality and quantity facilities appear to be providing important stormwater detention and peak attenuation.

Conveyance System Deficiencies

InfoSWMM™ was used to simulate the design storms within Table 5-1 for the existing and build-out conditions. Results of system capacity deficiencies identified by the model simulations are shown in Figure 5-5. For reporting purposes, the 25-year flows were used to identify risk of overflow.

Based on the hydraulic model results, no conduits were found to experience backwater conditions that would result in flooding of the upstream manholes under either existing or build-out conditions. A number of high to moderate risk locations were identified based on conservative runoff characteristics (limited ponding), flat conveyance slopes, and minimal freeboard. This is consistent with the firsthand accounts of flooding that has occurred under a rain event with approximately a two-year recurrence interval. Most of the system deficiencies are caused by deficient pipes within the stormwater system and not necessarily undersized outfall pipes.

FIGURE 5-5

CITY OF SHERWOOD

STORMWATER MASTER PLAN
SYSTEM DEFICIENCY RISK MAP

Murray, Smith & Associates, Inc.
Engineers/Planners

AUGUST 2016

SW EDY RD
SW ELWERT RD
SW PACIFIC HWY
SW KRUGER RD
SW SUNSET BLVD
SW BROOKMAN RD
SW TUALATIN SHERWOOD RD
SW OREGON ST
NE OREGON ST
SW BAKER RD
99W
Chicken Creek
Cedar Creek
Rock Creek
Coffee Lake Creek
Goose Creek
Rock Creek

FUTURE LEVEL OF RISK (25 YR EVENT):
- HIGH RISK
- MODERATE - HIGH
- LOW - MODERATE
- VERY LOW - LOW
- VERY LOW RISK

STORMWATER FACILITIES:
- MANHOLE
- WATER QUALITY MANHOLE
- DITCH
- CULVERT
- CITY STORM SEWER LINE
- CITY BOUNDARY
- STUDY AREA

N
W E
S

0 0.25 Miles

The model results were reviewed with City staff in February 2016. City staff provided comment and discussion about each flooded area as identified through the model simulations. These areas were then used to refine both the model and the analysis of results to arrive at the documented system deficiencies including less conservative runoff characteristics.

As documented in Section 3, "Existing System Description," an assessment of conditions was provided for affected conveyance infrastructure, with ratings ranging from 1 ("Minor Defect Grade") to 5 ("Most Significant Defect Grade"). Condition assessment was based on both Operations and Maintenance (O&M), and Structural ratings.

Regional Stormwater Facilities & Developed Areas Lacking Water Quality Facilities

Regional stormwater quality and quantity facilities were analyzed for areas of future development or existing development without current facilities. Where the implementation of a regional facility would mitigate deficiencies, the TRUST model was used to size these facilities for the range of precipitation events. These project types, their locations, sizes, and the drivers behind their selection are identified in Table 5-3. Locations of proposed facilities are presented in Figure 5-6.

Existing water quality and quantity facilities are adequately sized to the standards at the time of implementation. It is recommended the City focus attention on the operations and maintenance of these existing facilities to ensure their continued function (e.g., peak flow attenuation, minimization of flooding potential).

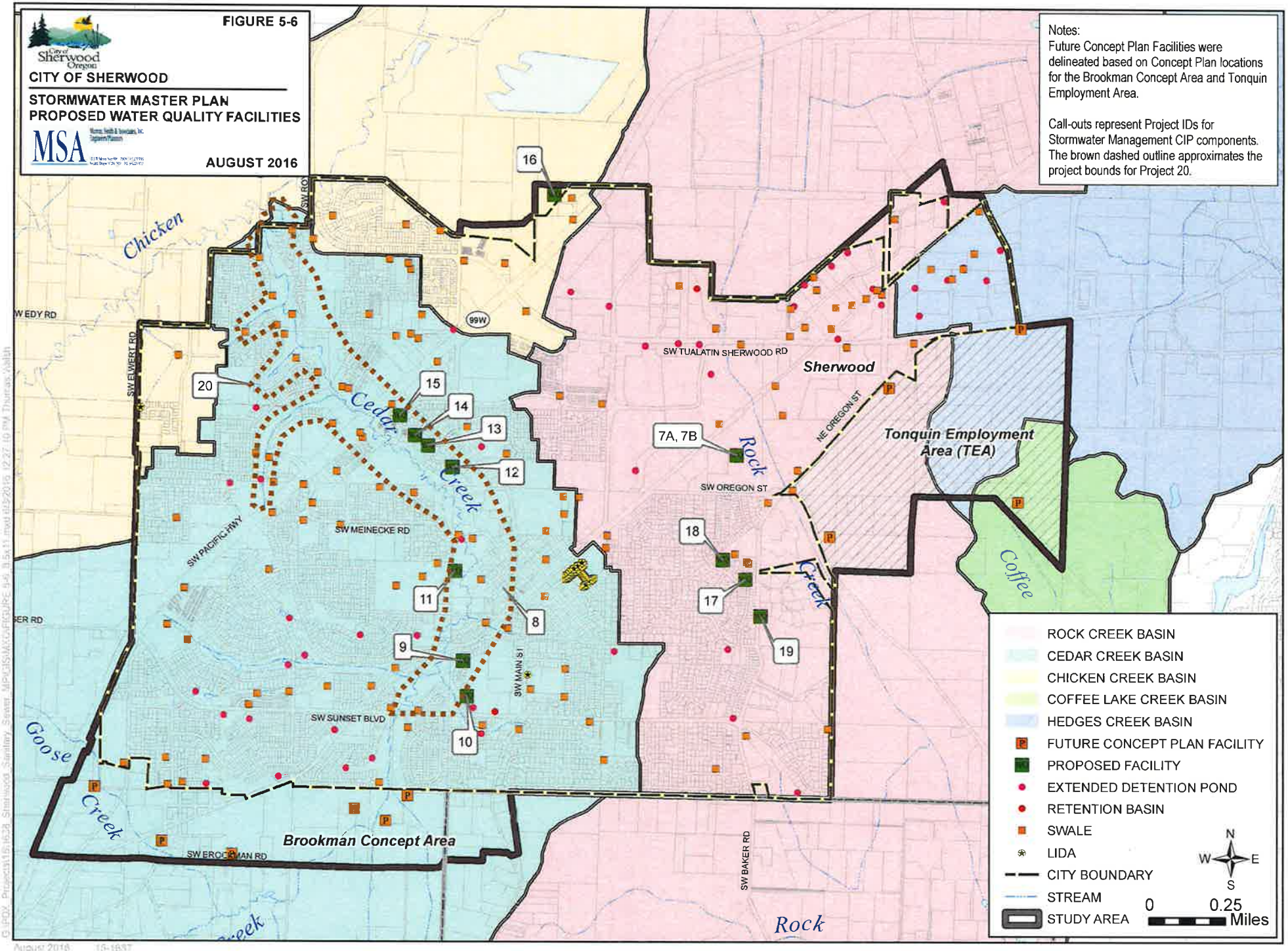

FIGURE 5-6
CITY OF SHERWOOD
STORMWATER MASTER PLAN
PROPOSED WATER QUALITY FACILITIES
MSA
AUGUST 2016
Notes:
Future Concept Plan Facilities were delineated based on Concept Plan locations for the Brookman Concept Area and Tonquin Employment Area.
Call-outs represent Project IDs for Stormwater Management CIP components. The brown dashed outline approximates the project bounds for Project 20.
Chicken
Cedar
Creek
Rock
Coffee
Goose
Creek
Sherwood
Tonquin Employment Area (TEA)
Brookman Concept Area
W EDY RD
SW ELWERT RD
99W
SW TUALATIN SHERWOOD RD
NE OREGON ST
SW OREGON ST
SW PACIFIC HWY
SW MEINECKE RD
SW MAIN ST
SW SUNSET BLVD
SW BAKER RD
16
20
15
14
13
12
7A, 7B
18
17
19
11
8
9
10
ROCK CREEK BASIN
CEDAR CREEK BASIN
CHICKEN CREEK BASIN
COFFEE LAKE CREEK BASIN
HEDGES CREEK BASIN
FUTURE CONCEPT PLAN FACILITY
PROPOSED FACILITY
EXTENDED DETENTION POND
RETENTION BASIN
SWALE
LIDA
CITY BOUNDARY
STREAM
STUDY AREA
N
W
E
S
0
0.25
Miles

Table 5-3 | Water Quality Facilities for Future Development				
Project ID	Type	Project Limits	Driver	Sizing Information
7A	Extended Detention Basin; Existing Ponds (Predesign)	14647 SW Oregon St	UGB-Infill	TBD
8	Stormwater Facility Rehab (Design)	NW 2nd Street and NW Park St	Regulatory - Treatment	TBD
9	Facility, Proprietary Catch Basin	23249 SW St Charles Way, West of 23159 SW St Charles Way	Regulatory - Treatment	2 x 2-Cartridge Catch Basin.
10	Facility, Proprietary Catch Basin	23249 SW St Charles Way, West of 23385 SW St Charles Way	Regulatory - Treatment	2 x 2-Cartridge Catch Basin; Consideration of vault if Archer Glen Elementary School discharge is treated.
11	Facility, Swale	West edge of 22257 SW Washington St & 16956 SW Meinecke Rd	Regulatory - Treatment	Designed with TRUST Model, Bottom Area: 1,820 ft²; Side Slopes: 4 to 1 (H to V); Effective Depth: 1.0 ft
7B	Facility, Extended Detention	Existing Ponds, 14647 SW Oregon St	UGB-Infill	Existing site should be investigated for redevelopment as extended detention facility.
12	Facility, Extended Detention	Southeast of 16518 SW Gleneagle Dr	Regulatory - Hydromodification	Designed with TRUST Model, Bottom Area: 9,000 ft²; Side Slopes: 3 to 1 (H to V); Effective Depth: 3.0 ft
13	Facility, Proprietary Vault	Southwest of 16574 SW Gleneagle Dr	Regulatory - Treatment	8-Cartridge Vault.
14	Facility, Proprietary Catch Basin	Southwest of 16678 SW Gleneagle Dr	Regulatory - Treatment	1 x 4-Cartridge Catch Basin, 1 x 1-Cartridge Catch Basin.
15	Facility, Proprietary Catch Basin	Southwest of 16738/16748 SW Gleneagle Dr	Regulatory - Treatment	1 x 2-Cartridge Catch Basin.
16	Facility, Extended Detention	20015 SW Pacific Hwy (Northwest of buildings)	Regulatory - Hydromodification	Designed with TRUST Model, Bottom Area: 12,000 ft²; Side Slopes: 3 to 1 (H to V); Effective Depth: 4.5 ft
17	Facility, Swale	14645 SW Willamette St	Regulatory - Treatment	Designed with TRUST Model, Bottom Area: 2,400 ft²; Side Slopes: 4 to 1 (H to V); Effective Depth: 1.0 ft
18	Facility, Swale	22210 SW Murdock Rd	Regulatory - Treatment	Designed with TRUST Model, Bottom Area: 2,000 ft²; Side Slopes: 4 to 1 (H to V); Effective Depth: 1.0 ft
19	Facility, Extended Detention	Northwest corner of 22900 SW Murdock Rd	UGB-Infill	Designed with TRUST Model, Bottom Area: 12,544 ft²; Side Slopes: 3 to 1 (H to V); Effective Depth: 3.5 ft

Brookman Concept Area

The Brookman Concept Area plan highlights collecting and conveying all site runoff, primarily within the road right-of-way, to regional detention and water quality facilities. After detention and treatment, the water will be discharged to the natural drainage network (i.e., creek system) adjacent to the facility. Facility design will be integrated within the urban and natural areas to provide additional habitat value and/or public open space for recreation. Low Impact Development Applications (LIDA) are encouraged for new development, though not required.

The Brookman Concept Area plan identifies a total of six potential locations for regional facilities. These locations target mitigation for multiple properties, and placement within open space to reduce costs and buildable land area impacts where feasible. The proposed Stormwater Infrastructure Plan (SWIP) is summarized in a 2009 technical memorandum, prepared by Otak, Inc. Facilities were sized per CWS *Design and Construction Standards*, which require:

- The 2-, 10-, and 25-year post-development runoff rates do not exceed flows under pre-developed conditions for regional detention facilities, and
- Capture of the water quality design storm flows (e.g., 0.36 inches over four hours applied to 100 percent of the new impervious area) for regional water quality facilities

All six facilities were designed as regional water quality facilities, with areal footprints ranging from 1,872 square feet (ft^2) to 7,500 ft^2. See Table 5-4 for a summary of the final parameters set forth in the SWIP. Financing for these facilities is assumed to be provided by private developers.

Table 5-4 | Brookman Concept Area Water Quality Facility Parameter Summary

Basin	Water Quality Flow (cfs)	Water Quality Volume (ft^3)	Length (ft)	Width (ft)	Footprint Area (ft^2)	Longitudinal Slope (ft/ft)
1 (BCA_1)	1.81	26,031	184	9	4,116	0.01
1 (undetained)	0.19	2,859	105	4	1,872	0.01
2 (BCA_2)	4.31	57,467	238	18	7,500	0.015
3 (BCA_3)	0.73	10,437	122	4.5	2,211	0.005
4 (BCA_4)	2.15	31,004	226	8.5	4,879	0.015
5 (BCA_5)	1.3	18,662	178	6	3,420	0.01
6 (BCA_6)	2.4	34,624	189	12	4,824	0.01

Tonquin Employment Area

The TEA stormwater management strategy is guided by the *Tonquin Employment Area Market Analysis, Business Recruitment Strategy and Implementation Plan* (2015), prepared

by Mackenzie. Development in the TEA is anticipated to phase outward from existing service boundaries in conjunction with the transportation network. Storm management provided by regional treatment facilities located to target existing drainage pathways (i.e., creeks) to achieve channel improvements as well as runoff treatment. The TEA strategy highlights the consolidation of treatment areas rather than relying on individual property owner facilities.

The TEA concept plan identified a total of three potential locations for regional facilities, sized according to CWS *Design and Construction Standards* for water quality treatment and flow control. It was assumed that developers would provide on-site detention. LIDA is encouraged for new developments to minimize the size of the regional facilities. Proposed storm projects, including storm piping and facilities, were grouped into three phases as shown in Table 5-5. Financing for these facilities is assumed to be provided by private developers.

Table 5-5 | TEA Storm Infrastructure Summary

Phase	Details
1	Construct 18-inch storm line, south to Tonquin Road Construct 2.25-acre regional treatment facility (TEA_1)
	Construct 18-inch storm line through site Construct 1.0-acre regional treatment facility (TEA_2)
2	Construct 18-inch storm line within Blake Road, along southwest frontage Construct 1.0-acre regional treatment facility (TEA_3)
3	Construct 18-inch storm line within Blake Road, along northwest and southwest frontages Construct 0.75-acre treatment facility adjacent to wetlands (TEA_4)

SECTION 6 | RIPARIAN CORRIDOR EVALUATION

INTRODUCTION

This section of the Stormwater Master Plan (SWMP) summarizes field investigations conducted of the riparian corridors within the study area. The evaluations resulting from this field work document the existing conditions of the City of Sherwood's (City) streams and qualitatively describe their general susceptibility to erosion, or hydromodification.

The U.S. Environmental Protection Agency (EPA) defines hydromodification as the "... alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources." This process includes changes to the natural system of water flow in an urban landscape, including water conveyance, surface water runoff, sediment transport, and water quality. The stream erosion caused by hydromodification leads to habitat and water quality degradation and risks to infrastructure from bank failure and incision.

A visual assessment of the stream's hydromodification resiliency is an important first step in identifying the strategies needed to prevent further erosion. The field investigations conducted as part of the SWMP begin this process and are summarized within this section. The information obtained through this field work also provides guidance towards stormwater management policies the City may implement in the future.

The primary objectives of this riparian corridor evaluation include the following:

- Determine the extent of stream erosion within the Study Area.
- Recommend strategies to address hydromodification that are effective and appropriate for local conditions.
- Identify future regulatory trends and anticipated requirements applicable to the City's streams.
- Recommend stormwater management policies that align local stream conditions with expected future regulatory requirements.

METHODOLOGY

Local Stream Conditions

All of the City's primary surface waters (Cedar Creek, Chicken Creek, Hedges Creek, Rock Creek and Upper Coffee Lake Creek) were evaluated for stream resilience through review of channel geomorphology, soil conditions, contributing hydrology, corridor vegetation, and signs of active erosion. Detailed field work and assessment for each conducted by Wolf Water Resources is provided within the *Hydromodification Technical Memorandum* (June 2015), contained in Appendix C.

This field work revealed the City has generally healthy streams that are resilient to erosion. Due to the streams' low gradient, adjacent floodplains, intact riparian vegetation and buffer separation from adjacent urban development, the surface water system is generally not susceptible to hydromodification. These physical characteristics, in conjunction with the City's current stormwater management policies have contributed to the general good health of the streams.

Native soils throughout the City are generally fine-grained, "tight" silts and clays. These cohesive soils are typically indicative of a high response of rainfall runoff and result in a low potential for infiltration. The streams within the City are comprised of similar soils and are typically susceptible to erosion when exposed to stream velocities exceeding their cohesive and shear strength over extended durations.

Regulatory Trends

As previously outlined in Section 4, the new NPDES MS4 permit was renewed as of June 1, 2016. The permit requires CWS to first complete a watershed-level hydromodification assessment, and then develop, implement and enforce a program to control post-construction stormwater runoff based on the findings of the assessment.

Generally, the trend in stormwater regulations is in minimizing hydromodification impacts. A review of other recent NPDES permits issued for neighboring Oregon communities was conducted by Wolf Water Resources and is summarized in the *Anticipated MS4 Permit Requirements* memorandum contained within Appendix B. It mentions that several new permits are requiring hydromodification assessments. From there, the permittees will be expected to adapt their post-construction stormwater runoff requirements to minimize or prevent further hydromodification of the receiving stream.

As also described in Section 4, additional regulations should be anticipated regarding development within the 100-year regulatory floodplain, which includes all of Sherwood's major receiving streams. The 2016 NFMS Biological Opinion states that hydromodification of the regulatory floodplains in Oregon can now be considered an impact to endangered species and/or their critical habitat. This will serve to further bolster the regulatory trend toward reducing post-construction runoff impacts to pre-development conditions.

RECOMMENDATIONS

One goal for this SWMP is to proactively anticipate future regulatory requirements so that they may be implemented in a cost-effective manner. The following recommendations achieve this goal and are based upon field research of the streams within the study area, review of recent NPDES permits issued to neighboring Oregon communities, and interviews with City staff.

Stormwater Management Policies

The City's current stormwater management policies are effectively preventing stream erosion and are based upon the current, 2007 CWS *Design and Construction Standards* (DCS). This document requires that riparian buffers be maintained, floodplains be protected from development, and that the conveyance capacity of the downstream system be adequate for development. It is recommended that these policies continue to be enforced.

Since the City's streams exhibit erosion stability under existing developed conditions, future stream hydromodification can be prevented by managing stormwater runoff from redevelopment and new development. In addition to the current DCS for stormwater management, it is recommended that all redevelopment and new development retain the water quality storm event on-site. The water quality storm event should follow Oregon DEQ's definition of 50% of the 2-year storm event. For Sherwood, this would correlate to 1.12-inches of rainfall over 24-hours with an NRCS Type 1A distribution. This on-site retention may be achieved through rainwater harvesting or infiltration into native soils using GI or LID. Where existing developed areas were constructed without stormwater treatment facilities, it is recommended these areas be retrofitted with regional GI or LID systems that retain stormwater to the maximum extent feasible, up to the water quality storm.

Stormwater detention exceeding the current DCS requirements is not recommended. Current DCS standards require detention primarily when the capacity of the downstream conveyance system is insufficient to support development. Detaining stormwater in excess of DCS standards will increase the duration of flow within the City's streams and expose the native cohesive soils to longer time periods of shear stress that exacerbate hydromodification.

Adopting these standards will position the City to more easily implement anticipated future NPDES permit requirements. A policy of retaining the water quality storm event on-site simplifies the analysis and review of stormwater management facilities under the City's purview. This storm event is expected to meet the treatment requirements issued to other Oregon communities under recent NPDES permits for 80% of the annual average runoff volume.

The City is also recommended to continue support for the CWS best management policy in place that promotes beaver habitat. Beavers are effective in stabilizing streams, especially in areas with broad active floodplains where risk to infrastructure is low. These floodplain areas are prevalent along the City's major stream corridors. Beaver dams and ponds also act as bed control by preventing the stream from down-cutting and help to attenuate and store flows from storm events, respectively.

Hydromodification Reduction Strategies

The policy recommendation to retrofit existing developed areas with regional treatment systems should incorporate GI and LID based designs. The regional treatment facilities described in Section 7 – Capital Improvement Plan (CIP) assume a GI/LID design approach. During future engineering design of these facilities, infiltration to the maximum extent

feasible may be realized through considerations pertaining to native soils characteristics, available property area, groundwater mounding performance, grading limitations, flow line invert elevations, etc. Providing treatment for stormwater from existing developed areas within the City will improve the quality of the runoff and help meet TMDL requirements of the receiving waters. These regional treatment facilities will also help alleviate increased runoff from infill development over time, which may otherwise cause stream erosion.

An extensive supply of woody riparian vegetation is a necessary component of beaver habitat and also adds to stream stability by strengthening banks and slowing overbank flow. In meeting with the policy recommendations to encourage beaver activity, a budgeting tool is provided in the CIP for riparian planting. Planting of trees within riparian corridors will increase the supply of the woody vegetation necessary to foster beaver habitat.

The new NPDES permit requires that CWS must conduct a hydromodification assessment of the watershed. However, it is not clear whether CWS will require their jurisdictions such as the City of Sherwood to participate financially in conducting the assessment. Furthermore, anticipated changes to the FEMA NFIP could result in the City, as an NFIP program participant, needing to perform an independent assessment of their floodplain corridors as part of a baseline hydromodification assessment.

As a conservative measure, the cost of such a study has been included in the CIP for budgeting purposes. The study would typically involve continuous simulation of storm runoff to estimate natural, existing, and proposed runoff pre- and post-development. A critical component of the hydromodification assessment would be to determine the range of channel forming flows that would be important to target for flow control. The results of this study could then be used to update City policies for stormwater management in meeting with NPDES permit requirements.

SECTION 7 | CAPITAL IMPROVEMENT PROGRAM

INTRODUCTION

This section summarizes the City of Sherwood (City) Capital Improvement Program (CIP), which consists of a list of prioritized stormwater system projects and estimated costs in 2015 dollars. The CIP is a blueprint for forecasting capital expenditures and is one of the most important means of meeting the City's obligation towards community development and financial planning.

The CIP is a direct result of the condition analysis described in Section 3, "Existing System Description" and the capacity analysis described in Section 5, "System Analysis." All projects were analyzed at a planning level of accuracy based on land use assumptions described in Section 2, "Study Area Characteristics". Prior to implementation, each project should undergo standard engineering design phases to finalize improvement sizing and location.

Improvements associated with the "Future Growth Areas," discussed in Section 2, are excluded from this CIP. As these future planning areas are urbanized, private developers are anticipated to fund the improvements required to serve their respective projects. As the City reviews development applications within the planning areas, opportunity will be provided to compare proposed conveyance and water quality treatment improvements against their concept plans.

STORMWATER CAPITAL IMPROVEMENTS PROGRAM

The City's CIP is organized into categories based on project type and prioritized based on system age and risk of design criteria violation. Project descriptions and cost estimates are provided in Table 7-1 and presented in Figure 7-1. The major categories include Condition, Stormwater Management, and Planning and are described below.

Project Type

- *Condition* – These improvements include the replacement and repair of existing manholes or pipelines to address aging infrastructure.
- *Stormwater Management* – These improvements include regional treatment and/or detention facilities that address water quality degradation caused by existing and future development.
- *Planning* – This SWMP will eventually become outdated due to future development, expansion of the Urban Growth Boundary (UGB), and modification of regulatory policies over time. These projects provide a framework for future development and assess changes in the regulatory environment that influence future improvement needs.

Project Prioritization

Improvements were prioritized into three timeframes, including the short-term (0-5 years), medium-term (6-10 years), and long-term (11-20 years). Condition-based improvement prioritization is based on the following guidelines:

- Improvements to repair and replace pipelines and manholes are assumed to occur at a similar rate of investment for each 5-10 year period.
- Improvements are prioritized based on relational groupings. Clusters of projects in close proximity to each other are anticipated to require reduced construction mobilization and staging costs, therefore will result in a greater economy of scale during construction and assigned a higher priority. Where the opposite is true, remote and scattered project grouping are anticipated to have economy of scale and therefore are assigned a lower priority.

For Stormwater Management project types, improvements are prioritized based on the following guidelines:

- Improvements identified in the City's current CIP for the next five years are identified in the 0-5 year timeframe.
- Improvements are assumed to occur at a similar rate of investment for each 5-10 year period.

For Planning projects types, capital expenditures are prioritized based on the following guidelines:

- Expenditures identified in the City's current CIP for the next five years are identified in the 0-5 year timeframe.
- Expenditures anticipated to result from updates to regulatory permit requirements are assigned the highest priority.

Project Driver

The CIP also identifies the project catalyst, or driver, in addition to the prioritization categories and timeframes. Project timeframes can be delayed without impacting the performance of the stormwater system should the driver not materialize. Often, phased development may be allowed without fully implementing a project. Likewise, if the project driver occurs sooner than the assumed timeframe, some improvement projects may require acceleration. Notes are provided in the CIP tables to assist the City in understanding project timing related to specific development. Common drivers include:

- *Pipe & Manhole Condition* – As the City updates its condition assessment of existing infrastructure, critical degradations are prioritized over others.
- *Regulatory* – The projects identified in the CIP are strategically located to either manage stormwater originating from existing impervious areas, or address future hydromodification permit requirements. Completing these projects is anticipated to meet future outfall retrofits and hydromodification NPDES permit requirements (see

Section 4). Alternatively, these projects can be implemented as available funding materializes to improve water quality within the City's streams.

- *UGB-Infill* – Projects classified by this driver result from infill development within the UGB. As redevelopment occurs in these largely undeveloped areas, hydromodification effects may be triggered by stormwater runoff originating from increased impervious surfaces. Extended detention basins are located to manage stormwater runoff from large tracts of land, while riparian plantings placed along the City's streams encourage beaver activity (see Appendix C).

It is important to note that areas with established Concept Plans, such as the Brookman Concept Area and the Tonquin Employment Area (TEA), have been excluded from the CIP. These projects have not been included since they will be driven by development in these areas and, therefore, will be the responsibility of developers. This responsibility includes funding and submission for review to the City of planning and design components related to stormwater management and the stormwater network.

Cost Estimation

Costs presented in the CIP tables are estimated using an approach outlined in the Basis of Opinion of Probable Cost, contained in Appendix D. This document contains the assumptions used in developing project costs, addressing such items as unit costs for materials, labor and construction, contingency factors, and the City's administrative costs.

All project descriptions and cost estimates in this document represent a Class 5 budget estimate, as established by the American Association of Cost Engineers. This preliminary estimate class is used for conceptual screening and assumes project definition maturity level below two percent. The expected accuracy range is -20 to -50 percent on the low end and +30 to +100 percent on the high end, meaning the actual cost should fall in the range of 50-percent below the estimate to 100-percent above the estimate.

The cost estimates are consistent with the definition of OAR 660-011-0005(2) and OAR 660-011-035 which define "rough cost estimates" for facility plans as "approximate costs expressed in current-year dollars." These estimates are intended to "provide an estimate of the fiscal requirements to support the land use designation" and "for use by the facility provider in reviewing the provider's existing funding mechanisms." They are intended to be used as guidance in establishing funding requirements based on information available at the time of the estimate. The CIP cost estimates should be reevaluated periodically to account for changes in inflation. It is important to note that the CIP omits costs for routine maintenance.

CAPITAL IMPROVEMENT PROGRAM FUNDING

Capital improvements within the City are primarily funded through the following mechanisms:

- The City funds capital improvements impacting existing customers through utility revenues generated from stormwater rates. These costs are allocated to the City's Stormwater Operating Fund.
- Capital improvements for future development, or growth are funded through System Development Charges (SDCs) as allowed under Oregon Revised Statute 223.297 through 223.314. These costs are allocated to the City's Stormwater SDC Fund.

The City may also seek funding and financing of specific projects through these additional internal and external sources:

- Business Oregon, including Community Development Block Grants, the Stormwater program, and the Special Public Works Funds
- Developer dedications
- Oregon Immediate Opportunity Program
- Oregon Industrial Development Revenue Bonds
- Oregon Infrastructure Bank
- City General Obligation Bonds
- City Local Improvement Districts
- City Stormwater Revenue Bonds
- City Urban Renewal Program

SDCs and Percent Related to Growth

For each improvement project, a growth percentage is provided in the CIP table to aid the City in establishing SDCs for the stormwater system. For improvements that benefit both current and new customers, the growth percentage can be applied to the project cost to allocate funding requirements through collection of SDCs.

The methodology used to calculate the growth percentage for a proposed project employs a formula (shown below) based on the ratio of existing and future flows.

Percent related to growth = 1 – (Existing Impervious Area / Developed Impervious Area).

The growth percentage relates directly to SDC percentage. The percentage not related to growth is funded through stormwater rates (e.g. Stormwater Operating Fund).

