Oregon
Theodore R. Kulongoski, Governor

Department of Land Conservation and Development
635 Capitol Street, Suite 150
Salem, OR 97301-2540
(503) 373-0050
Fax (503) 378-5518
www.lcd.state.or.us

NOTICE OF ADOPTED AMENDMENT

12/02/2013

TO: Subscribers to Notice of Adopted Plan or Land Use Regulation Amendments

FROM: Plan Amendment Program Specialist

SUBJECT: City of Milwaukie Plan Amendment
DLCD File Number 003-13

The Department of Land Conservation and Development (DLCD) received the attached notice of adoption. Due to the size of amended material submitted, a complete copy has not been attached. A Copy of the adopted plan amendment is available for review at the DLCD office in Salem and the local government office.

Appeal Procedures*

DLCD ACKNOWLEDGMENT or DEADLINE TO APPEAL: Wednesday, December 25, 2013

This amendment was submitted to DLCD for review prior to adoption pursuant to ORS 197.830(2)(b) only persons who participated in the local government proceedings leading to adoption of the amendment are eligible to appeal this decision to the Land Use Board of Appeals (LUBA).

If you wish to appeal, you must file a notice of intent to appeal with the Land Use Board of Appeals (LUBA) no later than 21 days from the date the decision was mailed to you by the local government. If you have questions, check with the local government to determine the appeal deadline. Copies of the notice of intent to appeal must be served upon the local government and others who received written notice of the final decision from the local government. The notice of intent to appeal must be served and filed in the form and manner prescribed by LUBA, (OAR Chapter 661, Division 10). Please call LUBA at 503-373-1265, if you have questions about appeal procedures.

*<u>NOTE:</u> The Acknowledgment or Appeal Deadline is based upon the date the decision was mailed by local government. A decision may have been mailed to you on a different date than it was mailed to DLCD. As a result, your appeal deadline may be earlier than the above date specified. <u>NO LUBA Notification to the jurisdiction of an appeal by the deadline, this Plan Amendment is acknowledged</u>.

Cc: Brett Kelver, City of Milwaukie
Gordon Howard, DLCD Urban Planning Specialist
Jennifer Donnelly, DLCD Regional Representative
Gary Fish, DLCD Transportation Planner

<paa> YA

DLCD FORM 2

NOTICE OF ADOPTED CHANGE TO A COMPREHENSIVE PLAN OR LAND USE REGULATION

FOR DLCD USE	
File No.:	003-13 (19960) [17694]
Received:	11/25/2013

Local governments are required to send notice of an adopted change to a comprehensive plan or land use regulation **no more than 20 days after the adoption**. (*See* OAR 660-018-0040). The rules require that the notice include a completed copy of this form. **This notice form is not for submittal of a completed periodic review task or a plan amendment reviewed in the manner of periodic review.** Use Form 4 for an adopted urban growth boundary including over 50 acres by a city with a population greater than 2,500 within the UGB or an urban growth boundary amendment over 100 acres adopted by a metropolitan service district. Use Form 5 for an adopted urban reserve designation, or amendment to add over 50 acres, by a city with a population greater than 2,500 within the UGB. Use Form 6 with submittal of an adopted periodic review task.

Jurisdiction: City of Milwaukie

Local file no.: **CPA-13-03**

Date of adoption: 11/19/13 Date sent: 11/25/2013

Was Notice of a Proposed Change (Form 1) submitted to DLCD?
☒ Yes: Date (use the date of last revision if a revised Form 1was submitted): 9/04/13
☐ No

Is the adopted change different from what was described in the Notice of Proposed Change? ☒ Yes ☐ No
If yes, describe how the adoption differs from the proposal:

There were no substantive changes from what was described in the Notice of Proposed Change, but there were some changes to the text of the document (Milwaukie's Transportation System Plan or TSP). Changes included minor revisions to several of the TSP chapters and the overall project list.

Local contact (name and title): Brett Kelver, Associate Planner

Phone: (503) 786-7657 E-mail: kelverb@milwaukieoregon.gov

Street address: 6101 SE Johnson Creek Blvd City: Milwaukie Zip: 97206

PLEASE COMPLETE ALL OF THE FOLLOWING SECTIONS THAT APPLY

For a change to comprehensive plan text:
Identify the sections of the plan that were added or amended and which statewide planning goals those sections implement, if any:

Milwaukie's Transportation System Plan (TSP) is an ancillary document to the City's Comprehensive Plan. All 14 TSP chapters and several appendices were amended as part of this update project. The TSP implements Statewide Planning Goals 1, 2, and 12.

For a change to a comprehensive plan map:
Identify the former and new map designations and the area affected:

Change from to . acres. ☐ A goal exception was required for this change.
Change from to . acres. ☐ A goal exception was required for this change.
Change from to . acres. ☐ A goal exception was required for this change.
Change from to . acres. ☐ A goal exception was required for this change.

Location of affected property (T, R, Sec., TL and address): .

☐ The subject property is entirely within an urban growth boundary

☐ The subject property is partially within an urban growth boundary

If the comprehensive plan map change is a UGB amendment including less than 50 acres and/or by a city with a population less than 2,500 in the urban area, indicate the number of acres of the former rural plan designation, by type, included in the boundary.

Exclusive Farm Use – Acres:
Non-resource – Acres:
Forest – Acres:
Marginal Lands – Acres:
Rural Residential – Acres:
Natural Resource/Coastal/Open Space – Acres:
Rural Commercial or Industrial – Acres:
Other: – Acres:

If the comprehensive plan map change is an urban reserve amendment including less than 50 acres, or establishment or amendment of an urban reserve by a city with a population less than 2,500 in the urban area, indicate the number of acres, by plan designation, included in the boundary.

Exclusive Farm Use – Acres:
Non-resource – Acres:
Forest – Acres:
Marginal Lands – Acres:
Rural Residential – Acres:
Natural Resource/Coastal/Open Space – Acres:
Rural Commercial or Industrial – Acres:
Other: – Acres:

For a change to the text of an ordinance or code:
Identify the sections of the ordinance or code that were added or amended by title and number:

For a change to a zoning map:
Identify the former and new base zone designations and the area affected:

Change from to . Acres:
Change from to . Acres:
Change from to . Acres:
Change from to . Acres:

Identify additions to or removal from an overlay zone designation and the area affected:

Overlay zone designation: . Acres added: . Acres removed:

Location of affected property (T, R, Sec., TL and address):

List affected state or federal agencies, local governments and special districts: Metro, TriMet, Clackamas County, City of Portland (Bureau of Transportation), ODOT

Identify supplemental information that is included because it may be useful to inform DLCD or members of the public of the effect of the actual change that has been submitted with this Notice of Adopted Change, if any. If the submittal, including supplementary materials, exceeds 100 pages, include a summary of the amendment briefly describing its purpose and requirements.

Submittal consists of adopting ordinance with findings and strikeout & clean versions of the proposed amendments, which update the City's TSP to remain compliant with Metro's 2035 RTP. The updates include:
* Adjustment of planning horizon year (2030 to 2035)
* Confirmation that modal master plans help the region meet 2035 performance targets
* Updates to existing maps, tables, & text to reflect current conditions (incl. new light rail)

NOTICE OF ADOPTED CHANGE – SUBMITTAL INSTRUCTIONS

1. A Notice of Adopted Change must be received by DLCD no later than 20 days after the ordinance(s) implementing the change has been signed by the public official designated by the jurisdiction to sign the approved ordinance(s) as provided in ORS 197.615 and OAR 660-018-0040.

2. A Notice of Adopted Change must be submitted by a local government (city, county, or metropolitan service district). DLCD will not accept a Notice of Adopted Change submitted by an individual or private firm or organization.

3. **Hard-copy submittal:** When submitting a Notice of Adopted Change on paper, via the US Postal Service or hand-delivery, print a completed copy of this Form 2 on light green paper if available. Submit **one copy** of the proposed change, including this form and other required materials to:

Attention: Plan Amendment Specialist
Dept. of Land Conservation and Development
635 Capitol Street NE, Suite 150
Salem, OR 97301-2540

This form is available here:
http://www.oregon.gov/LCD/forms.shtml

4. **Electronic submittals** of up to 20MB may be sent via e-mail. Address e-mails to plan.amendments@ state.or.us with the subject line "Notice of Adopted Amendment."

Submittals may also be uploaded to DLCD's FTP site at http://www.oregon.gov/LCD/Pages/papa_ submittal. aspx.

E-mails with attachments that exceed 20MB will not be received, and therefore FTP must be used for these electronic submittals. **The FTP site must be used for all .zip files** regardless of size. The maximum file size for uploading via FTP is 150MB.

Include this Form 2 as the first pages of a combined file or as a separate file.

5. **File format:** When submitting a Notice of Adopted Change via e-mail or FTP, or on a digital disc, attach all materials in one of the following formats: Adobe .pdf (preferred); Microsoft Office (for example, Word .doc or docx or Excel .xls or xlsx); or ESRI .mxd, .gdb, or. mpk. For other file formats, please contact the plan amendment specialist at 503-934-0017 or plan.amendments@state.or.us.

6. **Content:** An administrative rule lists required content of a submittal of an adopted change (OAR 660-018-0040(3)). By completing this form and including the materials listed in the checklist below, the notice will include the required contents.

Where the amendments or new land use regulations, including supplementary materials, exceed 100 pages, include a summary of the amendment briefly describing its purpose and requirements.

7. Remember to notify persons who participated in the local proceedings and requested notice of the final decision. (ORS 197.615)

If you have any questions or would like assistance, please contact your DLCD regional representative or the DLCD Salem office at 503-934-0017 or e-mail plan.amendments@state.or.us.

Notice checklist. Include all that apply:

☒ Completed Form 2

☒ A copy of the final decision (including the signed ordinance(s)). This must include city *and* county decisions for UGB and urban reserve adoptions

☒ The findings and the text of the change to the comprehensive plan or land use regulation

☐ If a comprehensive plan map or zoning map is created or altered by the proposed change:
- ☐ A map showing the area changed and applicable designations, and
- ☐ Electronic files containing geospatial data showing the area changed, as specified in OAR 660-018-0040(5), if applicable

☐ Any supplemental information that may be useful to inform DLCD or members of the public of the effect of the actual change

CITY OF MILWAUKIE
"Dogwood City of the West"

Ordinance No. 2073

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF MILWAUKIE, OREGON, AMENDING THE TRANSPORTATION SYSTEM PLAN, AN ANCILLARY DOCUMENT OF THE COMPREHENSIVE PLAN, TO MAINTAIN COMPLIANCE WITH THE STATE TRANSPORTATION PLANNING RULE AND REGIONAL TRANSPORTATION PLAN (FILE # CPA-13-03).

WHEREAS, the City's Transportation System Plan (TSP) was last updated in 2007, with a forecasting horizon to the year 2030; and

WHEREAS, the most recent Regional Transportation Plan (RTP) was adopted by Metro Council in 2010 and utilizes a forecasting horizon to the year 2035; and

WHEREAS, the State Transportation Planning Rule requires that local jurisdictions maintain their TSPs to be consistent with the applicable RTP; and

WHEREAS, Metro informed the City in December 2011 of the need for the City to demonstrate that its TSP is consistent with the 2035 RTP; and

WHEREAS, on October 31, 2012, Metro extended the City's deadline for demonstrating the TSPs consistency with the 2035 RTP to December 31, 2013; and

WHEREAS, all legal and public notices have been provided as required by law, in addition to efforts to educate community members more broadly about the proposal; and

WHEREAS, on September 10, 2013, the Planning Commission opened a public hearing on the proposed amendments, and on September 24, 2013, approved a motion to recommend that the City Council adopt the amendments; and

WHEREAS, the City Council opened a public hearing on October 15, 2013, and finds that the proposed amendments are in the public interest of the City of Milwaukie and will ensure that the TSP remains compliant with the 2035 RTP and State Transportation Planning Rule; and

WHEREAS, the City Council finds that the amendments are extensive in scope and require 60 days from the date of adoption to put into effect.

Now, Therefore, the City of Milwaukie does ordain as follows:

Section 1. Findings. Findings of fact in support of the amendments are attached as Exhibit A.

Section 2. Amendments. The Transportation System Plan is amended as described in Exhibit B (underline/strikeout version) and Exhibit C (clean version).

Section 3. Effective Date. The amendments shall become effective 60 days from the date of adoption.

Read the first time on **10/15/2013**, and moved to second reading by __5-0____ vote of the City Council.

Read the second time and adopted by the City Council on __**11/19/13**__.

Signed by the Mayor on 11/19/13.

Jeremy Ferguson, Mayor

ATTEST:

APPROVED AS TO FORM:
Jordan Ramis PC

Pat DuVal

Pat DuVal, City Recorder

City Attorney

Exhibit A

Findings in Support of Approval
File #CPA-13-03, Transportation System Plan Update

Sections of the Milwaukie Municipal Code not addressed in these findings are found to be inapplicable to the decision on this application.

1. The applicant, the City of Milwaukie, is proposing to amend its Transportation System Plan (TSP), an ancillary document to the Comprehensive Plan. The land use application file number is CPA-13-03.

2. The purpose of the proposed amendments is to ensure that the City's TSP remains consistent with Metro's 2035 Regional Transportation Plan (RTP) and therefore compliant with the State Transportation Planning Rule. The proposed amendments will also bring the TSP up to date in its representation of existing conditions and make it more current with regard to the prioritization of improvement projects.

3. The proposal is subject to the following provisions of the Milwaukie Municipal Code (MMC):
   - MMC 19.902 Amendments to Maps and Ordinances
   - MMC 19.1008 Type V Review

4. The application has been processed and public notice provided in accordance with MMC Section 19.1008 Type V Review. Public hearings were held by the Planning Commission on September 10 and September 24, and by City Council on October 15, November 5, and November 19, 2013, as required by law.

5. MMC Section 19.1008 Type V Review

   a. MMC Subsection 19.1008.3.A.1 requires opportunity for public comment and review.

      Opportunity for public comment and review has been provided. Public meetings were held on April 17, June 3, and September 5, 2013. The Planning Commission and City Council have each had worksessions that discussed the TSP. Public notice in the form of e-mail to the Neighborhood District Associations and over 50 interested persons, and information on the City website have publicized the Planning Commission's hearing on the TSP to encourage comment by any interested party.

   b. MMC Subsection 19.1008.3.A.2 requires notice of public hearing on a Type V Review to be posted on the City website and at City facilities that are open to the public. A notice of the Planning Commission's September 10, 2013, hearing was posted as required on August 9, 2013. A notice of the City Council's October 15, 2013, hearing was posted as required on September 13, 2013.

   c. MMC Subsection 19.1008.3.A.2 requires notice be sent to individual property owners if the proposal affects a discrete geographic area. The TSP is a document that is applicable to the entire city, and specific property owner notice is not required.

   d. MMC Subsection 19.1008.3.B and C require notice of a Type V application to be sent to Metro 45 days prior to the first evidentiary hearing and to the Department of Land Conservation and Development 35 days prior to the first evidentiary hearing. This notice was sent to Metro on July 26, 2013, and to the DLCD on August 6, 2013.

   e. MMC Subsection 19.1008.3.D requires notice to property owners if, in the Planning Director's opinion, the application would affect the permissible uses of land for those property owners. The TSP is a transportation master plan and does not affect permissible land uses for property owners. As such, this notice is not required

f. MMC Subsection 19.1008.4 and 5 establish the review authority and process for review of a Type V application. The Planning Commission held duly advertised public hearings on September 10 and September 24, 2013, and passed a motion recommending that the City Council approve the Comprehensive Plan amendment. The City Council held duly advertised public hearings on October 15, November 5, and November 19, 2013, and approved the Comprehensive Plan amendments.