Table 7-1 | Capital Improvement Program

Project Type	Project ID	Project Description	Basin(s)	Time Frame	Driver	Length (ft.) / Sizing Information	Improvement Diameter (in.) / (Stormwater Management)	Growth Ratio[4]	Estimated UGB Cost [1,2,3]
Condition	1	SW Willamette St & SW Norton Ave, & SW Martin Ct, & SW Lincoln St & SW Oregon St	Rock Creek	10-year	Pipe & Manhole Condition	962	10 - 24	N/A	$370,000
	2	SW Merryman St, North to SW Oregon St (beneath properties)	Rock Creek	20-year	Pipe & Manhole Condition	2,102	10 - 36	N/A	$680,000
	3	SW Lower Roy St to SW Oregon St, SW Hall Street & SW Merryman St, & SW Lower Roy St & SW Brickyard Dr, & SW Hall St, SW Nottingham Ct to SW Oregon St	Rock Creek	20-year	Pipe & Manhole Condition	1,252	8 - 36	N/A	$580,000
	4	SW Galbreath Dr, Northeast of 13910 SW Galbreath Dr, & SW Tualatin Sherwood Rd & SW Dahlke Ln	Rock Creek	20-year	Pipe & Manhole Condition	398	10 - 12	N/A	$80,000
	5	16956 SW Meinecke Rd (beneath property), & SW Meinecke Rd & SW Lee Dr, & 16956 SW Meinecke Rd (beneath property)	Cedar Creek	20-year	Pipe & Manhole Condition	291	12	N/A	$70,000
	6	SW Sherwood Blvd & SW Langer Dr, & SW Jonquil Ter, Across from 20649 SW Jonquil Ter, & SW Roy Rogers Rd, Behind 17438 SW Roosevelt St	Cedar & Chicken Creeks	20-year	Pipe & Manhole Condition	683	12 - 30	N/A	$330,000
Stormwater Management	7A [5]	Extended Detention Basin; Existing Ponds, 14647 SW Oregon St (Predesign)	Rock Creek	5-year	UGB-Infill	TBD		0%	$35,000
	8 [5]	NW 2nd Street and NW Park Street Stormwater Facility Rehab (Design)	Cedar Creek	5-year	Regulatory - Retrofit	TBD		0%	$35,000
	9	Proprietary Catch Basin; 23249 SW St Charles Way, West of 23159 SW St Charles Way	Cedar Creek	5-year	Regulatory - Retrofit	2 x 2-Cartridge Catch Basin.		0%	$70,000
	10	Proprietary Catch Basin; 23249 SW St Charles Way, West of 23385 SW St Charles Way	Cedar Creek	5-year	Regulatory - Retrofit	2 x 2-Cartridge Catch Basin; Consideration of vault if Archer Glen Elementary School discharge is treated.		0%	$70,000
	11	Swale; West edge of 22257 SW Washington St & 16956 SW Meinecke Rd	Cedar Creek	5-year	Regulatory - Retrofit	Designed with TRUST Model, Bottom Area: 1,820 ft² Side Slopes: 4 to 1 (H to V); Effective Depth: 1.0 ft		2%	$110,000
	7B	Extended Detention Basin; Existing Ponds, 14647 SW Oregon St	Rock Creek	10-year	UGB-Infill	Existing site should be investigated for redevelopment as extended detention facility.		19%	$150,000
	12	Extended Detention Basin; Southeast of 16518 SW Gleneagle Dr	Cedar Creek	10-year	Regulatory - Hydromodification	Designed with TRUST Model, Bottom Area: 9,000 ft² Side Slopes: 3 to 1 (H to V); Effective Depth: 3.0 ft		17%	$170,000
	13	Proprietary Vault; Southwest of 16574 SW Gleneagle Dr	Cedar Creek	10-year	Regulatory - Retrofit	8-Cartridge Vault.		1%	$110,000
	14	Proprietary Catch Basin; Southwest of 16678 SW Gleneagle Dr	Cedar Creek	10-year	Regulatory - Retrofit	1 x 4-Cartridge Catch Basin, 1 x 1-Cartridge Catch Basin.		0%	$80,000
	15	Proprietary Catch Basin; Southwest of 16738/16748 SW Gleneagle Dr	Cedar Creek	10-year	Regulatory - Retrofit	1 x 2-Cartridge Catch Basin.		4%	$70,000
	16	Extended Detention Basin; 20015 SW Pacific Hwy (Northwest of buildings)	Chicken Creek	20-year	Regulatory - Hydromodification	Designed with TRUST Model, Bottom Area: 12,000 ft² Side Slopes: 3 to 1 (H to V); Effective Depth: 4.5 ft		39%	$220,000
	17	Swale; 14645 SW Willamette St	Rock Creek	20-year	Regulatory - Retrofit	Designed with TRUST Model, Bottom Area: 2,400 ft² Side Slopes: 4 to 1 (H to V); Effective Depth: 1.0 ft		7%	$120,000
	18	Swale; 22210 SW Murdock Rd	Rock Creek	20-year	Regulatory - Retrofit	Designed with TRUST Model, Bottom Area: 2,000 ft² Side Slopes: 4 to 1 (H to V); Effective Depth: 1.0 ft		0%	$120,000
	19	Extended Detention Basin; Northwest corner of 22900 SW Murdock Rd	Rock Creek	20-year	UGB-Infill	Designed with TRUST Model, Bottom Area: 12,544 ft² Side Slopes: 3 to 1 (H to V); Effective Depth: 3.5 ft		57%	$330,000
	20	Riparian Area Planting: Confluence to SW Sunset Boulevard	Cedar Creek	20-year	Regulatory - Hydromodification	N/A		0%	$344,000
Planning	21 [5]	Master Plan Update	All	5-year	UGB Growth & Expansion	N/A		N/A	$6,000
	22	Hydromodification Study	All	10-year	UGB Growth & Expansion	N/A		N/A	$125,000
	23	Master Plan Update	All	20-year	UGB Growth & Expansion	N/A		N/A	$250,000
								Total	**$4,525,000**

SUMMARY

This section presents a proposed City CIP for the 20-year period between 2015 and 2035, as shown in Table 7-1 and Figure 7-1. Improvements are defined to address condition issues within the existing system and future growth within the City's UGB. The total estimated project costs are summarized in Table 7-2.

Table 7-2 | Capital Improvement Program Summary (Estimated Total Costs)[1,2,3]

Project Type	Time Frame (Cost)			Total Cost
	0-5 Years	6-10 Years	11-20 Years	
Condition	$0	$370,000	$1,740,000	$2,110,000
Stormwater Management	$320,000	$580,000	$1,134,000	$2,034,000
Planning	$6,000	$125,000	$250,000	$381,000
Total	$326,000	$1,075,000	$3,124,000	$4,525,000

Notes for Tables 7-1 and 7-2

Note 1. Cost estimates represent a Class 5 budget estimate, as established by the American Association of Cost Engineers. This preliminary estimate class is used for conceptual screening and assumes project definition maturity level below two percent. The expected accuracy range is -20 to -50 percent on the low end, and +30 to +100 percent on the high end, meaning the actual cost should fall in the range of 20 percent below the estimate to 100 percent above the estimate. The cost estimates are consistent with the definition of OAR 660-011-0005(2) and OAR 660-011-035. They are intended to be used as guidance in establishing funding requirements based on information available at the time of the estimate.

Note 2. Cost estimates for new infrastructure improvements assume unit costs for new materials and construction. Cost estimates for pipe upsizing and condition based improvements assume unit costs for replacement materials and construction. All cost estimates include markups for construction contingency, owner administrative costs, and contract costs. Right-of-way acquisition costs, property purchase, and legal condemnation fees are excluded from the estimates.

Note 3. All improvements are sized for build-out of the upstream service area at a planning level of accuracy based on land use assumptions described in Section 5 of this document. Improvement sizing is limited to service within the existing UGB. Prior to implementation, each project should undergo standard engineering design phases to finalize improvement sizing and location.

Note 4. The growth percentage is an estimate of the percentage of the build-out flow associated with future development within the existing UGB, calculated by the formula: *Percent related to growth = 1 – (Existing Impervious Area / Developed Impervious Area).*

Note 5. This project is a pre-existing budget item.

FIGURE 7-1

City of Sherwood Oregon

CITY OF SHERWOOD

STORMWATER MASTER PLAN
CAPITAL IMPROVEMENT PROGRAM

MSA Murray, Smith & Associates, Inc. Engineers/Planners

AUGUST 2016

Note:
Future Concept Plan Facilities were delineated based on Concept Plan locations for the Brookman Concept Area and Tonquin Employment Area.

Call-outs represent Improvement Project IDs. The brown dashed outline approximates the project bounds for Project 20.

SW EDY RD
Chicken Creek
SW FILWERT RD
Cedar Creek
99W
SW TUALATIN SHERWOOD RD
Sherwood
Rock Creek
NE OREGON ST
Tonquin Employment Area (TEA)
Coffee Lake
SW PACIFIC HWY
SW KRUGER RD
SW SUNSET BLVD
SW MAIN ST
SW BAKER RD
Goose Creek
Brookman Concept Area
SW BROOKMAN RD
Rock Creek

16 6 4 15 14 13 20 12 7A, 7B 2 3 5 18 17 11 8 9 1 19 10

- FUTURE CONCEPT PLAN FACILITY
- PROPOSED FACILITY
- WATER QUALITY MANHOLE
- MANHOLE
- EXTENDED DETENTION POND
- SWALE
- RETENTION BASIN
- LIDA
- DITCH
- CULVERT
- CITY STORM SEWER LINE
- CONDITION PROJECT
- CITY BOUNDARY
- STUDY AREA
- TAXLOT
- WATER BODY
- STREAM
- WETLAND

N W E S

0 0.5 Mile

G:\PDX_Projects\151338_Sherwood_Sanitary_Sewer_MP\GIS\MXD\FIGURE 7-1_11x17_A.mxd 8/10/2016 8:36:55 AM Thomas.Walsh

August 2016 15-1637

APPENDIX A | INTERGOVERNMENTAL AGREEMENT

AMENDMENT TO INTERGOVERNMENTAL AGREEMENT BETWEEN CITY OF SHERWOOD AND CLEAN WATER SERVICES

THIS AMENDMENT is made and entered into as of the 1st day of July, 2008, between the **City of Sherwood,** a municipal corporation of the State of Oregon, hereinafter referred to as "City," and **Clean Water Services**, a municipal corporation and county service district, hereinafter referred to as the "District."

WHEREAS City and District entered into an Intergovernmental agreement (IGA) on January 4, 2005 for the operation of sanitary sewer and surface water facilities; and

WHEREAS Section 7 of that IGA allows the agreement to be amended upon approval of the governing bodies of both parties; and

WHEREAS that IGA is now in need of amendment.

NOW, THEREFORE, it is agreed that the IGA be amended as follows:

1. In the recitals, revise the second "Whereas" statement to read:

   WHEREAS as a county service district organized under ORS 451, the District has the legal authority for the sanitary sewerage and storm water (surface water) management programs within its boundaries consistent with relevant laws, rules and agreements. The District performs watershed, sub-basin and facility planning, develops standards and work programs, is the permit holder, and operates and maintains wastewater treatment facilities, ~~surface water collection system and~~ the public sanitary sewer conveyance systems, and the public surface water collection systems within ~~unincorporated areas and within certain cities within~~ its boundaries~~. The District also performs various ancillary functions throughout the basin and within various cities~~; and

2. In Section 1, Definitions, add the following new definitions, number them alphabetically, and renumber the existing definitions:

   A. Local Program – The elements of the work program that are available for the City to perform.

   B. District Wide Program – The elements of the work program that are performed exclusively by the District in all areas within the District's boundary.

   C. Roadside Facilities include all of the following stormwater facilities within road rights of way:

1. Roadside Ditches and Swales are man-made ditches on one or both sides of roadways, within the road right-of-way and generally intended for the collection and conveyance of storm and surface water runoff from the road.

2. Driveway Culverts are short pipes passing under driveways connecting two sections of roadside ditch.

3. Roadside Ditch Cross Piping is the piping system connecting a roadside ditch or roadside piping system on one side of the road to a roadside ditch or roadside piping system on the other side of the road, and being at the grade of the roadside ditches or piping systems.

4. Roadside Piping Systems are shallow pipes and inlets on one or both sides of a road, which are generally at a similar grade as typical roadside ditches, and generally lack manholes.

3. Revise Section 2 to read:

"Section 2. Determination of Programs, Rules, Policies and Standards

The District is responsible for the management and operation of the public sanitary sewer and storm and public surface water systems within its boundary, and is the designated permittee who shall obtain and enforce timely compliance with relevant Federal and delegated State Clean Water Act permits for treatment plants, collection systems, and stormwater. The District, after considering input from the cities, shall adopt orders, standards, specifications, work programs, reporting requirements, and performance criteria for the proper and effective operation of the sanitary sewer and storm and surface water systems and to comply with State and Federal permits, laws and regulations. In addition, the District, after considering input from the cities, shall have the authority to make changes to its orders, work programs, reporting requirements, and performance Standards. Any such changes to work programs, reporting requirements, and performance standards that the Board determines are necessary to meet or are required by state and/or federal permits or regulations will become effective 90 days from the date of notice to City by District or as mutually agreed to. Any changes to work programs, reporting requirements, and performance standards, not required by state and/or federal permits and regulations, shall be mutually agreed to by the District and City before they become effective. Proposed changes not required by state and/or federal permits and regulations should be communicated between the District and the City in or before December of the year before they are to be implemented to allow District and City to budget appropriately for the following fiscal year.

A. City agrees to follow and enforce the Orders, Standards, specifications, work programs, reporting requirements, and performance criteria promulgated by the District, subject, however, ~~to program funding and~~ to the extent that City may be lawfully authorized to act. The City shall not be responsible for any failure to act or defect in performance caused by ~~lack of adequate program funding,~~ inadequacies in the Work Program and Performance Standards as adopted by the District, or lack of lawful authority to act. ~~Lack of adequate~~

~~funding from the District and~~ Compliance with the Work Program and Performance Standards as adopted by the District shall be absolute defenses to any claim against the City under this Agreement. City further agrees to notify District of apparent violations of the subject Orders, Standards, specifications, work programs, and performance criteria, of which it has knowledge, which may require District legal action or enforcement.

4. Revise Section 3.A.1 to read:

   The purpose of this agreement is to delegate to and contract with the City to perform specific ~~functions~~portions of the Local Program. The responsibilities of the District and City are defined in this Section and Appendix A. Exhibit A is a map showing boundaries of responsibility between the District and City and is hereby made a part of Appendix A and incorporated into this agreement.

5. Revise Section 3.B.2 to read:

   Responsibilities defined in this Section and Appendix A may be modified by the District Board after receiving input from the City and determining the change is necessary to meet or comply with State or Federal permits, laws or regulations. The District Board shall not reduce the total scope of City responsibilities without consent of the City unless there is a change in the program or funding requiring the reduction, or unless the Board determines the City has failed to correct identified instances of nonperformance related to the adopted standards that are necessary to meet or comply with state or federal permits, laws or regulations. The District Board may adopt procedures regarding determination of nonperformance.

6. Revise Section 3.B.3 to read:

   Upon reasonable notice from City to District, District shall assume responsibility for any portion of the Local Program defined in this Section and Appendix A. Reasonable notice shall be at least 6 months, unless agreed to in writing by the District and City. Corresponding adjustments to the revenue allocation shall be made to reflect the change in responsibility upon implementation of such changes. City shall be responsible for correcting or paying to have corrected any deficiencies in the system resulting from non-performance of the programs under its responsibility~~, subject, however, to funding availability~~. For any Local Program activity the City previously elected to be performed by the District, the City may at any time request that activity be transferred back to being a City responsibility by following the procedures in Section 3.B.1 above. The District shall approve the request unless the District determined the City can not provide a reasonably equivalent level of overall efficiency. The date of the transfer of responsibility shall be as mutually agreed to, or in no case longer than one year from the date of the request.

7. Revise Section 3.C.2 to read:

   Require persons who are proposing 'development', as defined in the District's Design and Construction Standards Resolution and Order, to obtain a Service Provider Letter from the District. City shall not issue a stormwater connection permit without verification that the District has issued a Service Provider Letter.

8. Revise Section 3.C.6 to read:

   Inform the District in writing not less than 30 days prior to initiating or entering into any agreement for the financing or incurring of indebtedness relating to the storm and surface water system or the sanitary sewerage system. Revenues ~~allocated by the District to the City~~ defined in Section 4 of this agreement for the performance of functions identified in Appendix A are considered restricted, and may only be used to perform those functions (including reasonable administration) delegated to the City for such things as operation and maintenance of the sanitary or storm and surface water system. City shall not obligate any assets or facilities of the District's sanitary or storm and surface water system for any debt. For purposes of debt funding, the District's asset schedule for storm and surface water and sanitary sewer facilities shall be the basis for determining ownership within City boundaries. In general, sanitary sewer lines 24" and over are the property of the District regardless of location, as are sanitary treatment plants and pump stations, and storm and surface water quality and quantity facilities that are one acre or greater in surface area.

9. Revise Section 4 to read:

   Section 4. Determination of Monthly Service Charge Rates and System Development Charges; ~~and Division of Revenue;~~ Operating Procedures and Rules Relating to Revenue and Reporting

   ~~A. After~~ consultation ~~between City and district staff, the District Board shall determine and certify annually for both the sanitary sewerage system and for the storm and surface water system the monthly service charge and system development charge. The City agrees to impose these charges as a minimum. The City may impose additional charges as allowed in Section 4.E.4.~~

   B. ~~After consultation between City and district staff, the District Board shall determine and certify annually for both the sanitary sewerage system and for the storm and surface water system the portion of the monthly service charge and system development charge to be retained by the City for performance of the functions defined in this Agreement and for the City's share of annual debt service payment. Except as provided in Section 4.D, District shall notify City by the September preceding the start of the next Fiscal Year of any proposed decrease in the monthly service charge and system development charge to be retained by the City and any other proposed changes that could affect the City's 5-Year Sanitary Sewer or Stormwater Financial Forecast Plans.~~

~~C. The District Board shall not implement any significant change in the division of monthly service charge revenue from that shown in the Rates and Charges Resolution and Order No. 01-34 effective Fiscal Year 2001/2002 until July 1, 2004 with the following exceptions:~~

~~1. The Board may make routine principal and interest adjustments for debt service repayment.~~

~~2. The Board may make adjustments in response to significant increases or decreases in program responsibilities~~

A. Setting of Rates and Charges

1. After consultation between City and District staff, the District Board shall determine and certify for the Storm and Sanitary Sewer programs:

   a. District Wide System Development Charges that apply in all areas within the District boundary.
   b. Local System Development Charges that apply to areas outside of the City Limits.
   c. District Wide Monthly Service Charge Rates that apply in all areas within the District boundary.
   d. Monthly Service Charge Rates for the Local Program that apply to the areas outside the City limits.
   e. Funding levels for elements of the Local Program performed by the District within the City's Area of Geographic Responsibility.
   f. Funding levels for elements of the Local Program performed by the District within the City Limits but outside of the City's Area of Geographic Responsibility.
   g. Funding levels for elements of the Local Program performed by the City outside of the City Limits but inside the City's Area of Geographic Responsibility.
   h. Funding levels for elements of the Local Program performed by the District within the City Limits but outside of the City's Area of Geographic Responsibility where the City identifies a higher level of service than in the District's adopted standards.
   i. Elements within items "e" through "h" of this subsection may be expressed in terms of monthly service charge rates or rates per unit of facility.

2. The City shall set for the Storm and Sanitary Sewer programs:
   a. Local System Development Charges that apply to areas inside the City Limits.
   b. Monthly Service Charge Rates for the Local Program that apply to the areas inside the City Limits.

B. Collection of Rates and Charges as set in Section A above

1. The District shall collect for both the Storm and Sanitary Sewer programs:
   ~~a. System Development Charges in areas where the District issues connection~~ permits.

b. Local and District Wide Monthly Service Charges in areas where the District provides the billing function.

2. The City shall collect for both the Storm and Sanitary Sewer programs:
   a. Local and District Wide System Development Charges in areas where the City issues connection permits.
   b. The Monthly Service Charges for the District Wide Rate and the Local Rate in areas where the City provides the billing function.

C. Transfer and Remittance of Funds

1. The District shall transfer to the City the portion of the Storm and Sanitary Sewer revenue from the Local Rate collected for the elements of the Local Program performed by the City in areas that are inside the City's Area of Geographic Responsibility, but where the District does the billing.

2. The City shall transfer to the District for the Storm and Sanitary Sewer Programs:

   a. Revenue from the District Wide System Development Charges collected by the City.
   b. Revenue from the District Wide Monthly Service Charge Rate collected by the City.
   c. The portion of the revenue from fees and the Local Monthly Service Charge rate for the elements of the Local Program performed by the District within the City Limits and within the City's Area of Geographic Responsibility.
   d. The portion of the revenue from fees and the Local Monthly Service Charge rate for the elements of the Local Program performed by the District within the City Limits but outside the City's Area of Geographic Responsibility.
   e. Funds for performance of elements of the work program by the District within the City Limits but outside the City's Area of Geographic Responsibility where the City has identified a higher level of service than in the adopted District standards.

D. ~~Changes in the division of revenue will typically be made as a part of the annual Fiscal Year budget process. However, the division of revenue may be adjusted by the District to recognize changes in responsibilities that occur outside the normal budget cycle after coordination and communication with the Cities. Any such mid-year changes in the division of revenue initiated by the District Board shall only be implemented when the Board determines such a change is necessary to comply with State or Federal permits, laws or regulations. If there is a mid-year change in responsibilities, which the District determines to be significant, the District Board may, upon 60 days notice to City, adjust the division of revenue outside of the annual budget process.~~ Determination by the District of the items in Section 4.A.1 will typically be made as a part of the annual Fiscal Year budget process. However, these rates and funding levels may be adjusted by the District to recognize changes that occur outside the normal budget cycle after coordination and communication with the Cities. Any such mid-year changes initiated by the District Board shall only be implemented when the Board determines such a change is

necessary to comply with State or Federal permits, laws or regulations, or that are due to changes in responsibility.

E. Operating Procedures Relating to Revenue

~~1. City shall remit to the District the portion of sanitary sewer service charges and systems development charges collected, and storm and surface water service charges and systems development charges collected,~~ less the City ~~Portion, as identified in Section 4.B.~~

1. Payments shall be remitted on a monthly basis, with a report on District designated forms.

2. Payments ~~to the District~~ of revenue collected by the billing party shall be due within 20 days following the end of each month, unless the payment has been appealed by the billing party.

3. City may charge and collect a Local Monthly Service Charge or System Development Charge at a higher rate per DUE and ESU than that set by the District when the City determines it is needed for the Local ~~City~~ Program elements performed by the City. ~~system. The City shall retain 100% of these additional revenues collected.~~ Such additional charge shall be consistent with the services provided by City and with applicable federal rules in order to preserve eligibility for grants and other funding programs.

~~4. City may request District to perform permit and inspection services for private development construction of public storm and surface water facilities and sanitary sewer facilities, and for erosion control. City shall remit to the District the fee set forth in District's Rates and Charges to compensate District for its costs for such services performed relative to these fees, as prescribed by District Order or separate agreement with City.~~

4. For Industrial Waste fees, District shall remit to City 5 percent ~~a percentage~~ of system development charges, and 15 percent of the volume, and monthly service charges collected within the City's Area of Responsibility~~equal to the percentages of service charges retained by the City as defined in Section 4.B~~. District shall retain one hundred percent (100%) of the annual Industrial Waste permit fee, and any penalty fees, COD, SS (as those terms are defined in the Rates and Charges) and other fees related to Industrial Waste that may be assessed.

5. City will institute administrative procedures to diligently maintain regular billings and collection of fees, adjust complaints thereto, and pursue delinquency follow-ups and take reasonable steps for collection thereof.

~~6. City and District shall each establish separate accounts for the storm and surface~~ water program and sanitary sewerage program for the purpose of accounting for

service charges and systems development charges collected and received pursuant to this agreement.

7. District or City may at any reasonable time upon reasonable notice inspect and audit the books and records of the other with respect to matters within the purview of this Agreement.

8. City and District shall each prepare and submit to each other a performance report of the storm and surface water functions, and the sanitary sewer functions for which each is responsible. After consultation with the City, District will specify the requirements, frequency, and content of the performance report.

9. The City and District may, each at its own cost, install permanent and temporary volume and quality monitoring stations, and other monitoring equipment, to determine the effectiveness of City and District programs.

10. Interest shall accrue on late monthly payments as specified in Section 4.C~~E.1~~ at a rate of 1.25 times the monthly Local Government Investment Pool (LGIP) earnings rate as posted for the previous month, and will be applied each month to the unpaid balance.

11. The City and District will form a CIP Review Committee along with representatives from other Cities within the District's boundary for the purpose of recommending the prioritization and funding of sanitary sewer and Stormwater collection system projects. Board will adopt the CIP funding and project selection only after holding a public hearing to allow the Cities to provide additional input to the Board.

10. Revise Section 5.G to read:

District and City acknowledge that District may receive notices of violation or fines from state or federal agencies for violations of state or federal rules. As the permittee and the entity that establishes standards and controls payment, District shall be responsible for responding to notices of violations and for payment of all fines. District shall invite the City to participate in any discussions with State and Federal agencies regarding notices of violation involving City actions or responsibility. City will cooperate with District in the investigation and response to any notice of violation involving actions relating to actions or responsibilities of the City. If a fine is imposed, City shall reimburse District to the extent that the fine results from non-performance of adopted programs or non-compliance with District, State, or Federal rules or policies by the City and those acting on behalf of the City. If possible, the City shall reimburse the District prior to the date due for payment of the fine. ~~The City shall not be responsible for reimbursement if the City's non-performance or non-compliance was caused by lack of adequate funding by District.~~ If more than one party is responsible, the City's responsibility for reimbursement payment will be allocated based on the degree of responsibility and degree of fault of the City. Disputes over the amount of reimbursement shall be resolved by the dispute resolution process set out in Section 6 of this Agreement. ~~To the extent that the City is required to perform any work to correct a violation,~~

~~District shall provide adequate funding for the work to be performed, unless the violation was caused by the City's omission or misconduct.~~

11. Revise Section 7 to read:

1. This Agreement shall supersede all prior agreements of similar scope and subject matter, including amendments and the "City Committee Agreement" between the parties with respect to sanitary sewerage and service, storm and surface water management; provided that, except as expressly modified herein, all rights, liabilities, and obligations of such prior agreements shall continue. This agreement shall be effective upon its execution by both parties hereto, and unless terminated earlier, shall end at the end of the day on June 30, 2027~~ and shall continue in effect for four renewable terms of five years each~~.

2. ~~This Agreement shall be deemed automatically renewed for a single succeeding five year term up to a limit of 25 years, unless either party gives the other written notice not less than one year prior to the nominal expiration of term of its intent not to renew this agreement~~. This agreement may be terminated when either party gives the other written notice per the dates in the table below of its intent not to renew this agreement, and the agreement shall then terminate on June 30 of the following calendar year.

Notice given on or prior to June 30 of	Termination effective at the end of the day on June 30 of
2009	2010
2010	2011
2011	2012
2016	2017
2021	2022

3. The notice of termination may be withdrawn at any time prior to the termination date with written approval of the City's Chief Executive Officer and District General Manager.

4. If District enters into an intergovernmental agreement with any other city in its territory covering the same subject as this Agreement and if any of the provisions of the other agreement differ from this Agreement, the City may elect to replace any provision of this Agreement with the parallel provision from the other agreement, with the exception of Appendix A and Exhibit A. The replacement shall be effective on receipt by District of written notice from the City. This Agreement may not otherwise be modified except by written amendment or as otherwise specified in this Agreement.

IN WITNESS WHEREOF, this instrument has been executed in duplicate by authority of lawful actions by the Council and District's Board of Directors.

CLEAN WATER SERVICES

By _____
FOR General Manager

Approved as to Form:

_____
Attorney for District

CITY OF SHERWOOD, OREGON

By _____
City Manager

Attest: _____
City Recorder

_____
City Attorney

AMENDMENT TO CITY AGREEMENT

The City of Sherwood (City) and Clean Water Services (District) have entered into an Intergovernmental Agreement dated January 4, 2005. Section 3.B of that agreement allows the parties to modify Appendix A of that agreement (the Responsibility Matrix) with the approval of the District's General Manager and the City's Administrator/Mayor. The revised Appendix A is attached and will take effect July 1, 2008. Both parties hereby acknowledge amending Appendix A to change the effective date to July 1, 2008.

Approved by both parties on July 1, 2008.

CLEAN WATER SERVICES

By _____
For General Manager

CITY of Sherwood, OREGON

By _____
City Administrator/Mayor

Approved as to Form:

_____
District Counsel

_____
City Attorney

APPENDIX A				V12b 4/14/08
Sherwood				
DIVISION OF RESPONSIBILITIES	**EFFECTIVE JULY 1, 2008**			
	Inside City, and Inside "Areas of Assigned Service Responsibility"	Outside City, and Inside "Areas of Assigned Service Responsibility"	Inside City, and Outside "Areas of Assigned Service Responsibility"	Effective Dates. Unless shown differently, activities are effective July 1, 2008 and continue through the term of the agreement
I. Sanitary Maintenance				
A. Local Program				
Lines under 24"				
Line Cleaning	City	City	District	
Manhole and lid maintenance and adjustment (excluding sealing)	City	City	District	
Root Cutting and Chemical Control	City	City	District	
Maintenance TV inspection (See Engineering Section for new construction TV)	City	City	District	
Vector Control	City	City	District	
Surface Inspection, marking, self closing lids, of lines in stream corridors	City	City	District	
Easement and Access Road Maintenance	City	City	District	
Siphon maintenance where line leading to siphon is under 24"	City	City	District	
Overflow and Complaint response, investigation, and reporting	City	City	District	
Emergency response	City	City	District	
Utility Locates	City	City	District	
Minor repairs including point repairs and individual laterals	City	City	District	
B. District Wide Program				
Lines 24" and Larger				
All O&M on lines 24" and larger	District	District	District	
Siphon maintenance where line leading to the siphon is 24" and larger	District	District	District	
All Lines and All Areas				
Compilation of TV reports and system-wide evaluation	District	District	District	
Non-structural line sealing (pressure grouting)	District	District	District	
Manhole rehabilitation (sealing)	District	District	District	
Treatment Plant O&M	District	District	District	
Pump Station O&M	District	District	District	

II. CIP (Service Charge Rate and SDC Funded)	Inside City, and Inside "Areas of Assigned Service Responsibility"	Outside City, and Inside "Areas of Assigned Service Responsibility"	Inside City, and Outside "Areas of Assigned Service Responsibility"	
A. Local Program				
Lines Under 24"				
Repairs, replacements, reconstruction, rehabilitation, CIP construction and improvements	City	District	City	This row is effective July 1, 2008 through June 30, 2009***
Repairs and rehabilitation to abate I&I	City	District	City	This row is effective July 1, 2008 through June 30, 2009***
Lines Under 12"				
Repairs, replacements, reconstruction, rehabilitation, CIP construction and improvements (except projects for Collection system I&I abatement projects)	City	District	City	This row is effective beginning July 1, 2009 and continues through the term of the agreement.***
B. District Wide Program				
Lines 24" and Larger				
Repairs, replacements, reconstruction, rehabilitation, CIP construction and improvements	District *	District *	District *	This row is effective July 1, 2008 through June 30, 2009***
Lines 12" and Larger				
Repairs, replacements, reconstruction, rehabilitation, CIP construction and improvements	District *	District *	District *	This row is effective beginning July 1, 2009 and continues through the term of the agreement.***
All Lines and All Areas				
Treatment Plant CIP	District	District	District	
Pump Station CIP	District	District	District	
Collection system repairs and rehabilitation to abate I&I	District *	District *	District *	This row is effective beginning July 1, 2009 and continues through the term of the agreement.***

III. SWM Maintenance	Inside City, and Inside "Areas of Assigned Service Responsibility"	Outside City, and Inside "Areas of Assigned Service Responsibility"	Inside City, and Outside "Areas of Assigned Service Responsibility"	
A. Local Program				
Line Cleaning	City	City	District	
Manhole maintenance and adjustment	City	City	District	
Manhole repair and grouting	City	City	District	
Root Cutting	City	City	District	
TV inspection (except related to new construction)	City	City	District	
Catch Basin cleaning	City	City	District	
Water quality manhole cleaning	City	City	District	
Local surface retention/detention facility maintenance	City	City	District	
Filter vault inspection and maintenance	City	City	District	
Complaint response, investigation, and reporting	City	City	District	
Storm and emergency response	City	City	District	
Roadside ditches and piping system in City Roads	City	None	City	
Street Sweeping	City	City	District	
Placement of sweeper, catch basin and other material from storm system structures into drop boxes or other designated locations (excluding leaves)	City	City	District	
Maintenance of public streams/creeks/open channels	City	City	District	
Proactive leaf management program including leaf collection, hauling, processing and disposal	City	City	District	
Hauling, processing and disposal of sweeper, catch basin and other material from storm system structures	City - Sweeper Material District - All Others	City	City - Sweeper Material District - All Others	
Culvert maintenance under 36" in City Roads	City	City	District	
Culvert maintenance 36" and larger and bridge maintenance in City Roads	City	None	City	
Culvert maintenance under 36" in County Roads	City	City	District	
Culvert maintenance 36" and larger and bridge maintenance in County Roads	County	County	County	
Vector Control including mosquito treatment, beaver, nutria, rats and others that impact the storm system	City	City	District	
Utility Locates	City	City	District	
Repairs, replacements, reconstruction, rehabilitation, CIP construction and improvements	City	District	City	This row is effective July 1, 2008 through June 30, 2009****
B. District Wide Program				
Regional surface treatment or control facilities where the treatment area is 1 acre or larger	District	District	District	
Roadside ditches and piping system maintenance in County Roads	District through County funding	District through County funding	District through County funding	
Compilation of TV reports and system-wide evaluation	District	District	District	

IV. ENGINEERING, INSPECTION, AND SUPPORT ELEMENTS	Inside City, and Inside "Areas of Assigned Service Responsibility"	Outside City, and Inside "Areas of Assigned Service Responsibility"	Inside City, and Outside "Areas of Assigned Service Responsibility"	
A. Local Program				
Maintaining local GIS information	City	District	City	
Maintaining local system mapping	City	District	City	
Maintaining Engineering records of systems	City	District	City	
MMIS	City	City	District	
Service Provider Letter Pre-screening	District	District	District	
Service Provider Letters Issuance	District	District	District	
Development Process (development review, plan review, land use)	City	District	City	
Sanitary Sewer connection permit issuance	City	District	City	
SWM connection permit issuance	City	District	City	
Erosion control permit issuance	City	District	City	
1200C Permit	City	District	City	
Inspection of developer projects and new construction	City	District	City	
Erosion control inspection	City	District	City	
Post construction TV	City	District	City	
1-year warranty TV	City	District	City	
Fat, Oil and Grease Program	City	District	City	
Preparing and revising local sanitary sewer masterplans	City	District	City	
Preparing and revising local SWM masterplans	City	District	City	
Formation and Administration of LID's	City	District	City	
Cross connection investigation and response	City	City	District	
Inspection of Private Facilities	City	District	City	
Fixture Counting	City	District	City	
Billing and collection of monthly service charges	City	District	City	
Response to customer billing inquiries	City	District	City	
B. District Wide Program				
Industrial Waste Program	District	District	District	
Maintaining system-wide GIS and mapping	District	District	District	
Preparing and maintaining system-wide storm and sanitary masterplans	District	District	District	
Public information, newsletters, etc., for SWM and Sanitary programs**	District	District	District	
Flow Monitoring	District	District	District	
Sanitary sewer connection permit issuance authorization	District	District	District	
SWM connection permit issuance authorization	District	District	District	

Notes

1. Where "District *" is shown, this does not preclude a City funding a project with its own source of funds and also does not limit the ability for District and City to agree as to who actually performs the work.
2. ** "Public Information" is the overall ad and public information campaigns (TV, radio, brochures, etc.) and does not include the activities related to local projects and local maintenance which are a part of those activities

***Scheduled to be finalized and adopted by governing bodies by December 31, 2008, to reflect local and District Wide funding.

****Scheduled to be reviewed with changes adopted by governing bodies during fiscal year 2009.

Clean Water Services
Our commitment is clear.

May 15, 2009

Craig Sheldon
Public Works Director
City of Sherwood
22560 SW Pine Street
Sherwood, OR 97140

Dear Mr. Sheldon:

Jan Kingsfather of our office sent you by email a draft of modified Appendix A, Division of Responsibilities, to the Operating Inter-Governmental Agreement, utilizing Beaverton as an example, on April 29, 2009. Since then, the Service Delivery Study (SDS) project committee has worked on its finalization. So, I would consider the attached document as a final draft of Appendix A. If you have any concerns with any of the functions contained in it, please do not hesitate to contact me to discuss.

Also enclosed is an Amendment to City Agreement, which formally modifies and approves Appendix A. As stated in it, Appendix A may be modified by the parties with the approval of the City Manager. In our SDS committee meetings, however, we discussed the fact that some cities may choose to present it to their City Councils for approval because it represents a tremendous amount of work by the representatives of the seven large Cities and District. We leave it up to each individual city regarding presentation to its Council.

Since Appendix A has an effective date of July 1, 2009, time is of the essence for approving it. I would appreciate receiving a response from you regarding the City's time line for approving it. Thank you in advance for your staff's and your help and cooperation in completing the new and, hopefully, better Appendix A.

Sincerely,

Robert C. Cruz
Deputy General Manager

Enclosure

2550 SW Hillsboro Highway • Hillsboro, Oregon 97123
Phone: (503) 681-3600 • Fax: (503) 681-3603 • www.CleanWaterServices.org

AMENDMENT TO CITY AGREEMENT

The City of Sherwood (City) and Clean Water Services (District) have entered into an Intergovernmental Agreement dated January 4, 2005. Section 3.B. of that agreement allows the parties to modify Appendix A of that Agreement (the Responsibility Matrix) with the approval of the District's General Manager or Designee and the City Manager. The revised Appendix A is attached and will take effect July 1, 2009. Both parties hereby acknowledge amending Appendix A to change the effective date to July 1, 2009.

Approved by both parties on _____, 2009.

CLEAN WATER SERVICES

By _____
General Manager or Designee

CITY OF SHERWOOD, OREGON

By _____
City Manager

Approved as to Form:

_____
District Counsel

_____
City Attorney

APPENDIX A	EFFECTIVE JULY 1, 2009		V3 Revised 6/16/09	
Sherwood				
DIVISION OF RESPONSIBILITIES				
	Inside City, and Inside "Areas of Assigned Service Responsibility"	Outside City, and Inside "Areas of Assigned Service Responsibility"	Inside City, and Outside "Areas of Assigned Service Responsibility"	
I. Sanitary Maintenance				
A. Local Program				
Lines under 24"				
Line Cleaning	City	City	District	
Manhole and lid maintenance and adjustment (excluding sealing)	City	City	District	
Root Cutting and Chemical Control	City	City	District	
Maintenance TV inspection (See Engineering Section for new construction TV)	City	City	District	
Vector Control	City	City	District	
Surface Inspection, marking, self closing lids, of lines in stream corridors	City	City	District	
Easement and Access Road Maintenance	City	City	District	
Siphon maintenance where line leading to siphon is under 24"	City	City	District	
Overflow and Complaint response, investigation, and reporting	City	City	District	
Emergency response	City	City	District	
Utility Locates	City	City	District	
Minor repairs including point repairs and individual laterals	City	City	District	
B. District Wide Program				
Lines 24" and Larger				
All O&M on lines 24" and larger	District	District	District	
Siphon maintenance where line leading to the siphon is 24" and larger	District	District	District	
All Lines and All Areas				
Compilation of TV reports and system-wide evaluation	District	District	District	
Non-structural line sealing (pressure grouting)	District	District	District	
Manhole rehabilitation (sealing)	District	District	District	
Treatment Plant O&M	District	District	District	
Pump Station O&M	District	District	District	

II. Sanitary CIP (Service Charge Rate and SDC Funded) -- See Attachment 1 for detailed responsibility	Inside City, and Inside "Areas of Assigned Service Responsibility"	Outside City, and Inside "Areas of Assigned Service Responsibility"	Inside City, and Outside "Areas of Assigned Service Responsibility"	
A. Local Program				
Lines 12" and Under				
Repairs, replacements, reconstruction, rehabilitation, CIP construction and improvements (except projects for Conveyance system I&I abatement projects). Project Management to be determined by the City, with the exception of the middle column	City	District	City	
B. District Wide Program				
Lines Larger than 12" and under 24"				
Repairs, replacements, reconstruction, rehabilitation, CIP construction and improvements except projects for Conveyance system I&I abatement projects; Funding responsibility only; Project management to be determined by the City, with the exception of the middle column	District *	District *	District *	
Lines 24" and Larger				
Repairs, replacements, reconstruction, rehabilitation, CIP construction and improvements	District	District	District	
All Other Facilities (Project Management to be determined by District)				
Treatment Plant CIP	District	District	District	
Pump Station CIP	District	District	District	
C. I&I Repairs and Rehabilitaion				
Conveyance system repairs and rehabilitation to abate I&I; Funding responsibility only; Project management to be determined by the City with the exception of the middle column	City and District 50/50 Funding*	District Funding*	City and District 50/50 Funding*	

III. SWM Maintenance	Inside City, and Inside "Areas of Assigned Service Responsibility"	Outside City, and Inside "Areas of Assigned Service Responsibility"	Inside City, and Outside "Areas of Assigned Service Responsibility"
A. Local Program			
Line Cleaning	City	City	District
Manhole maintenance and adjustment	City	City	District
Manhole repair and grouting	City	City	District
Root Cutting	City	City	District
TV inspection (except related to new construction)	City	City	District
Catch Basin cleaning	City	City	District
Water quality manhole cleaning	City	City	District
Local surface retention/detention facility maintenance	City	City	District
Filter vault inspection and maintenance	City	City	District
Complaint response, investigation, and reporting	City	City	District
Storm and emergency response	City	City	District
Roadside ditches and piping system in City Roads	City	None	City
Street Sweeping	City	City	District
Placement of catch basin and other material from storm system structures into drop boxes or other designated locations (excluding leaves)	City	City	District
Maintenance of public streams/creeks/open channels	City	City	District
Proactive leaf management program including leaf collection, hauling, processing and disposal	City	City	District
Hauling, processing and disposal of sweeper material	City	City	District
Hauling, processing and disposal of catch basin and other material from storm system structures	District	District	District
Culvert maintenance under 36" in City Roads	City	City	District
Culvert maintenance 36" and larger and bridge maintenance in City Roads	City	None	City
Culvert maintenance under 36" in County Roads	City	City	District
Culvert maintenance 36" and larger and bridge maintenance in County Roads	County	County	County
Vector Control including mosquito treatment, beaver, nutria, rats and others that impact the storm system	City	City	District
Utility Locates	City	City	District
Repairs, replacements, reconstruction, rehabilitation, CIP construction and improvements. Note: It is anticipated these responsibilities will change to more closely match the CIP shown under Sanitary beginning July 1, 2009	City	District	City
B. District Wide Program			
Regional surface treatment or control facilities where the treatment area is 1 acre or larger	District	District	District
Roadside ditches and piping system maintenance in County Roads	District through County funding	District through County funding	District through County funding
Compilation of TV reports and system-wide evaluation	District	District	District

IV. ENGINEERING, INSPECTION, AND SUPPORT ELEMENTS	Inside City, and Inside "Areas of Assigned Service Responsibility"	Outside City, and Inside "Areas of Assigned Service Responsibility"	Inside City, and Outside "Areas of Assigned Service Responsibility"
A. Local Program			
Maintaining local GIS information	City	District	City
Maintaining local system mapping	City	District	City
Maintaining Engineering records of systems	City	District	City
MMIS	City	City	District
Service Provider Letter Pre-screening	District	District	District
Service Provider Letters Issuance	District	District	District
Development Process (development review, plan review, land use)	City	District	City
Sanitary Sewer connection permit issuance	City	District	City
SWM connection permit issuance	City	District	City
Erosion control permit issuance	City	District	City
1200C Permit	City	District	City
Inspection of developer projects and new construction	City	District	City
Erosion control inspection	City	District	City
Post construction TV	City	District	City
1-year warranty TV	City	District	City
Fat, Oil and Grease Program	City	District	City
Preparing and revising local sanitary sewer masterplans	City	District	City
Preparing and revising local SWM masterplans	City	District	City
Formation and Administration of LID's	City	District	City
Cross connection investigation and response	City	City	District
Inspection of Private Facilities	City	District	City
Fixture Counting	City	District	City
Billing and collection of monthly service charges	City	District	City
Response to customer billing inquiries	City	District	City
B. District Wide Program			
Industrial Waste Program	District	District	District
Maintaining system-wide GIS and mapping	District	District	District
Preparing and maintaining system-wide storm and sanitary masterplans	District	District	District
Public information, newsletters, etc., for SWM and Sanitary programs**	District	District	District
Flow Monitoring	District	District	District
Sanitary sewer connection permit issuance authorization	District	District	District
SWM connection permit issuance authorization	District	District	District
Preparation of five-day letter	District	District	District

Notes

1. Where "District *" is shown, this does not preclude a City funding a project with its own source of funds and also does not limit the ability for District and City to agree as to who actually performs the work.
2. ** "Public Information" is the overall ad and public information campaigns (TV, radio, brochures, etc.) and does not include the activities related to local projects and local maintenance which are a part of those activities

Attachment 1

SANITARY CAPITAL IMPROVEMENT PROGRAM FUNDING RESPONSIBILITY

Pipe Size, New	Responsibility	SDC Eligible
12-inch and smaller	Local	Yes, 100%
Larger than 12 inches	District-Wide*	Yes, 100%

Pipe Size, Replacement/Upsize	Responsibility	SDC Eligible
From 12-inch and smaller to 12-inch and smaller	Local	Yes, Proportional to new capacity provided
From 12-inch and smaller to larger than 12-inch	Shared cost based on proportionate capacity*	Yes, Proportional to new capacity provided
From larger than 12-inch to larger than 12-inch	District-Wide	Yes, Proportional to new capacity provided

*Note: A Local share is required based on the capacity of a 12-inch pipe

APPENDIX B | ANTICIPATED MS4 PERMIT REQUIRMENTS

City of Sherwood
Stormwater Master Plan Update
Anticipated MS4 Permit Requirements

June 2015

WOLF WATER RESOURCES



Cover photo Tributary to Cedar Creek

Contributing Authors:

Wolf Water Resources
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List of Acronyms

BiOP – Biological Opinion
BMP – Best Management Practice
CSM – Continuous Simulation Model
CSO –Combined Sewer overflow
CWA – Clean Water Act
CWS –Clean Water Services
DEQ – Oregon Department of Environmental Quality Ecology – Washington State Department of Ecology
DCS – CWS Design and Construction Standards
EPA – Environmental Protection Agency
ESA – Endangered Species Act
GIS – Geographic Information Systems

HEC-HMS - Hydrologic Engineering Center (U.S. Army) Hydrologic Modeling System
HMP – Hydromodification Plan
HSPF – Hydrologic Simulation Program Fortran
KCRTS – King County Runoff Time Series LID – Low Impact Development
MS4 – Municipal Separate Storm Sewer System
NFIP – National Flood Insurance Program
NPDES - National Pollutant Discharge Elimination System
Q_2 – Discharge Rate with a 2-year return interval
SBUH – Santa Barbara Urban Hydrograph
SEM – Stream Evolution Model
SWMM – Storm Water Management Model
TMDL – Total Maximum Daily Load
WWHM – Western Washington Hydrology Model
VC- Vegetated Corridor

1. Introduction

The City of Sherwood is regulated the Clean Water Services (CWS) MS4 permit that was last issued in July of 2005. This is a unique watershed based permit that combines both stormwater and wastewater NPDES discharge permit requirements. One of the advantages of the watershed based permit is that it allows the use of distributed watershed based strategies to offset point discharge impacts. For instance, planting tributary stream corridors that provide shade as well as a suite of other habitat and water quality benefits to offset temperature impacts at the waste water treatment plant outfalls.

This report outlines existing CWS permit requirements and policies relevant to the City of Sherwood Stormwater Master Plan Update. These are compared to anticipated new requirements based on more recently issued Phase 1 permits for neighboring Oregon jurisdictions. These include;

- **Multnomah County, Gresham Group, City of Salem, City of Eugene** -Reissued Dec. 30, 2010
- **Portland Group (City of Portland and Port of Portland)** -Reissued Jan. 31, 2011
- **Clackamas County Group (Clackamas County DTD, City of Gladstone, City of Johnson City, City of Lake Oswego, City of Milwaukie, City of Oregon City, City of West Linn, City of Wilsonville, Oak Lodge Sanitary District, CCSD #1, City of Happy Valley, SWMACC and City of Rivergrove)** -Reissued Mar. 16, 2012

The language of these permits outlining requirements is consistent across permits. Some of these jurisdictions have adopted standards and policies to meet these new permit requirements. A unified and consistent set of standards and policies across jurisdictions is easier to negotiate with the Department of Environmental Quality (DEQ) and provides simplicity and assurance to developers. This must be balanced with the unique needs and site specific constraints of particular jurisdictions and watersheds. For instance, the City of Portland requires high levels of infiltration to reduce stormwater runoff. This is necessary to reduce flows to the combined sewer overflow (CSO) system and large parts of Portland is underlain with soils that have high infiltration rates. By contrast Sherwood and much of the Tualatin basin has tight soils that do not infiltrate well and there is a separate storm sewer system. Unlike the City of Portland, Sherwood has not piped the streams and has maintained much of the floodplain while enhancing riparian vegetation. As a result stream health in Sherwood is impressive for urban watersheds.

The health of Sherwood streams is due in part to past stormwater and floodplain management policies. As regulatory requirements increase Sherwood is in a position to choose policies that meet these requirements in a manner that minimizes cost while protecting natural aquatic resources. This memo outlines what policies are currently effective in protecting stream health, what MS4 permit requirements are likely to come into effect with the next permit renewal, and recommendations for how Sherwood can best meet these requirements. This report focuses on those regulations that fall within Capital Improvement or structural BMPs for Post Construction Site Runoff.

2. Clean Water Services Existing Stormwater Requirements and Policies

In 2005 CWS was issued an innovative watershed based permit that combined MS4 and wastewater discharges. This permit initiated a number of strategies that focused on temperature that also had additional benefits to stream health and water quality. The next permit renewal is an opportunity to refine these policies that continues to protect streams cost effectively and in a manner that is suited to natural watershed conditions.

Vegetated Corridors

The NPDES watershed based permit allows for water quality trading for temperature and oxygen demanding parameters. To meet this requirement CWS engages in riparian planting projects as well as programs that partner with the agricultural community to enhance riparian vegetated corridors. In addition, vegetated corridor requirements in the CWS Design and Construction Standards (DCS) meet statewide planning goal 5 to protect natural resources and conserve scenic and historic areas and open

spaces. As a result of these regulations vegetated buffers in Sherwood have been protected and in some cases enhanced. Vegetated riparian corridors provide additional benefits to urban streams beyond water quality. These include;

- streambank stabilization that reduces erosion and turbidity,
- attenuation of overbank flows that encourages settlement of sediment on the floodplain,
- filtering of pollutants from runoff that flows overland across the buffer,
- a source of large wood habitat to the stream,
- a source of detritus to aquatic food web, and
- reduction of runoff through infiltration and evapotranspiration.

Often stormwater outfalls are piped through the riparian corridor to the stream edge which significantly reduces the benefits of the buffer. Outfalls should daylight at the edge of the buffer or floodplain whenever possible. Occasionally steep slopes will require piping to the edge of the stream to prevent erosion.



Figure 1. Outfall piped to the edge of Rock Creek



Figure 2 Outfall to swale at the edge of the Cedar Creek floodplain

Vegetated Water Quality Facilities



Figure 3. Streetside Vegetated Swale

The City of Sherwood uses the CWS Design and Construction Standards (DCS) for post construction water quality treatment requirements. These standards promote the use of vegetated swales, extended dry basins, or constructed water quality wetlands to meet stormwater treatment requirements. These vegetated facilities likely also provide infiltration, evapotranspiration, and flow attenuation benefits. These facilities are also likely to be considered green infrastructure by DEQ in subsequent MS4 permits. Continued use of these facilities is highly recommended for regulatory compliance and stream protection. These designs could be modified to maximize infiltration through the use of uncompacted soils, gravel/rock sub layer, and small berms to retain a portion of the flow in the bed of the facility. Recent approaches to flow control for hydromodification developed by the Environmental Protection Agency (EPA) that oversees DEQ require retention of the 90th percentile storm which is close to or less than the water quality storm in Western Oregon jurisdictions. With analysis that demonstrates that the existing or modified versions of the vegetated facilities can meet these hydromodification flow control requirements could reduce the pressure to adopt continuous simulation detention strategies.

LIDA Manual

The City of Sherwood has adopted the CWS Low impact development Approaches LIDA manual for compliance with stormwater standards. This manual is expected to meet anticipated requirements for green infrastructure and low impact development. It could also be updated to meet hydromodification flow control requirements using the percentile storm approach. This approach is unlikely to require any increase in facility sizing based on preliminary review comparing the 6% sizing factor used in the LIDA Handbook with the EPA National Stormwater Calculator (SWC).[1] This calculator looks up rainfall, evapotranspiration, soil, and slope data anywhere in the country and sizes a limited number of LID controls to meet percentile storm requirements. It uses a SWMM model that can incorporate additional LID designs.

Outfall Retrofit Program

The City of Sherwood participates in the CWS districtwide outfall retrofit program which has a goal of six outfall retrofits per year. These projects target areas with limited structural treatment facilities prioritizing high load areas. Tracking measures include the number of outfall retrofits in planning, design, construction or completed including type of BMP, location, and area treated. Proposed regional facilities within the updated Stormwater Master Plan can be used to meet this regulatory requirement when treating previously untreated impervious area.

3. Recent Oregon Phase 1 Permit Requirements and Adopted Policies

Post-Construction Site Runoff

Recent MS4 permits in Oregon have required that post construction runoff strategies mimic natural hydrology, utilize green infrastructure (GI) or low impact development (LID), and treat 80% of the annual average runoff volume. This language describes flow control requirements that would address hydromodification impacts from increased impervious area and creates a uniform water quality design storm approach.

DEQ Permit Language:

f. Post-Construction Site Runoff: *The permittee must continue to implement their post-construction stormwater pollutant and runoff control program.*

i. By (date varies by permit) the post-construction stormwater pollutant and runoff control program applicable to new development and redevelopment projects that create or replace (area varies by permit) of impervious surface must meet the following conditions:

1) Incorporate site-specific management practices to mimic natural surface or predevelopment hydrologic functions as much as practicable. The site-specific management practices should optimize on-site retention based on the site conditions;

2) Reduce site specific post-development stormwater runoff volume, duration and rates of discharges to the municipal separate storm sewer system (MS4) to minimize hydrological and water quality impacts from impervious surfaces;

3) Prioritize and include implementation of Low-Impact Development (LID), Green Infrastructure (GI) or equivalent planning, design and construction approaches; and,

4) Capture and treat 80% of the annual average runoff volume, based on a documented local or regional rainfall frequency and intensity.

[1] EPA National Stormwater Calculator http://www2.epa.gov/water-research/national-stormwater-calculator

iii. To reduce pollutants and mitigate the volume, duration, time of concentration and rate of stormwater runoff, the permittee must develop or reference an enforceable post-construction stormwater quality management manual or equivalent document that, at a minimum, includes the following:

3) Applicable LID, GI or similar stormwater runoff reduction approaches, including the practical use of these approaches.
4) Conditions where the implementation of LID, GI or equivalent approaches may be impracticable.[2]
An innovative way to meet all of these requirements is to use green infrastructure to treat a water quality design storm depth that also meets hydromodification requirements. The recent Hydromodification Assessment for Salem demonstrated that infiltration of their water quality design storm of 1.38" in 24hrs was equivalent to flow control using continuous simulation for ½ the 2yr to the 10 year. The same report also demonstrated the feasibility of infiltration for the water quality design storm even in tight soils. This approach simplifies compliance by meeting both flow control and water quality treatment in a single facility that can be incorporated into site landscaping.

Hydromodification Assessments

DEQ Permit Language:
Hydromodification Assessment: The permittee must conduct an initial hydromodification assessment and submit a report by November 1, 2014 that examines the hydromodification impacts related to the permittee's MS4 discharges, including erosion, sedimentation, and/or alteration to stormwater flow, volume and duration that may cause or contribute to water quality degradation. The report shall describe existing efforts and proposed actions the permittee has identified to address the following objectives:

a. Collect and maintain information that will inform future stormwater management decisions related to hydromodification based on local conditions and needs;
b. Identify or develop strategies to address hydromodification information or data gaps related to waterbodies within the permittee's jurisdiction;
c. Identify strategies and priorities for preventing or reducing hydromodification impacts related to the permittee's MS4 discharges; and,
d. Identify or develop effective tools to reduce hydromodification[3].

4. Recent Flow Control Strategies Being Adopted in Oregon

Most jurisdictions have adopted some type of continuous simulation model to match pre- and post-development flows within a defined channel forming discharge range. The channel forming discharge is typically ½ the 2 year to the 10 year though often a flood control requirement is added. This approach requires complex continuous simulation modeling tools that are typically developed by jurisdictions for developers and designers to size facilities. They are based on theoretical relationships of channel forming flow with very little actual data. Resulting facilities are typically 2 to 5 times the size of traditional detention facilities. In an attempt to make these facilities more feasible jurisdictions have adopted policies that can dramatically reduce the performance of these facilities in preventing stream erosion. Two such policies include;

- A minimum orifice size
- Defining pre-development as existing condition rather than the natural forest or forest/meadow.

If the minimum orifice size is larger than that needed to meet the detention flow requirements the facility will potentially release flows within the channel forming range over a longer period of time actually increasing erosion potential. The pre-development condition is tied to the channel forming discharge and

[2] NPDES MS4 Permits issued by DEQ since 2011
[3] NPDES MS4 Permits issued by DEQ since 2011

changes dramatically between a natural and developed condition. For instance, ½ the 2 year flow under developed conditions can be 2-3 times ½ the 2 year under natural forested or forest meadow conditions. These goal of flow control for hydromodification is to recreate the natural channel forming flows and a pre-development condition that is already developed does not meet this goal. As a result the flows released from facilities that use a developed condition as pre-development are likely to release flows high enough to erode downstream channels over a longer duration potentially increasing the risk of stream erosion. Both the BMP sizing tool and the Tualatin River Urban Stormwater Tool define pre-development as existing conditions. Additional analysis particularly measuring the stream erodibility would determine if these tools have targeted the appropriate channel forming discharge for the defined pre-development conditions. The channel forming discharge of ½ 2 year to the 10 year is based on theoretical relationships for sand bed streams. Studies in Salem and the Tualatin basin have shown that the channel forming flows for cohesive soils can vary dramatically and can often be less than ½ the 2 year especially in headwater streams.

Locally developed continuous simulation model sizing tools include the following;

BMP sizing tool developed by Clackamas County WES and adopted by City of Wilsonville
This tool is based a multiple runs of a continuous simulation model that generates a series of sizing factors based on soils, slopes, and change in development condition.

Tualatin River Urban Stormwater Tool (TRUST) for use in the River Terrace Development is a modified version of the Western Washington Hydrologic Model (WWHM) and actually runs a continuous simulation program to size the facility.

Variations on both of these tools are being implemented in California and Washington. These tools are suitable for sizing facilities that use a natural forested or forest meadow condition as pre-development and a channel forming discharge of ½ to the 10 year for sand or gravel bed receiving streams. If unacceptably small orifice sizes are sized for detention then regional detention or infiltration strategies should be used instead of using a minimum orifice size. These tools should not be used to protect receiving streams with erodible cohesive soils or to match a developed pre-development condition without further stream erodibility analysis. Such applications could increase stream erosion by extending the duration of actual channel forming flows.

5. Additional Policies that Protect Water Quality

Beaver

"The District's beaver management policy supports the Oregon Plan for Salmon and Watershed guidelines, as follows:

- *The construction and maintenance of dams by beaver is a natural process benefiting salmon and other fish and wildlife species by creating beneficial pool and wetland habitat in many stream reaches.*
- *The goal of management efforts should be to maintain or improve the distribution and amount of beaver pond habitat without creating unacceptable risks of damage to other public and private resources.*
- *Lethal control is usually only a temporary solution. Beaver populations are at or near carrying capacity and removing a beaver only opens up living space for a new beaver.*

If a beaver dam affects drainage pipes or culverts and creates a substantial flood risk to a structure or other significant property damage, the affected property owner may remove or modify the beaver dam to restore flow."[4]

[4] Clean Water Services Integrated Pest Management Plan pp5-6.

Beaver are very good at stabilizing streams especially in areas with broad active floodplains where risk to infrastructure is low. The dams act as bed control preventing the stream from downcutting and the ponds



Figure 3. Beaver ponds along Cedar Creek tributary

help attenuate and store flows from storm events. Some neighborhoods have adopted beaver colonies by managing and monitoring the dams to reduce flood risk. An extensive supply of woody riparian vegetation is a necessary component of beaver habitat and also adds to stream stability by strengthening banks and slowing over bank flow. Many urban streams in Washington County were stabilized by beaver after Clean Water Services adopted a pest management policy that supported their presence.[5]

Natural and Beneficial Functions of Floodplains

Several plaintiff's sued the Federal Emergency Management Agency (FEMA) for not adequately consulting on Endangered Species Act (ESA) issues in managing floodplain development. As a result of a 2010 light settlement FEMA must consult with the National Marine Fisheries Service (NMFS) to comply with the ESA on all floodplain development applications. NMFS will issue a Biological Opinion (BiOP) which will provide specific guidance for FEMA on what is required to comply with the ESA. A similar lawsuit in the Puget Sound Washington has resulted in must more protective floodplain development measures including green stormwater infrastructure, extensive setbacks, and riparian enhancement requirements. At the same time flood insurance rates are scheduled to increase dramatically to sustain the National Flood Insurance Program (NFIP). These two changes in floodplain management regulations will have the effect of making development in the floodplain much more expensive both to build and to insure. Local jurisdictions will be required to either adopt more protective regulations or require independent ESA consultation with each floodplain development application. It makes sense to adopt policies that will meet both the FEMA ESA requirements and MS4 permit requirements for hydromodification while continuing to protect the long term health of Sherwood's streams.

6. Recommendations

Flow Control Recommendations

[5] Pers. Com. Kendra Smith, Clean Water Services 2009

Flow control will likely be required in the new DEQ MS4 permits for all phase 1 jurisdictions. At a minimum this would include flow control requirements that optimize on site retention and mimic natural runoff volumes and durations. For the City of Sherwood we recommend that the flow control focus on retention of the water quality storm (assuming this meets the 80% average annual runoff volume). The tight cohesive soils on Sherwood landscapes would have naturally low infiltration rates. If the City were to adopt the percentile storm approach the hydromodification design storm would likely be close to the water quality design storm. Vegetated facilities designed to infiltrate a depth of 1"-1.5"/24 hrs. would meet both water quality and flow control. The volume of water would be infiltrated in 24 hours would be equivalent to 1-1.5 inches over the impervious area. This is generally feasible with infiltration rates as low as 0.5 inches per an hour.

Recommendation: Develop a flow control storm using the percentile storm approach that meets both hydromodification and water quality requirements. Use vegetated facilities to infiltrate the water quality/flow control design storm. This is expected to meet all new requirements for post construction run off control and could be a hydromodification tool.

Hydromodification Assessment Recommendations

Our preliminary assessment has determined that Sherwood streams have relatively high resilience to erosion with very few problem areas. We expect that continue and even improve with the adoption of minimal infiltration flow control requirements, enhancement of riparian buffers, and continued protection of floodplains. A full hydromodification assessment would still be required by DEQ. This would involve continuous simulation of runoff modeling to estimate natural, existing, and proposed runoff regimes under expected development. The existing HEC-RAS models could be used to compare base line (2006) conditions to today and see if stream cross sections have changed significantly. We could also use these models to determine the change in shear stress of the receiving channels under increased runoff and how various strategies perform in reducing stream shear stress. A critical component of the hydromodification assessment would be to determine the range of channel forming flows that would be important to target for flow control. Based on recent studies in Salem and the Tualatin basin these could be less than ½ the 2 year event for cohesive soils. If that is the case adopting a tool that uses large detention facilities that release flows at ½ the 2year could increase channel erosion by extending the duration of erosive flows at great expense to the City and developers.

Recommendation: Complete a hydromodification assessment analysis that;

- Quantifies expected increase in runoff volumes and durations,
- Determines erodibility of stream channels and channel forming flow range
- Identifies reaches of stream that are susceptible to erosion from increased runoff
- Assess hydromodification tools that are best suited to Sherwood conditions and are cost effective
- Develop a monitoring plan that identifies and addresses data gaps while collecting information critical to hydromodification decision making.