6. MMC Section 19.902 Amendments to Maps and Ordinances

a. MMC Subsection 19.902.3.B establishes criteria for Comprehensive Plan amendments. Amendments to ancillary documents such as the TSP are subject to the same criteria.

(1) The proposed amendments are consistent with the goals and policies of the Comprehensive Plan, as proposed to be amended.

(a) Chapter 1 – Citizen Involvement

The City strove to involve citizens throughout the Transportation System Plan (TSP) update process. To reach this goal, the City provided numerous opportunities for citizens to participate in the development of the TSP over the course of seven months. Approximately 60 people chose to participate by attending a public meeting or submitting comments. Public outreach and involvement efforts included the following:

- Open Houses & Workshops (3 meetings total)
- Ongoing E-mail Announcements
- Multiple Pilot Articles and Announcements

In addition to the above events, project staff created a project web site containing up-to-date information about the TSP update process, draft TSP revisions, meeting materials and notes, and information about how to use the TSP.

The TSP was distributed to all Neighborhood District Associations in the City for review and comment prior to the first public hearing. The public was properly notified of all public hearings pursuant to Milwaukie Municipal Code (MMC) Section 19.1008.

As noted in Finding 5, above, both the Planning Commission and City Council held public hearings to consider the proposed amendments and took public testimony on the proposal.

(b) Chapter 5 – Transportation, Public Facilities, Energy Conservation: Transportation Element

In combination with the TSP, the Transportation Element of the Comprehensive Plan reflects the City's long-term transportation goals and policies. The TSP has been updated to reflect current goals and policies, recognize the completion of goals and projects from the 2007 TSP, and reestablish project priorities.

(2) The proposed amendment is in the public interest with regard to neighborhood or community conditions.

The TSP identifies existing problem areas for all modes of transportation in the city, looks into the future to identify the needs created by growth, and provides solutions to existing and future needs with guidelines to develop a more robust multimodal transportation system. By identifying specific needs, the TSP helps guide the City in making future investments in the transportation system and outlines how land use and transportation decisions can be brought together for the benefit of the whole community. The proposed amendments to the TSP further the public interest by updating a document that will be used to improve the transportation infrastructure over the next two decades.

(3) The public need is satisfied by these particular proposed amendments.

The TSP contains the community's vision for the city's transportation system and includes both a policy framework (in the form of goals, policies, and recommendations) and a financially constrained project list (in the form of mode-specific Action Plans). The updates to the TSP reflect the community's preferences related to the project list, and recognize that the City has made progress on several of the projects since 2007.

(4) The proposed amendments are consistent with the Metro Urban Growth Management Functional Plan and relevant regional policies.

The proposed amendments were sent to Metro for comment. Metro did not identify any areas where the proposed amendments were inconsistent with the Metro Urban Growth Management Functional Plan and relevant regional policies.

(5) The proposed amendments are consistent with relevant State statutes and administrative rules, including the Statewide Planning Goals and Transportation Planning Rule.

The proposed amendments were sent to the Department of Land Conservation and Development (DLCD) for comment. DLCD did not identify any areas where the proposed amendments were inconsistent with State statutes and administrative rules.

The City Council finds that these criteria are met.

The City Council finds that the criteria of MMC 19.902 are met.

7. Notice of the proposed legislative changes was posted at City Hall, Ledding Library, and the City's office on Johnson Creek Boulevard, as well as online at the City's website. The proposed amendments were referred to various City departments, governmental agencies, neighborhood district associations (NDAs), and stakeholders for review and comment. A draft of the proposed amendments to the TSP was posted online at the City's website, with hard copies made available to the NDAs. The proposed amendments were discussed at several Planning Commission and City Council meetings. Public comments received, including any City responses, are summarized in the staff report.

Exhibit B

Milwaukie ~~2007~~ 2013 TSP
Table of Contents

Appendices

Complete List of Figures

Complete List of Tables

1 Executive Summary

The Milwaukie Transportation System Plan (TSP) is the City's long-term plan for transportation improvements and includes policies and projects that could be implemented through the City Capital Improvement Plan, development review, or grant funding. The 2007 TSP planning process was a great opportunity for the community to fully define its transportation goals and discuss how the whole transportation system ~~can~~ could be improved to support livability in Milwaukie. The 2013 TSP update process provided an opportunity to ensure that the plan reflected current conditions and took into account the latest forecasts and projections.

Milwaukie is a city of approximately 21,000 people and just under five square miles. Part of Milwaukie is designated as a Town Center in the 2040 Growth Concept. Though Milwaukie's population is expected to grow moderately (approximately one % per year), the city lies at the intersection of several regional transportation facilities and downstream from several areas slated for significant growth in Metro's 2040 Growth Concept.

THE PURPOSE OF A TRANSPORTATION SYSTEM PLAN (TSP)

~~One of the~~ A primary purposes of ~~creating~~ an up-to-date TSP ~~(and keeping it updated)~~ is to fulfill the State of Oregon Transportation Planning Rule (TPR) requirements for comprehensive transportation planning in the cities of Oregon. The TSP is ~~used as~~ a guiding policy document for long-term transportation planning and presents the City's goals and policies while outlining and prioritizing proposed improvements for pedestrian, bicycle, public transit, ~~and~~ motor vehicle, and freight systems; downtown parking; and neighborhood traffic management ~~(as well as other non-motorized elements)~~. In addition, the TSP outlines the financial forecast for potential funding ~~for the City,~~ and ties that back to potential prioritized improvements to determine any funding shortfalls for projects. When funding shortfalls exist, potential concepts for generating additional revenue ~~for the City~~ are outlined to help guide ~~the~~ City funding-related decisions ~~towards policy decisions related to funding~~.

The TSP strives to determine existing problem areas for all modes of transportation, looks into the future to identify the needs created by growth, and provides solutions to existing and future needs ~~along~~ with guidelines to develop the desired multimodal transportation system. Identifying specific transportation system needs will help the City guide its future transportation system investments and determine how land use and transportation decisions can be brought together beneficially for the community.

After Chapter 4 Future Forecasting Process, each section of the TSP ~~(after the Future Forecasting Chapter)~~ includes a long-range master plan and an action plan. The action plans address those transportation improvements that could be made using limited local funding sources. The final prioritization of transportation system improvements will be determined by the Milwaukie City Council as part of the annual capital improvements planning and budgeting process.

WHO WAS INVOLVED IN THE CITY'S TSP UPDATES?

During the 2007 TSP update process, the City of Milwaukie launched an extensive public outreach and involvement process (see Appendix ~~A~~ B). Citizens, partner agencies, and business representatives were invited to join one or more mode-specific working groups and the TSP Advisory Committee. The working groups were created to focus on different subtasks of the TSP, including: Traffic and Street Network Solutions, Pedestrian and Bike Solutions, Street Design, Transit Solutions, Downtown Parking, and Freight Access. The Advisory Committee ~~(AC)~~ oversaw both technical and policy review of the TSP, and offered guidance on the final prioritization of projects and strategies.

In 2013, the City conducted a smaller-scale update to the TSP in order to maintain compliance with Metro's 2035 Regional Transportation Plan (RTP). The public engagement component of the 2013 TSP update was far less intensive than the one in 2007, as the proposed changes did not involve major policy decisions and instead focused on the following elements:

- Update existing figures, tables, and text to reflect current conditions.
- Adjust the TSP's planning horizon year from 2030 to 2035.
- Remove completed projects and update project descriptions as needed.
- Add the final Portland-Milwaukie Light Rail (PMLR) alignment to master plan maps.

The 2013 TSP update, driven by the RTP compliance requirement, allowed the City to confirm that the master plans for the various travel modes (e.g., pedestrian, bicycle, public transit, etc.) will help the region move toward meeting its performance targets for 2035, including reductions in congestion, percentage of single-occupancy vehicle trips, and vehicle miles traveled per capita.

TSP UPDATE PROCESS

In addition to data collection and public involvement, ~~the~~ a TSP update consist~~ed~~s of seven main elements. The following sections describe each of these elements in more detail.

Goals

Transportation goals and policies form the basis for how the local transportation system will be developed and maintained over the next ~~20~~ 22 years. The City's transportation goals support a multimodal approach to transportation planning and reflect how citizens think about and experience Milwaukie's transportation system. The City's nine transportation goals are:

- **GOAL 1 Livability:** Design and construct transportation facilities in a manner that enhances the livability of Milwaukie's community.
- **GOAL 2 Safety:** Develop and maintain a safe and secure transportation system.

- **GOAL 3 Travel Choices**: Plan, develop, and maintain a transportation system that provides travel choices and allows people to reduce the number of trips made by single-occupant vehicles.
- **GOAL 4 Quality Design**: Establish and maintain a set of transportation design and development regulations that are sensitive to local conditions.
- **GOAL 5 Reliability and Mobility**: Develop and maintain a well-connected transportation system that reduces travel distance, improves reliability, and manages congestion.
- **GOAL 6 Sustainability:** Provide a sustainable transportation system that meets the needs of present and future generations.
- **GOAL 7 Efficient and Innovative Funding:** Efficiently allocate available funding for recommended transportation improvements, and pursue additional transportation funding that includes innovative funding methods and sources.
- **GOAL 8 Compatibility**: Develop a transportation system that is consistent with the City's Comprehensive Plan and coordinates with County, State, and regional plans.
- **GOAL 9 Economic Vitality**: Promote the development of Milwaukie's, the region's, and the state's economies through the efficient movement of people, goods, and services, and the distribution of information.

Existing Conditions

Project staff reviewed existing conditions to establish how the transportation systems within Milwaukie currently operate in terms of quality, effectiveness, accessibility, and safety. Sidewalk and pavement conditions, roadway and intersection traffic volumes, transit and freight operations, as well as parking, rail, environmental justice and natural resources were all reviewed with the goal of understanding the "bigger picture" of the City's transportation needs. Additional detail related to these topics can be found in Chapter 3.

Forecasting Future Traffic Conditions

The forecast year for this plan is ~~2030~~ 2035. The City used Metro's urban area transportation forecast model to forecast future p.m. peak-hour traffic volumes at study area intersections. This is a complex model that takes many anticipated trends in demographics, changes in land use, population, etc. into account when forecasting future traffic volumes. Some of the more important assumptions include the projected growth in population in Clackamas County and the rest of the Metro region, residential and employment growth in downtown Milwaukie, and an increase in transit use within the Metro region. See Chapter 4 for more detail.

Identification of Needs and Potential Improvements

The traffic volume projections forecasted from the Metro model formed the basis for identifying potential roadway deficiencies and evaluating alternative circulation improvements within Milwaukie. Needs for other modes were then identified, based on the future traffic forecasts and deficiencies in the existing infrastructure (sidewalks, bike lanes, transit stops, etc.).

Collectively, the master plans in Chapters 5 through 12 of the TSP describe the proposed capital and operational improvements to the transportation system between ~~2008~~ 2013 and ~~2030~~ 2035. While many of these potential improvements are presented as benefiting one mode, when possible, multiple modes are combined into one project. For instance, the Railroad Ave road-widening project listed in the ~~Auto~~ Street Network Master Plan could include new bike lanes and sidewalks, as well as improvements for freight and transit.

Between the 2007 and 2013 TSP updates, the PMLR project became more defined, with construction starting in 2012. A thorough feasibility and impact study was conducted for the PMLR project, identifying and developing appropriate mitigation for the new light rail system's impacts to Milwaukie's transportation infrastructure. The warranted improvements are being constructed as the new light rail system is being built. Once completed, PMLR will become a part of the City's transportation system and will be further studied to identify and address needed improvements as part of future updates to the TSP.

In June 2013, the Tacoma Station Area Plan (TSAP) was adopted to address potential redevelopment opportunities near the new PMLR station at Tacoma St. The TSAP included a list of approximately 20 projects identified to meet new transportation needs. These projects were assigned order-of-magnitude costs and were added to the relevant project lists for the various modes.

Ranking and Prioritizing Improvements

The action plans in Chapters 5 through 12 focus on the highest priority projects that are most likely to be funded over the next ~~15~~ 22 years with limited City funds. The action plans are built upon the premise that, given the limited funds available, the City should prioritize funding of transportation projects that 1) effectively address identified problems, and 2) best meet the City's Goals.

To prioritize the projects as part of the 2007 TSP update, project staff and the ~~AC~~ Advisory Committtee used three sources: the project rankings from the working groups, evaluation of each project against the nine TSP Goals, and other information regarding dependence on other projects, neighborhood support, etc. Using this approach, project staff and the ~~AC~~ Advisory Committtee developed a relative ranking of the projects, grouping them into three categories (high, medium, and low priority).

For the 2013 TSP update, project staff did not reevaluate projects against the nine TSP Goals but, instead, considered the input generated around a public meeting that was held to discuss transportation project priorities. For approximately 20% of the existing projects, the priority classification was adjusted to reflect changes in current conditions or a new awareness of community need. For new projects arising from the Tacoma Station Area Plan (TSAP), staff assigned a priority to each based on input from the TSAP Advisory Committee as well as staff knowledge of overall system needs.

Financing Transportation Projects

The financially constrained action plan lists in Chapters 5 through 12 identify which projects the City should prioritize for funding with limited City funds. While these action plans will set the priorities for use of local funds, ~~it~~ they do~~es~~ not assume funding sources such as State or regional grants, or contributions from local development. Therefore, the "financially constrained" lists are very constrained.

Given the limited availability of funding, the City will have to make tradeoffs when deciding how to spend the limited funds each year. As part of the 2007 TSP update, the ~~AC~~ Advisory Committee determined that the City should use a strategic approach that funds a range of high priority "implementable" projects. This approach encourages the City to tackle smaller projects with local funds, but also use local funds as the required local match to leverage State and federal funds for larger high priority projects. The 2013 TSP update reaffirmed this strategic approach.

The primary function of the TSP is to provide guidance for long-range policy and investment decisions about needed improvements to the transportation system over the next 22 years. The Consolidated Action Plan in Table 13-3 (located in Chapter 13 Funding and Implementation Plan) provides a list of the highest priority projects for the community. This list is utilized to build the "Transportation Priority Project—Unfunded" section of the City's 5-year Capital Improvement Plan (CIP). The CIP is a list of projects for the City's water, wastewater, stormwater, and transportation systems that are scheduled to be funded in the short term. As funding becomes available, projects are moved from the unfunded section of the CIP to the section recommended for funding. Projects in the CIP section recommended for funding are reviewed by the City Council for funding every 2 years through the City's budgeting process. In essence, the CIP is the primary implementation mechanism for TSP projects.

Recommendations

The Milwaukie TSP focuses on Milwaukie's transportation needs and decisions. Therefore, participants in the 2007 planning process created a set of recommendations that implemented State and regional policies but ~~are~~ were tailored to Milwaukie's current and future needs. From all of the input that citizens and businesses offered during the 2007 TSP process, there were some clear messages. The highest priorities established in 2007 for improving transportation in Milwaukie ~~are~~ were:

- Improve pedestrian and bicycle facilities throughout the city.
- Enhance public transit service.
- Maintain existing facilities.
- Manage traffic in neighborhoods (address "cut-through" traffic) as regional traffic volumes increase.
- Improve safety and accessibility of crossings over major corridors.

Though it is common for people to be focused on their own street, neighborhood, or bus line, a broad number of people identified the following areas as a priority in 2007:

- Downtown
- Milwaukie Marketplace area
- Railroad Ave
- Railroad crossings throughout the city

The 2013 TSP Update process did not involve the same level or depth of public involvement and discussion, as it was intended as only a minor refresh of the 2007 document. However, public comments gathered at and around a public meeting held in June 2013 largely confirmed the above recommendations (with at least one exception, that there was no clear identification of the Milwaukie Marketplace as a priority area). In 2013, people appear to be generally more supportive of projects that serve to improve multiple modes of transportation than those that enhance only one aspect of the larger transportation system. In addition, there is a clear emphasis on improving east-west connections across the community, especially to mitigate the divisive effect that Hwy 224 has in separating downtown from the predominant population in the eastern neighborhoods.

The following section summarizes the specific recommendations that resulted from the analysis of each mode and aspect, including: pedestrian, bicycle, public transit, motor vehicle, freight, street design, neighborhood traffic management, and downtown parking. Figure 1-1, the

Composite Master Plan Map, summarizes the recommended improvements on one map, showing the location of recommended master plan improvements for pedestrians, bicycles, public transit, motor vehicles, and freight modes.

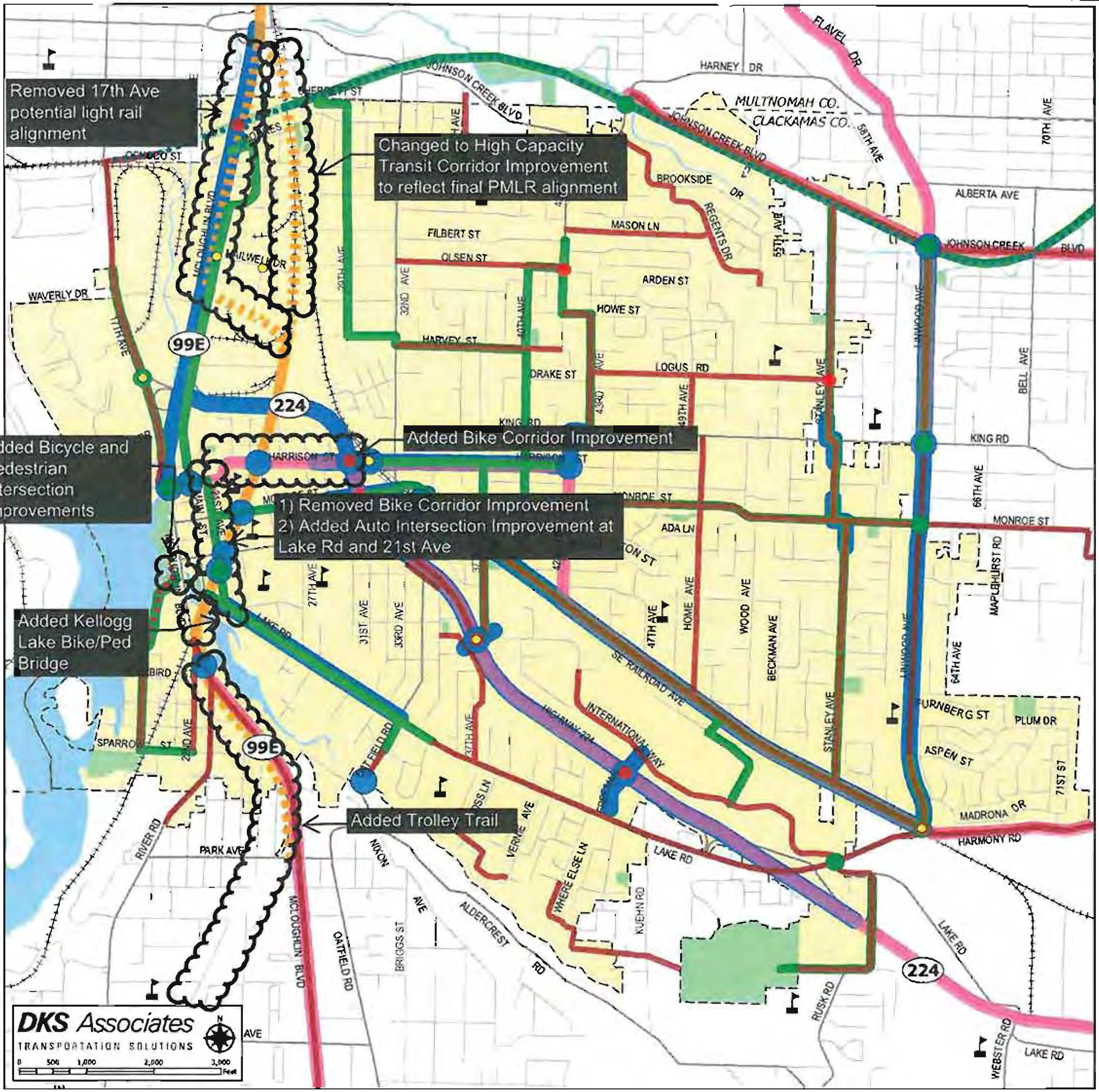
CITY OF MILWAUKIE

Transportation System Plan

FIGURE 1-1

COMPOSITE MASTER PLAN

December 2007



LEGEND

- Schools
- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Parks
- Water
- City Limits

PROPOSED PROJECTS

- Auto Corridor Improvement
- Transit Corridor Improvement
- High Capacity Transit Corridor Improvement
- Potential High Capacity Transit Corridor Alignment
- Potential High Capacity Transit Corridor Extension
- Bicycle Corridor Improvement
- Pedestrian Corridor Improvement
- Auto Intersection Improvement
- Bicycle Intersection Improvement
- Pedestrian Intersection Improvement
- Freight Intersection Improvement

PEDESTRIAN FACILITIES

Walking is the most affordable and accessible of all transportation modes. It is also clean, low-impact, and healthy for the individual. A safe and comfortable pedestrian environment allows people of all ages and abilities to travel independently.

Milwaukie's pedestrian system is challenged by an incomplete arterial/collector sidewalk system, a lack of local street connectivity, arterial crossings with potential safety and connectivity issues, and a lack of complete multiuse trails (see Chapter 3).

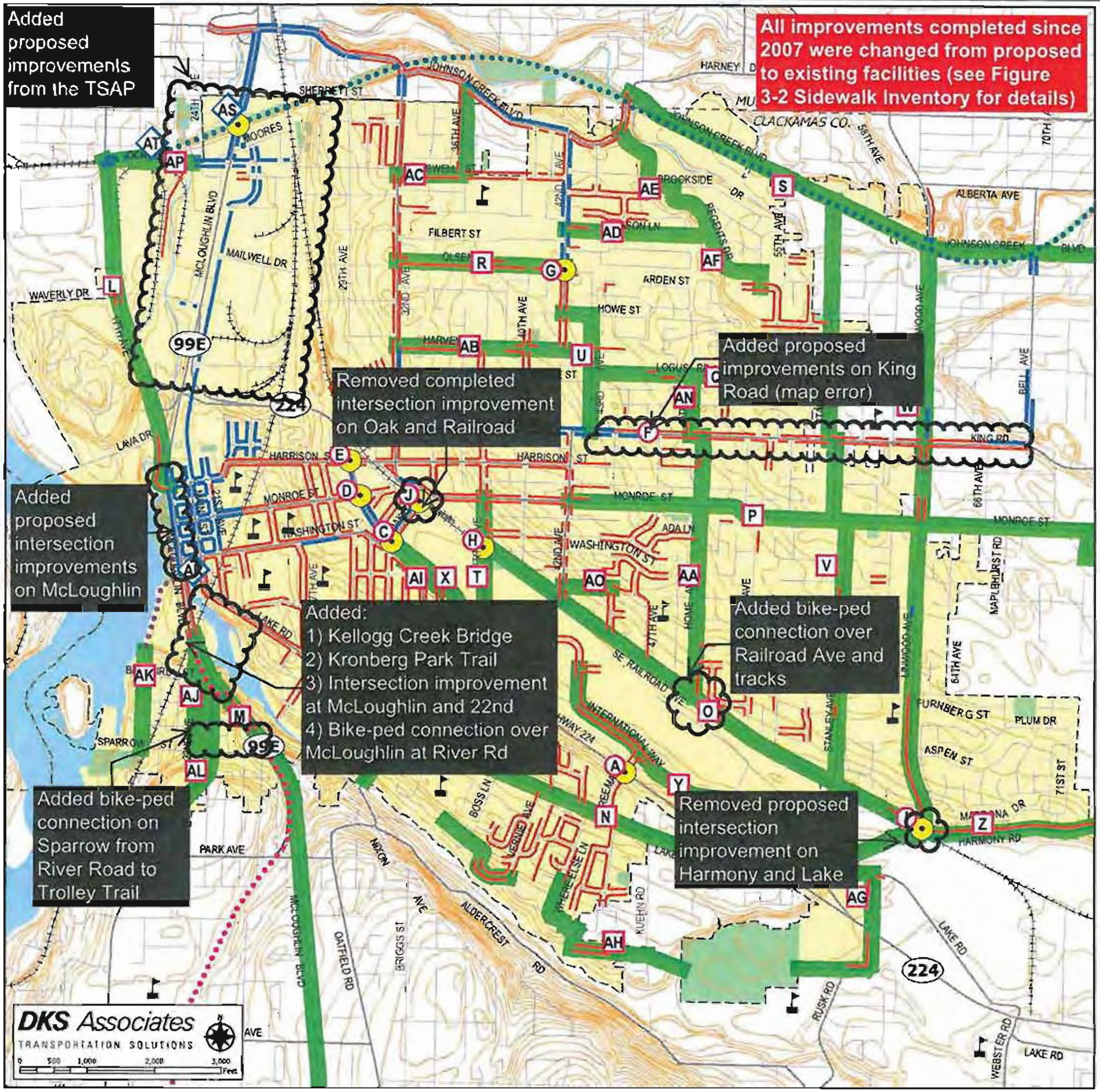
The City has several strategies for addressing pedestrian system needs and guiding project prioritization. The prioritization process helps to focus community investment on those projects that are most effective at addressing critical needs, while deferring other projects of lesser importance. The strategies for pedestrian facilities include:

- Key pedestrian corridors to connect neighborhoods with schools, parks, activity centers, and major transit stops.
- Arterial crossing and safety enhancements.
- Fill gaps in the network where some sidewalks exist.
- Pedestrian corridors that connect to major recreational uses.
- Enforcement of laws that protect pedestrians.
- Education about pedestrian safety and available walking routes.

These strategies would be implemented by projects that address needs and deficiencies.

Key Recommendations

- **Arterial and Collector Street Improvements:** Construct walkways along key collector and arterial streets, especially when project is publicly funded:
  - Monroe St from 42nd Ave to eastern city limit
  - Stanley Ave within the city limits
  - Linwood Ave within city limits
  - 17th Ave north of downtown
  - Railroad Ave within the city limits
- **Local Street Improvements:** Walkways on local streets will be mostly constructed by new/infill development.
- **Intersection Improvements:** Construct intersection improvements to improve pedestrian safety near Hwy 224 and the Milwaukie Marketplace:
  - Oak St by the railroad tracks
  - Harrison St and Hwy 224
  - Railroad Ave and 37th Ave
- **Develop and distribute walking maps** that show routes to major destinations such as parks, schools, commercial areas, and trails.
- **Enforce against motorists** who speed and run stop signs.



Transportation System Plan

FIGURE 1-2

PEDESTRIAN MASTER PLAN

December 2007

LEGEND

Existing Sidewalks
- < 5 ft. Width
- 5 ft. - 10 ft. Width
- Springwater Trail
- Kellogg Creek Trail

Proposed Improvement
- Pedestrian Facilities
- Pedestrian Intersection Safety Improvement
- Trolley Trail

- Schools
- Major Roads
- Streets
- Railroad
- 10' Contours
- County Line
- Parks
- Water
- City Limits

PROPOSED PROJECTS

Improve Intersection to Increase Pedestrian Safety
- (A) Freeman Way/HWY 224
- (B) 37th Ave/HWY 224
- (C) Oak St/HWY 224
- (D) Monroe St/HWY 224
- (E) Harrison St/HWY 224
- (F) King Rd crossing improvements
- (G) Olsen St/42nd Ave
- (H) Railroad Ave/37th Ave
- (I) Harmony Rd/Lake Rd
- (J) Oak St/railroad tracks
- (K) Stanley Ave/Logus Rd

Provide Pedestrian Facilities Where Not Currently Present

See Table 5-1 for L - AQ project descriptions

Enhance Existing Pedestrian Connection
- (AR) Construct pedestrian underpass under HWY 99E at Kellogg Creek
- (AS) Improve ramp at Springwater Trail/HWY 99E
- (AT) Complete Springwater Trail along Ochoco St

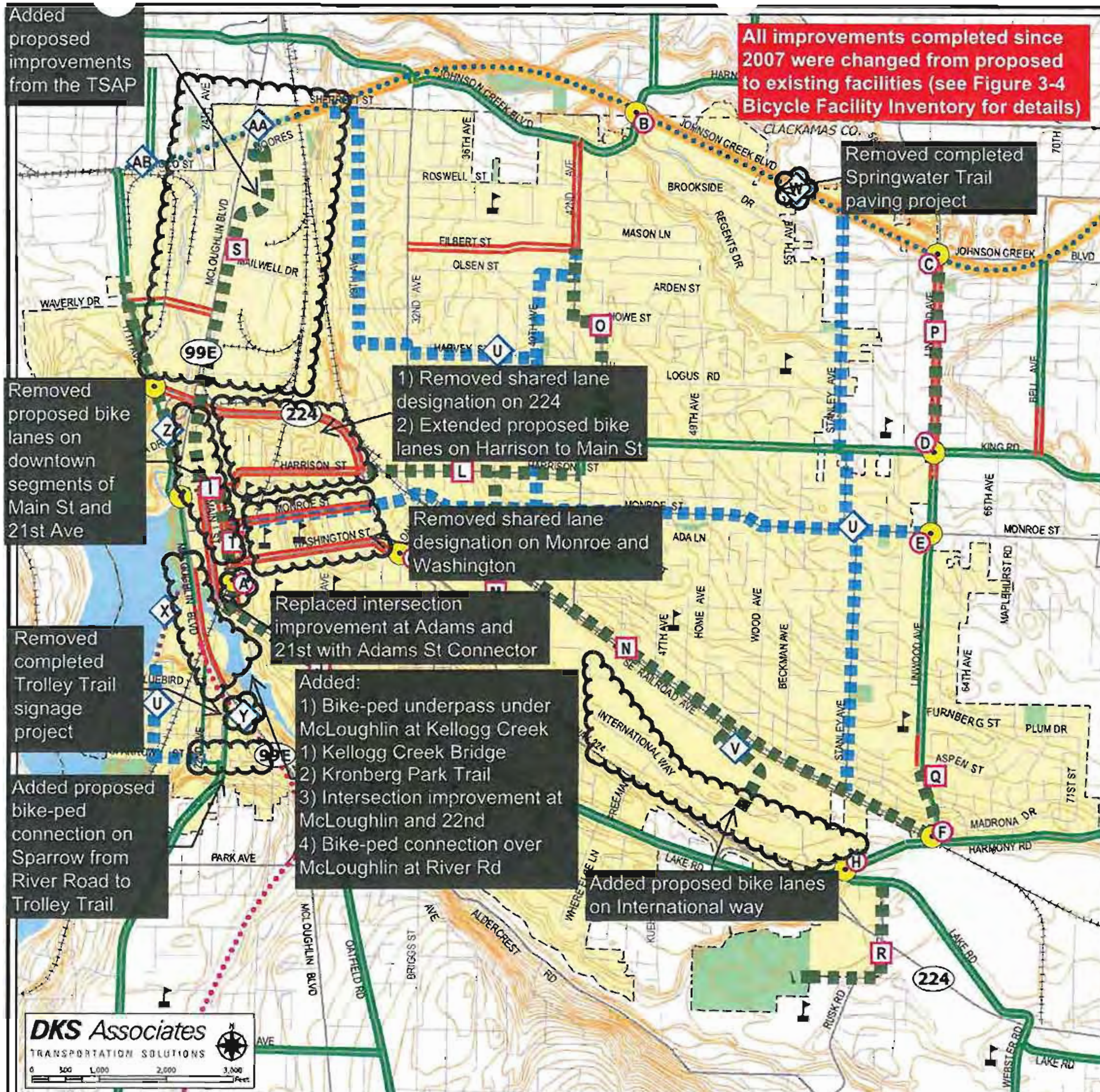
BICYCLE FACILITIES

The bicycle is a human-powered vehicle that allows people of all ages to move independently, at relatively low cost and with little impact to the environment. Bicycling promotes the well-being of people who live and work in Milwaukie, with the added benefit of reducing auto traffic on city streets.