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NPDES MS4 discharge permits issued by DEQ :
http://www.deq.state.or.us/wq/stormwater/municipalph1.htm#permit

Clackamas County issued March 2012
City of Gresham issued December 2010
City of Salem issued December 2010
City of Portland issued January 2011
City of Eugene issued December 2010
Clean Water Services issued July 2005

APPENDIX C | HYDROMODIFICATION

City of Sherwood
Stormwater Master Plan Update
Hydromodification Technical Memorandum

Preliminary Stream Review and Recommended Approaches

May 2015

WOLF WATER RESOURCES





Cover photos various streams in Sherwood

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List of Acronyms

BiOP – Biological Opinion
BMP – Best Management Practice
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SBUH – Santa Barbara Urban Hydrograph
SEM – Stream Evolution Model
SWMM – Storm Water Management Model
TMDL – Total Maximum Daily Load
WWHM – Western Washington Hydrology Model

Executive Summary

The City of Sherwood is embarking upon a Stormwater Master Plan to identify and prioritize stormwater infrastructure projects that improve conveyance and water quality. These projects are intended to protect health and public safety and meet regulatory requirements of the National Pollution Discharge Elimination system (NPDES) Municipal Separate Storm Sewer System (MS4) permit and Total Maximum Daily Loads (TMDLs) that have been established for water bodies located within and downstream of the city boundaries. To address these requirements in an integrated cost effective manner, the City is embarking on a preliminary hydromodification assessment to determine the extent of stream erosion and recommend strategies to address hydromodification that are appropriate and effective in local conditions.

The purpose of this technical memorandum is to summarize existing stream information and guide strategies to address hydromodification. The term hydromodification is used to describe alterations to the natural system of water flow in an urban landscape, including changes to water conveyance, surface water runoff, sediment transport, and water quality. Hydromodification causes stream erosion leading to habitat and water quality degradation, and risks to infrastructure from bank failure and incision. There are a variety of approaches that can be implemented to offset impacts of hydromodification that control hydrology, retain coarse sediment supply, and improve stream resiliency. Several examples of these approaches, implementation tools, and lessons learned from other Oregon communities, as well as from Washington and California, are provided in this report.

There are five streams within the City and adjacent urban growth boundary and reserve areas: 1) Chicken Creek, 2) Cedar/Goose Creek, 3) Rock Creek, 4) Coffee Lake Creek, and 5) Hedges Creek. Based on existing information these stream systems share common characteristics related to stormwater runoff and hydromodification:

- Streams are low gradient with steeper sections in some headwater reaches.
- Streams have adjacent active floodplains located in broad ravines with development along adjacent higher bluffs.
- Riparian vegetation is diverse and largely native supporting a wide variety of songbirds and wetland habitats along many streams within the City.

The City of Sherwood has generally healthy urban streams that are resilient and not very susceptible to hydromodification due to the low gradient, adjacent floodplains and intact riparian vegetation. In addition, the fine soils limit infiltration in both the natural and developed condition. Cedar Creek has the most developed watershed and yet shows indications of the healthiest stream due to the protected floodplains and significant riparian vegetation. This demonstrates that measures supporting stream resiliency are effective in protecting Sherwood streams from hydromodification impacts. Implementing rigorous detention measures to match pre-development flow duration thresholds would be expensive and require significantly larger footprints for stormwater facilities without significant benefits to downstream conditions. In lieu of detention, improved riparian vegetation and protection of floodplains are likely to be much more effective in protecting streams. Using green stormwater infrastructure for water quality treatment such as swales, raingardens, and planters mimic natural hydrology of forest on tight soils by providing some infiltration and flow attenuation. The streams should be monitored and targeted problem areas addressed to prevent excessive bank erosion or headcut migration.

1. Introduction

The City of Sherwood endeavors to protect water resources and meet permit requirements as directed by Clean Water Services (CWS) who holds the MS4 permit. The adoption and implementation of CWS guidelines and standards is informed by local conditions within the City. Though a hydromodification assessment is not currently required, the City has requested a preliminary assessment to address hydromodification in an integrated cost effective manner in conjunction with the updated Stormwater Master Plan. This preliminary assessment addresses three main components:

1. Preliminary look at the condition of City streams in terms of active erosion and stream resilience.
2. A review of hydromodification strategies used by other jurisdictions.
3. Recommendations for integrated and effective hydromodification strategies for City stream conditions.

2. Background

Regulatory Permit Requirements

The City of Sherwood is a Municipal Separate Storm Sewer System (MS4) municipality that falls under the Phase I rules established by the U.S. Environmental Protection Agency (EPA) for surface water management. These regulations are currently covered by a NPDES watershed-based waste discharge permit issued to Clean Water Services (CWS) that includes "All existing and new discharges of storm water from the MS4 within the storm water service area of Clean Water Services and within the urban growth boundary of Washington County."

Other Oregon Phase 1 permittees with more recent permits have been required to implement specific requirements to assess hydromodification. As an example, the 2012 MS4 permit for Gresham included specific permit requirements:

1. Examine the hydromodification impacts related to the City's MS4 discharges, including erosion, sedimentation, and/or alteration to stormwater flow volume and duration that may cause or contribute to water quality degradation.
2. Describe existing efforts and proposed actions the City has identified to address the following objectives:
    a) Collect and maintain information that will inform future stormwater management decisions related to hydromodification based on local conditions and needs;
    b) Identify or develop strategies to address hydromodification information or data gaps related to water bodies within the City's jurisdiction;
    c) Identify strategies and priorities for preventing or reducing hydromodification impacts related to the City's MS4 stormwater discharges; and,
    d) Identify or develop effective tools to reduce hydromodification.

3. Develop a retrofit strategy and plan that applies to developed areas that impact water quality and which are underserved or lacking stormwater quality controls.

In addition, design standards must comply with the MS4 permit requirements to implement a post-construction stormwater program that meets the following identified objectives:

a) Mimics natural surface or pre-development hydrologic functions,
b) Reduces site specific stormwater runoff volume, duration and rates to minimize hydrologic and water quality impacts from impervious surfaces, and
c) Prioritizes use of vegetated stormwater treatment systems (e.g., green infrastructure (GI)) and low impact development (LID) approaches that emphasize stormwater infiltration and evapotranspiration.

Existing City Efforts

Clean Water Services Design and Construction Standards and Low Impact Development Approaches (LIDA) Manual

The City has adopted the CWS Design and Construction Standards and LIDA manual to regulate and guide stormwater management for new development. These standards require vegetated corridor enhancement with streamside development. Water quality facilities include stormwater manholes for pre-treatment and vegetated swales, extended dry basins, or constructed water quality wetlands for treatment. These facilities likely provide some level of infiltration and flow attenuation that will reduce hydromodification impacts to some extent even though this was not the original intent of the design. The LIDA manual is available to developers who wish to integrate stormwater facilities throughout the landscape such as rain gardens, green roofs, pervious pavement, and planters.

Retrofit through Regional Facilities

As initial steps in addressing a retrofit strategy and plan, the City has begun preliminary work in identifying opportunities for regional facilities to treat previously untreated stormwater runoff or oversized facilities that add treatment for untreated areas with new development. Retrofit projects are priorities across the CWS District on an annual basis.

Regional Hydromodification Strategies

This section provides an overview of regulations and hydromodification strategies from Washington, California, and other locations in Oregon, including future trends in hydromodification management. This information is used to provide a suite of established approaches and methodologies. Since the early 1990s, stormwater management manuals throughout the west coast have been developed to mitigate the impacts of development on stream hydrology and water quality, focusing largely on reduction of peak flow events using structural, end-of-pipe techniques (Booth et al. 2002). Studies have concluded that there is little evidence that traditional stormwater management practices are protective of physical, chemical, or biological processes (Maxted and Shaver 1997; Maxted 1999; Horner et al. 1999, 2002). It is likely that traditional stormwater management approaches are unsuccessful because they fail to account for stream processes. The processes occur at multiple spatial scales and are controlled by regional

landscapes (NRC 1992). In 2007, the EPA decided that Phase I and Phase II NPDES permits should require elements of watershed planning instead of relying entirely on traditional end-of-pipe approaches for managing surface water runoff in urban area. According to the EPA, watershed planning also includes feedback loops based on monitoring data to ensure that the goals established in the permits are being met.

Because each state is responsible for implementing policies and regulations to meet the intent of the CWA, there is some variation in how hydromodification regulations are developed, how they are responding to new scientific and technical advances, and how they are evolving to meet new regulatory expectations. Unlike Washington and California, Oregon, DEQ is looking to individual jurisdictions to identify strategies and tools to address hydromodification rather than identifying a one size fits all solution. The future trends of all three States are likely to influence DEQ's direction and acceptance of particular solutions.

Western Washington

In Washington State, the Department of Ecology (Ecology) is the regulatory agency responsible for meeting the intent of the Clean Water Act (CWA). In Washington, hydromodification is generally defined to mean changes in the frequency, magnitude and duration of flows as a result of increases in impervious surface and increased density and connectivity of the drainage network. The regulatory driver for hydromodification requirements is the update of NPDES MS4 permits. As part of the NPDES permit, Ecology requires that jurisdictions located in Western Washington adopt the Western Washington Stormwater Management Manual, or develop an equivalent model. This manual focuses on several aspects of hydromodification including source control, flow control, and water quality treatment and also emphases Low Impact Development (LID) and Green Infrastructure (GI).

The first Washington hydromodification requirements were in the 1990 King County Stormwater Management Manual; followed by the 1992 Ecology Stormwater Management Manual. These manuals were based on peak flow matching using the Santa Barbara Urban Hydrograph (SBUH) modeling method. In 1998, King County updated their manual and switched to a flow duration standard, which was supported by the King County Runoff Timeseries Model (KCRTS), a disk operating system (DOS) interface with Hydrologic Simulation Program-Fortran (HSPF) and a stormwater BMP sizing tool. Also in 1998, several species of Puget Sound salmon were listed on the endangered species list. This listing was linked to urban stormwater runoff and significantly more emphasis was placed on increasing the standards for stormwater runoff. Ecology revised their manual in 2005, requiring a flow duration standard supported by the Western Washington Hydrologic Model (WWHM). These two manuals have subsequently been revised to include elements of LID and emerging technology. The 2012 Ecology Manual now includes a low flow threshold of 8% of the 2-yr flow (0.08Q2) to increase the focus on infiltration.

Washington NPDES Phase 1 MS4 permits that went into effect in August 2013 put an increased focus on LID, through stormwater low flow standards, building codes, and land use codes. The new permits also put additional focus on monitoring, private facility inspections, and watershed planning.

- The 2012 Stormwater Manual from the Department of Ecology, finalized in 2013, includes a new LID flow control standard, which requires site developers to match flow rates between 8% and 50% of the forested Q_2, in addition to other flow control standards that target durations from 50% of Q_2 up to Q_{50}. This manual continues to include a flow control standard specific to wetlands, based on continuous modeling. It requires the applicant to demonstrate that the wetland hydroperiod, which is

the duration and frequency of wetland saturation/inundation, will not be impacted by stormwater discharges.

California

In California, hydromodification strategies are confined to restoring hydrologic processes. While there is an implicit understanding that these physical changes are intertwined with biological functions, and that biological functions are often the stream Beneficial Uses that are being protected, California Hydromodification Management Plans (HMPs) have been slow to explicitly bring ecological criteria into HMPs. The regulatory driver for HMPs is the update of MS4 permits. As MS4s have been renewed over the last decade, permittees have been required to develop HMPs, starting with large municipalities in Phase I and extending to smaller communities in Phase II.

The first California HMP was completed for the Santa Clara Valley (north Santa Clara County) in 2005. This HMP created many of the precedents that were subsequently followed and refined across the San Francisco Bay Area, in Southern California and Sacramento. These include the use of flow duration control between a high flow threshold (always Q_{10}) and a low flow threshold associated with the onset of creek erosion (locally variable but between 0.1 and $0.5Q_2$). Flow duration control required the use of continuous hydrologic simulations, and the first set of HMPs saw the development and refinement of models based on the WWHM as well as LID sizing factors and design tools that were based on continuous modeling conducted in HSPF and HEC HMS. Most of the HMPs following Santa Clara can be viewed as direct technical descendants that refined, optimized for local conditions, and in some cases simplified the key approaches. The main departure from this trend is the Central Coast HMP, which took a very different approach based on retention and infiltration of certain percentile storms.

Future trends in California

- MS4 stormwater permits may seek to unify disparate approaches to manage water quality, flooding and hydromodification, based on retention and infiltration of certain percentile storms (as Central Coast has done).
  - More focus on biological functions rather than just erosion and sediment.
  - More focus on sediment depletion, especially bedload.
- Align regulations with off-site mitigation programs such as regional detention facilities or stream restoration projects that manage or safely convey excess flows.

Oregon

- Recent Phase 1 MS4 stormwater permits require a hydromodification assessment to determine susceptibility and risk of hydromodification impacts and to identify tools and strategies to address them.
  - MS4 stormwater permit encourages use of LID.
  - Portland is well known as a leader in LID though early efforts were primarily driven by CSO issues and water quality improvement for permit compliance rather than hydromodification.
- WES and Wilsonville are in the process of adopting a BMP sizing tool based on HSPF continuous modeling for hydromodification flow control.

3. An Integrated Watershed Approach to Hydromodification

Urban development alters natural pre-development hydrology by decreasing vegetation (especially forested areas) and increasing impervious area; reducing both evapotranspiration and infiltration and resulting in increased runoff (Figure 1). This increased runoff is conveyed to stream channels rapidly, especially where curb and gutter development directs flow to a piped storm system that outfalls into the nearest receiving water.

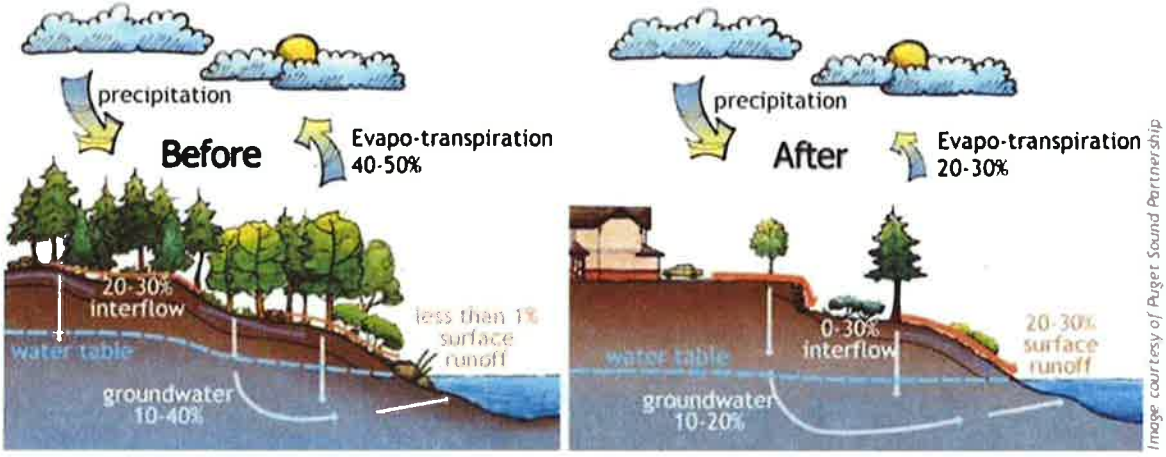


Figure 1. Hydrologic cycle in an undeveloped and urbanized landscape.

Size of arrows represents magnitude of inputs/outputs. (Puget Sound Partnership 2012). In the Pacific Northwest, average evapotranspiration can account for 40 percent of average precipitation[1]. Urbanized landscapes influence watershed and stream processes through multiple stressors and successful hydromodification strategies target multiple impaired or at risk processes. These stressors are intricately linked often resulting in a domino effect of impacts. For instance, piping streams both increases flows and reduces coarse sediment supply resulting in increased stream power. The increased stream power drives bank and bed erosion reducing water quality and habitat complexity. The urban stressors that drive stream erosion can be broadly categorized as increased volumes and peaks of surface runoff, reduced coarse sediment supply, and reduced stream resiliency.

When hydromodification was first identified as a problem, the strategies tended to focus exclusively on restoring natural hydrology. More recently it has been recognized that controlling hydrology, particularly reliance on detention, does not adequately address hydromodification impacts. Hydrologic control requirements only affect new and re-development projects. Even when flow control accurately targets channel forming flow it takes decades for redevelopment to restore "natural" hydrology to an urban watershed and even longer for these watershed level changes to show improvement in streams.

For these reasons, more recent hydromodification strategies include elements that address coarse sediment supply and stream resilience in addition to hydrologic controls. Strategies that address

[1] http://geochange.er.usgs.gov/sw/changes/natural/et/

hydrology, coarse sediment supply, and stream resilience are likely to be more effective in improving stream health over the long term and also have the potential to meet multiple regulatory requirements. Restoring watershed and stream processes has the added benefits of reducing maintenance costs, minimizing risks to health and human safety, reducing flood risk and infrastructure failure risk, and improving habitat in addition to regulatory compliance.

Table 1 summarizes hydromodification factors addressed by various strategies and ranks effectiveness for City of Sherwood conditions. This summary can be used as a tool for the City evaluate strategies and identify potential barriers (i.e. codes, etc.) to implementation.

Table 1.Matrix of relationships between hydromodification strategies and factors

Strategies	Hydromodification Factors			
	Flow Reduction	Flow Attenuation	Coarse Sediment Supply	Stream Resilience
Infiltration	High	Minimal	N/A	High
Ditch Conveyance	Variable	High	High	High
Detention Facilities	Minimal	High	N/A	Variable
Setbacks	Variable	High	High	High
Riparian Corridors	High	High	High	High
Wetlands	High	High	Minimal	High
Floodplains	High	High	High	High
Tree Canopy	High	Minimal	N/A	High

This table indicates that riparian corridors and floodplains have the most significant effect on hydromodification impacts in the City as these strategies affect all four factors that influence stream erosion. This is demonstrated by the lack of stream erosion in reaches where riparian corridors are well established with diverse native vegetation and floodplains and frequently activated. In a couple of cases the effect of a particular strategy is variable depending on site conditions and design. For instance, ditch conveyance can potentially have a high impact on flow reduction but often ditches are compacted to minimize infiltration. Likewise, detention facilities can improve stream resilience by reducing peak flows but if release rates are within channel forming flow thresholds these can actually increase erosion by extending the duration of high flows in the streams. There are only a few strategies that can improve or retain coarse sediment supply which makes these strategies more important. In Sherwood where soils are generally fine and the streams are low gradient coarse sediment supply is less critical than in steeper streams with gravel and cobble substrates.

4. City of Sherwood Stream Conditions

The City of Sherwood geology presents a unique backdrop to stream conditions. As shown in figure 2, the established stream beds are mapped as **alluvium (Qalf)** of smaller streams consisting of unconsolidated clay, silt, sand, and minor gravel. The surrounding landscape including the floodplains and uplands where most of the development has occurred are mapped as main body of **fine-grained Missoula flood deposits (Qff2)**.

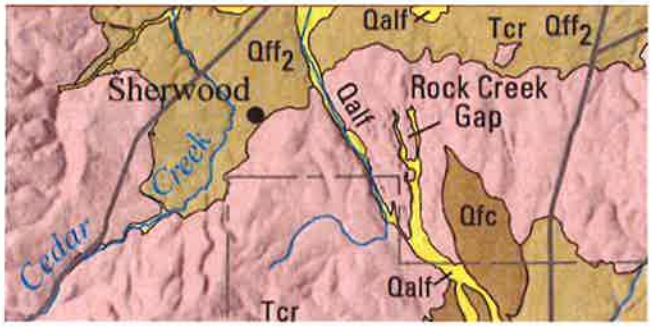


Figure 2. Geological Map of Sherwood

This planar undulating surface consists of clay, silt, and minor gravel forming benches. The surrounding foothills to the South and West are mapped as **Columbia River Basalt Group (Tcr)** which are weathered lava flows including small areas of alluvium, colluvium, loess, and landslide debris. This area provides a source of coarse sediments to the streams where surface water runoff connections exist. The stream channels throughout the City have down cut through upland to form wide inset floodplains that are largely free from fill and development. This has preserved stream resiliency even as the uplands have been developed. Figure 3 shows the general topography of the Sherwood vicinity, the inset floodplains of Rock, Cedar, and Chicken Creek and the proximity to the Tualatin River. Watershed boundaries are mapped in Figure 2-2 at the end of this report.

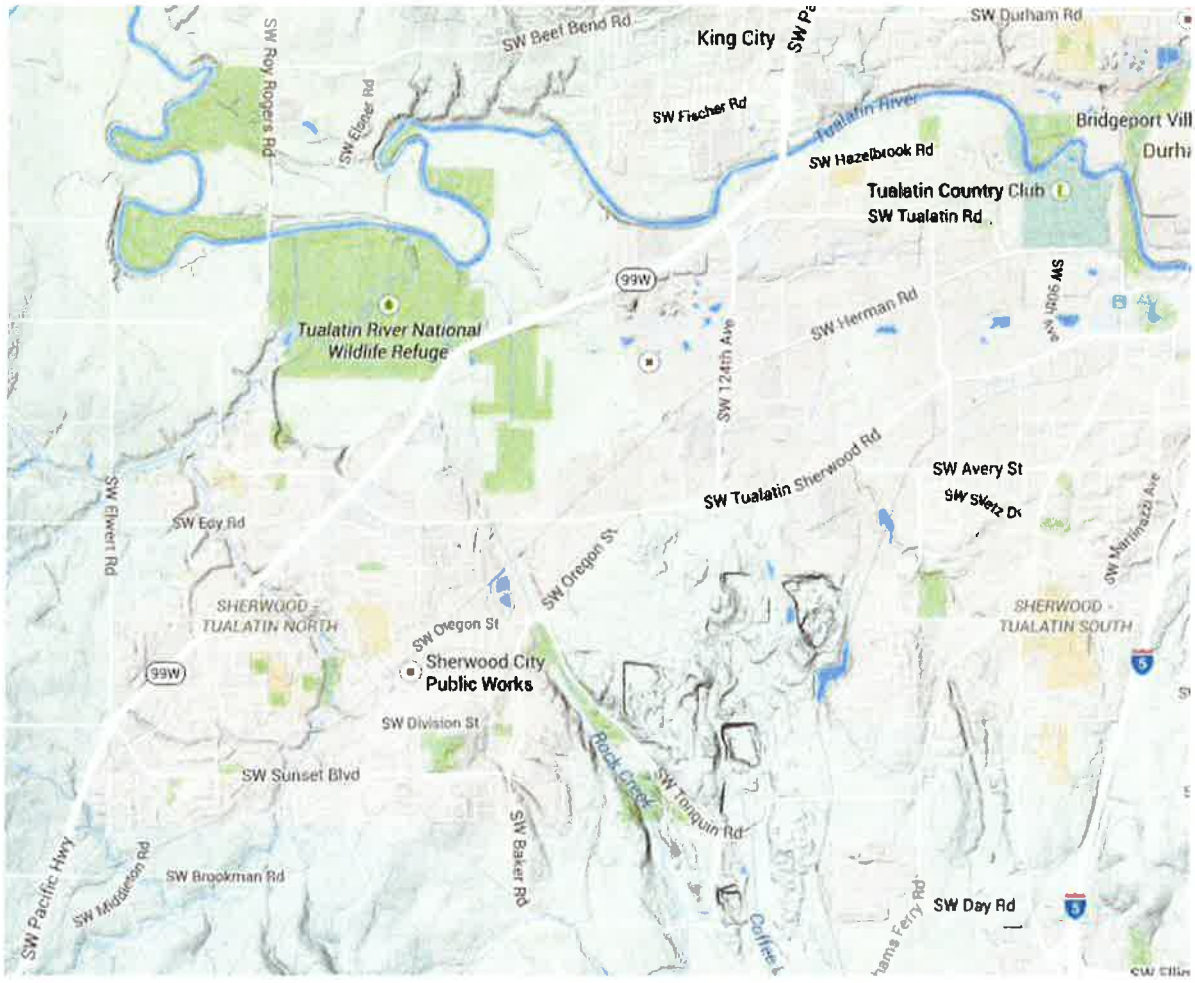


Figure 3. Topography of Sherwood Vicinity

Rock Creek

Rock Creek flows North East through the City as a straightened channel through a broad inset floodplain. Much of the floodplain is choked with invasive reed canary grass and large patches of Himalayan blackberry. There are few trees along the channel except along the East side North of SW Tualatin Sherwood Road. There have been recent plantings of willow on the floodplain upstream which are relatively sparse but getting established. Minor beaver activity was observed. The channel does not appear to be incised likely due to the low gradient and adjacent floodplain. Much of the upland draining to Rock Creek is likely to see increased development through the expansion of the urban growth boundary to the East and the Tonquin Urban Reserve Area. The surrounding landscape soils are largely silt loams with low infiltration rates. The straightened channel is still susceptible to incision and as incision separates the channel from the floodplain it could begin to rapidly erode.



Figure 4. Rock Creek with wide floodplain

Signs of minor incision were observed just upstream of SW Tualatin Sherwood Road where beaver activity and a weir are providing some streambed stability. There is a piped outfall that enters a rock stilling basin directly adjacent to the stream. The outfall appears to drain a pond to the East of SW Century Dr. It could be beneficial to relocate this outfall to the edge of the floodplain where flow can be distributed in a manner that increases infiltration, water quality, and flow attenuation. It could also add to habitat diversity in the floodplain by creating a wetter area along the floodplain fringe. The indications of minor incision were observed downstream of this outfall.



Figure 5. Minor bank erosion at instream weir on Rock Creek

Existing Conditions:

- Some signs of minor incision just upstream of SW Tualatin Sherwood Road.
- Straight homogeneous channel
- Active floodplain protects the channel from incision
- Riparian vegetation is largely invasive reed canary grass and blackberry with few trees and willows.



Figure 6. Outfall piped across floodplain to Rock Creek

Recommendations:

- Protect the floodplain from further fill and development
- Continue to establish native riparian planting throughout the floodplain
- Consider restoring stream channel sinuosity to reduce risk of downcutting and increase habitat diversity.
- Encourage beaver activity
- Consider retrofitting stormwater outfall to make use of floodplain and riparian area to provide flow attenuation and improve water quality.

Chicken Creek

Chicken Creek borders the West side of Sherwood and flows through the Sherwood West Urban Reserve Area. Existing uplands are largely agricultural fields with remnant forest blocks and scattered residential developments. The stream flows through an inset floodplain but unlike Rock Creek retains natural sinuosity. Overhead power lines follow the Creek corridor through this section likely prevents reestablishment of a forest canopy. Much of the floodplain is a monoculture of reed canary grass.





Figure 7. Chicken Creek Floodplain Vegetation

Existing Conditions:

- Active floodplain with sinuous channel
- Riparian vegetation is largely invasive reed canary grass with patches of forest.

Recommendations:

- Protect the floodplain from further fill and development
- Re-establish native riparian planting throughout the floodplain
- Encourage beaver activity
- Retain adjacent forests



Figure 8. Chicken Creek Reed Canary Grass Floodplain

Cedar Creek

Cedar Creek flows through the center of Sherwood with urban development along both sides and some tributary headwaters within the City. Stella Olson Memorial Park near the center of town features extensive wetland, floodplain, and riparian habitat alongside trails and recreation facilities that bring the public in contact with this rich natural resource.

Cedar Creek demonstrates the stabilizing effect of an active floodplain that supports diverse mature native vegetation and encourages wetland habitats.

There are three areas of concern at the headwaters of Cedar Creek Tributaries where localized erosion was observed. These sites should be monitored and corrected as necessary. Two of the sites are located along the tributary that flows under Wildlife Haven Court adjacent to downtown where water quality facilities built in the floodplain have confined the main channel.



Figure 9. Cedar Creek Wetland a Public Amenity

There is a new water quality facility built at the headwaters adjacent to Main Street that appears to provide treatment and flow attenuation for a large volume of water likely originating from downtown. The channel is confined to a deep straight ditch alongside the facility behind residential buildings. This channel is prone to incision due to confinement depending on the flows that it is subject to. This channel should be monitored for incision and bed control measures implemented if necessary to protect adjacent infrastructure.





Figure 10. Water quality facility confines stream

Just downstream of Wildlife Haven Court a water quality swale was constructed using large concrete blocks to separate it from the main channel. As a result the straightened confined channel is incising and the bank protection only drives the incision further. This site could be retrofitted with local bed control to prevent further incision that may undermine the water quality swale. Revegetation in the riparian corridor would also slow the flows reducing erosion and protecting water quality.





Figure 11. Water quality swale confines stream

The third area of concern is likely caused by a road culvert that is not aligned with the stream forcing the flow up against one bank. This tributary was inaccessible due to blackberry and steep banks so it is uncertain whether the erosion continues downstream. The





Figure 12. Bank erosion on tributary

headwater tributaries are more prone to erosion then the main streams due to the steeper gradients and higher percentage increase in runoff. These areas are often neglected and isolated. Re-vegetation and monitoring is recommended to identify and correct issues early on. In areas that have public access riparian buffers are better maintained and erosion is easily monitored.

There is a great example of a water quality swale within the natural area of Cedar Creek South of SW Sunset Blvd on the East side of the Creek. This swale does not confine the channel and adds to the diversity of the floodplain habitat.
Wetland complexes along a significant tributary of Cedar Creek adjacent to SW Fitch Dr provide rich native habitat and enhanced flow storage and attenuation. Tributaries are well forested with a diverse native understory. Trails along the edge of the corridor are actively used by the neighborhood and this likely contributes to the investment in the natural resource.





Figure 13. Water quality swale that does not confine the channel

Beavers enhance wetlands by expanding storage and also prevent incision as their dams act as natural bed control. The management and integration of beavers in urban environments can be a hydromodification strategy. At times beaver deceiver devices may be required to mitigate flood risk. These devices act as a hidden silent culvert that allow higher flows to pass through the dam. The inset floodplains will minimize the need for these. A neighborhood in Tigard adopted a beaver colony and actively monitors for flood risk to ensure that the beavers stay a part of the community. Beaver can be encouraged by enhancing woody vegetation along the streams and in the floodplains.



Figure 15. Vibrant riparian understory of native plants along Cedar Creek tributaries and public paths



Figure 14. Beaver activity and wetlands store flow and improve habitat on Cedar Creek tributaries

There is a well-established floodplain forest upstream of SW Sunset Blvd that provides rich habitat, a source of large wood and shade for the channel and enhanced floodplain storage and flow attenuation. Trails along the edge of the forest provide a beautiful neighborhood amenity. Floodplain wetlands store water and provide much needed habitat for amphibians including Western pond and painted turtles and red legged frogs.



There is a forested tributary to Cedar Creek South of subdivision development that SW Brookman Rd crosses. This is a small stream with a wide floodplain that should be protected from development preserving the wide riparian forested corridor. The loss of the riparian forest and floodplain typically leads to rapid incision of the stream.



Figure 16. Forested Cedar Creek tributary with wide floodplain

Existing Conditions:

- Active floodplain with sinuous channel and wetlands
- Riparian vegetation is well established native vegetation with blackberries established in some tributaries.
- A significant tributary flows through a series of wetland complexes with a forest canopy and beaver activity.
- Public access along both Creeks provides an educational opportunity for these rich natural areas.

Basin Specific Recommendations:

- Protect the floodplain from further fill and development
- Monitor headwater tributaries where incision has been observed and stabilize as necessary
- Encourage beaver activity
- Retain adjacent forests
- Protect tributary headwaters from development.
- Protect Tributary Headwaters from development

Coffee Lake Creek

Coffee Lake Creek is a very low gradient stream between wetland complexes and lakes. The adjacent agricultural areas have many ditches draining to the creek. As a result Coffee Lake Creek is not prone to

incision but provides great flow storage and habitat. Wetland areas should be preserved and where dominated by reed canary grass native plants should be reestablished. Adjacent floodplain and upland natural areas should be preserved to maintain food webs and enhanced flow attenuation with increased runoff. Confined wetlands are more vulnerable to invasive species and altered hydrology due to development or climate change.