Milwaukie's existing bicycle system is deficient in three primary ways: lack of connectivity, difficult crossings, and insufficient street designations. Recommended improvements should be aimed at closing the gaps in the bicycle network, improve crossing safety, maintaining the existing system, improving signage, and educating bicyclists and motorists.

Key Recommendations

- **~~Bike Boulevard~~ Neighborhood Greenway Improvements:** Prioritize "neighborhood greenways" (also sometimes referred to as "bike boulevards") as a method for providing safe bikeway connections to other transportation modes and between parks, schools, activity centers, and regional destinations. Establish neighborhood greenways along the following routes:
  - Monroe St from downtown to Linwood Ave
  - Stanley Ave from Railroad Ave to Springwater Trail
  - 29th Ave from Springwater Trail to Monroe St (via Harvey St and 40th Ave)
  - 19th Ave and Sparrow St to Trolley Trail
- **Bikeway Improvements:** Improve existing bikeways by paving, striping, adding signage, establishing bike lanes where appropriate, etc.
- **Intersection Improvements:** Make key intersections safer and more functional for bicyclists with treatments such as improved striping, accessible signal buttons, and bicycle detection devices.
- **Education:** Improve education for bicyclists and drivers and encourage bicycling through planned bicycling events.
- **Maintenance:** Keep bike lanes clear of debris.
- **Coordination with Other Jurisdictions:**
  - Work with other jurisdictions on long-range projects such as route connectivity and trail system planning and construction.
  - Improve response on day-to-day issues such as sweeping out bike lanes and enforcing traffic and parking laws.



CITY OF MILWAUKIE

Transportation System Plan

FIGURE 1-3

BICYCLE MASTER PLAN

December 2007

LEGEND

Existing Bicycle Facilities	*Proposed Improvements*
Shared Facility	Bicycle Intersection Safety Improvement
Bicycle Lane	Bicycle Corridor Enhancement
Springwater Trail	Bike Boulevard
Kellogg Creek Trail	Bicycle Lanes
	Trolley Trail
Schools	County Line
Major Roads	Parks
Streets	Water
Railroad	City Limits
10' Contours	

PROPOSED PROJECTS

Improve Intersection to Increase Bicycle Safety

- A Adams St/21st Ave/Railroad Crossing
- B Johnson Creek Blvd/Springwater Trail
- C Johnson Creek Blvd/Linwood Ave
- D Linwood Ave/King Rd
- E Linwood Ave/Monroe St
- F Linwood Ave/Harmony Rd
- G Washington St/Oak St/HWY 224
- H International Way/Lake Rd

Provide Bicycle Lanes Where not Currently Present

- I Harrison St from HWY 99E to 21st Ave
- J Lake Rd from Main St to Guilford Dr
- K Oatfield Rd from Guilford Ct to Lake Rd
- L Harrison St from HWY 224 to 42nd Ave
- M 37th Ave from Harrison St to HWY 224
- N Railroad Ave from 37th Ave to Linwood Ave
- O 43rd Ave from King Rd to Filbert St
- P Linwood Ave from Queen Rd to Johnson Creek Blvd
- Q Linwood Ave from approximately Juniper St to Harmony Rd
- R Rusk Rd from Lake Rd to North Clackamas Park
- S Main St from Harrison St to Moores St
- T 21st Ave from Harrison St to Lake Rd

Enhance Existing Bicycle Connection

- U Install Bike Boulevard treatments at various locations
- V Construct bicycle overpass from Railroad Ave to International Way
- W Improve Springwater Trail paving
- X Improve Kellogg Creek Trail
- Y Install Trolley Trail signage
- Z Fill in gaps in exisiting bike network with bike lanes or multiuse path. Improve intersection safety on 17th Ave at HWY 224 and at 99E.
- AA Improve ramp at Springwater Trail/HWY 99E
- AB Complete Springwater Trail along Ochoco St

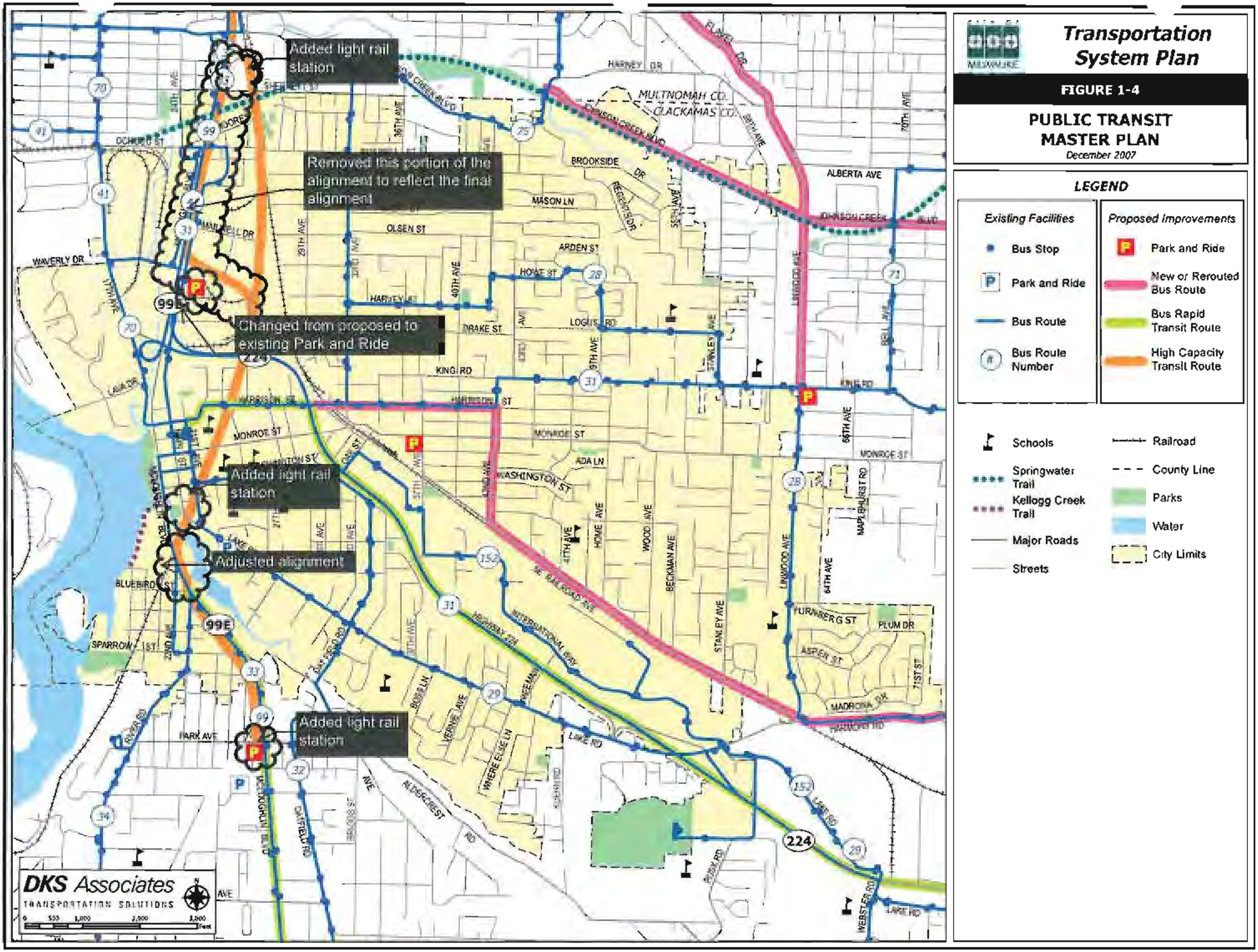
PUBLIC TRANSIT FACILITIES

The availability, convenience, and desirability of public transit are key aspects of a system that must support the movement of people to, from and through Milwaukie. Transit trips reduce single-occupant vehicle trips (which reduces traffic and energy consumption), serves community members who cannot drive (including the elderly, disabled, and youth), and minimizes transportation system impacts to the environment, such as vehicle emissions and soil and water pollution from impervious surface runoff.

Though transit service in Milwaukie needs to be improved in many ways, its greatest deficiencies are in the areas of service levels, safety, and convenience of service. There is a disparity between the City's goals for transit service and use, and the system's ability to meet those goals today. To close this gap, the City and TriMet should simultaneously pursue three types of improvements: service enhancements, capital improvements, and policy improvements.

Key Recommendations

- **Service Enhancements:**
  - Add a bus route on Railroad Ave (extending to Clackamas Town Center via Harmony Rd)
  - Add a bus route on Johnson Creek Blvd
  - Reduce headways to less than 30 minutes on all routes.
  - Enhance service on north-south routes.
  - Improve reliability of all routes.
- **Capital Improvements:**
  - Install shelters at bus stops that meet TriMet criteria.
  - Improve downtown bus stops and shelters, and include ample bike parking.
  - Construct a new bus layover facility at the Southgate park-and-ride.
- **Policy Recommendations:**
  - Eliminate the layover function of the downtown transit center.
  - Expand transit service. Provide service in "transit disadvantaged" areas. Fund local service enhancements through savings made from transit capacity improvements.
  - Provide appropriately located and sized park-and-ride facilities. Provide park-and-rides on Milwaukie's fringe for commuters and park-and-rides inside Milwaukie for Milwaukie residents.
  - Improve transit safety.
  - Reinvest transit "savings" within Milwaukie. Any savings derived from new capacity should be contained and reinvested within the Milwaukie service area.


Transportation System Plan
FIGURE 1-4
PUBLIC TRANSIT MASTER PLAN
December 2007
Added light rail station
Removed this portion of the alignment to reflect the final alignment
Changed from proposed to existing Park and Ride
Added light rail station
Adjusted alignment
Added light rail station
LEGEND
Existing Facilities
Bus Stop
Park and Ride
Bus Route
Bus Route Number
Proposed Improvements
Park and Ride
New or Rerouted Bus Route
Bus Rapid Transit Route
High Capacity Transit Route
Schools
Springwater Trail
Kellogg Creek Trail
Major Roads
Streets
Railroad
County Line
Parks
Water
City Limits
DKS Associates
TRANSPORTATION SOLUTIONS

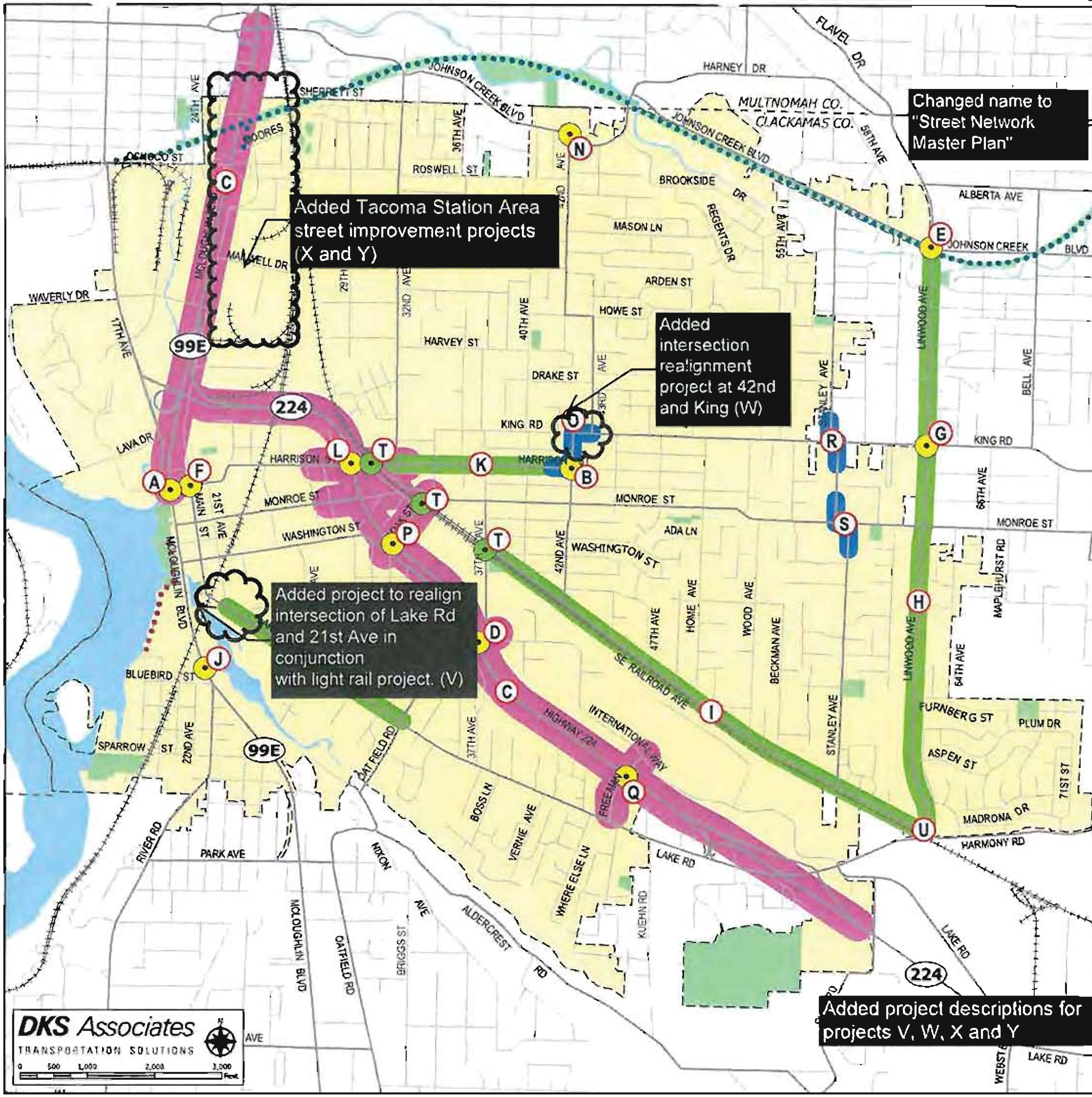
MOTOR VEHICLE FACILITIES

The ~~Auto~~ Street Network element of the TSP focuses on maintaining motor vehicle traffic flow and mobility on arterial and collector roadways, protecting residential neighborhoods from excessive through traffic and travel speeds, providing reasonable access to and from residential areas, improving safety, and promoting efficient through-street movement.