Figure 17. Coffee Lake Creek wetlands forested and developed edges

Existing Conditions:

- Active floodplain with straightened channel and network of tributary ditches draining agricultural land
- Riparian vegetation is well established in patches but large expanses of reed canary grass remain.

Basin Specific Recommendations:

- Protect the floodplain from further fill and development
- Encourage beaver activity
- Retain adjacent forests
- Provide setbacks to connect wetland to adjacent upland habitat for sustainability



Figure 18. Coffee Lake Creek wetlands

Hedges Creek

There is a small portion of the Sherwood Urban Growth Boundary that drains to Hedges Creek. Other developed tributaries to Hedges Creek in Tualatin are incised and have been confined by development. Hedges Creek is very low gradient with many adjacent wetland areas downstream. The best way to protect this stream from incision would be to establish a riparian buffer on the headwaters and protect and restore the downstream wetland areas. There is currently an average buffer of 100ft from the stream to agricultural areas. This could be maintained as a set-back for development instead of requiring detention to hydromodification standards.



Figure 19. Bing bird's eye view of the Hedges Creek tributary

Existing Conditions:

- Low gradient stream with existing setbacks to agricultural fields
- Some native riparian vegetation.

Basin Specific Recommendations:

- Protect the floodplain and riparian corridor from further fill and development
- Encourage beaver activity
- Retain adjacent forests

5. Conclusions and Recommended Actions

Sherwood streams currently exhibit very few locations of incision or bank erosion. All the locations where stream erosion was observed the channel was either confined by streamside infrastructure or there were localized hydraulic influences such as an outfall or culvert that forced flow up against the bank. There are unique natural features of the Sherwood landscape that protect these streams from hydromodification.

1. The tight soils of these watersheds mean that even under forested conditions the streams receive more runoff than streams with contributing areas that naturally infiltrate most of the rainfall.
2. The streams are low gradient which significantly slows the flow.
3. Most of the streams have significant inset and undeveloped floodplains that are activated at moderate flows.
4. Many reaches are protected by significant riparian vegetation. These reaches are the most resilient.
5. The most prevalent water quality treatment is the vegetated swale which likely provides some infiltration benefits especially during low flows.



Figure 20. Cedar Creek riparian vegetation provides habitat and shade improving water quality

Given that the streams in Sherwood are holding up well to current levels of development, it is recommended that protecting and restoring the natural features that maximize stream resiliency should be the highest priority. The recommended hydromodification strategies for Sherwood fall into three categories and all meet additional exiting and/or expected regulations:

1. Mimic natural hydrology by providing water quality treatment through green stormwater infrastructure,
2. Enhance riparian buffers with native vegetation to protect stream banks, and
3. Protect and enhance floodplains to preserve storage and flow attenuation.

Water quality treatment is required and should be provided by vegetated swales, rain gardens, planters or other types of green stormwater infrastructure. These facilities provide both infiltration and flow attenuation that mimic the natural hydrology of a low gradient forest with tight soils. All floodplain areas should be protected from development and fill. These areas are critical for providing flood storage and flow attenuation. Floodplains should be revegetated with native woody species which will improve water quality and habitat as well as restore natural hydrology. Detention strategies are not recommended as a hydromodification tool for Sherwood as this is likely to be very costly to build and maintain with very little benefit to the streams. Floodplains need to be inundated at relatively low flows with less than a two-year discharge (Q_2) or on average every other year. Any infrastructure that separates the stream from the floodplain or confines the channel will increase the risk of incision. If placed incorrectly, water quality swales can confine the channel. Instead, swales can be designed to integrate with the floodplain without confining the channel.



Figure 21. Floodplain habitat and storage along Cedar Creek

Recommendations provided in this document have the added benefit of meeting upcoming MS4 and FEMA regulations. Recent MS4 permits in Oregon have required mimicking natural hydrology and green stormwater infrastructure. The water quality swales and LIDA manual that Sherwood currently encourages developers to use meet this requirement and protect streams from hydromodification. FEMA floodplain regulations in Oregon will soon require Endangered Species Act consultation and regulations that protect natural and beneficial functions of floodplains from hydromodification and will also protect endangered species. At the same time, flood insurance rates for properties within the floodplain are expected to increase dramatically making floodplain development less economically viable.

Sherwood has minimized stormwater capital and maintenance costs by encouraging regional facilities. Riparian and floodplain areas of Sherwood streams can be seen as regional facilities that will address hydromodification. By continuing to protect and restore these areas, Sherwood can expand the network of regional trails and natural park amenities, meet multiple regulatory requirements, and reduce costs and developable surface areas required for stormwater management.

A future hydromodification plan could demonstrate through modeling and analysis the cost and benefits of implementing stream resilience strategies compared to the conventional detention and infiltration hydromodification tools. This would combine flow duration modeling with existing HEC-RAS models to correlate increased runoff with shear stress on the channel bed and banks. The HEC-RAS models would be run with various levels of active floodplain and riparian vegetation to compare watershed detention to stream resilience strategies in reducing shear stress at channel forming flows. The hydromodification plan would also compare capital and maintenance costs of watershed detention vs stream resilience strategies.

Specific Stormwater Master Plan recommendations include regulations that

- encourage green stormwater infrastructure such as swales or LIDA to treat water quality,
- protect floodplains from development by requiring no rise certification, balanced cut and fill, and endangered species act compliance with all proposed floodplain development
- protect headwater streams and wetlands with buffer requirements

Capital projects would include;

- purchase and restoration of flood prone properties,
- revegetation of floodplains and riparian buffers with native woody vegetation

Sherwood streams are holding up well to with existing developed watershed and this is largely due to the riparian vegetation and active floodplains that improve stream resiliency. In addition, these streams have adapted to higher rates of runoff due to tight soils. Therefore, it is unnecessary to require additional detention or infiltration requirements to address hydromodification. Instead efforts should be focused on continuing to protect and enhance floodplains, wetlands, and riparian corridors.

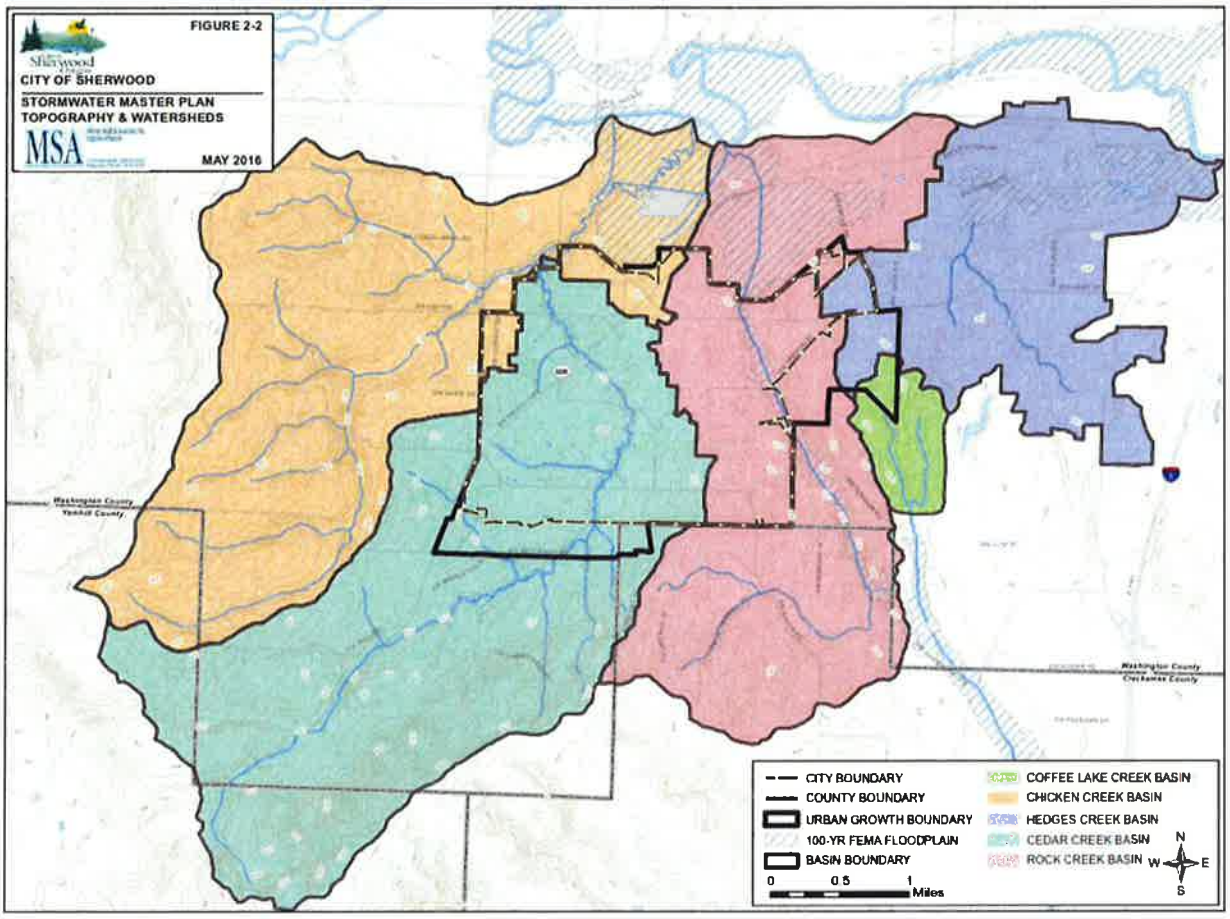


Figure 22 Sherwood Watershed Boundaries

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APPENDIX D | BASIS OF OPINION OF PROBABLE COST

INTRODUCTION

This section summarizes the approach used in development of unit costs and project costs used in the Capital Improvement Program (CIP).

All project descriptions and cost estimates in this document represent a Class 5 budget estimate, as established by the American Association of Cost Engineers. This preliminary estimate class is used for conceptual screening and assumes project definition maturity level below two percent. The expected accuracy range is -20 to -50 percent on the low end, and +30 to +100 percent on the high end, meaning the actual cost should fall in the range of 50-percent below the estimate to 100-percent above the estimate.

Cost estimates are intended to be used as guidance in establishing funding requirements based on information available at the time of the estimate. The procedure used to generate cost information presented herein is consistent with the definition of "rough cost estimates" under OAR 660-011-0005(2) and OAR 660-011-035. The final cost of individual projects will depend on actual labor and material costs, site topography, existing utility installations within the limits of work, competitive market conditions, regulatory requirements, project schedule, contractor bidding strategies, and other factors. All cost estimates are in 2015 dollars.

Due to the project definition maturity level at this phase in system planning, the following considerations are excluded from the opinion of costs:

- Land or Right-of-Way Acquisition;
- Studies, planning or modeling of the Transportation System, Collection System, Water System, or Stormwater System;
- Borrowing or finance charges during the planning, design, or construction of assets;
- Improvements to distribution, conveyance, pumping, storage, or treatment facilities in response to changes in regulatory standards or rules;
- Remediation or fines associated with system violations.

PROJECT COST DEVELOPMENT

Project costs were developed through a progression of steps, starting with development of construction costs. Construction costs consist of the sum of materials, labor and equipment of easily identifiable features of a project such as piping, manholes, trench work, and road work. The estimated costs for each improvement are based on averages from the *RS Means Heavy Construction Cost Data* (Reed Construction Data, 2015), supplemented with quotes from local suppliers, City input and construction costs for similar projects near the City of Sherwood. Information from RS Means is derived from a national average of construction cost indexes from over 700 cities. To correlate these costs to local market conditions, a

Portland market location factor was applied to both materials (98.8) and labor (100.4). The historical cost index for the date of publication is 206.7 (January 2015).

Component Unit Costs

The unit costs are applied to improvement pipe lengths for varied depths and manhole spacing at approximately 400 feet. The unit costs account for the materials, labor, and equipment necessary to complete the improvements. Unit costs for stormwater collection system improvements are shown in Tables D-1 through D-5. These costs include considerations for:

- Trench saw cutting, excavation and hauling of waste;
- Importing and placement of pipe zone bedding;
- Importing and placement of trench backfill when encountering rock excavations;
- Pipe material and installation labor;
- Trench safety systems (temporary shoring or trench box);
- Testing and video inspection;
- Surface restoration of unpaved streets, or paved local versus arterial roads;
- Dewatering;
- Bypass pumping on pipe replacement projects;
- Subcontractor's markup for profit and overhead.

The CIP presents projects defined according to three categories: existing system capacity upgrades, condition based improvements, and new infrastructure for future development. The unit costs were applied according to the CIP project's category, as summarized below:

- Cost estimates for projects specifying replacement of existing pipes for condition utilize the unit costs tabulated in Tables D-1, D-2, and D-3.
- Cost estimates for projects specifying pipe trunk line upsizing or new infrastructure utilize the unit costs contained within Tables D-1, D-4 and D-5.

Table D-1 | 2015 Unit Costs for Surface Restoration of Pipelines ($/linear-foot)		
Surface Restoration Cost with Road Category		
Local – 4" Asphalt	Arterial – 6" Asphalt	Unpaved
$51	$65	$4

Table D-2 | 2015 Unit Costs for Condition Based Replacement of Existing Gravity Pipelines ($/linear-foot)					
Pipe Diameter (inch)	Material Cost	Installation and Equipment Cost with Depth Category			
		<10 ft	10-15 ft	15-20 ft	20-25 ft
8	$7	$68	$124	$235	$402
10	$12	$71	$127	$238	$405
12	$13	$73	$129	$240	$407
15	$13	$81	$136	$247	$414
18	$15	$88	$144	$255	$422
21	$21	$95	$151	$262	$429
24	$27	$102	$158	$269	$436
27	$37	$160	$216	$327	$491
30	$50	$172	$227	$338	$505
36	$66	$201	$257	$368	$535
42	$84	$226	$282	$393	$560
48	$102	$252	$307	$419	$585

Table D-3 | 2015 Unit Costs for Condition Based Repair of Existing Manholes ($/each)		
Manhole Diameter (inch)	Corresponding Pipe Size	Installation and Equipment Cost
48	Pipe Ø< 24"	$1,528
60	24" ≤ Pipe Ø < 48"	$1,813
72	Pipe Ø ≥ 48"	$2,181

Table D-4 | 2015 Unit Costs for New and Upsized Gravity Pipelines ($/linear-foot)					
Pipe Diameter (inch)	Material Cost	Installation and Equipment Cost with Depth Category			
		<10 ft	10-15 ft	15-20 ft	20-25 ft
8	$7	$61	$111	$212	$362
10	$12	$62	$113	$214	$364
12	$13	$64	$115	$215	$365
15	$13	$70	$121	$221	$372
18	$15	$76	$127	$228	$378
21	$21	$82	$132	$233	$383
24	$27	$87	$138	$238	$388
27	$37	$129	$179	$280	$430
30	$50	$136	$187	$288	$438
36	$66	$158	$209	$310	$460
42	$84	$177	$227	$328	$478
48	$102	$195	$246	$346	$497

Table D-5 | 2015 Unit Costs for New Manholes ($/each)									
Manhole Diameter (inch)	Corresponding Pipe Size	Material Cost with Depth Category				Installation and Equipment Cost with Depth Category			
		<10 ft	10 to 15 ft	15 to 20 ft	20 to 25 ft	<10 ft	10 to 15 ft	15 to 20 ft	20 to 25 ft
48	Pipe Ø< 24"	$3,088	$5,002	$5,637	$6,272	$3,062	$5,258	$8,072	$17,867
60	24" ≤ Pipe Ø < 48"	$5,236	$8,180	$9,580	$10,980	$3,539	$8,600	$13,035	$18,517
72	Pipe Ø ≥ 48"	$6,595	$10,230	$12,130	$14,030	$4,669	$10,710	$16,098	$22,731

Unit Cost Notes Applicable to Tables D-1 through D-5:

1. Unit costs exclude lateral tie-ins.
2. Unit costs exclude utility relocation associated with potential conflicts.
3. Road resurfacing assumes:
   a. Local = 4-inch AC + 8-inch base course + 2-inch leveling course
   b. Arterial = 6-inch AC + 10-inch base course + 2-inch leveling course
   c. Unpaved = 4-inch base course.
4. All trench work is assumed to be vertical (no side slope) with either trench box or temporary shoring.
5. The pipe material for gravity sewer was assumed to be PVC (ASTM D-3034, SDR 35) for 15-inch diameter pipe and smaller, and Class III (ASTM C-76) reinforced concrete for pipe with a diameter greater than 15 inches.
6. Manhole installation assumes that surface restoration effort is covered under the surface restoration cost associated with the pipeline (Table D-1).
7. The bypass pumping is for above grade application (no trenchwork) and includes the cost of the piping, installation and removal.

Rock Excavation

Specific geotechnical investigations were not provided during this master planning effort; however the geologic mapping and the Natural Resource Conservation Service (NRCS) Soil Survey were referenced for any obvious conflicts for pipe installation with lithic bedrock. Additionally, well logs were referenced from the Oregon Water Resources Department with mixed results. There are numerous domestic water wells within the study area reporting encountering rock within 10 feet of the ground surface.

Basalt rock near the ground surface appears prevalent in the southeast corner of the City, and there are no projects within the CIP needed within this area. For this reason, unit costs associated with construction of new and upsized pipelines exclude rock excavation. Pipeline replacement costs for condition-based improvements also exclude rock excavation since presumably any rock encountered during installation of the existing pipeline has been removed and replaced with granular backfill.

Trenchless Construction Methods

Where existing pipes are recommended to be replaced with new larger pipes, upsizing within two pipe diameters of the original size is assumed to be a candidate for pipe bursting. In the absence of site specific geotechnical information, which would preclude this construction practice, a trenchless approach is typically less expensive than open trench construction. However, pipe bursting costs are highly variable and rely upon site specific influences, such as soil type, installation depth, length of construction, and ability to excavate departure and receiving pits.

The information presented in Table D-6 is provided for the City's reference in budgeting future pipe replacement projects utilizing the pipe bursting approach. Due to the absence of geotechnical information for the projects presented in the CIP, these prices have been excluded from use during preparation of project cost estimates.

Table D-6 | 2015 Unit Costs for Replacing Existing Gravity Pipelines Using Pipe Bursting ($/linear-foot)

	From Existing Pipe Dia. To New Pipe Dia. (Inch)	Material Cost	Installation and Equipment Cost
Increase One Pipe Diameter	8 to 10	$19	$47
	10 to 12	$26	$53
	12 to 15	$41	$61
	15 to 18	$46	$70
	18 to 21	$48	$95
	21 to 24	$66	$107
	24 to 27	$74	$125
	27 to 30	$89	$143
Increase Two Pipe Diameter	8 to 12	$26	$81
	10 to 15	$41	$90
	12 to 18	$46	$102
	15 to 21	$48	$115
	18 to 24	$66	$155
	21 to 27	$74	$172
	24 to 30	$89	$198
	27 to 36	$130	$225

Stormwater Treatment and Detention

The CIP presents Water Quality and Quantity Facility projects to manage stormwater runoff originating from existing unmanaged impervious areas. These facility locations will also manage runoff from future redevelopment within the UGB. The unit costs presented in Table D-7 account for the materials, labor, and equipment necessary to complete the improvements.

Table D-7 | 2015 Unit Costs for Stormwater Treatment and Detention	
Swales and Extended Dry Basins	
Excavation and Embankment	$25/cubic-yard
Treatment Topsoil – 18" minimum	$50/cubic-yard
Geotextile	$3/square-yard
Landscaping	$50,000/acre
Emergency Overflow	$5,000/each
Fencing	$30/linear-foot
Access Road with Gate	$11,000/each
Pretreatment Sediment Manhole	$12,000/each
Inlet Structure	$6,000/each
Flow Control Outlet Structure	$14,000/each
Proprietary Systems	
Catch Basin System, 1-cartridge	$8,600/each
Catch Basin System, 2-cartridge	$15,300/each
Catch Basin System, 3-cartridge	$21,000/each
Catch Basin System, 4-cartridge	$26,300/each
Vault System, 8-cartridge	$48,200/each

Riparian Planting

The CIP presents a budget for riparian planting to promote beaver habitat (see Appendix C for more information). The cost to install riparian buffers varies widely and can depend on a number of site specific conditions (number of plants, cost of materials, land ownership, etc.). Riparian Planting costs contained within the CIP are based on Oregon DEQ guidance[1] and Clean Water Services correspondence[2] for the Middle and Baker-Heaton restoration projects. The $15,000 per acre unit cost applied in the CIP includes site planning, installation, materials and labor for restoration within an urban setting, and excludes land acquisition considerations. Projects are recommended to be constructed at a minimum of 4-acre increments to remain cost effective.

CONSTRUCTION COST ALLOWANCES

Costs for commonly occurring general work elements in stormwater collection projects were factored into the construction costs through the use of assumed allowances. Table D-8 presents a summary of these allowances. When combined with the unit costs and multiplied by the improvement lengths, these allowances create an estimated "bid price" for the work. Detailed information justifying the assumed allowance values is provided below.

[1] Michie, Ryan. "Cost Estimate to Restore Riparian Forest Buffers and Improve Stream Habitat in the Willamette Basin, Oregon." Oregon DEQ. March 2010.
[2] Emanuel, Robert. "Riparian Planting Costs." Message to Marjorie Wolfe. 31 May 2016. Email.

Table D-8 | Construction Cost Allowances	
Additional Cost Factor	Percent
Traffic Control	3%
Erosion Control	1%
General Contractor's Overhead	10%
General Contractor's Profit	8%
Mobilization	7%
Clearing and Grubbing	2.5%
Removal of Structures and Obstructions	4%

Traffic Control

Traffic control will be required for all projects that occur in roadways. The traffic control mark-up is intended to account for costs, such as signage, flagging and temporary barriers, pavement markings, lane delineators, and lighting at flagging locations.

Erosion Control

The erosion control mark-up accounts for materials and practices to protect adjacent property, stormwater conveyance systems, and surface water in accordance with regulatory requirements. The City's NPDES Permit stipulates that construction site runoff control is required for activities that result in a land disturbance exceeding 500 square feet. More complex projects may require the development of a stormwater pollution prevention plan, 1200-C permit application and reporting, installation of erosion control best management practices (BMPs), and routine maintenance, testing and inspection of all installed BMPs.

General Contractors Overhead

Overhead costs associated with the General Contractor's day-to-day operations, such as staff salary, taxes, benefits, insurance, marketing, and proposal preparation, are an inherent cost of everyday business. Contractors will typically markup their subcontractor's costs as a management expense to keep their business running.

General Contractors Profit

Beyond overhead costs, contractors will typically markup their subcontractors to realize a profit for their effort. This is one of the most highly variable parts of a budget and depends upon the type of project, the size of the project, the amount of risk involved, how much money the contractor wants to make, the general market conditions, and bidding strategies.

Mobilization

Before construction of a project may begin, setup and preparatory activities are necessary. Mobilization is a general term used to capture numerous variables, but typically relates to:

- Moving staff, equipment, supplies, and incidentals to the project site;

- Establishing site trailers, offices, or other facilities necessary for the project;
- Incurring costs as necessary before beginning work on the project, which may include expenses associated with acquisition of bonds and insurance.

PROJECT COST ALLOWANCES

The project cost is the sum of construction component unit costs and any additional cost allowances for contingency, engineering, permitting, legal and administration fees. Table D-9, below, presents the cost allowances for each additional project cost. These project cost allowances are factored into the total construction cost and not the individual unit costs. The engineering costs include design and surveying. Construction administration is the cost associated with managing the construction of the project. The administration and legal costs are those associated with the City providing financial and legal oversight of the contract.

Table D-9 | Project Cost Allowances

Additional Cost Factor	Percent
Engineering, Legal, Permitting and Construction Services	20%
Contingency	30%
City Internal Overhead	12%

Engineering, Legal, Permitting and Construction Services

This category is intended to capture the costs needed for development of all the upfront project related documentation to make a project bid ready. Construction drawings, specifications and permit applications are both time and resource intensive, often requiring months of preparatory work before a project may be bid. Additional services typically provided by the engineering team during construction include site inspections, assisting the contractor in interpretation of the contract documents, and preparation of record drawings.

Costs for engineering, legal, permitting and construction services can vary widely based on the unique scope of work for each project. A cost factor approach is an appropriate assumption for most projects of the size and character within the CIP, however the cost factor is not well suited for projects with construction costs below $300,000. For these smaller projects, the engineering, legal, permitting and construction services costs should be evaluated by the City on a case-by-case basis for project budgeting.

Contingency

A contingency was included in each project's cost to account for the uncertainties inherent within the preliminary level of the estimate. Contingency is a term used in estimating that refers to costs that will likely occur based on past experience, but with some uncertainty regarding the amount. This factor was applied to all estimated project costs except for the City Internal Overhead. The contingency is provided to account for factors, such as:

- Unanticipated utilities;
- Relocation and connection to existing infrastructure;
- Minor elements of work not addressed in component unit cost development;

- Details of construction;
- Changes in site conditions;
- Variability in construction bid climate.

The contingency excludes:

- Major scope changes such as end product specification, capacities and location of project;
- Extraordinary events such as strikes or natural disasters;
- Management reserves;
- Escalation and currency effects.

City Internal Overhead

The City has an assortment of departments and personnel involved in the realization of a construction project. The City Internal Overhead cost allowance is intended to capture the effort needed on the part of the City related to project management, plan review, permit processing, code compliance, construction inspections, and financial management.

PROJECT COST MULTIPLIER

For simplicity in estimating overall project costs, a multiplier can be applied against the construction costs determined from unit pricing. This multiplier accounts for the allowances for both construction costs and project costs into one easily used factor. An example calculation showing how this multiplier was developed and is provided in Table D-10 below.

Table D-10 | Project Cost Multiplier		
Construction and Project Cost Allowances	Allowance Factor	Cost
Example Construction Cost Total	-	$1,000,000
Mobilization	7%	$70,000
Erosion Control	1%	$10,000
Clearing and Grubbing	2.5%	$25,000
Traffic Control	3%	$30,000
Removal of Structures and Obstructions	4%	$40,000
	MOB Subtotal	*$175,000*
General Contractor's Overhead	10%	$117,000
General Contractor's Profit	8%	$94,000
Engineering, Legal, Permitting and Construction Services	20%	$234,000
	Contractor Cost Subtotal	*$1,615,000*
	Construction Subtotal	*$1,615,000*
Contingency	30%	$466,500
	Subtotal	*$2,021,500*
City Internal Overhead	12%	$242,580
	Project Cost Subtotal	**$2,264,080**

Project Cost Multiplier	
Total Project Cost divided by	$2,264,080
Unit Construction Costs	$1,000,000
= Project Cost Multiplier	**2.26**

APPENDIX E | FEMA LETTER, FLOODPLAIN IMPACTS

U.S. Department of Homeland Security
FEMA Region 10
130 – 228th Street, SW
Bothell, Washington 98021

FEMA

June 13, 2016

Honorable Mayor Krisanna Clark
22560 SW Pine St.
Sherwood, OR 97140

Dear Honorable Mayor Clark,

In 2009, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) was sued by the Audubon Society of Portland, the National Wildlife Federation, the Northwest Environmental Defense Center, and the Association of Northwest Steelheaders for failure to consult under Section 7 of the Endangered Species Act (ESA) with respect to the effects of the implementation of the National Flood Insurance Program (NFIP) on certain ESA-listed species in the state of Oregon. On July 12, 2010, the United States District Court, District of Oregon at Salem, required FEMA to consult with the National Marine Fisheries Service (NMFS) on impacts the NFIP was having on ESA listed species. FEMA complied by submitting a Biological Assessment in July of 2011 to NMFS, which concluded the NFIP may affect, but does not adversely affect, the ESA-listed species considered in the assessment.

On April 14, 2016, NMFS provided a Biological Opinion in which they concluded that the implementation of the NFIP in Oregon jeopardizes the continued existence of 18 ESA listed species and adversely modifies their critical habitat. Federal agencies are prohibited by the ESA from causing jeopardy to ESA-listed species or adversely modifying the designated critical habitat of such species. Although the NMFS Biological Opinion's determination is written for FEMA, the Endangered Species Act (ESA) applies to everyone, whether a federal agency, state agency, local jurisdiction, or individual. We all have a legal responsibility to ensure our actions do not cause a take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) to threatened or endangered species. Under Section 9 of the ESA, actions or decisions enacted by you and your officials are subject to this take prohibition regardless of federal involvement. Additionally, any person can be subject to criminal or civil penalties for causing a take of threatened or endangered species. NMFS considers the issuance of floodplain development permits that do not avoid or compensate for detrimental impacts on ESA-listed species or their critical habitat as noncompliant with the Endangered Species Act. NMFS identifies certain private floodplain development activities as harmful to listed species, including the addition of fill, structures, levees and dikes, the addition of impervious surfaces, removal of vegetation, and bank armoring. NMFS has determined that these activities impair natural floodplain functions and thereby negatively impact the survival and recovery of ESA-listed species.

With a jeopardy determination, NMFS is obligated to provide a Reasonable and Prudent Alternative (RPA), which are program changes to the NFIP that will allow the program to be implemented in a manner that avoids jeopardy to ESA-listed species and adverse modification

of their critical habitat. For details on these program changes, please see the RPA attached to this letter or the complete NMFS Biological Opinion at http://www.westcoast.fisheries.noaa.gov/habitat/conservation/index.html.

As envisioned by NMFS, the RPA is intended to be implemented in stages, with two different sets of program changes that will need to be implemented by FEMA and the NFIP participating communities. The first set of program changes are interim measures found in Element 2 of the RPA, which must be implemented within 2 years of the issuance of the Biological Opinion (April 14, 2018). These measures will remain in place until FEMA and the participating communities implement the second set of program changes (Elements 3-6 of the RPA), which are the permanent program changes to the NFIP required by the RPA. NMFS requires the interim measures in Element 2 to be superseded by the permanent floodplain management criteria in RPA Element 4 that do not require regulatory revisions (such as revising the Code of Federal Regulations) by January 1, 2019. All elements of the RPA that do not necessitate regulatory revisions are to be implemented by September 15, 2019 and complete implementation, including regulatory revisions, is required to occur by January 1, 2021.

The NMFS Biological Opinion authorizes a certain amount of jeopardy or adverse modification to ESA-listed species or their habitat during the time necessary for FEMA and participating NFIP communities to implement the complete RPA. During this interim time and until all permanent RPA elements are in place, your community may either choose to voluntarily impose a temporary moratorium on all floodplain development that adversely impacts ESA listed species or their habitat, or voluntarily implement the interim measures found in RPA Element 2. Oregon DLCD and FEMA will develop guidance to help your community implement these interim requirements.

FEMA and Oregon DLCD will be inviting you and other interested stakeholders to participate in workgroups to identify options and methods that communities can implement, with respect to the RPA. These implementation options may include guidance, training, and technical assistance. One example is the development of a model ordinance that would meet FEMA's minimum criteria while also incorporating the requirements of the RPA. Once this model ordinance is finalized, it will be shared with all interested communities.

The RPA comprises six elements or sections, and a full copy of the RPA is provided as an attachment to this letter. Element 1 involves notice, education, and outreach regarding the outcome of FEMA's consultation with NMFS on the implementation of the NFIP in Oregon. This letter is part of that requirement for FEMA to provide Notice of the Biological Opinion and RPA. RPA Element 1encourages communities to send data or information on locally identified flood-related hazards due to erosion or inundation, including anticipated flooding patterns influenced by build-out, climate change or sea level rise, which are not currently reflected on effective Flood Insurance Rates maps (FIRMs) to the FEMA Region X office by August 12, 2016. In addition, the RPA recommends that substantially improved and new structures (as defined in the RPA) placed in the Special Flood Hazard Area should be elevated by methods other than fill, and that proponents of projects that involve adding fill exceeding 50 cubic yards should pursue CLOMR-Fs prior to LOMR-Fs to ensure ESA compliance is obtained prior to undertaking floodplain development. This element also requires FEMA to

provide guidance to communities regarding elevating structures in a manner that minimizes the adverse effects to natural floodplain functions. For information on elevating structures, please see the attached Frequently Asked Question document - Elevating Structures Without Fill.

In Element 2 of the RPA, NMFS has laid out a set of Interim Measures expected to be implemented within 2 years and requires that all development in the SFHA be mitigated to achieve no net loss of natural floodplain functions. Element 2 includes requirements for mitigation ratios, impervious surfaces, stormwater, floodplain management standards, riparian buffers, LOMCs and CLOMCs, and floodplain development permit reporting. FEMA will be working to provide you with guidance regarding how to achieve the requirements listed in RPA Element 2.

Additionally, to help minimize the time and effort imposed upon your staff resulting from the floodplain development permit reporting requirement, FEMA intends to use a Microsoft Excel based reporting tool that will be sent to each community to track all new development occurring in floodplains. Once the interim RPA requirements are in place, if communities issue floodplain development permits without reporting said development or without mitigating for adverse effects on ESA listed species or their habitat, FEMA will be required, in coordination with NMFS acting under their own authority, to initiate appropriate enforcement action.

Element 3 requires use of revised mapping protocols and methodologies for the stated purpose of improving the identification of special hazard areas. The RPA also requires several additions to the Flood Insurance Rate Maps, including the future conditions floodplain, erosion zones, and channel migration zones.

Element 4 requires revisions to the floodplain management criteria to, among other things:

- Include a generally applicable ESA performance standard;
- Prohibit almost all development in an area known as the High Hazard Area (floodway, V-Zone, LiMWA, erosion zone);
- Prohibit re-drawing of the floodway to accommodate floodplain development;
- Require a 60 year erosion setback area with very limited uses (agricultural, open space, temporary structures); and
- Significantly restrict subdivisions of lots.

Element 4 also requires extensive compensatory mitigation requirements in the areas where floodplain development is not otherwise prohibited. FEMA will be working to provide you with guidance regarding how to achieve the requirements listed in RPA Element 4.

Element 5 requires data collection and describes reporting requirements needed to accurately track floodplain development impacts and RPA implementation. Element 6 speaks to compliance and enforcement requirements of the RPA and the associated timelines for compliance.

FEMA recognizes that many of you have already been implementing measures that compensate/mitigate floodplain development actions affecting ESA-listed species and their habitat. However, for others, these requirements may pose an additional workload on your

community. We will work diligently with you, State resource agencies, and NMFS to offer guidance and resources that will help facilitate this transition. We will keep you advised and look forward to working with interested stakeholders to develop our strategy for implementation. If you have any questions, please email FEMA-R10-ESAcomments@fema.dhs.gov or contact Scott Van Hoff, Senior NFIP-ESA Specialist at 425-487- 4677.

Sincerely,

Mark Carey,
FEMA Region X Mitigation Division Director

cc: FPA
State NFIP Coordinator
Kim Kratz, NMFS

Attachments: Oregon NFIP Reasonable and Prudent Alternative (RPA)
FAQ- Elevating Without Fill

SVH: jg

U.S. Department of Homeland Security
Region X
130 228th Street SW
Bothell, WA 98021-9796

FEMA

June 10, 2016

FAQ: How can I elevate my new structure without fill?

National Marine Fisheries Service's (NMFS) Biological Opinion (BiOp) on the NFIP implementation in Oregon requires FEMA to issue guidance on a variety of issues. Element 1 of the Reasonable and Prudent Alternative (RPA) requires FEMA to issue a letter to all communities that provides notice of the findings in the BiOp, interim measures, and guidance regarding elevating new structures in a manner that minimizes adverse effects of fill as an elevation technique to natural floodplain functions. This Frequently Asked Question (FAQ) document provides resources to find more detailed guidance on elevating new structures. There will be additional guidance documents provided as FEMA implements the BiOp, however this specific guidance is required by element 1 of the RPA.

FEMA has the following web-based and publications available to help understand some of the available options:

- FEMA 54-Elevated Residential Structures
  - This document contains design characteristics and recommendations for pilings, posts, piers, and other open foundation systems; several case studies are provided.
- FEMA P-259-Engineering Principles and Practices of Retrofitting Floodprone Residential Structures
  - Section 5E offers some elevation techniques for retrofitting a home.
- FEMA 15- Design Guidelines for Flood Damage Reduction
  - This document offers various pre-construction design considerations.
- FEMA P-347-Above the Flood: Elevating Your Flood Prone House
  - This document is largely targeted to existing structures and does not include post or pier elevating, but still offers alternatives to using fill.
- FEMA P-312-Homeowner's Guide to Retrofitting 3rd Edition
  - This document is also mainly targeted to existing structures and the example method 2 in Chapter 3 shows an open foundation.
- FEMA P-499-Home Builder's Guide to Coastal Construction
- FEMA P-55-Coastal Construction Manual
- Technical Bulletin 5-Free-of-Obstruction Requirements

DKS Associates
TRANSPORTATION SOLUTIONS

City of Sherwood Oregon
Transportation System Plan

7 Lane Section

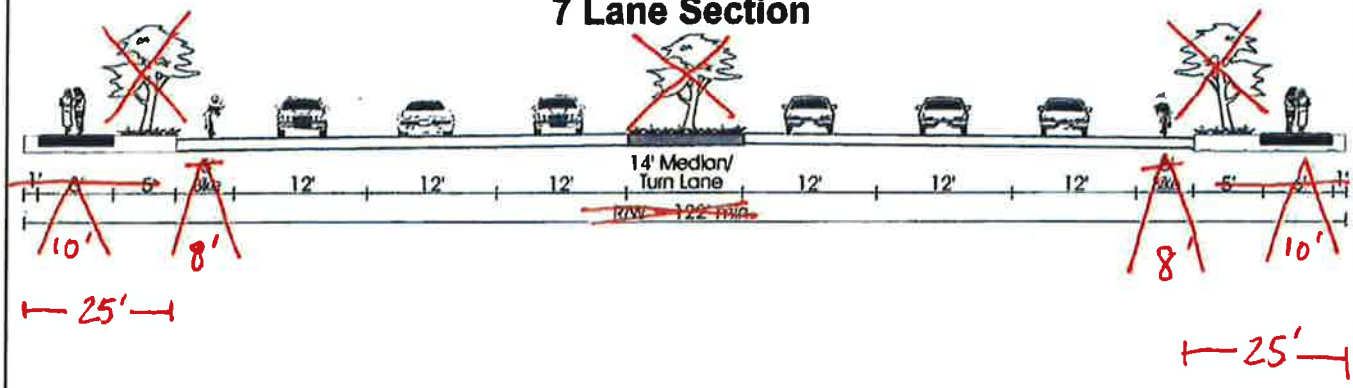
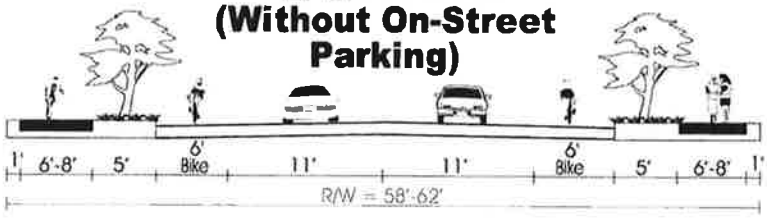


Figure 8-3
ORE99W ODOT STANDARD
STREET CROSS SECTION

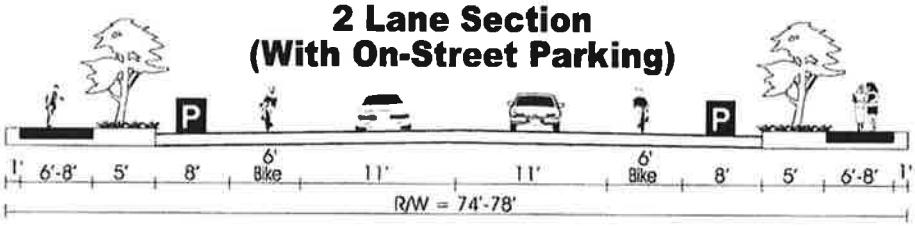
DKS Associates
TRANSPORTATION SOLUTIONS

City of Sherwood Oregon
Transportation System Plan

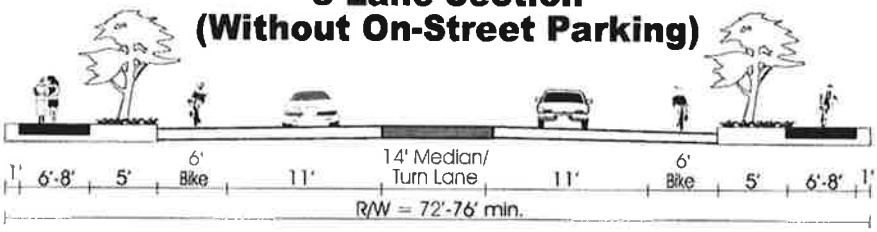
2 Lane Section (Without On-Street Parking)



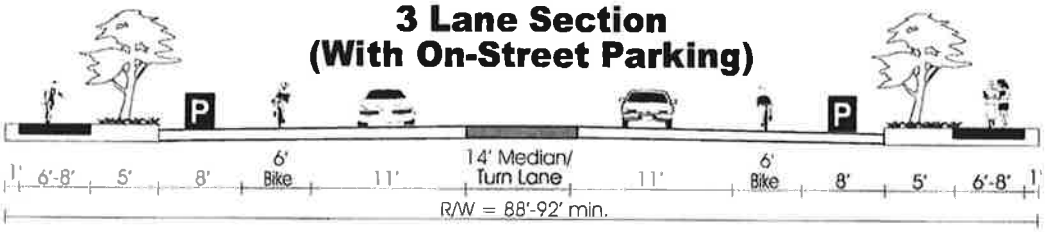
2 Lane Section (With On-Street Parking)



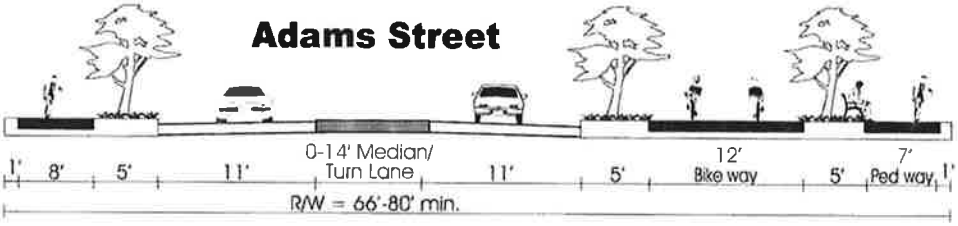
3 Lane Section (Without On-Street Parking)



3 Lane Section (With On-Street Parking)



Adams Street



A variance requires demonstration of hardship or other exceptional circumstances resulting from conditions of the property. Variances must meet Sherwood Development Code and TPR criteria.

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

Notes:

1. *In constrained conditions on collectors a minimum width of 10 feet may be considered (i.e. for intersection turn lanes). 14-feet is desirable for continuous two-way left turn lanes.*
2. *8 feet for residential streets, 6 feet in commercial/industrial areas.*
3. *Turn lane warrants should be reviewed using Highway Research Record No. 211, NCHRP Report No. 279 or other updated/superseding reference.*

Collector Street Design Characteristics

Characteristic	Collectors
Vehicle Lane Widths (Turn Lane - 12-14 ft.) *1	11 ft.
On-Street Parking	8 ft.-Optional
Bicycle Lanes (minimums)	6 ft.
Sidewalks (minimums)	6-8 ft. *2
Landscape Strips	Required
Raised Medians	Optional (Required where 3-lane section used)
Neighborhood Traffic Management (NTM)	Under Special Conditions
Transit	Appropriate
Turn Lanes	When Warranted *3
Access Control	See Later Discussion

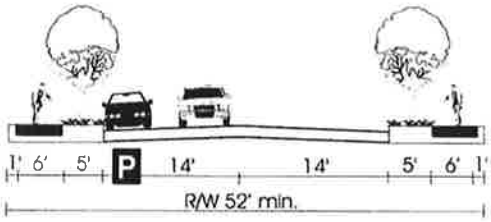
Figure 8-4
COLLECTOR STREETS
SHERWOOD
STREET CROSS SECTIONS

DKS Associates
TRANSPORTATION SOLUTIONS

A variance requires demonstration of hardship or other exceptional circumstances resulting from conditions of the property. Variances must meet Sherwood Development Code and TPR criteria.

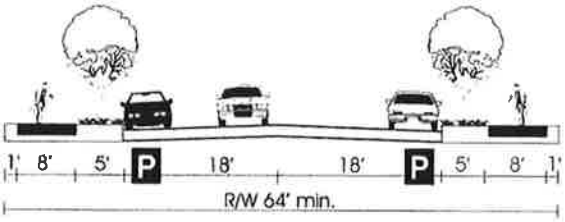
City of Sherwood Oregon
Transportation System Plan

28' Standard Residential*



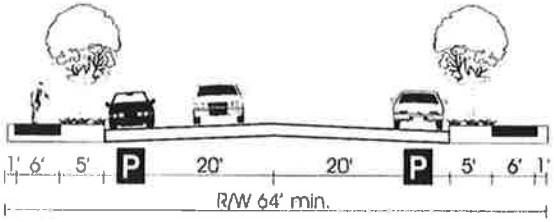
<1,000 vpd

36' Neighborhood Route

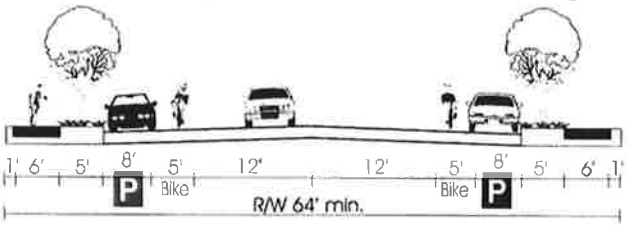


>1,000 vpd

40' Standard Commercial/Industrial Not Exceeding 3,000 Vehicles Per Day



50' Standard Commercial/Industrial Exceeding 3,000 Vehicles Per Day



Local Street Design Characteristics
(typically minimums unless stated otherwise)

Characteristic	Neighborhoods	Locals	Comm/Ind
Vehicle Lane Widths (Bus Route - 11 ft.)	10 ft.	10 ft.	20 ft. *
On-Street Parking	8 ft.		
Sidewalks (minimums)	8 ft.	6 ft.	6 ft.
Landscape Strips	Required	Required	Required
Neighborhood Traffic Management (NTM)	Acceptable	Should Not be Necessary	Acceptable
Transit	Special Circumstances	Not Appropriate	Acceptable

* Combined travel/parking lane.

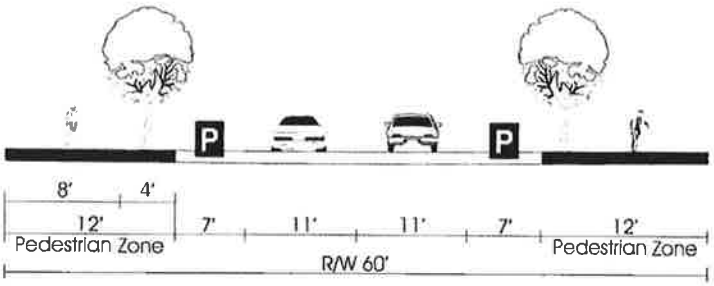
Legend

P - On-street Parking Lane

* - Parking can be provided on both sides if it can be demonstrated that curb cuts make up at least 40% of street frontage.

Figure 8-5a
LOCAL/NEIGHBORHOOD STREETS
SHERWOOD
STREET CROSS SECTIONS

Pedestrian Streets**



** *No Curbs*

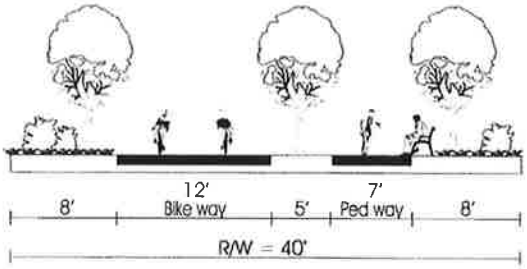
Legend

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

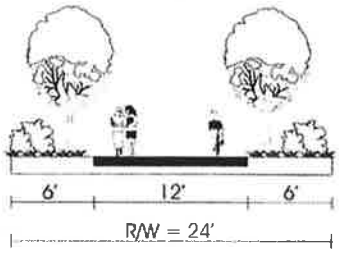
Figure 8-5b
DOWNTOWN STREET STANDARDS
RESIDENTIAL/PEDESTRIAN

A variance requires demonstration of hardship or other exceptional circumstances resulting from conditions of the property. Variances must meet Sherwood Development Code and TPR criteria.

Pedestrian/Bicycle Greenway



Primary Trail



Feeder Trail

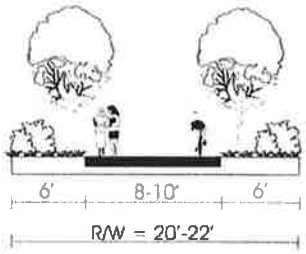


Figure 8-6
TRAIL STANDARDS
SHERWOOD
CROSS SECTIONS

City of Sherwood, Oregon
Planning Commission
May 27, 2014

Planning Commission Members Present:	**Staff Present:**
Chair Jean Simson	Julia Hajduk, Community Development Director
Commissioner John Clifford	Bob Galati, Civil Engineer
Commissioner Beth Cooke (at 7:05 pm)	Brad Kilby, Planning Manager
Commissioner Russell Griffin	Kirsten Allen, Planning Dept. Program Coordinator
Commissioner Sally Robinson	
Commissioner Lisa Walker	

Planning Commission Members Absent:
Vice Chair James Copfer

Council Members Present:	**Legal Counsel:**
Councilor Robyn Folsom	Chris Crean

1. Call to Order/Roll Call

Chair Jean Simson called the meeting to order at 7:00 pm.

2. Agenda Review

The agenda consisted of the Consent Agenda and a public hearing for the PA 14-01 Transportation System Plan Update.

3. Consent Agenda:

a. **January 28, 2014 Planning Commission Minutes**
b. **February 11, 2014 Planning Commission Minutes**
c. **March 11, 2014 Planning Commission Minutes**
d. **April 8, 2014 Planning Commission Minutes**
e. **May 13, 2014 Planning Commission Minutes**

Chair Simson indicated that she submitted Scrivener's errors that did not change the content of the minutes and recommended that on page 22 of the February 11, 2014 minutes the record show that Mr. Tiemann declined an opportunity for rebuttal or additional testimony with his remaining time.

Commissioner John Clifford indicated that he was present for the February 11th meeting, but in the final motion it indicated that he was absent. Commissioner Clifford's name was changed to Commissioner Walker who was absent at the meeting. At Commissioner Clifford's request the first line at the top of page 23 of the packet was changed to read "Brad responded to a question from Commissioner Clifford and commented that…"

Motion: From Commissioner Russell Griffin to approve the Consent Agenda as amended. Seconded by Commissioner Lisa Walker. All present Planning Commissioners voted in favor (Vice Chair James Copfer was absent).

4. Staff Announcements

Brad Kilby, Planning Manager, spoke of the first Local Trail Advisory Committee (LTAC) meeting for the Cedar Creek Trail that was held on May 15, 2014 at City Hall. He asked Commissioner Clifford, LTAC liaison, to tell about the meeting. Commissioner Clifford said there was a good turn out and the main speaker, from the Tualatin Hills Park and Recreation District (THPRD), was very informative.

Brad indicated that the Department of Environmental Quality (DEQ) also held a meeting on May 15th about the Ken Foster Farms site in southeast Sherwood. The DEQ has provided the City with a draft copy of the findings in the Remedial Investigation Report, dated May 15, 2014. The report has been placed in the Sherwood Library reference section.

Brad asked Commissioner Walker, who was in attendance, to convey what happened at the meeting. Commissioner Walker said the meeting was meant to be a general information meeting to let the public know that the process is ongoing and on hold. She said the Environmental Protection Agency (EPA) may change some of the threshold levels allowed for Chromium levels in the soil (they did not indicate whether it was up or down) and it may be another year from any conclusions. Brad said he heard that the Chromium was concentrated in certain areas and that there were two types of in it the area. Commissioner Walker said it was a complicated site with a continuing process.

Julia added that even though nothing on the site may change, the standards change, so the rules and complications change too. She recounted that at the Oregon Brownfields Conference earlier that day the tannery and the Ken Foster Farms site was a topic of discussion where even the environmental professionals commented on how complicated the site was.

Note: a brownfield site is real property where the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant *(www.epa.gov/brownfields/overview/glossary.htm)*.

Brad informed the Commission that TriMet has announced that they will be investing in services again and will release their Draft Service Enhancement Plan this summer. He said they have discussed expanding service to the YMCA and an option for service between Tualatin and Sherwood. Brad said the City can provide comments to advocate for or against proposed enhancements.

Brad related that the Friends of the Tualatin River Wildlife Refuge had over a thousand people attend their annual Bird Festival and Sherwood is in the running for a $100,000 grant towards a dog park. The City is looking at the west portion of Snyder Park for the first dog park and there is a link on the City website to vote for Sherwood.

Brad thanked the Commission for their commitment to reading all of the material for the Transportation System Plan update and pointed out that the consultants role was to:

- Create a network of connected streets which serve all transportation modes in Sherwood.
- Create an efficient system that is compliant with state and regional policies.
- Ensure that all people have access to safe, healthy, convenient and affordable transportation options regardless of age, income or other socioeconomic factors.

- Propose measures, by way of the project list, to the community to help realize a complete system of streets, sidewalks, trails, bike lands, and transit amenities.

Brad said the Planning Commission's role was as an advisory body to the policy makers, which is the City Council. He said the proposal was a mix of policy and regulation based on engineering data, long range forecasting and assumptions that he did not always understand and encouraged members to ask questions. Brad advised that the Planning Commission was to make a recommendation to the City Council based on the proposal and if the recommendation changed the direction of the policy or regulation, follow up with the reasoning for that change would be needed. He suggested that members ask themselves if they liked or disliked the concept, if the language afforded the community an opportunity to study the concept, if it was right for the community, and if the City was compliant with state and regional policies.

Brad reported that there was an article in the May 27, 2014 edition of the Daily Journal of Commerce (DJC) about the signal removal and the Land Use Board of Appeals (LUBA) court case.

5. Council Liaison Announcements

Councilor Folsom said the Budget Committee passed the budget for the Fiscal Year 2014-15 with a vote of 13 to 1, which will go to City Council on June 17, 2014. She said there was an 11% extra reserve over the 20% requirement due to the economy and hard work of staff equivalent to over $900,000. The budget committee opted to use approximately $450,000 on one time assets like park equipment replacement, and $300,000 would be placed in a reserve account for maintenance of assets built about ten years ago. Councilor Folsom mentioned Murdock Park as one of those assets recently finished from funds allocated in the last budget cycle. At Chair Simson's request, Councilor Folsom explained that the Budget Committee is made up of seven citizen volunteers and the seven City Council members. She added that citizen comments were part of the budgeting process and a Budget Committee meeting was held on a Saturday to encourage citizen involvement, but it did not. After the budget is approved by the Budget Committee it is forwarded to the City Council for adoption (see the June 17, 2014 agenda) and public comment will be allowed at that hearing.

Councilor Folsom reported that all five of the Charter Amendments on the May ballot had passed by a great margin.

6. Community Comments

Keith Weir, Sherwood resident came forward and said he drives to Sherwood nearly every day using Railroad Street and Main Street. He spoke of the TriMet bus taking up both lanes [when turning] and of instances where either he or the bus had to back up. Mr. Weir recounted that he spoke with the Police Department and City staff who told him that TriMet "handles everything". He suggested that the City not let TriMet handle everything. Mr. Weir commented that Tualatin Sherwood Road needed more lanes and it could be done with the space used by the bike lanes and sidewalks. Mr. Weir commented that Old Town had the character to be like Bridgeport in the future and eliminate cars in Old Town except for during Cruise-in Sherwood.

Chair Simson explained that Washington County takes care of Tualatin Sherwood Road and it is in their plan to widen the road.

Julia Hajduk, Community Development Director, added that there is coordination with TriMet and the conversation about routes and the ease of their turning movements could be had. She responded to Chair Simson's question about which department that would be and said that it was multiple departments: Engineering, Public Works, and Tualatin Valley Fire and Rescue (TVF&R).

Bob Galati, City Engineer, added that the City Council has directed staff to look into the cost of removing the monuments, replacing them with something less site restraining. It is on the Engineering Department's task list.

7. New Business
a. Public Hearing – PA 14-01 Transportation System Plan Update

Chair Simson read the public hearing statement and stated that the Planning Commission would be making a recommendation to City Council. She asked for any conflicts of interest. Receiving none, she asked for the staff report.

Brad Kilby, Planning Manager, gave a presentation (see record, Exhibit 1) and explained that the Transportation System Plan was last updated in 2005 except for the minor amendments done for individual projects such as Cedar Brook Way, the extension of Baler Way, and Langer Farms Parkway North. He indicated that the update was staff initiated was to amend:

- Goals and Policies within Chapter 6 of the City's Comprehensive Plan,
- City's Development Code Chapters:
  - 16.10 Definitions
  - 16.80 Plan Amendments
  - 16.90 Site Plan Review
  - 16.94 Off-Street Parking and Loading
  - 16.106 Transportation Facilities
- 2005 Transportation System Plan (superseded if adopted)
- Map Amendment to remove the trip cap imposed through Ord. 2008-003 regarding the Pfeiffer property on Hwy 99W next to Providence Medical.

Brad explained that a traffic analysis was not performed for the Pfeiffer property when Ord. 2008-003 was adopted and Council decided that the additional CAP would be put on the property. As a result of the TSP update there has been traffic modeling as retail commercial for the property and that the analysis is no longer needed because measures to mitigate the impacts have been identified.

Brad explained that the public involvement included two Planning Commission work sessions, a dedicated website that was updated at least monthly, two public open houses, a Citizens Advisory Committee that met three times, and a Technical Advisory Committee consisting of engineers, planners and policy makers from Oregon Department of Transportation (ODOT), Washington County, Tualatin, Beaverton, and Tigard. He said the Draft TSP has been available to the public for comment since late March, and there were several articles about the TSP Update in the Archer or Gazette.

Brad stated that the proposed amendments meet the necessary approval criteria to justify a Planning Commission recommendation for approval of the policy document and Staff recommends that the Commission forward a recommendation of approval of the proposed amendments to the Sherwood City Council based on the work and input that has been put into this process to date.

Brad turned the time over to the Bob Galati, City Engineer. Bob introduced the project consultants Chris Maciejewski and Garth Appanaitis from DKS Associates and Darci Rudzinkski with Angelo Planning Group. Mr. Maciejewski gave a presentation (see record, Exhibit 2) and recapped the process to date. He said the process was at the final step of adoption for a process that started about a year ago. Mr. Maciejewski reported that the planning work done in the city and the region over the past five plus years was compiled and the City's transportation infrastructure inventoried regarding how it was working and how people use it in order to identify transportation needs. Then transportation needs were forecasted 20 years into the future using Metro's regional forecasting tool to the year 2035. Mr. Maciejewski stated that money available was considered to develop alternatives to meet those transportation needs through multi-modal transportation projects. With that we came out with a preferred list of projects and accompanying implementing ordinances.

Mr. Maciejewski gave an overview of what the document contained and said that it sets the vision for the community on how the transportation system will help manage growth with strategies to guide in those decisions. He said there is list of future improvement projects that would improve safety, operation, mobility, connectivity and other types of transportation needs around the community. He said one of the most important section was the standards which include standards for:

- Cross-sections – the components of a street, width, sidewalk, etc.
- Access spacing – how far apart should driveways and roadways be
- Traffic calming – how to protect the livability for residential neighborhoods as traffic volumes increase
- Connectivity – local street connection
- Mobility targets – how to manage congestion and how much congestion is acceptable

Mr. Maciejewski explained that the update was being done because the 2005 Transportation System Plan looked to the year 2020 and a twenty year plan needs to be in place. He said the update contains an updated project list that compiles all the work that has been done over the last five plus years, regional projects like the Tualatin Sherwood Road widening project, and concept plans areas. The project list is a little different from the last update and is focused on lower cost strategies used to manage congestion as opposed to major capital improvements to widen roadways to build out of congestion. Mr. Maciejewski related that mobility targets are highlighted more in the document and the Capacity Allocation Program (CAP) Ordinance is removed.

Mr. Maciejewski explained that to build the project list the City started by establishing transportation goals from goals already in place as policy elements and worked with advisory groups to develop evaluation criteria that aligned with those goals. He said the process used revenue constraints and compared the evaluation criteria to choose which alternatives made the most sense. Mr. Maciejewski showed that there were two types of projects; *conservatively fundable* projects which looked at the revenue from the last five

years that can be used on transportation and projected out the next twenty years; *projected fundable* projects take into account the potential growth areas around the city and the revenue that could come in with that.

Mr. Maciejewski concluded that there was a focus on lower cost items, safety and multi- modal projects and roughly a third of the approximated costs are spent on each of the major types of transportation: 37% is projected to be used for pedestrian enhancements, 33% for Motor Vehicle, 23% for Bicycle, and 7% on Transit. A more significant component in the 2005 plan was motor vehicle focused. Mr. Maciejewski said the documents list each project by mode and color coded with near term, medium term or long term priority.

Mr. Maciejewski explained that there was updated language in the draft TSP about the Brookman Road area as the city coordinated with Washington County in designating that as an arterial roadway, but the language acknowledges that there are compatibility issues with the Brookman Road Concept Plan that may need further work or revisited.

Mr. Maciejewski indicated that the City and ODOT staff have been coordinating on the Hwy 99W cross sections and are close to having an agreement. He said TriMet has continued its Local transit service enhancements planning and a proposal from them will be coming this summer that will need to be incorporated into the TSP in the future. Mr. Maciejewski advised that the need for parking management plan was identified as part of the Sherwood Town Center planning process. He recounted that a statement that was added relating support from the community regarding relieving traffic congestion from through traffic and support for regional efforts with Washington County or other jurisdictions to get through traffic onto Tualatin Sherwood Road or Hwy 99W, giving an option to go around the city.

Note: Part of the TSP Update includes amendments to the Comprehensive Plan and Sherwood Zoning and Community Development Code so that all documents complement each other. DKS Associates was contracted to work on the transportation aspect of the TSP update. Angelo Planning was contracted to work on Comprehensive Plan and Sherwood Zoning and Community Development Code language.

Darci Rudzinski from Angelo Planning Group explained that she was one of the planners that worked on the policies in the Comprehensive Plan and Development Code language. She explained that the language has evolved as a result of feedback from the Planning Commission, the City Council, the Technical and Citizen Advisory Committees and City staff. She related that one of the objectives was to get the proposed language in closer compliance with the Regional Transportation Functional Plan, which implements that Regional Transportation Plan, as well as the state Transportation Planning Rule. Ms. Rudzinski reported that some of the more substantial areas of change being proposed in the code was the traffic impact analysis; the code articulates existing city practice that the city uses the impact analysis to assess what the impacts of proposed development might be on the transportation system and, if necessary, gives the city the power to ask for mitigation to make sure the system is in line with the growth that happens. She added that bicycle parking requirements were clarified, and the CAP program was removed.