Limited connectivity between Milwaukie neighborhoods often forces motorists to travel out of direction and increases traffic volumes and miles traveled on the few connecting streets. Regional and local traffic volumes are projected to increase on many city streets and cause many intersections to operate below jurisdictional standards.

Key Recommendations

- **Use Transportation System Management** to get the most out of the existing system.
- **Improve substandard streets and intersections** to accommodate traffic and improve safety.
- **Enhance neighborhood character and livability** through well-designed street improvements.
- **Leverage Street Surface Maintenance projects** to bring roads up to standards when possible.
- **Initiate a Hwy 99E/Hwy 224 Refinement Plan** with ODOT to define the future conditions of this corridor. Assumptions to include:
  - Primary crosstown connection is Harrison St.
  - Improve freight access to North Industrial area
  - Multiple grade-separated connections between Harrison St and Freeman Way.
  - Reduce the visual and physical "barrier" effect of the highway for nonmotorized modes of travel.
- **Implement capacity improvement projects on key corridors** as needed:
  - Harrison St/Main St
  - Harrison St/42nd Ave/King Rd
  - Johnson Creek Blvd/Linwood Ave
  - King Rd/Linwood Ave
  - Monroe St



CITY OF MILWAUKIE

Transportation System Plan

FIGURE 1-5

~~AUTO~~ STREET NETWORK MASTER PLAN

December 2007

LEGEND

Proposed Street Network Improvements

- Roadway Widening Project
- Travel Route Improvement
- Corridor Refinement Plan
- Intersection Improvement
- Rail Crossing Improvement
- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Parks
- Water
- City Limits

PROPOSED PROJECTS

- (A) Prohibit left turn movement at 17th Ave/McLoughlin Blvd and include in Refinement Plan
- (B) Signalize Harrison St/42nd Ave
- (C) Conduct Refinement Plan for HWY 99E/HWY 224 focused on motor vehicle and freight mobility.
  - HWY 99E Project Limits: Tacoma St to 17th Ave
  - HWY 224 Project Limits: HWY 99E to Lake Rd Interchange
- (D) Reconfigure intersection to consolidate 37th Ave/ Industrial Way
- (E) Add eastbound/westbound right turn lanes and integrate the trail crossing
- (F) Create westbound shared through/right lane; or Add eastbound right turn pocket
- (G) Implement protected/permitted phasing for northbound and southbound left turns
- (H) Widen Linwood Ave to standard three lane cross section
- (I) Widen Railroad Ave to standard three lane cross section
- (J) Redesign intersections of River Rd and 22nd Ave to consolidate intersections; or Add northbound left turn pocket on River Rd
- (K) Widen Harrison St to standard three-lane cross section
- (L) Add left turn-lanes and protected signal phasing on Harrison St approaches
- (M) Widen Lake Rd to standard three-lane cross section
- (N) Replace 3-way stop with signal when warranted and appropriate. (Coordinate with the City of Portland)
- (O) Enhance connection between King Rd and Harrison St
- (P) Add protected signal phasing on Oak St approaches
- (Q) Improve intersection/modify access at HWY 224 and Freeman Way
- (R) Enhance connection along Stanley Ave at King Rd
- (S) Enhance connection along Stanley Ave at Monroe St
- (T) Implement railroad crossing safety and quiet zone project
- (U) Upgrade crossing to grade separated facility (dependant upon Harmony Rd Project findings)

FREIGHT PLAN

A quality local freight network facilitates movement of bulk goods and materials, and is essential to the economic health of the city. While all cities have some need for local delivery of goods to retailers and similar activities, in Milwaukie a majority of employment is in the heavy manufacturing, warehousing, and distribution sectors, which are dependent on efficient movements of large quantities of both raw materials and finished products. A well-functioning and reliable system for the movement of freight into and out of the city contributes significantly to the City's ability to attract and retain industrial investment—and the jobs and tax proceeds that come with that investment.

The city's freight network faces a few specific challenges. Access to the North Industrial area from McLoughlin Blvd is limited due to turn restrictions at Milport Rd and Ochoco St. Most rail crossings exhibit deterioration due to wear and tear and frequent train crossings, resulting in increased delay for the general public and freight haulers. The number of routes available to trucks is limited by weight limitations on certain freight routes and narrow intersections.

Key Recommendations

- **North Industrial Access:** Improve access to the area, potentially with an overpass of Hwy 99E at Ochoco St. This and other solutions should be evaluated through a Hwy 99E/224 Refinement Plan (described in the previous section).
  - ~~Light rail, if built on the 2003 "LPA" alignment (running along Main St or McLoughlin Blvd between Tacoma and Milport Rd), almost inevitably degrades access in and out of the east side.~~
- **Rail Crossings:** Improve the quality of the materials at at-grade crossings and pursue the grade separation of key crossings.
- **Street Reclassification:** Designate International Way as a freight route.

No major changes
Minor data updates

Transportation System Plan

MILWAUKIE

FIGURE 1-6

FREIGHT MASTER PLAN

December 2007

LEGEND

Existing Freight Routes

- Major Regional
- Minor Preferred (Local)
- Weight Restricted Minor Preferred (Local)

Proposed Improvements

- Intersection Improvement
- Intersection Material Upgrade
- Corridor Refinement Plan
- Minor Preferred Freight Route (Local)*

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Parks
- Water
- City Limits

*Upon adoption of this document, the functional classification for SE International Way will be upgraded to Minor Preferred Freight Route (Local).

PROPOSED PROJECTS

Improve Corridor

A Conduct Refinement Plan for HWY 99E/HWY 224 focused on motor vehicle and freight mobility.
- HWY 99E Project Limits: Tacoma St to 17th Ave
- HWY 224 Project Limits: HWY 99E to Lake Rd Interchange

Improve Intersection

B ***17th Ave/HWY 224***
Upgrade intersection turning radii to better accommodate freight movements

C ***Main St/Mailwell Dr***
Upgrade intersection turning radii to better accommodate freight movements

D ***Mailwell Dr/Omark Dr***
Upgrade intersection turning radii to better accommodate freight movements

E ***Harrison St/Union Pacific Railroad Crossing***
Upgrade crossing to grade separated facility (outcome of crossing dependant upon 99E/224 Refinement Plan findings)

F ***HWY 224/37th Ave***
Consolidate two northern legs of 37th Ave and Industrial Way into one leg at HWY 224.

G ***Harmony Rd/Union Pacific Railroad Crossing***
Upgrade crossing to grade separated facility (outcome of crossing dependant upon Harmony Rd Project findings)

H ***At-grade Railroad Crossing Material Upgrades***
Upgrade crossing paving material to concrete or rubberized material for longevity of crossing at: Harrison St, Monroe St, Washington St, Adams St, Oak St, and 37th Ave

STREET DESIGN

A street's design determines how it will look and function. How a street looks and functions ultimately depends upon which elements are included, their dimensions, and how they relate to each other. Well-designed streets can contribute to the identity and character of a neighborhood and increase property values. They can also speed or slow traffic, reduce environmental impacts, and allow for safe multimodal use.

Problems

Milwaukie is a developed city with a largely incomplete street network. Though the community supports the completion of its streets through construction of safe pedestrian and bicycle facilities, most neighborhoods also want to maintain neighborhood character by saving existing trees and maintaining the slower traffic speeds that often accompany substandard roads. The City's current design standards limit the City's ability to sensitively improve existing streets by only allowing a few street design options. Allowing for more flexibility when determining the design of a street would allow for the City to respond to the character of the surrounding natural and built environments.

Possible Solutions

The City should update its standards and policies to allow for implementation of context-sensitive street design. The use of innovative designs, such as green streets, skinny streets, and flexible pedestrian designs are some examples of street design options that the City could incorporate into its street design standards.

Key Recommendations

- **Standards:** Develop a baseline cross section for each street functional classification and a street design prioritization approach for when the baseline design elements do not fit.
- **Flexibility:** Build more flexibility into street design standards to:
  - Allow for local design preferences.
  - Increase bicycle and pedestrian safety.
  - Avoid costly and time-consuming variance process requirements.
- **Alternative Designs:** Develop street design standards for green streets, skinny streets, and alternative pedestrian facilities.
- **Balance:** Balance the larger community's needs, local design preferences, and best practices when developing street design standards.
- **Landscaping:** Provide for landscaping (including street trees) wherever feasible.
- **Maintenance:** Consider maintenance costs and issues when developing design standards and design alternatives.

NEIGHBORHOOD TRAFFIC MANAGEMENT

The City recognizes that the vitality and feel of a neighborhood can be greatly influenced by the speed and volume of traffic traveling to and through it. Neighborhood traffic management is a way for the City and its citizens to create a dialogue about traffic concerns on a neighborhood level.

Problems

Milwaukie consists mostly of residential neighborhoods, and has a relatively small population compared to the surrounding Portland metropolitan area. Because of its proximity to the city of Portland, its many employment opportunities, and the two major regional routes that traverse the city (McLoughlin Blvd and Hwy 224), cut-through traffic is an ongoing concern for Milwaukie residents. As traffic volumes increase and congestion occurs on regional routes and major streets, there is potential for traffic to spill over onto neighborhood routes and local streets in search of less congested or more direct routes. Neighborhood traffic management is a means to address the negative impacts of unchecked speed and volume on neighborhood and local streets.

Possible Solutions

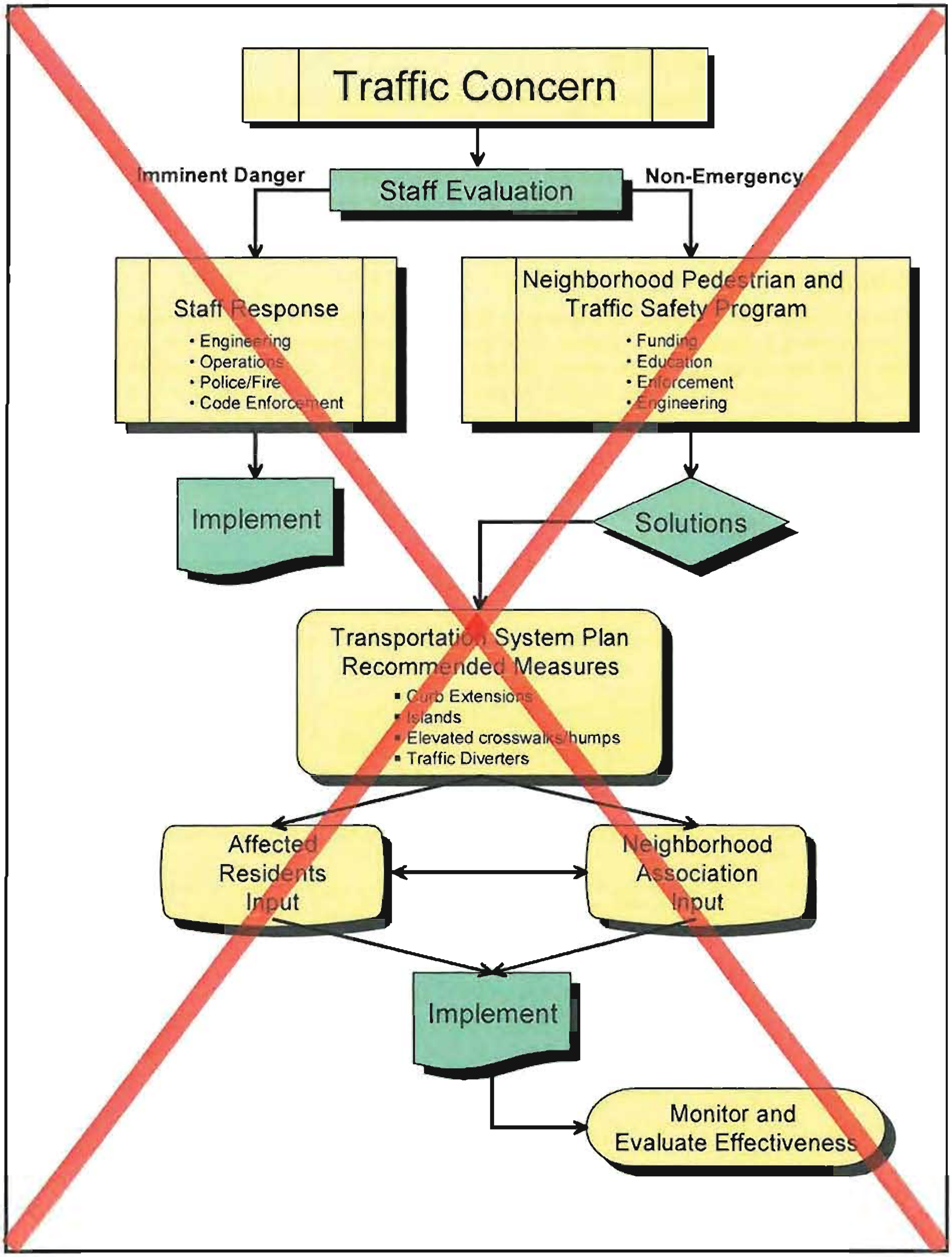
There are many different options available in the neighborhood traffic management 'tool box,' but not all of these options are appropriate for all streets. Traffic management options need to be based on the functional classification of the road, surrounding land uses, the design of the street, as well as input from emergency services and residents. Effective use of neighborhood traffic management in Milwaukie can address community needs and concerns, including, but not limited to, the following:

- Speeding
- Cut-through traffic
- Pedestrian safety
- Student safety around school zones

Key Recommendations

- **Funding:** It is recommended that the City annually fund the ~~Neighborhood Pedestrian and Traffic Safety~~ Walk Safely Milwaukie Program so that prioritized needs are implemented over time. The Neighborhood Traffic Management Action Plan (see Table 11-2) does not identify specific projects, but it does show the level of funding the City ~~proposes~~ aspires to commit to the ~~Neighborhood Pedestrian and Traffic Safety~~ Walk Safely Milwaukie Program for the duration of this plan. With regard to this funding, it is recommended that the City develop a process that ensures neighborhood traffic management funding is equitably distributed throughout the city.
- **Investment:** Allocate a certain amount of money per year to install selected neighborhood traffic management projects. The number of projects would be limited but coordinated with citizen involvement. Encourage implementation of neighborhood traffic management projects by private development.
- **Variety:** Allow for a wide variety of traffic management measures.
- **Effectiveness:** Ensure that the chosen measure addresses the identified problem.
- **Neighborhood Input:** Involve affected neighborhoods when designing neighborhood traffic management measures.
- **Landscaping:** Neighborhood traffic management solutions need to provide for landscaping wherever feasible.
- **Maintenance:** Consider maintenance needs and issues (including landscaping) when designing traffic management measures and ensure that the long-term maintenance needs can be met.

~~*Figure 1-7 Neighborhood Traffic Management Process*~~



[Delete duplicate Figure 1-7: Neighborhood Traffic Management Process. Already included in Chapter 11 as Figure 11-1.]

DOWNTOWN PARKING

Properly managed downtown parking is vital for implementing and maintaining the City's 2001 *Downtown and Riverfront Land Use Framework Plan*. This plan envisions a lively downtown area with a clear sense of place and identity, comprised of an attractive mix of uses and amenities. The city's downtown area will grow as an important employment center and therefore parking must be built and managed to serve the retail core as downtown transitions to a multimodal environment.

Problems

Currently, downtown Milwaukie is vulnerable to serving as an impromptu park-and-ride for people traveling to downtown Portland. Downtown residents and employees are parking in ~~stalls~~ spaces that should serve visitors, which causes parking to spill over into neighborhoods. The parking lots that are available, and some downtown streets, are not well lit and do not feel safe. Downtown employees are often not aware of their parking and transportation options and the current parking permit system does not work as well as it could. As the downtown area evolves, the existing parking lots will be developed and other parking options will need to be considered.

Possible Solutions

There are two viable solutions Milwaukie can use to improve the downtown parking situation: parking management and parking supply. Parking must be managed to assure that priority land uses are supported with an effective and efficient system of access that caters to the needs of priority users. The City and the private sector can also invest in new parking supply to support downtown development.

Key Recommendations

- **Manage parking to support downtown revitalization**, according to the vision in the Downtown and Riverfront Plan. Manage on-street parking to serve adjacent ground-floor uses.
- **Keep an updated parking inventory** and conduct periodic parking use studies to understand how parking areas are used.
- **When parking areas are over 85% full**, adjust parking management practices to make the best use of available parking (adjust parking zones, increase prices, install parking meters, etc.).
- **Require the private sector to identify sufficient parking** for residential and commercial uses, but do not ask developers to "over-build" parking. Encourage shared parking arrangements.
- **Provide public off-street parking for downtown employees** as funds and property availability allows. First priority will be given to buildings and businesses existing in 2007.
- **Work with property and business owners** to decrease employees' need for auto parking as downtown transitions to a multimodal environment.
- **Develop a plan to ~~finance and~~ locate a public parking structure** to support downtown, but only in collaboration with the downtown business community and only after a viable funding strategy is identified.

OVERVIEW

Transportation goals and policies form the basis for how the local transportation system will be developed and maintained over the next ~~20~~ 22 years. The City's transportation goals support a multimodal approach to transportation planning and reflect how citizens think about and experience Milwaukie's transportation system.

The policy framework of this plan is organized as follows:

- **Goal Statement:** A statement that describes an ideal condition that the City desires to attain over time for various aspects of the transportation system. For example: Provide access to safe, affordable, and reliable transportation choices for all Milwaukie residents and businesses.
- **Policy Statements:** Statements that are intended to outline specific measures that will be taken to achieve a goal.

The following section lists the goals and policies for the Milwaukie Transportation System Plan (TSP). They are not listed in order of importance or priority, but rather are all aspects that need to be considered when developing, funding, and managing the transportation system.

GOAL 1 LIVABILITY

Design and construct transportation facilities in a manner that enhances the livability of Milwaukie's community.

Policies

a. Provide convenient walking and bicycling facilities to promote the health and physical well being of Milwaukie citizens.

b. Protect residential neighborhoods from excessive through traffic and travel speeds while providing reasonable access to and from residential areas.

c. Protect residential neighborhoods from excessive noise and pollutants associated with higher functional class streets, industrial uses, and rail activities.

d. Minimize the "barrier" effect of large transportation facilities on nonmotorized modes of travel.

e. Construct a transportation system that is accessible to all members of the community.

f. Provide a seamless and coordinated transportation system that is barrier-free, provides affordable and equitable access to travel choices, and serves the needs of all people and businesses, including citizens of low income, people with disabilities, children, and seniors.

GOAL 2 SAFETY

Develop and maintain a safe and secure transportation system.

Policies

a. Design and maintain safe and secure walkways and bikeways between parks, schools, and other activity centers in Milwaukie.

b. Design and construct transportation-related improvements to meet City standards as outlined in the City's Transportation Design Manual and the Americans with Disabilities Act (ADA).

c. Adopt and implement access control and spacing standards for all streets under the City's jurisdiction to improve safety and promote efficient through-street movement. Access control measures should be generally consistent with Clackamas County access guidelines to ensure consistency on City and County roads.

d Improve riders' sense of safety at transit stops through lighting, design, and enforcement.

GOAL 3 TRAVEL CHOICES

Plan, develop, and maintain a transportation system that provides travel choices and allows people to reduce the number of trips made by single-occupant vehicles.

Policies

a. Provide a citywide network of convenient walkways and bikeways that are integrated with other transportation modes and regional destinations.

b. Collaborate with TriMet and other transit providers to provide convenient and accessible public transit service to all Milwaukie neighborhoods.

c. Support travel options that allow individuals to reduce single-occupant vehicle trips.

d. Establish local non-single-occupancy-vehicle (non-SOV) modal targets, subject to new data and methodology made available to local governments, for all relevant design types identified in the Regional Transportation Plan. Targets must meet or exceed the regional modal targets for 2040 Growth Concept land use design types as illustrated in ~~the following~~ Table 2-1.

Table 2-1 2040 Regional Metro Targets for Non-Single-Occupant Vehicles (non-SOVs)

2040 Design Type	Modal Target
Regional centers, town centers, main streets, station communities, corridors, passenger intermodal facilities	45% to 55%
Industrial areas, freight intermodal facilities, employment areas, inner neighborhoods, outer neighborhoods	40% to 45 %

e. Encourage local employment and commercial job creation in order to reduce the number of locally generated regional work and shopping trips.

f. Ensure bike and bus routes are well separated, marked, mapped, and marketed.

g. Ensure that savings derived from adding capacity (LRT or other) is reinvested in local service enhancements for Milwaukie.

GOAL 4 QUALITY DESIGN

Establish and maintain a set of transportation design and development regulations that are sensitive to local conditions.

Policies

a. Design streets to support their intended users.

b. Integrate bicycle and pedestrian facilities into street planning, design, construction, and maintenance activities.

c. Require developers to include pedestrian-, bicycle-, and transit-supportive improvements within proposed developments and adjacent rights-of-way in accordance with adopted policies and standards.

d. Promote context-sensitive transportation facility design, which fits the physical context, responds to environmental resources, and maintains safety and mobility.

e. Consider maintenance costs and issues when developing and implementing design standards.

f. Promote landscaping and pervious surfaces wherever practical and feasible.

GOAL 5 RELIABILITY AND MOBILITY

Develop and maintain a well-connected transportation system that reduces travel distance, improves reliability, and manages congestion.

Policies

a. Enhance street system connectivity wherever practical and feasible. In particular, improve east-west connectivity across the community, especially to connect the eastern neighborhoods across Hwy 224 to downtown.

b. Maintain traffic flow and mobility on arterial and collector roadways.

GOAL 6 SUSTAINABILITY

Provide a sustainable transportation system that meets the needs of present and future generations.

Policies

a. Encourage an energy efficient transportation system.

b. Increase the use of walking and bicycling for all travel purposes.

c. Improve and enhance the livability of Milwaukie by decreasing reliance on automobile transportation and increasing the use of other modes to minimize transportation system impacts on the environment.

d. Practice stewardship of air, water, land, wildlife, and botanical resources. Take into account the natural environments in the planning, design, construction, and maintenance of the transportation system.

GOAL 7 EFFICIENT AND INNOVATIVE FUNDING

Efficiently allocate available funding for recommended transportation improvements, and pursue additional transportation funding that includes innovative funding methods and sources.

Policies

a. Plan for an economically viable and cost-effective transportation system.

b. Identify and develop diverse and stable funding sources to implement recommended projects in a timely fashion.

c. Prioritize maintenance of the transportation system.

d. Identify local street improvement projects that can be funded by the State of Oregon to improve the performance of the State highway system.

e. Provide funding for local match share of jointly funded capital projects with other public partners.

f. Prioritize funding of projects that are most effective at meeting the goals and policies of the TSP.

GOAL 8 COMPATIBILITY

Develop a transportation system that is consistent with the City's Comprehensive Plan and coordinates with County, State, and regional plans.

a. Coordinate and cooperate with adjacent jurisdictions and other transportation agencies to develop transportation projects that benefit the city of Milwaukie and the region as a whole.

b. Work collaboratively with other jurisdictions and agencies so the transportation system can function as one.

c Coordinate with other jurisdictions and community organizations to develop and distribute transportation-related information.

d. Review City transportation standards periodically to ensure consistency with regional, State, and federal standards.

e. Coordinate with TriMet, the Milwaukie Center, and adjacent jurisdictions to identify existing and future transit-related needs, including placement of park-and-ride facilities.

f. With ODOT's assistance, coordinate with railroad companies to provide a viable commercial railroad system in and through Milwaukie.

g. Coordinate with ODOT to address improvements to State highways within Milwaukie to benefit all modes of transportation.

GOAL 9 ECONOMIC VITALITY

Promote the development of Milwaukie's, the region's, and the state's economies through the efficient movement of people, goods, and services, and the distribution of information.

Policies

a. Ensure a safe and efficient freight system that facilitates the movement of goods to, from, and through Milwaukie, the region, and the state while minimizing conflicts with other travel modes.

b. Consider constructing grade separation or gate control for all railroad crossings.

c. Provide transportation facilities that support land uses that are consistent with the Comprehensive Plan.

d. Evaluate land development projects to determine possible adverse traffic impacts

e. Ensure that all new development contributes a fair share toward on-site and off-site transportation system improvements.

f. Manage parking in downtown to support revitalization, according to the vision in the *Milwaukie Downtown and Riverfront Plan*. The purpose of, and priority for, on-street parking in downtown is to support the vitality of the retail core.

3 Existing Conditions

The main objective of Milwaukie's Transportation System Plan (TSP) is to inventory, evaluate, and plan for all modes of travel. The purpose of this chapter is to document the existing transportation facilities in the TSP study area, and provide a basis of knowledge and benchmarks for assessing the physical and operational needs of the system.

OVERVIEW

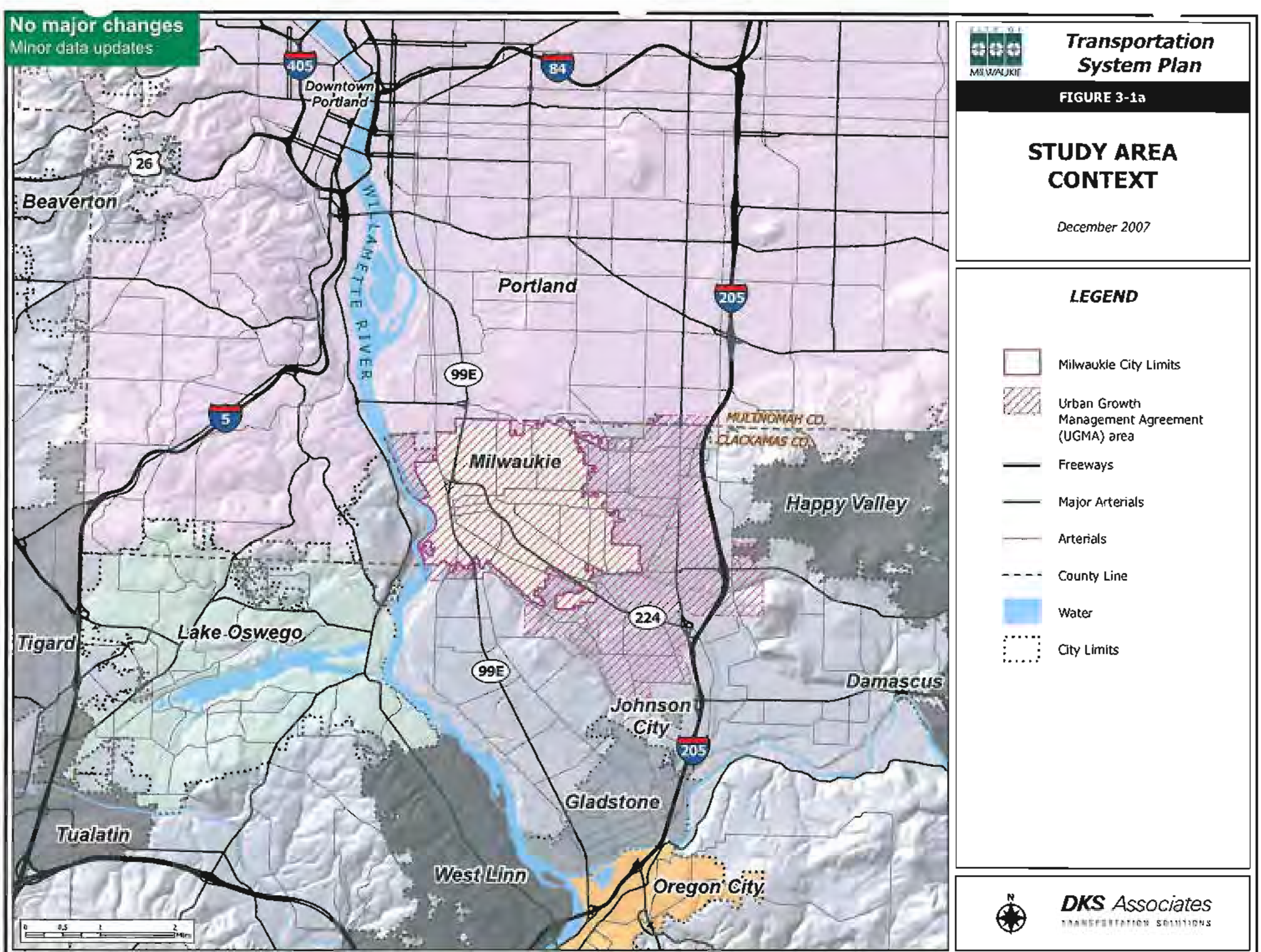
Existing transportation conditions in Milwaukie were evaluated in late 2006. The existing traffic and transportation conditions for the following modes of travel and items that affect the transportation environment were inventoried and analyzed:

- Pedestrians
- Bicycles
- Public Transit
- Motor Vehicle
- ~~Freight~~
- Rail
- Parking
- Environmental Justice
- Environmental Resources

This list of areas covered includes two topics not previously included in the 1997 TSP: environmental justice and environmental resources. Environmental justice with respect to transportation is aimed at identifying underserved and vulnerable populations to help increase outreach efforts to adequately serve those areas within the city. The environmental resources evaluation within this document helps to identify and map environmentally sensitive areas with respect to flood plains, fish and wildlife habitat, wetlands, vegetation, and local historical resources.

The city of Milwaukie is located within Clackamas County just south of the city of Portland. Figure 3-1a shows the location of Milwaukie with respect to the Portland metropolitan region. The study area for this analysis is defined as approximately 1/4 mile beyond the city of Milwaukie boundary limits and includes twenty-two intersections that were selected to address major roadways and areas of concern. Figure 3-1b shows this study area and the study area intersections.

The following sections describe the City's existing transportation facilities and their usage and performance.