Ms. Rudzinski stated that the changes in the Code and the Comprehensive Plan are intended to reflect what is happening in the transportation system plan so there is underlying policy that supports what the city requires of developments and city improvements when building a new facility for the community. She noted that there were some housekeeping items; if strategies or implementation measures have already happened it was suggested they be deleted. Ms. Rudzinski revealed that some comprehensive plan policies

included planning coordination with regional partners like Metro, Washington County and ODOT, and added performance targets and measures with a policy that articulates Sherwood's intention to try to adopt measures that reflect Metro targets. She concluded by saying that the through traffic had come up as an issue so there is policy language that encourages regional trips do not occur on local street systems.

Chair Simson proposed that the Commission hear public testimony before the consultants answer questions. The Commission was in agreement.

Brad said there was written testimony submitted by Sherwood resident, Wade Anderson. Chair Simson indicated that the Commission would read the letter after hearing public testimony.

Ty Wyman, attorney representing Merlone Geier Partners, which owns the Albertsons based shopping center on Tualatin Sherwood Road, cited his appreciation for the time and attention given to Merlone Geier. He commented that the article distributed by Brad Kilby did a good job talking about the LUBA case regarding the removal of the signal on Tualatin Sherwood Road. Mr. Wyman mentioned that the TSP Update is far beyond the traffic signal, but the signal was important to them. He said that Merlone Geier was not going to ask for any revisions or additions to the proposed update, because the signal is already in the existing plan. Mr. Wyman stated that Merlone Geier is invested in the Sherwood community and intends to stay with or without the signal. He expressed appreciation for time spent by Bob Galati and Brad Kilby with himself and his client about property issues and acknowledged that is was not an easy one.

Anthony Bevel, Sherwood resident said he has lived in Sherwood for sixteen years and told the Commission that SW Lynnly to SW Houston serves as cut through streets from Roy Rogers Road to Edy Road. He commented that drivers go very fast through the neighborhood and said he would like to see traffic calming devices placed on the street. Mr. Bevel said that he has picked up dead animals and described the difficulty in retrieving his mail at 5:30 pm because of the danger. He asked the City to put traffic calming devices on his street to correct the bad behavior. Mr. Bevel added that he had been told the reason for not having traffic calming devices was because of the damage caused to emergency vehicles and he did not find it acceptable.

Mr. Bevel asked how a pedestrian was expected to get to the south side of Sherwood and commented that twenty years from now he did not see it happening. He commented about living near the Ross Island bridge that had a pedestrian bridge across Powell Blvd.

Eugene Stewart, Sherwood property owner said as a member of the Citizen's Advisory Committee he felt that there was not sufficient time to discuss a number of topics and he felt as though the process was rushed to satisfy Metro instead of looking at the needs of the citizens. He asked that the Planning Commission continue the hearing and leave it open for public comment. Mr. Stewart commented regarding a bypass around Sherwood and advised at that when the Dundee Newberg bypass is built, Sherwood will see more truck traffic. He said trucks currently cut over to Salem and when the bypass is done it will create a better situation to drive up here instead of going through Salem.

Mr. Stewart told of a property owner on Roy Rogers Road who may develop that was told by Washington County planners that the road will be five lanes by 2018 from Scholls Ferry Road to Hwy 99W. He asked what would happen to the neighborhoods then and stressed the importance for Sherwood to look at a bypass around our core area so traffic that does not want to stop in Sherwood can get through without

causing traffic jams. He said that evening traffic can back up to the junkyard, which was unacceptable, and suggested that 90% of evening traffic through Old Town does not stop. Mr. Stewart urged that Sherwood look more seriously at where is traffic coming from, where is it going, and how it can be handled. He commented that Metro was pushing against single occupant vehicles and traffic counts done in the evening when commercial trucks were no longer on the road or are from 2010. Mr. Stewart asked how the recession has affected truck traffic and suggested that bicycle and pedestrian counts at major intersections be completed. He commented that some counts showed only one bicycle to four pedestrians and asked why plans to accommodate bicyclists were being moved forward when there is no demand. Mr. Stewart commented that the plans show where the bicyclist could go, but not where they were coming from. He asked where skate boarders would go and said there were a number of things he would like discussed, but four minutes was not enough time.

With no other public testimony, Chair Simson called for a recess at 8:03 pm and reconvened at 8:12 pm. The letter from Wade Anderson (read by Commissioners during the break) was labeled Exhibit G in the PA 14-01 file.

Chair Simson advocated discussing the questions raised by public comment first and asked about the process for getting traffic calming implemented.

Bob Galati responded that the City receives complaints through either the Engineering or Police Department. The Police Department determines, through an investigation of the complaint, what the traffic conditions are like. He said they may run a traffic count scenario that collects data such as speed, number of cars, and determine if the average speed is it hitting the 85% or are they exceeding it. If it is a speed issue they will do enforcement because it is a safety issue. Bob said that traffic volume was more a quality of life issue and the City will try to change the system to make the drivers go a route other than through the subdivision. He related that with Mr. Bevel's subdivision stop signs were added at every intersection, but the City has not revisited to see if there has been a change. Bob explained that the process is to go back and check if the change had a positive effect and if not, decide on the next implementation; what least option works the best and then ratcheting it up.

Chair Simson summarized that the citizen has an opportunity aside from the TSP process to raise the level of awareness through staff, Police and the City Council. Bob confirmed that there was an internal process to address the issue. Julia Hajduk, Community Development Director, added that the City is developing a more formal traffic calming program. She set forth that the City plans to address concerns as they arise and consider the impacts on the local roadways when money is allocated for traffic improvements on major roadways through the capital improvement program.

Chair Simson commented that in the TSP there is a collector street from Roy Rogers Road to Sherwood Blvd, D29, identified as a long term project. Chris Macijewski confirmed and said that the project came from collector grid spacing and Metro's requirement for having a complete grid. Chair Simson commented that there could be potential relief for Lynnly/ Houston in the long term.

Chair Simson asked regarding additional pedestrian crossings in the update. Mr. Maciejewski answered that crossings have been identified at the signalized locations; for example crossings on both sides of Edy Road crossing Hwy 99W. He added that the Cedar Creek Trail has a grade separated crossing in the long term. Chair Simson asked about a crossing on Langer Farms Parkway between Century Drive and Oregon

Street for safety purposes. Mr. Maciejewski responded that crossings were at the intersections and in order to have a safe crossing at another location it may need more than striping. He suggested that an enhanced crossing might be added as a TSP project. The Commission was in favor of adding it.

Chair Simson addressed Mr. Stewart's request to continue the hearing and said in a quasi-judicial hearing the body is obligated to keep the record open if a continuance is requested. She asked if this was true for a legislative hearing. Chair Simson commented that the public could testify at the City Council level. Chris Crean, City attorney, answered that it was not a legal requirement because it was not in the statute. He said it was required in a quasi-judicial, but not in a legislative context.

Chair Simson began the Commission's comments by turning to Volume 2 of the TSP documents, Section A, page 4. She noted the Tualatin Sherwood Industrial Area and expressed a concern that the Tonquin Employment Area (TEA) was not called out and asked how the TEA was incorporated into the plan. Mr. Maciejewski responded that Volume 2 was documentation of the context setting exercise for the project where all of the currently adopted plans were reviewed and said this particular language came from Metro's TSP plan. He said the land use and the transportation system from the concept planning for the TEA were incorporated into the analysis. He suggested that a footnote could be added to clarify the reference, but it would not change the analysis. The Commission was in favor of adding it.

Chair Simson referred to the footnote 11 on page 5 and asked that it show the Sherwood Town Center as adopted instead of being considered for adoption.

Chair Simson turned to page 9 of the same section and asked how Metro's Regional Transportation Plan (RTP) regarding non-single occupancy vehicles targets applied to Sherwood. She remarked that Sherwood is outside of the Portland area and not covered well by transit. Mr. Maciejewski answered that Metro establishes the targets for the region and their targets vary by area; outer neighborhoods have different targets than inner neighborhoods, town centers, or employment areas. He expressed that the designations in Metro's 2040 Concept Plan for Sherwood are equivalent to what would be seen for other suburban areas around the region and not unique. He added that the City has to incorporate the targets into the TSP and Sherwood is compliant with those targets or moving towards those targets in the twenty year plan. The analysis in the plan shows that all areas of town, except the very northeastern portion off of Cipole Road, are in compliance with the targets and no specific strategies are needed to address shortcomings.

Chair Simson asked for confirmation that Sherwood was already in compliance or moving towards compliance with Metro's targets. Mr. Maciejewski confirmed and clarified that the Regional Transportation Functional Plan (RTFP) had a series of development alternatives the City needed to go through starting with operational enhancements, pedestrian and bicycle projects and building up to major capacity projects. He said that the process itself is one of the ways Metro dictates that communities move towards those targets in the process of updating the plan.

Chair Simson expressed her concerns with applying Metro's standards to our unique community and said we should try to preserve the small town community feeling when reviewing the document. She said she has spoken with others in the community with the same concerns regarding Metro.

Mr. Maciejewski discerned that if Sherwood was not meeting the targets and Metro was forcing action the City did not want, then it would be a greater issue. He said the findings of the analysis were not used to

modify the project lists or the policies and advocated that the Commission address concerns with Metro in the long term, if it becomes an issue. Chair Simson asked if that applied to the draft goals, strategies and policies should the Commission change items in the draft TSP because they did not meet the community vision and if the Commission was in jeopardy of violating Metro standards that would cause funding to be cut.

Darci Rudzinski responded that the changes in the document reflect the multi-modal goals and non-single occupant vehicle (SOV) targets which are now in the document, because they were not strongly emphasized in the policy language or needed clarification that Sherwood was part of regional planning process. She said the recommended language could be modified to better reflect the community and it was the appropriate time to do that. Ms. Rudzinski said the targets in the Regional Transportation Functional Plan (RTFP), and Regional Transportation Plan (RTP) are high level and all-encompassing of the region. She remarked that Sherwood has representation at Metro and is represented on the technical advisory and policy advisory committees, and has a Metro councilor. Sherwood's plan should reflect the community's goals and recognize that Sherwood is part of a region with regional aspirations.

On that point, Chair Simson turned to page 12 of Section A under the heading Metro RTP Near-term goals, which is within the next one to four years, where it says that alternatives analysis for high capacity transit (HCT) corridor should be completed. She enquired how that would be integrated into our community. Mr. Maciejewski responded that it was in reference to the ongoing Southwest Corridor planning process underway that Metro was leading and not a new effort that Sherwood would undertake. Julia Hajduk concurred, suggesting that it could be clarified specifically as the Southwest Corridor project. A process that has decided not to bring high capacity transit (HCT) to Sherwood, but that Sherwood is part of the planning effort with local transit service connecting into the HCT in Portland, Tigard, and Tualatin.

Chair Simson sought confirmation that the document was what Metro was requesting of us and by being included in the Southwest Corridor study area, even though Sherwood is not part of the HCT solution, it is connected locally through enhanced transit service through Tualatin. Mr. Maciejewski confirmed that the goal is reached by participating in the planning processed which looks at the overall corridor strategies. Discussion followed with a reference to the Southwest Corridor process being added to the draft document.

Ms. Rudzinski commented that the plan and policy summary was, a background policy document, done at the beginning of the process to illustrate all of the planning documents that informed the transportation planning process. It does not obligate the City to do anything but identified anything that could be relevant to developing the TSP update.

Chair Simson remarked that the only process she knew to review the Draft TSP was to start at the beginning and go through page by page. She turned to Volume 1 of the TSP documents, page v, Traffic Calming. She asked regarding traffic calming and if the process needed to be called out in more detail; how does a citizen requests traffic calming per the TSP? Julia responded that it was not appropriate to have that level of detail in the TSP and it was more of process of policy and the Community Development Department was working on a more comprehensive traffic calming program. Even once that has been completed it would be part of the Municipal Code not the TSP. Chair Simson asked if it should be part of

the goals, policies, or strategies in the Comprehensive Plan. Julia concurred that it could be in the Comprehensive Plan as a goal to have a traffic calming program, but it would not identify the process.

Mr. Maciejewski added that there are standards in Volume 2 around which types of traffic calming treatments are appropriate on which types of facilities which came from Tualatin Valley Fire & Rescue (TVF&R). He explained that TVF&R went to all of their cities and counties in their service area and coordinated on what was acceptable for their primary response routes based on safety and impacts on travel time.

Ms. Rudzinski added that Goal 3, Policy 10 is an existing policy that discusses traffic calming: *the city will establish and maintain a set of guidelines and standards for traffic calming measures to retrofit existing streets and as part of land use review.* Chair Simson suggested a corresponding strategy to implement a traffic calming plan.

Bob Galati, City Engineer, provided that there was language in the Traffic Calming section should change from the Sherwood "Public Works" department to the "Community Development" department.

Chair Simson pointed to the Street Cross-Sections standard on page v and asked about the last sentence which reads: *In constrained situations, a design exception may be allowed through a variance procedure.* She said in the development code a "variance" was a term used in land use application and in this context the street cross section would go through a "design exception". Bob, agreed and explained that in the Engineering Design Manual described how to apply for a design variation, the internal review process, and the appeal process to City Council. Chair Simson requested to change the language from a *variation procedure*, which is already defined in the code, to a *design exception process.*

Chair Simson turned to Volume 1, page 37, project D24, Sherwood Blvd Intersection Modifications: *remove the Sherwood Blvd/Langer Drive traffic signal (allow right-in, right-out, and left-in movement only), and install a traffic signal at the Sherwood Blvd/Century Drive intersection (add eastbound and westbound left turn lanes).* She commented that this was a topic of the [written] testimony and expressed her concern. Chair Simson acknowledged that technically it was the correct project, but asked, as citizens of Sherwood, if it was politically and emotionally correct to remove the light. She argued that the consultants and staff provided technically correct answers from Metro, ODOT, and computer models, but just as Villa Road was removed from the last TSP, did the Commission believe the signal should be removed in the short term.

Commissioner Cooke indicated that she had concerns about removing the light and said she would like to see the impact of the new road going in off of Tualatin Sherwood Road first. She acknowledged that the removal of the light may be an eventuality, but she was concerned of the impact on the retail areas nearby that already had vacant issues. Discussion followed. Bob Galati clarified that the removal of the light would make access right-in/right-out only and the project tries to correct an existing deficiency in how traffic backs up at the highway light through the intersection at peak times during the day. He added that Dutch Bros was required to make improvements to prevent turning movement and traffic stacking onto Century Drive. Bob explained that the identified project solution is to move signals around, but there is no indication of whether it will get worse. He commented that it was more appropriate to determine whether it was a short term project, medium term, or long term project. Commissioner Cooke commented on how long the Kohl's location was empty and wanted to give them a chance to survive. With the Commission's agreement, Chair Simson requested that project D24 be moved. She noted that the project list can change at the desire of City Council.

Julia Hajduk added that when the City Engineer prepares the Capital Improvement Plan (CIP), a five year plan, the City looks at funds available, project costs, priorities, impacts, and need. She said the preparation process for the CIP may become more publically inclusive. Julia stated that if a project is listed as short term but there was no public support or dire need it would not be included in the CIP. If a project is listed as long term and citizens are eager about getting the project done it might be moved up in priority. Chair Simson said that it was a $900,000 project and if it moved to an aspirational list it would free up funds for more appealing projects.

Commissioner Griffin indicated that he would like to wait and see how the overall traffic pattern is affected by other signaling changes and suggested the project be placed on the medium term list. He said he did not want to leave it on the short term list. Mr. Maciejewski reminded the Commission that there was a major retail development on the east end of the corridor which showed the Century Drive/ 12th Street as a key corridor.

Commissioner Cooke commented that she was not comfortable killing off an existing retail in favor of another and she would like to see how it played out. Discussion followed.

Chair Simson stated that she could see the benefit of the light on Century Drive, but did not see it as a short term project that needs to be done right now without roads in place and suggested medium term. The Commission was in agreement.

Chair Simson turned to Volume 1, page 39, Project P44, Oregon Street Sidewalk Infill Segment 1, and asked if the project was supposed to be a short term project. Mr. Maciejewski confirmed that is was, but was missed when the draft document was edited.

Chair Simson turned to Volume 1, page 44, Figure 14 and asked if the map was presented to the Technical Advisory Committee or Citizen's Advisory Committee. Mr. Maciejewski responded that he did not think the map had been presented, but that it was a graphic representation of the strategies discussed with the committees with options for enhancing local transit service and providing connections to Tualatin. He said they were routes where local service would be an option and if a local was study done regarding local transit routes, these were the prioritized locations. Commissioner Griffin questioned if it would be TriMet, or a local city service. Mr. Maciejewski said it could be either, but the map was showed the larger, arterial collector roadways that might be appropriate for a transit service route.

Chair Simson asked how this impacted the developer when an application came in if a wider road would be required. Brad commented that he would point it out to TriMet when notifying them of the project and see what kind of comment they provide. He said if TriMet was not going to provide transit service, there would be no issues and until transit is within a quarter of a mile of a site, the city does not generally require anything of a developer and ask TriMet what they have planned for the area 99% of the time they don't respond. Chair Simson clarified that the existing blue colored line impacted current development and provides an opportunity if TriMet decides to connect Sherwood to Tualatin. Brad responded that there is talk in the service enhancement plan of looking down Tualatin Sherwood road or to the YMCA. There may be opportunites on the blue line,but TriMet already stops where they want and the map was more of an indicator to the city staff. Maciejewski added regarding traffic calming that if there was a proposal to do any modification to any roads to narrow or put in "vertical deflection devices" speed humps the transit routes should be cross referenced when making those decisions.

Chair Simson turned to Volume 1, page 57, Truck Routes, where ODOT and Washington County identify Hwy 99W and Tualatin Sherwood /Roy Rogers Road as truck routes and that the city cannot limit the volume to capacity (V/C) ratio. She explained that on page 55 it indicates that within the Sherwood Town Center, which includes Hwy 99W and Tualatin Sherwood /Roy Rogers Road, the traffic will be allowed to be over capacity. She asked regarding this discrepancy. Mr. Maciejewski explained that the 1.1 v/c is part of metro's RTP and should also match the Oregon Plan for that area and is an overlay that would supersede the freight route mobility standard for ODOT. He said that Washington County, who manages Tualatin Sherwood Road does not necessarily comply with what Metro has in the RTP and when doing something on Tualatin Sherwood Road, Washignton County standards trump. When doing something on the highway system, ODOT standards apply, but they are consistent with Metro in the Town Center overlay. He said the freight routes outside of the Town Center have a certain standard and roads inside the Town Center apply a new Town Center standards.

Chair Simson asked if the City was setting up for failure. She went on the say that the standard for Washington County and ODOT was .99 and .90 and the City says it will allow 1.1 capacity on our Town Center which is over 100%. Mr. Maciejewski responded that it was being done on facilities that were not Sherwood's and those agencies have said they want to plan for that, because otherwise they would have to spend a lot more money that they do not have to avoid congestion issues. It is how they choose to manage their system and planning for more than capacity, 1.1 v/c, what that means is they are anticipating that demand will spread into multiple hourse and people will change driving behavior, there will be more congestion in those areas, and traffic queues will get longer which is what they are expecting.

Commissioner Cooke asked if those agencies were planning for more congestion in order to save money that it would cost to relieve in our small town. Mr. Maciejewski confirmed that it was not just for Sherwood but part of the statewide and regional policy. Ms. Rudzinski added that planning and building for that type of congestion may give facilities that are larger and may destroy downtown as well. You can try to build your way out of congestion, but the roadways you end up with are very wide.

Chair Simson said she was reading a concern into it. Mr. Maciejewski expressed that it was a tough balance. Commissioner Griffin added the plan mentions the effect of a change to the footprint of an intersection several times. He said the intersections were rated with possible soluttions. He said some of the solutions were ranked lower than others but were more palatable because it was less infrastructure coming into the city. He said having 1.1 v/c was better than having eight lanes.

Chair Simson turned to Volume 1, page 67-68, Transit Service Enhancements and said it was her two greatest concerns about projects going forward and making sure the language allows citizen input. It talks about high capacity transit. In the last paragraph it says: *While it have been determine that high capacity transit (HCT) will not be provided from Portland to Sherwood through the current Southwest Corridor planning process, it is possible that HCT to Sherwood may be reconsidered in the long term.* Chair Simson suggesting added language indicating it would go through another public process. Commissioner Griffin asked who decided that the option to reconsider HCT was going in the document. Julia answered that the issue came up with Chair Simson said that HCT is not coming to Sherwood and this additional language that there may be addition processes that look at it long term and I think that is totally valid to acknowledge that if it is consider it will be through another regional planning process not because there is a sentence about it in the TSP. Mr.

Maciejewski concurred and said it was consistent with the Sherwood Town Center process. Discussion followed and staff was directed add the language to the plan.

Chair Simson turned to Volume 1, page 67 and said the Brookman Road Concept Plan was mentioned in the plan several times that Washington County wants to designate Brookman Road and arterial road. She explained that Brookman Road in the Concept Plan, as approved by City Council, as a collector route with several streets connecting to it. Chair Simson said she could not support the TSP that calls Brookman Road an arterial and inconsistent with the Brookman Road Concept Plan. She said the Concept Plan should be revisited. The spacing for the collector was set at 100-400 spaced roads, if it is made an arterial it would have 600-1000 foot spacing and a lot of people would be driving through small neighborhoods to get to a very big road and the plan did not intend this. Commissioner Griffin commented that the property was inside our Urban Growth Boundary, but not inside the City limits and the County's road. He said he felt the County was mandating the road to be five lanes and he was not in favor of it. Chair Simson asked if the City could designate the road to be a collector and force the County to come before the Planning Commission to change it to an arterial. Mr. Maciejewski answered that the County has jurisdiction over the roadway so their road designation trumps the City's designation. He said if a land use action for the property was submitted, the County would make the decision. Chair Simson stated that scenario is okay so long as the area was in Washington County, because the project will be completed to County Standards, but if the area is annexed into our city the Comprehensive Plan and the Brookman Area Concept plan will be in play and there would be a conflict. Chris Crean commented that, absent an agreement between the County and the City, both comprehensive plans can't apply at the same time; it is one or the other. So long as the road is outside of the city, the County's comp plan applies. Brookman road is a County road, some roads automatically transfer juridictions with an annexation others are subject to a transfer process. If the county transfers the road to the city then the city's comp plan applies.

Julia specified that the zoning is not for a collector road, but the street spacing that was illustrated in the concept plan shows spacing much closer together and it was envisioned that it was going to be a collector road. She said that if it comes in as an arterial road and the county standards apply the zoning does not change, but there would be wider spacing. That does not mean that we would not want to review if the planned zoning on an arterial road was still appropriate.

Chair Simson explained that she was part of the Brookman Road Concept planning and she was looking at the zoning map that lays out all of the zoning and language in the Comprehensive plan with the roads. In there is says *a significant challenge to development of the Brookman Road area is providing connections to the surrounding street network without degrading livability on residential streets.* When created the plan anticipated light industrial, neighborhood commercial with a lot of density next to 99w anticipating that people would be able to access it. She said that if they cannot access Hwy 99W then they will use Middleton Road to get to Sunset or down the road 1000 feet to go through a residential neighborhood and she had great concerns that we will be sending commercial traffic through neighborhoods to get to get to Hwy 99.

Bob interjected that in his discussions with the County they said it would not happen, County arterial spacing standards cannot be maintained with that development and an already concept planned area with the spacing requirements. He explained that normally there could be a parallel collector status road that would connect to the arterial at the appropriate spacing levels, but that is not going to work there because the spacing is too narrow, with topographic constraints, the vegetative corridor and presence of the

railroad that chops it up. Bob said there is no way to meet the County's spacing standards for an arterial and be able to develop the area. He commented that the other aspect is that the identified southern connector is not set up, they want to go further south, but cannot because of political lines. It is a roadway that has been overlaid for political expediency and even if the County indicated it would be twenty years before constructing the southern connector there was a question of what happens with all the road connections. The area will develop and the properties will have to have local road connectors. Bob said it will have to be a compromise, that is why it is a redefinement area and the Concept Plan will have to be looked at again.

Mr. Maciejewski added that it was important to understand the context. This is the I-5 /99 connector southern arterial that the County is talking about and they believe it is important. He said the City supports a strategy for roads to bypass the city and the County cannot show the line south of Brookman Road because that would be outside the Urban Growth Boundary. The County needs to adopt their plan with the connector shown on Brookman Road and they want to move ahead with the arterial shown there. He said the County has suggested policy language acknowledging that there is a functional need for both types of roads in the area; one to move regional traffic and one to provide access to Brookman Road and the County will have to look case by case as development comes in and cannot legally land lock properties and say there is no access unless they buy the property. Mr. Maciejewski acknowledged that there will have to be compromises until additional planning work is done and The County may have to apply for a goal exception to move the arterial alignment south of Brookman Road.

Commissioner Griffin asked why the County was designating only a portion of the road if they do not have a plan for the southern extension of I-5. Mr. Maciejewski responded that from 124th Ave east they do, from Ladd Hill to 99W is Brookman Road, and the part in between goes through Clackamas County and they do not have control over that area. He said The RTP has the entire corridor in the plan and when the I-5/ 99 Connector Study was completed it showed a fairly straight east to west alignment across the area that would require major grading work to get through the hills.

Bob said the language in the TSP update was approximately three months of negotiation with County Planning and it was the best compromise to provide assurances for the developer's expectations, and still give the city the flexibility to change the plan to meet needs as they occur. He said it is a difficult situation to get both the city and county TSPs to align.

Commissioner Griffin asked if the city could show support a bypass route that would take traffic out of populated areas. Chair Simson expressed her concern for the language that said the *long term intent is to re-evaluate the Brookman Addition Concept Plan.* She asked if long term meant after the area is annexed in and then change the plan for the property owners. She commented that it would be a staff level and a funding issue to revisit the concept plan to match the arterial.

Julia added that the reevaluation could happen at any time; if funding can be obtained, concurrent with annexation discussions, after annexation. Sher explained that re-planning and re-zoning happen often, it is not unheard of to do after annexation and a conversation to have with property owners.

Commissioner Sally Robinson said she would be more comfortable with language at the bottom of page 67 where it says *In the interim to provide for future flexibility, Brookman Road has been designated as an arterial with a 5-lanes of right away needed* if it indicated that the County was identifying the road as an arterial.

Chair Simson asked regarding the County giving the road to the City and reverting access spacing that complies with the concept plan. Mr. Maciejewski advised that if the County was preserving the roadway corridor for the southern arterial they were unlikely to hand the road over. Bob added that if the County could build the corridor further south they may be amenable to if it the City wanted it. The Commission requested to add "by Washington County" to the document. Julia reminded the Commission that the city was required to have our TSP to be consistent with the County's TSP and Metro RTP. Julia indicated that the City did discuss this with the county, regarding the arterial, but in the end the two documents have to be consistent and we cannot adopt something that is blatantly not. Chair Simson asked if the County was willing to incorporate the Brookman Concept Plan into their document. Bob answered that the County had worked the flexibility into the language that allows the concept plan to be looked at and the need to be flexible in applying county standards for development in the area. Mr. Maciejewski acknowledged that it was not the ideal and the desired function is to have no access except aat a few arterial street connections based on the TSP language for the eastern portion of the corridor from 124th to I-5. With the language proposed for Brookman Road the county shows that they realize they cannot have that type of access control. The language in the County's TSP is "cut and pasted" into the City's. Bob added that the language was what we worked together with them that was something was acceptable. Commissioner Griffin commented that it was a triumph considering that the City does not even own the road. Staff was requested to add "designated by Washington County" to the document.

Commissioner Robinson asked regarding Langer Farms Parkway near Home Depot. She referred to project D12 on the project list which extends it to the other side of 99W and asked if it was considered to have Langer Farms Parkway wider to accommodate the growth from the Walmart coming in to town and the other traffic that will be created by that. Mr. Maciejewski replied that the volume demand for the road was projected for the next twenty years and when the concept plan for the area was designed the city took into account all of the potential development in the area and forecast out twenty years to see if there was enough demand to warrant a four or five lane corridor. At the time there was not enough demand to use it as a short cut route, but primarily to provide access and the decision was to design it as a two to three lane roadway. Chair Simson asked if none of the modeling for the road from Oregon Street to Home Depot projected more than one lane each way. Mr. Maciejewski affirmed.

Commissioner Robinson expressed her surprise and expressed that she thought it should be part of a long term plan to expand the roadway if development warrants it. Chair Simson commented that designating it as a larger road would require a larger right of way than is currently required. Mr. Maciejewski confirmed and said that by adopting the road as a larger corridor a right of way dedication would be required from future developments. He commented that there would be no technical basis for justifying a larger corridor and questioned if that would cause issues. Bob related that staff could provide the technical basis for the road designations and said to speculate on the future size of the road or the business development without the technical support leaves the City open to being challenged at all levels the first of which would be an appeal that the City would lose. Mr. Maciejewski related that the study did not indicate a huge demand using the link from Tualatin Sherwood to 99W north towards Tigard; coming south from Tigard to Tualatin was not a huge demand. The major regional demand is crossing the highway to Roy Rogers or south to Newberg and of all those origins of destinations. It is the least dominant traffic stream. After a

comment from Commissioners Walker and Simson that they plan using the road, Mr. Maciejewski stated that the road will be utilized by local traffic, but local traffic generally are not enough to trigger a multi-lane roadway. Commissioner Walker said she expected traffic from Tigard turning left at the Home Depot to cut through to Tualatin Sherwood Road to avoid the traffic stacking at the light at Tualatin Sherwood Road and Hwy 99W. Mr. Maciejewski reminded the Commission to remember that SW 124th Ave going south of Tualatin Sherwood down to Tonquin Road, into the north Wilsonville area, so all the Tigard/northern Tualatin demand will use the 124th corridor to go north/south through the area, which may explain the projections.

Commissioner Robinson asked regarding upgrades to Tonquin Road. Mr. Maciejewski indicated that the Regional Transportation Plan (RTP) and Washington County's TSP have upgrades to Tonquin Road, not to a five lane road, but a standard two lane road with upgrades to an urban standard east into Tualatin's planning area with three lanes, sidewalks and bike lanes.

Bob read on page V of the Preface, Transportation Standards, Street Cross-Sections where it states *that new streets shall meet the design requirement in Sherwood's* ***Engineering Design and Standard Details Manual*** *per the functional class in the TSP* was referring to the street cross sections. He said the cross section requirements need to be part of the TSP and the design manual concurs with the TSP and may even show the same details. Bob explained that, as the City Engineer, he was following the TSP as far as the standard for road sections; designation and physical standard. He stated that details (Figure 8-2 to Figure 8-6) needed to be in the TSP documents. The language ***Engineering Design and Standard Details Manual*** *per the functional class in the TSP* was changed to ***Transportation System Plan*** *per Figures attached.*

Chair Simson moved to page 53 of the Planning Commission packet to the Proposed Transportation Goals and Policies and asked for comments. Receiving none, she turned to page 57 and expressed that she thought Strategy 4: *Plan for an array of transportation assets and services to meet the needs of the transportation – disadvantaged,* was a duplicate of Goal 5: *Provide reliable convenient transit service to Sherwood residents and businesses as well as special transit options for the City's elderly and disable residents.* Darci Rudzinski responded that she did not think the strategy was as narrow as just planning for transit.