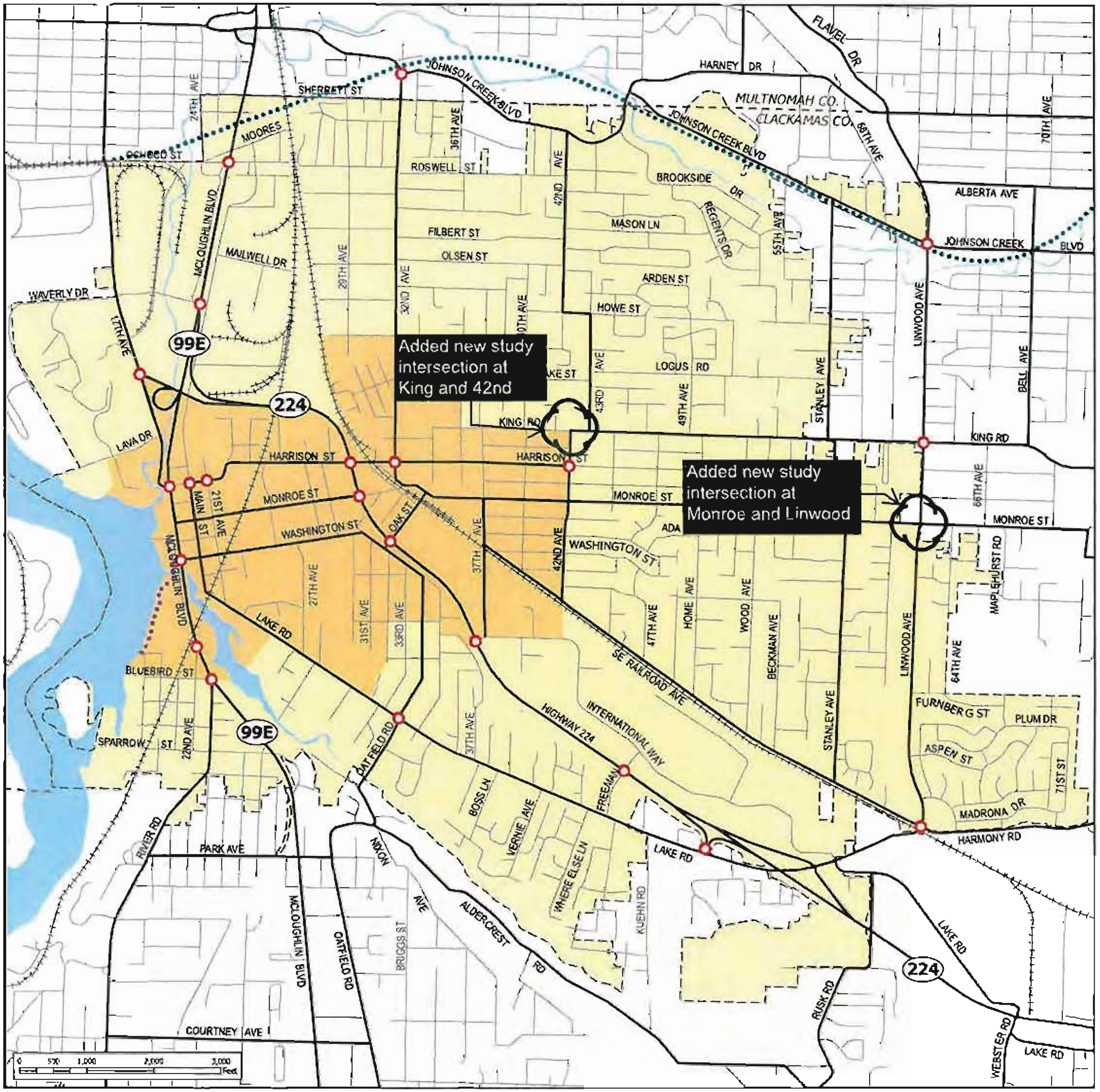

No major changes
Minor data updates
Transportation System Plan
MILWAUKIE
FIGURE 3-1a
STUDY AREA CONTEXT
December 2007
LEGEND
Milwaukie City Limits
Urban Growth Management Agreement (UGMA) area
Freeways
Major Arterials
Arterials
County Line
Water
City Limits
DKS Associates
TRANSPORTATION SOLUTIONS
405
84
205
5
26
99E
224
Downtown Portland
Beaverton
Portland
WILLAMETTE RIVER
MULTNOMAH CO.
CLACKAMAS CO.
Milwaukie
Happy Valley
Tigard
Lake Oswego
Damascus
Johnson City
Gladstone
Tualatin
West Linn
Oregon City

Transportation System Plan

FIGURE 3-1b

STUDY AREA

December 2007



LEGEND

- Study Intersections
- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Town Center
- Water
- City Limits

Note: "SE" street name prefix applies to all roads.

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PEDESTRIANS

The Metro Regional Transportation Plan (RTP) identifies downtown Milwaukie as a Town Center; a local activity area that provides a range of local retail and service opportunities within close proximity to each other. Milwaukie's downtown is characterized by a variety of small specialty retail shops, storefront businesses, and a historic street grid network. There are three parks within downtown and five schools within the Town Center boundary. These features are important hubs of pedestrian activity.

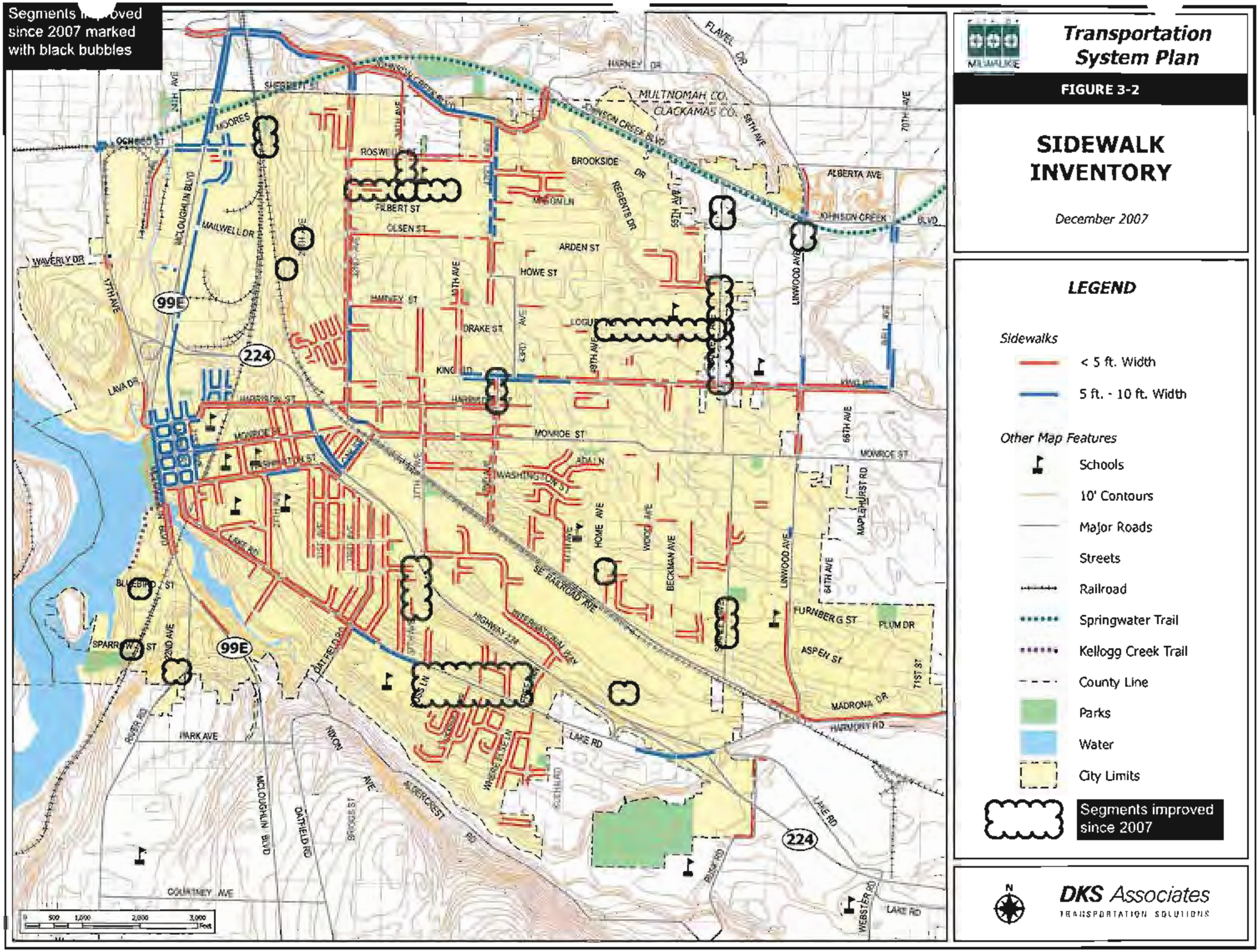
Existing Pedestrian Facilities

All of the sidewalks and trails within Milwaukie are displayed in Figure 3-2. Many sections of the City's arterial and collector streets, identified as Major Roads on Figure 3-2, have sidewalks on at least one side of the street. A typical sidewalk configuration is a "curb tight" design, where the sidewalk is constructed adjacent to the curb.

In general, neighborhoods to the northeast of Hwy 224 lack adequate pedestrian facilities. For example many older residential areas in this part of the city have no sidewalks whatsoever whereas most of the streets in downtown and residential areas to the southwest of Hwy 224 have sidewalks on both sides. This patchwork of sidewalks is well illustrated in Figure 3-2, which shows the existing sidewalks and areas lacking.

Based on a visual inspection, many of the sidewalks in Milwaukie are in good to excellent condition, with no major cracking or heaving. Examples of sidewalks in very good or excellent condition are 37th Ave near Milwaukie Marketplace and along McLoughlin Blvd near downtown. Almost all sidewalks are located in the public right-of-way, yet in Milwaukie it is the responsibility of the adjacent property owner to repair sidewalks in poor condition.

Sidewalks are rarely free of obstructions, and Milwaukie sidewalks are no exception. In addition to the occasional utility pole, many Milwaukie residents share their sidewalks with mailboxes. This is more of a concern where older, narrower sidewalks exist; for instance, the western portion of Lake Rd, where the sidewalk is narrow and made of asphalt.



Segments
since 2007 marked
with black bubbles
Transportation System Plan
MILWAUKIE
FIGURE 3-2
SIDEWALK INVENTORY
December 2007
LEGEND
Sidewalks
< 5 ft. Width
5 ft. - 10 ft. Width
Other Map Features
Schools
10' Contours
Major Roads
Streets
Railroad
Springwater Trail
Kellogg Creek Trail
County Line
Parks
Water
City Limits
Segments improved since 2007
DKS Associates
TRANSPORTATION SOLUTIONS
N
MULTNOMAH CO.
CLACKAMAS CO.
FLAVEL DR
HARNEY DR
JOHNSON CREEK BLVD
SHERRETT ST
OCHOCO ST
MOORES
ROSWELL
FILBERT ST
OLSEN ST
BROOKSIDE DR
REGENTS DR
ARDEN ST
HOWE ST
HARNEY ST
DRAKE ST
LOGUS
KING RD
HARRISON ST
MONROE ST
WASHINGTON ST
ADALN
ALBERTA AVE
LINWOOD AVE
66TH AVE
MAPLEHURST RD
64TH AVE
FURNBERG ST
PLUM DR
ASPEN ST
MADRONA DR
HARMONY RD
71ST ST
70TH AVE
58TH AVE
MAILWELL DR
WAVERLY DR
17TH AVE
MCLOUGHLIN BLVD
LAVA DR
99E
224
SE RAILROAD AVE
HIGHWAY 224
HOME AVE
WOOD AVE
BECKMAN AVE
LAKE RD
BLUEBIRD ST
SPARROW ST
22ND AVE
PARK AVE
RIVER RD
OATFIELD RD
NIXON AVE
ALDERCREST RD
COURTNEY AVE
WEBSTER RD

In Milwaukie, wheelchair ramps are not provided at every intersection with sidewalks. However, since the Americans with Disabilities Act (ADA) was enacted in 1991, the City has required and installed wheelchair ramps in all sidewalk projects. Over the past few years, the City has retrofitted numerous intersections in the downtown area with wheelchair ramps. There are still a number of intersections that have partial or no ramps and need to be retrofitted.

Pedestrian crosswalks exist primarily at signalized intersections and crossings. Most of these intersections have crosswalks on all four legs, but there are a few where crosswalks are only partially provided.

The Springwater Trail, a regional multiuse path, extends east from Ochoco St, and continues along Johnson Creek Blvd to Linwood Ave, where it extends beyond the city limits to the east. East of 45th Ave, this trail serves as a pedestrian facility for Johnson Creek Blvd, as there are no sidewalks on this stretch of road. The ~~recently completed~~ Three Bridges Project, which constructed bridges across the Union Pacific Railroad, McLoughlin Blvd, and Johnson Creek, has extended the Springwater Trail westward to the intersection of 19th St/Ochoco St. This trail is nearly continuous and connects Portland to Milwaukie. However, there is limited access to the trail between 45th Ave and Ochoco St due to grade separation of the trail and the streets it crosses.

The Kellogg Creek Trail, a regional multiuse path, is recognized by Metro as being part of the North Clackamas Greenway. The trail is 7.5 feet wide and runs along the Willamette River from Adams St to Eagle St, connecting downtown Milwaukie with the Island Station neighborhood. This trail serves as an alternative multiuse path along McLoughlin Blvd and the riverfront.

Another trail that is partially constructed is the Trolley Trail. This multiuse trail starts in downtown Milwaukie and ~~will eventually~~ extends south to Gladstone. The Trolley Trail provides an aesthetically pleasing and safe connection between neighborhoods, parks, schools, retirement communities, businesses, and public transit. A segment of the trail along McLoughlin Ave between Park Ave and River Rd is closed until 2014 due to construction of the Portland-Milwaukie Light Rail (PMLR).

Pedestrian Volume

Pedestrian crossing volumes were counted at the study intersections during the summer of 2006, and are shown in Figure 3-3a and Figure 3-3b. The counts were taken during the evening peak period (4:00 to 6:00 p.m.) at the study intersections, and represent a snapshot in time of pedestrian travel.

The most significant pedestrian movements occur near retail and educational areas, including downtown Milwaukie, the intersection of Linwood Ave and King Rd, and the intersection of Johnson Creek Blvd and Linwood Ave. Along major roadways, such as McLoughlin Blvd and Hwy 224, pedestrian crossings are limited to locations with traffic signal controls, due to high motor vehicle volumes and speeds.

Summary of Pedestrian Findings

The following summarizes key pedestrian findings related to the level of activity documented as well as deficiencies for this mode of travel. These findings will be utilized to help guide future improvements to address the deficiencies for this mode of travel in the transportation network.

- The majority of study area intersections have pedestrian activity levels on individual legs of the intersections that are ten crossings or less during the p.m. peak hour. Locations with higher activity levels than this occur along the Springwater Trail and in downtown.
- There are a number of discontinuous sidewalks within Milwaukie that prohibit the ease of use for pedestrians to travel in and around the city. These occur primarily in the east and north areas of the city.
- The city contains numerous dead-end and curvilinear streets that hamper pedestrian connectivity.
- Travel between the ~~northern~~ eastern and ~~southern~~ western areas of the city is particularly problematic due to the location of Hwy 224 and the railroad line that parallels it to the north. Both of these transportation facilities act as barriers to pedestrian travel because there are few places where these facilities can be crossed. The roadway width and average vehicle speed on Hwy 224 also contribute to this barrier effect.
- The ~~widespread~~ use of asphalt at the city's railroad crossings is also of concern to pedestrians because it is more prone to buckling than concrete. The city has numerous at-grade railroad crossings, and the ~~asphalt~~ condition at these crossings varies widely. Those crossings with uneven walking surfaces~~, such as the one at Oak St,~~ are of special concern to elderly and disabled individuals.