Chair Simson read Strategy 5: *Evaluate, identify, and map existing and further neighborhoods for potential small scale commercial businesses to primarily serve local residents.* She said this was an existing strategy and that the commentary suggested that the strategy be reevaluated to ensure that is continues to be relevant and match the city's priorities. She asked if there was ever a need to rezone from residential to commercial and if it was a strategy that was needed in the TSP. Ms. Rudzinski responded that the strategy was related to Policy 4: *The City shall encourage the use of more energy efficient and environmentally sound alternatives to the automobile by: (last bullet) encouraging the development of self-contained neighborhoods, providing a wide range of land use activities within a single area.* She said it was likely the City was looking at mixed use neighborhoods with a small commercial serving the neighborhood through a convenience store or hair salon that would not attract a lot of traffic but serve the needs of the immediate neighborhood. The strategy was there to ensure those uses were allowed in the right places and not just everywhere. Commissioner Griffin commented that it said potential and that action was not required. He said it could apply to the edge between Brookman Road residential the commercial properties and the strategy was not irrelevant yet. Chair Simson suggested that it was more for the existing neighborhoods like the southeast Sherwood area. The strategy remained.

Chair Simson turned to page 60, Goal 2, Strategy 7: *Adopt performance measures that are consistent with regional modal targets for non-single occupancy vehicles and track the City's progress with meeting adopted goals and policies each successive TSP update.* Chair Simson suggested to add "based on local community goals" and said she did not like having to adopt Metro's standards without applying community values. Ms. Rudzinski suggested "consistent with community values", which was accepted by the Commission.

Chair Simson turned to page 66, Goal 3, Strategy 12 it has deleted language and with the new language that says *Support public or private development of the bicycle and pedestrian improvements shown on Map 2 of the Town Center Plan.* She said that through the town center plan we were trying to incorporate both sides of 99w and making sure that opportunities were available throughout the six corners area and commented that the deleted language included six corners. We have identified six corners within our comprehensive plan as a region and the area developing on both sides of the highway to complement each other and not be completely different.

Note: The deleted language was "consider a mixed use overlay zone in a the development code that will apply to the Six Corners area. Include design standards that will encourage a vibrant, pedestrian friendly environment through the implementation of boulevards, medians, mixed-use development and site design".

Commissioner Griffin commented that the strategy changed from six corners to bicycle and pedestrian improvements and they seem unrelated.

Ms. Rudzinski responded that coming out of the Town Center Plan, the town center was identified as the city's concentration zone where mixed use would be the most appropriate and the Planning Commission's recommendation was not to ignore north of 99w but that there should be some integration with similar policies. She was not aware that there was strong support for mixed use and she could see that what was recommended was not a one for one replacement, but taking advantage of the space provided by a deleted policy. She said that if the existing policy is still valid, and the Town Center Plan did not fulfill the desire then it could remain, but she thought it was a placeholder for when Six Corners was considered the town center. Chair Simson concurred that the mixed use overlay was not as relevant as when the area was the town center but as was testified tonight, the citizens on both sides of the highway need to have the same opportunity for bicycle and pedestrian avenues that connect to each other. She said the Commission fought during the town center planning efforts to create cohesion; that six corners, both north and south of Tualatin Sherwood Road but east and west of Hwy 99 be treated to get the connectivity. Ms. Rudzinski replied that she did not think Map 2 would satisfy that for north of the highway, Although it was an important strategy for the Town Center Plan. She suggested adding the six corners language to the proposed language so that the support for public and private development of bicycle and pedestrians without being confined the map that shows the town center. The Commission was in favor of adding "and within the six corners area north and south of the highway".

Chair Simson turned to page 73, Goal 5, Policy 9: *The city supports transit service that serves the needs of the residents and businesses in and adjacent to the Town Center, including maintaining a robust local transit service network and planning for future local and high capacity transit service to neighboring cities.* She asked if there was any concern about the language. Commissioner Griffin commented that it did not tie the city down to anything.

Chair Simson turned to page 75, Goal 5, Strategy 4: *Work with Metro, as well as the cities of Tualatin and Tigard, to explore feasible modes and location to provide high-capacity transit service to the Towne Center and adjacent areas.* She said that she was okay with this strategy and expressed concern for Strategy 6: *Continue to explore opportunities to achieved long term transit supportive densities in the Town Center in order to increase the viability of high-capacity transit.* Chair Simson said to her it meant an increase in density and expressed concern over that policy decision. Commissioner Griffin commented that this concern not wanting to increase density was expressed during the town center meetings. Chair Simson disclosed that the commission felt pressured during the Town Center planning process to comply with metro requirements. She asked if the city was required through this process or any other process to increase our densities.

Ms. Rudzinski responded that it was not required through this process, but as part of having a community that can support transit is having enough people and businesses to do that. High Capacity Transit is very destination oriented and there needs to be enough of those to support that type of investement. Ms. Rudziniski reminded that there were also positive comments regarding having transit as an option, but ridership drives demand and demand is provided by people and businesses and without one you cannot cost effectively have the other. She said the focus has shifted since the development of the Town Center planning away from high capacity transit because it has been deemed not feasible to come all the way to Sherwood. She said Strategy 4 keeps the door open for future planning and Strategy 6 is a question for the PlanningCommission to answer.

Commissioner Griffin declared that it was too far in the wrong direction to continue to explore to increase the viability of high capacity transit; he did now think the city was in a position to be looking for that right now and that the statement was not relavant at the moment. He said Sherwood wanted connectivity with TriMet and surrounding cities, but the public has not shown interest in light rail or increasing density. Chair Simson commented that the buildings shown, in the town center planning process, over three stories were received poorly. Commissioner Robinson suggested deleting Strategy 6 and keeping Strategy 4. The Commission voiced their approval of the suggestion.

Chair Simson said she was done with her suggestions for Goals and Policies. Commissioner Griffin pointed to page 67, Goal 3, Strategy 19: *The City will reexamine local street standards and will expore appropriate locations within the City an circumstances under which a narrower street standards may be permitted as part of new development.* He said he understood having less impervious surface and commented with words like reexamine, consider, explore, and if appropriate the strategy may be vague enough to be acceptable. Commissioner Clifford commented on SW Dewey Drive, a curved road with houses on either side, with parking on one side and parking was horrible on Fridays because of garbage cans on the street for collection and the buses and car traffic. He asked how a situation like that could be avoided. Commissioner Cooke concurred that the situation was unsafe. Mr. Maciejewski responded that the issues were a lack of connectivity that forces all the traffic onto one roadway and the design of the road itself. He said the cross-sections in the Plan have a narrower local street (28') and a wider option; there are volume thresholds for when each street would be appropriate. In the update, a road like Dewey, that is a higher local volume, would not be a 28 foot wide street and he thought it has already been addressed with the cross-sections and the strategy may not be relevant by the work that has been done in the TSP.

Commissioner Walker commented that when the road is built you may not know how much traffic it will have. Mr. Maciejewski answered that when development occurs a traffic study is done for the roadways and should consider connectivity in the area and what the TSP forecast has indicated. Chair Simson commented it was probably not envisioned that SW Lynnly and Houston would be accessed the way they are either and it is hard to think of using streets more narrow than we already have. The commission wanted to remove Strategy 19.

Chair Simson noted errors beginning with page 85, the first reference to the TSP should be written out as Transportation System Plan and page 88, second paragraph, the *and/or* should be *and.*

Chair Simson turned to page 92, and expressed concern for the existing code for carpool and vanpool parking spaces that requires preferential spaces for development with twenty or more employees. Commissioner Griffin added that the carpool/vanpool spaces would be required to be located closer to the main entrance than all other spaces except for ADA spaces and asked where that came from. Ms. Rudzinski replied that the language was modified language from the model code for small cities and commented that it was not a lot of spaces, but a space or two next to the employee entrance and was intended to incentivize carpooling to increase the non-single occupant vehicle percentage. Commissioner Simson asked how the twenty employees was determined. Ms. Rudzinski responded that it did not make sense to provide carpool spaces for small businesses, the number is somewhat arbitrary and the intent was to incentivize the behavior in the larger businesses. Commissioner Walker asked if the employees were full time or part time. Ms. Rudzinski answered that the determination would be at development review and would not be monitored over time in a community this small. It would be a one-time deal; for a business park, larger employer, or industrial area. Commissioner Walker suggested increasing the number of employees. Discussion followed regarding the correct number. Suggestions ranged from a hundred employees when TDM requirements are required, forty five for when healthcare is required. Commissioner Walker suggested forty full time employees, which was accepted by the Commission. Commissioner Clifford asked about local shopping centers that have fifteen minute parking stalls and asked if the businesses were offering that or if it was an incentive by the developer. Ms. Rudzinski indicated that she had not seen any code that required them. Brad Kilby suggested it was a leasing incentive and the City only required that a minimum number of parking spaces be provided and how the parking is managed is up to the property owner. Ms. Rudzinski added that a parking management plan should be part of development in the Town Center Plan.

Chair Simson turned to pages 100-101 and asked why the maps were being deleted. Ms. Rudzinski explained it was so that information was not duplicated so that the development code does not have to be updated when the TSP updates. She added that it was unusual to have the maps in the code.

Chair Simson complimented staff for the article in the May edition of the Sherwood Archer explaining that the Capacity Allocation Program (CAP) would be removed. She indicated that if there were issues from the development community, they would be at the hearing, but none were present. Chair Simson explained that Bob Galati had explained why the CAP was no longer relevant in a work session and she thought it was a great idea. She said the citizens had enough notice and opportunity to raise a concern if they wanted the CAP to remain and it gave her a comfort level that the Commission was doing something outside of what citizens would be concerned about.

Chair Simson turned to pages 96-99, Bicycle Parking and Facilities. She said the section seemed cost prohibitive and needed a defined number of hours for short term and long term parking. Commissioner Griffin stated that the language says long term is defined as at least several hours which needed to be clearer. If it is long term racks, storage rooms, or lockers have to be provided located within one hundred feet of the entrance and covered. He said that could be expensive.

Chair Simson agreed and turned to the table on page 99. She said it was an existing table with use categories that she thought was in the code because it was required by Metro in 2005. She said the use categories listed in the table did not match the use categories in Sherwood's code and what was driving the number of bicycle spaces required did not align with existing uses. Chair Simson asked what the City was required to put in the code per Metro or any other governing agencies. Ms. Rudzinski answered that the City needs to distinguish between long term and short term and the definition is by design. The City may identify people who will not only use a bike rack for a certain duration, but to look at it as a design issue in providing space for people to feel comfortable leaving the bicycle for a longer period of time. Commissioner Griffin said the commission needed to come up with a more concrete way of measuring long term parking.

Ms. Rudzinski answered that the city requires the design to have a certain amount to be long term bicycle parking and must have at least one long term space and of the amount required a certain percentage of those will be long term. Commissioner Griffin asked what the racks, storage rooms, or lockers were like and if they were inside or outside. Ms. Rudzinski responded that there should be flexibility in the code in this respect and examples can be found to guide developers; a plastic locker like the ones found at transit centers, a closet area inside, anything as long as somebody feels like they can leave their bike there for longer than it takes to go into a convenience store. She explained that the long term parking is for the commuter, student, or employee who will work a shift and does not want to leave their bike vulnerable to the elements or to being taken. She recognized that it was a shift in thinking and was more difficult to conceive how it would look in Sherwood but everyone was struggling with this and figuring out what makes sense for their communities. Regarding the table, Ms. Rudzinski said it was not unusual to roll up uses, unlike parking requirements that are use oriented. She said the bicycle parking could be tacked on to the parking requreiments table but the existing table would be the easiest way to go because only the design will change not the requirements. She suggested that looking at the appropriateness of specific bicycle parking requirements for specific uses was a longer process.

Chair Simson pointed out that the last items on the list (colleges, schools, community service, parks and open spaces, park and ride facilities) were zoned Institutional Public and should be categorized as such. She advocated changing Basic utilities to Industrial and asked what drive up vehicle servicing was. She was informed it was like a Jiffy Lube. She asked about Drive-thru restaurants and determined that they would require bicycle parking with one long term space. This provided four categories: Residential, Commercial, Industrial, and Institutional Public.

Chair Simson and Commissioner Griffin declared that they were still not happy with the long term parking. Chair Simson repeated her sentiment that it was cost prohibitive. Brad commented that in 1.d of the section it requires that *at least 50% of the require bicycle parking spaces be long-term.* He noted a project he worked on in the private sector for a private school that required 40 parking spaces and commented that the 50% requirement would have been an issue. He said there were different ways to cover the bicycle

parking and talked about the cantilevered roof on the bathrooms at Stella Olsen Park to provide covered bicycle parking. If cost is a concern the Commission could lower the percentage of required long term spaces.

Chair Simson asked regarding long term parking in a park, where the parking has to been within one hundred feet of the entrance and secured or with a security guard. Councilor Robyn Folsom revealed that she was the council liaison to the parks board when the bathrooms were being built and this code requirement was a concern. She said it almost stopped the bathrooms from being built.

Commissioner Cook added that she had a child who bikes around town and she was teaching him to lock up his bicycle. She said she did not see very many bike commuters and did not see an increase in the next twenty years. She said 50% seemed aspirational and a high threshold to reach. Brad added that he rode his bike to work at a previous job and often the employer will make concessions for bicycle commuters.

Chair Simson and Commissioner Cooke said that their experience was that bicycle commuters would bring their bicycles inside the building for long term parking. Commissioner Cooke intimated that she would be comfortable with 25%.

Ms. Rudzinski reminded that the long term parking requirement was flexible and could be as little as a bicycle hook on the wall in the utility closet inside that building. She said it may be difficult at site design approval without the building plans, but for the smaller employer it would be easier to accommodate inside. Ms. Rudzinski said there was a lot of flexibility for how to satisfy what secure means and the language is not suggesting that Sherwood has to make sure every development has a security guard for one bike commuter.

Chair Simson commented that it may be difficult for an applicant that has to meet all of the code requirements with a code requiring racks in an area that is secure or monitored, within a hundred feet of the entrance. Commissioner Griffin asked if the requirement was putting a burden on certain businesses and said that he understood the concept of encouraging people to bicycle.

Commissioner Walker suggested that if the requirement is more than four or five long term spaces then the code applies, and if the applicant meets a minimum threshold then the 25% of the parking must be long term parking. Discussion followed with the following language being proposed. "If required to provide eight or more bicycle parking spaces, 25% of those spaces must be long term". The commission discussed how this would work with Target as an example. They decided that if Target was a new development they would be required to provide five long term bicycle parking spaces and that it was a reasonable number.

Commissioner Walker said she was more concerned for the burden placed on the small businesses. Brad commented that he liked long term bike parking for his bike and he did not want to leave it out. Chair Simson asked him that if long term bicycle parking was at City Hall and it met the code if he would park his bike there or in his workspace. Brad responded that he would use the long term parking because he did not have room in his work space. He revealed that when he does ride his bike there is closet under the stairs that is available.

Chris Crean added that when he was a bicycle commuter he used a fenced off area in the parking structure that was secured and he would not leave his bicycle outside all day. Bob Galati commented on bicycle

lockers that could be rented at a location in Portland. Mr. Crean commented that they were expensive and a secure, covered and fenced area was good.

Commissioner Robinson asked if the current schools in Sherwood were meeting the criteria being discussed and was informed that they probably were not. She said she did not think much of the population in Sherwood commuted and asked if anyone had researched how much of the population was being served. Mr. Maciejewski said those numbers were not available. Ms. Rudzinski argued that it was a "Catch 22" and facilities need to be provided before people will commute by bicycle. It is a safety and security issue and if you do not build it, people won't commute by bicycle. Brad related that Sherwood is on the scenic route for Washington County and the Commission has discussed ways to do agro-tourism to wineries and the city could attract that dynamic. The commission members confirmed the suggested language.

Commissioner Clifford asked regarding the language requiring the long term spaces to be located within one hundred feet of the entrance and asked if it could be changed to be more specific which entrance was appropriate. Commissioner Griffin said it specified that the language indicates that it is the entrance accessed by the intended users. He commented that it did not matter to him where it was located if it was inside the building because it would be out of the rain. Chair Simson suggested that the space could be any place inside the building or within 100 feet of the entrance, if outside. Discussion followed with the language changed to "Locate outside spaces within a hundred feet of the entrance that will be accessed by the intended users".

Chair Simson stated that she had no other concerns or comments and asked the commission for any.

Commissioner Griffin commented that *at the discretion of the City Engineer* was used several times in the code and asked if that was how it was meant to be. Bob responded that the TSP goes hand and hand with design variations and if an applicant comes up with something outside of the standards they will have to justify it but it will not be a granted for monetary motives. He said he needed some leeway to take into account certain design requirements that are unique; a property that does not fit and development cannot work without flexibility. Bob said it was a balancing act and he did not grant everything that comes in. Commissioner Griffin asked if it would stand up at LUBA.

Chris Crean said he was less concerned about LUBA and more concerned with statutes that allow challenges to conditions that seem arbitrary. A decision that is exclusively at the discretion of a person without standards and safeguards could be abused and become arbitrary and capricious decision making. He said in this case the way the code and the manual work out, the design exception process allows for variations from design standards that are administered by the City Engineer with its own internal standards and safeguards to protect against arbitrary decision making by the City Engineering. Bob added that the design standards manual is written in a manner that requires the City Engineer to document decisions, with background information and written justification why the exceptions are accepted with limitations being placed on them. He said he liked having the option of trying to make something work but was very rigid when it came to the applicability of making a change to a standard and if there is a very good reason for it that can be supported.

With no other comments, the following motion was received.

Motion: From Commissioner Lisa Walker to forward a recommendation of approval to the City Council for PA 14-01 Transportation System Plan Update based on the applicant testimony, public testimony received, and the analysis, findings and conditions in the staff report with the modifications as discussed. Seconded by Commissioner John Clifford.

Julia Hajduk asked if the recommendation could be to a "date certain" so the public hearing with the City Council did not have to be noticed. Discussion followed regarding when the Council would be available, noticing procedures, deadlines for the grant contract and who pays for the consultants. The Commission decided to re-notice and the vote was taken.

All present Planning Commissioners voted in favor (Vice Chair James Copfer was absent).

8. Adjourn

Chair Simson adjourned the meeting at 10:35 pm.

Submitted by:

_____

Kirsten Allen

Planning Department Program Coordinator

Approval Date: _____

To: Planning Commission & City Council
From: Wade Anderson
Subject: Transportation Master Plan
Date: 5/27/14

ATTACHMENT I

Greetings. My sincere apologies that I am unable to attend this evening. I have a family member that has been dealing with a severe medical condition and that has been my priority. I attempted to contact city staff starting on April 19th with multiple attempts to follow up and received limited feedback only today (5/27). I understand if short staffing is resulting in the ability to respond to my inquiry but am hopeful that the response time can improve in the future.

Regardless of what ultimately ends up in the traffic plan, I think that it is important for the planning commission and city council to consider the larger picture of traffic rather than considering things in a piecemeal fashion. I know that this is the goal a master plan. This includes thinking through what ODOT is considering, along with Metro (Cedar Creek Trail, Transit, etc.), Sherwood City, and any other items that can impact the overall character of the city. For example, the extension of Langer Farms Parkway to connect with 99W at Home Depot is being constructed as a 2 lane road appears to be short sighted as compared to a 4 lane road that better prepares us for the future. The items of greatest concern to me are as follows:

1) 12th Street / Century revision and light relocation has flaws. In the current proposal, the light will be relocated from Langer Drive (McDonald's entrance) to 12th street. This change will result in the following:
    a. Elimination of a left turn for drivers from Langer Drive to Sherwood Blvd. For visitors of the complex that includes Albertson's, this means that anyone that utilizes Sherwood BLVD to reach this complex must now return via Baler Way. This will adversely impact those businesses in that complex. Vacancy rates are already climbing and I expect that Albertson's will no longer be in that location within 12-24 months after this change is completed, if not sooner due to changing business climate in Sherwood (WalMart being added).
    b. Traffic will increase significantly on 12th street and Langer Century Drive as northbound 99W folks wanting to reach WalMart and morning and evening commuters will now use 12th Street/Century as a "cutoff" that skips the 99W/Tualatin Sherwood Intersection. This will significantly impact the character of the Langer City Park and homes immediately surrounding this street. Many of these residents surrounding this facility live in single level homes and have mobility challenges. Avamere is directly across the street for example. I know several retired couples that live in the Sherwood Village subdivision.
    c. Traffic will increase significantly on Gleneagle Drive, a subdivision with no sidewalks! I believe that the traffic estimates that I have viewed grossly underestimate the actual impact to Gleneagle Drive and these other areas. Many residents of the Gleneagle neighborhood also have mobility challenges which is why they are living in these primarily single-level homes. The absence of sidewalks is already a hazard that will be compounded with this change.
        i. Traffic that today queues on 12th street to turn right on Sherwood Blvd will now instead choose to use Gleneagle Drive as a cutoff to reach the schools and other old town Sherwood locales. We already have UPS & Fedex vehicles speeding through the neighborhood as a cutoff as well as morning school traffic.
        ii. A suggestion I have previously made to partially and inexpensively improve safety is for a shared bike lane/pedestrian lane to be painted on the 'no parking' side of Gleneagle drive. Additional "calming" will need to be done in this neighborhood to

discourage speeding vehicles around several blind corners and a hill. The Cedar Creek Trail will also likely have an outlet into this neighborhood, further increasing pedestrian traffic.

iii. Sidewalks should be implemented on the south side of 12th street in advance to any improvements as well as be evaluated in Gleneagle Subdivision.

2) Langer Farms Parkway needs an additional pedestrian crossing near the Catholic Church driveway. Today, any attempt to legally cross the street has to be done at Century Drive or at Oregon Street.
3) The elimination of the light at Albertsons on T/S road will further decay this mall. Several stores are now vacant and this is only expected to increase in the coming months/years.
4) Langer Farms Parkway should have had consideration of 4 lanes rather than 2 between T/S road and Home Depot. This was our opportunity and we appear to have lost it. The queue from 99W turning left to Langer Farms Parkway @ Home Depot has been lengthened but ideally it should have been extended further. Also, the 3 lanes from T/S road to turn right at Home Depot, if not already in the plan, should have a full 3 lanes until that location followed by an acceleration/merge lane turning northbound on 99W from that street.
5) Pedestrian improvements to cross 99W need consideration. I know from the Cedar Creek Trail that there are aspirational goals to create an overpass/underpass to connect the 2 sides of the city. New development should incur the costs for this to take place.

I have not had sufficient time to do additional study of the TSP but these are ones that stand out currently.

Thanks for your time & consideration.

June 3, 2014

Proposed edits to the Transportation System Plan

TSP Volume I

Scrivener's Errors

Preface page V

- First paragraph, second sentence under Transportation Standards – insert "to" so that the sentence reads, "These apply to city..."
- Second paragraph, first sentence under Transportation Standards – replace, "*Engineering Design and Standard Details Manual*[1]" with "TSP" and eliminate footnote 1.
- Check all footnote numbering.
- Fourth paragraph, first sentence under Transportation Standards – replace "Sherwood Public Works Department" with "Sherwood Community Development Department" at the end of the sentence.
- Fifth paragraph, second sentence under Transportation Standards – insert "incorporate" so that the sentence reads, "Connections shown on the figure do not necessarily incorporate topographic,..."

Page 67

- Second paragraph, first sentence under Function and Design of Brookman Road and Concept Plan Area Update – insert, "designated by Washington County" so that the sentence reads, "In the interim...arterial designated by Washington County with 5-lanes..."

Page 68

- Second Paragraph – add the following language to the end of the sentence to read, "...it is possible that HCT to Sherwood may be reconsidered in the long term, but any decision to do so would require a separate public process.

Substantive Changes

Table 1: The Fundable Transportation System

- Page 37 - Move Project D-24 from a short- term priority to a medium- term project
- Page 39- Move Project P44 from a medium-term project to a short-term project

Throughout the document

- Change the term "variance procedure" to "design exception process" when discussing an exception made to the design as authorized by the City Engineer as opposed to "Variances" regulated under Chapter 16.84 of the Sherwood Zoning and Community Development Code (SZCDC).

Scrivener's Errors

- Section 16.106.010.A (page 3) – Spell out "Transportation System Plan" as opposed to TSP since this is the first time in the section that it is referenced.
- Section 16.106.080.A (page 6) – Last sentence in second paragraph replace "and/or" with "and" so that the sentence reads, "...part of the proposal and mitigation measures approved for the proposal.
- Section 16.106.090 (page 9) – renumber so that the purpose statement is "A." and becomes "16.106.090.A Purpose"

Substantive Changes

- Section 16.94.010.E.3.a (page 10) – Change the provision so that new developments with forty (40) or more employees include preferential carpool/vanpool spaces as opposed to the current language which requires twenty (20) or more. The language would read as follows: "All new development with ~~(20)~~(40) employees or more shall include preferential spaces for ~~either~~ car-pool ~~and~~/vanpool designation. Carpool and vanpool parking spaces shall be located closer to the main employee entrance than all other parking spaces with the exception of ADA parking spaces. Carpool/Vanpool spaces shall be clearly marked as reserved for carpool/vanpool only.
- Section 16.94.020.1.d (page 15) – Amend the language to say, "Minimum number of long-term spaces. If a development is required to provide eight (8) or more required bicycle parking spaces in Table 4, at least 25% shall be provided as long-term bicycle with a minimum of one long-term bicycle parking space." – This is a new standard. The consultants recommended 50% of required bicycle parking spaces regardless of the number required be provided as long-term spaces. With the Planning Commission recommendation a use would require 160- vehicle parking spaces before it would be required to provide one long-term bicycle parking space.
- Section 16.94.020.2.c.(2) (page 16) – Amend the language to say, "Locate the outside bicycle parking spaces within 100 feet of the entrance that will be accessed by the intended users." – This is a new standard, the Planning Commission just intended that bicycle parking spaces that were placed outside of the business would need to be located within 100 feet to allow bicycle parking that may be provided indoors for employees to be located anywhere within the building.
- Table 4 (Page 17) – Amend the table so that the categories include "Public and Institutional Categories" for the uses Park and Ride facilities and below, and replace "Basic Utilities" with "Industrial Uses." – Table 4 would be amended as follows:

Use Categories	Minimum Required Spaces
Residential Categories	

Household living	Multi-dwelling — 2 or 1 per 10 auto spaces. All other residential structure types — None
Group living	1 per 20 auto spaces
Commercial Categories	
Retail sales/service office	2 or 1 per 20 auto spaces, whichever is greater
Drive-up vehicle servicing	None
Vehicle repair	None
Commercial parking facilities, commercial, outdoor recreation, major event entertainment	4 or 1 per 20 auto spaces, whichever is greater
Self-service storage	None
Industrial Categories~~/Service Categories~~	
~~Basic utilities~~ Industrial	2 or 1 per 40 spaces, whichever is greater
Public and Institutional Categories	
Park and ride facilities	2 or 1 per 20 auto spaces
Community service essential service providers parks and open areas	2 or 1 per 20 auto spaces, whichever is greater
Schools	High schools — 4 per classroom
	Middle schools — 2 per classroom
	Grade schools — 2 per 4th & 5th grade classroom

Colleges, medical centers, religious institutions, daycare uses	2 or 1 per 20 auto spaces whichever is greater

TSP Volume II – Section G- Table 2: Draft Proposed Amendments to Section B [Chapter 6 of the Comprehensive Plan] – Goals Policies and Strategies

Scrivener's Errors

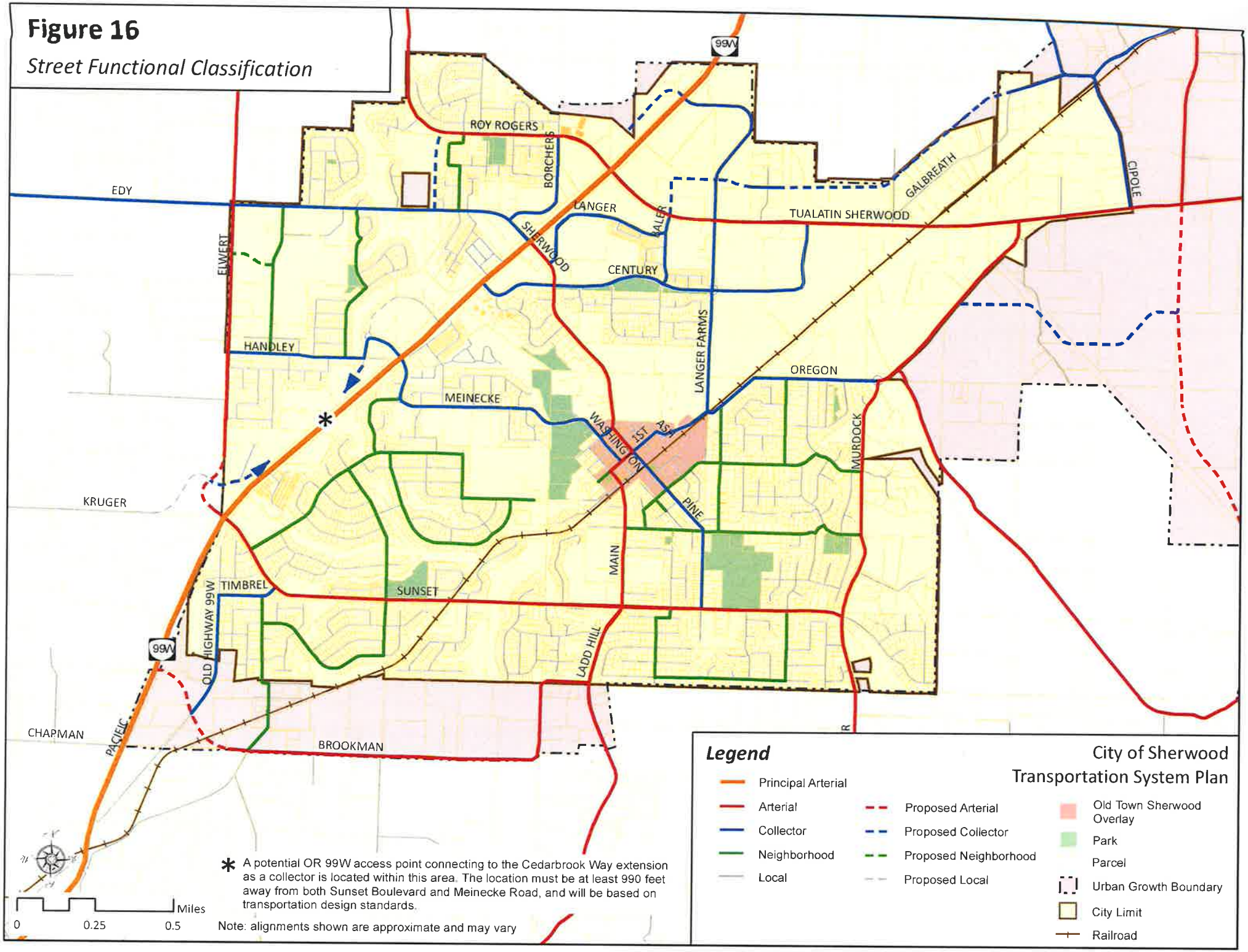
- None Identified

Substantive Changes

- Strategy 7 on (page 8) – Add the language "consistent with community values in" so that the strategy reads, "Adopt performance measures that are consistent with regional modal targets for non-single occupancy vehicles and track the City's progress with meeting adopted goals and policies that are consistent with community values in each successive TSP update."
- Strategy 12 on (page 14) – Add language within the proposed Strategy 12 to include the Six Corners area so that the strategy reads, "Support public or private development of bicycle and pedestrian improvements shown on Map 2 of the Town Center Plan and on both sides of Highway 99W in the Six Corners area."
- Strategy 19 on (page 15) – Remove this strategy
- Strategy 6 on (Page 23) – Remove this strategy

Figure 16

Street Functional Classification



* A potential OR 99W access point connecting to the Cedarbrook Way extension as a collector is located within this area. The location must be at least 990 feet away from both Sunset Boulevard and Meinecke Road, and will be based on transportation design standards.

Note: alignments shown are approximate and may vary