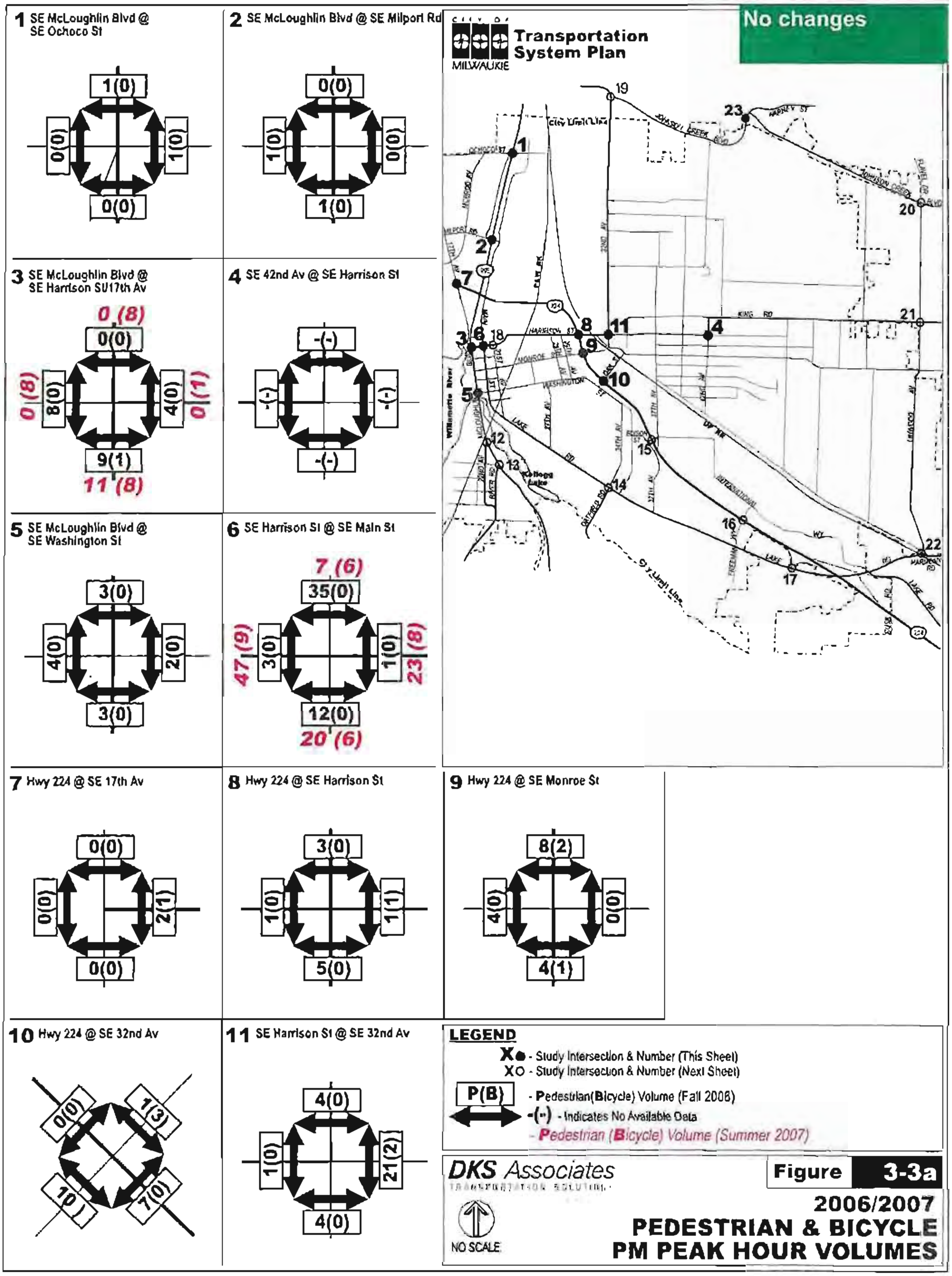


Figure 3-3a
2006/2007 PEDESTRIAN & BICYCLE PM PEAK HOUR VOLUMES

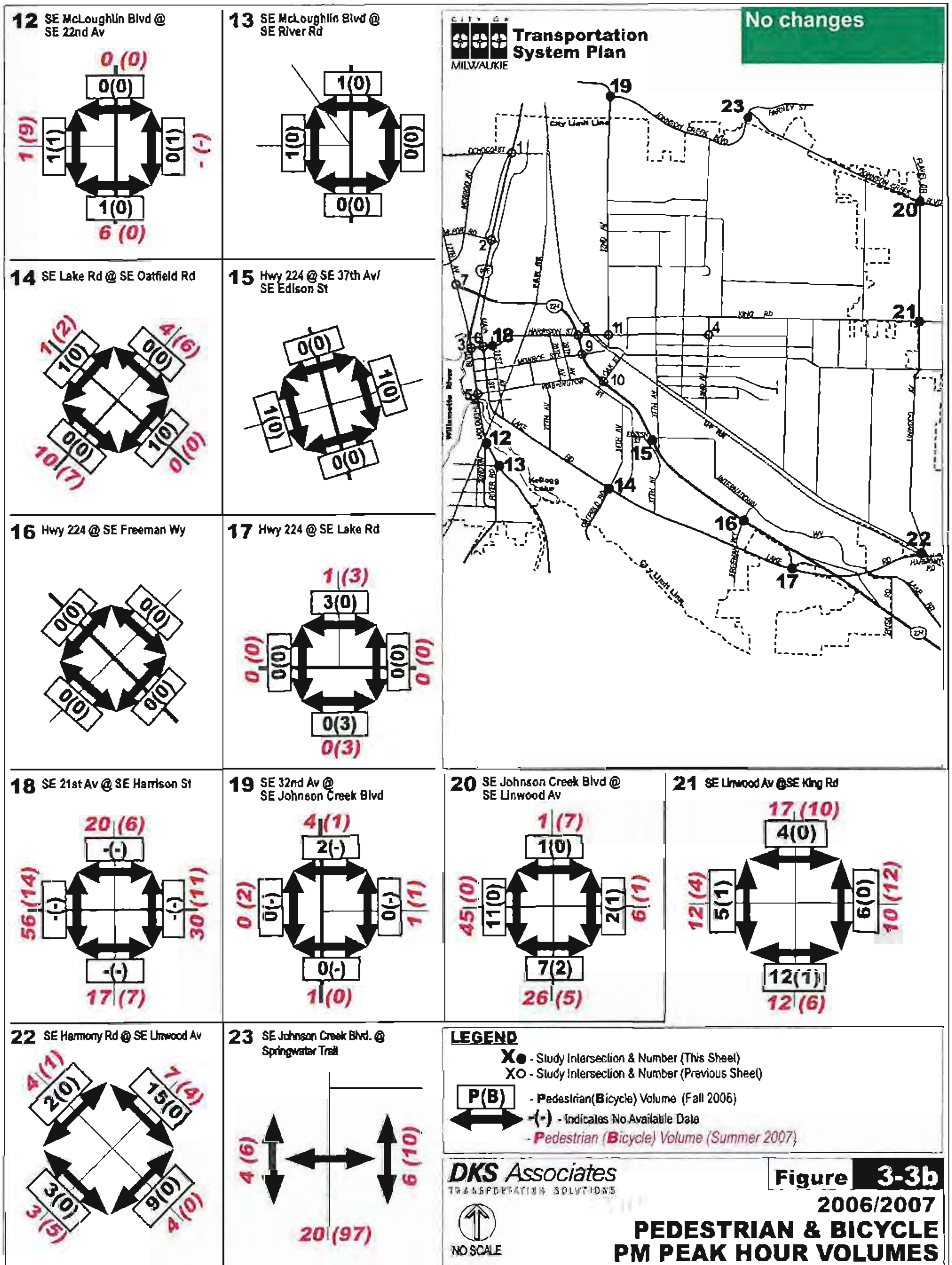


Figure 3-3b
2006/2007
PEDESTRIAN & BICYCLE
PM PEAK HOUR VOLUMES

BICYCLES

In general, designated bicycle facilities are limited in Milwaukie, making it difficult for bicyclists to safely and easily access activity centers and other local and regional destinations. The State Transportation Planning Rule requires cities to provide bikeways along roads classified as arterials and major collectors.[1] Figure 3-4 shows the existing designated bicycle facilities in Milwaukie.

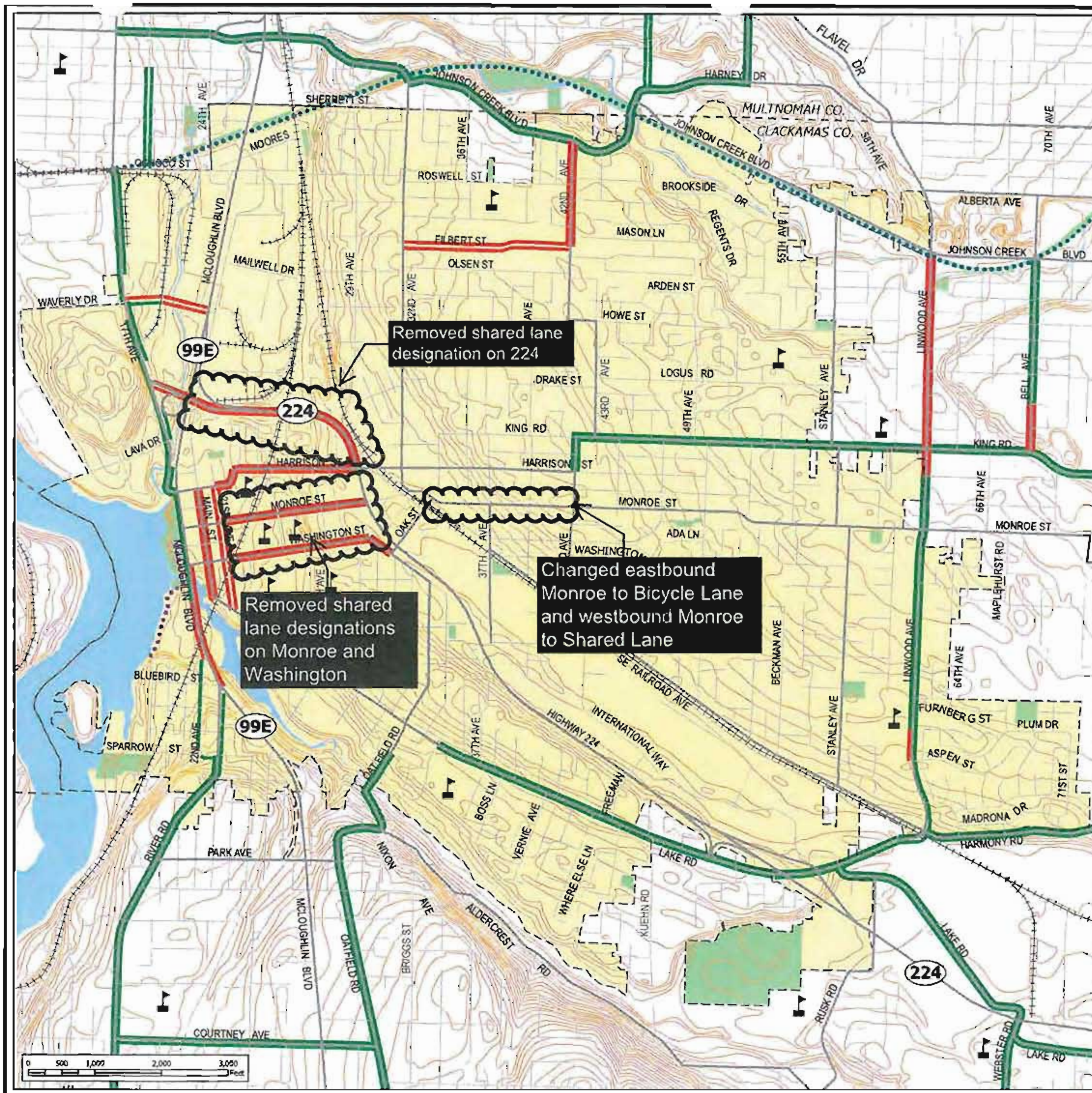
Existing Bicycle Facilities

There are a limited number of designated bikeways and bicycle facilities in Milwaukie. A bikeway can include any road that is designed to accommodate bicycles.[2] Bikeways may have wider lanes or shoulders, and can be marked by pavement markings and signage. On-road bikeways generally exist on arterial and collector streets and can consist of a delineated bike lane or a wide shoulder (six feet or more). However, in Milwaukie, bikeways do not exist on all arterial or collector streets. Typically, north-south bikeways are discontinuous, except for Linwood Ave. In general, bikeways exist on the edges of the city ~~and~~ lack connectivity. Metro's Regional Transportation Plan (RTP) identifies Hwy 224 and parts of McLoughlin Blvd as regional on-street bikeways, although the lack of marked bike lanes and higher traffic volumes and speeds along these corridors may discourage use by bicyclists. There are no bicycle detectors at signalized intersections or bikeway signage on the streets.

There are three off-road multiuse trails that enhance bicycle access in Milwaukie. First is the Springwater Trail, which parallels Johnson Creek Blvd in Milwaukie, and connects bicyclists to downtown Portland to the northwest and to the I-205 north-south multiuse trail to the east. Due to grade separation, there is limited access to the trail in some locations. Another off-street facility available in Milwaukie is the Kellogg Creek Trail in the downtown riverfront area, which is part of the North Clackamas Greenway. Bicyclists also have access to a portion of the Trolley Trail~~, which is partially constructed~~ where construction was recently completed in downtown Milwaukie. The Trolley Trail runs along an old streetcar route that begins in Riverfront Park in downtown Milwaukie and ends in Gladstone to the south. A segment of the trail along McLoughlin Blvd between River Rd and Park Ave is closed until 2014 due to construction of PMLR.

[1] (OAR 660-012-0020) Department of Land Conservation and Development, Division 12, Transportation Planning Rule

[2] Oregon Bicycle and Pedestrian Plan, Oregon Department of Transportation, June 14, 1995.



City of Milwaukie

Transportation System Plan

FIGURE 3-4

BICYCLE FACILITY INVENTORY

December 2007

LEGEND

Bicycle Lanes

- Shared Lane
- Bicycle Lane

Other Map Features

- Schools
- 10' Contours
- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Parks
- Water
- City Limits

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Based on a general visual survey, the surface conditions of bikeways are generally good to excellent with the exception of King Rd, where the bike and auto lanes suffer due to failing pavement conditions.

Bicycle Volume

Bicycle counts were conducted in Fall 2006 during the evening peak period (4:00 to 6:00 p.m.) at the study intersections shown in Figures 3-3a and 3-3b. At some locations, additional counts were taken in August 2007. These counts are shown in red on Figures 3-3a and 3-3b. The reported bicycle volumes are generally moderate, with the highest level of activity in the downtown area.

Summary of Bicycle Findings

The following summarizes key bicycle findings related to the level of activity documented as well as deficiencies for this mode of travel. These findings will be utilized to help guide future improvements to address the deficiencies for this mode of travel in the transportation network.

- In general, designated bikeways exist on the edges of the city and lack connectivity through the city.
- The Springwater Trail along the northern edge of the city is a valuable off-road bikeway; however, it is currently difficult to access west of 45th Ave.
- Bicyclists traveling between the ~~northern~~ eastern and ~~southern~~ western areas of the city are impeded by the location of Hwy 224 and the railroad line that parallels it to the north. Both of these transportation facilities act as barriers to bicycle travel because there are few places where these facilities can be crossed. The roadway width and average vehicle speed on Hwy 224 also contribute to this barrier effect.

PUBLIC TRANSIT

Fixed-route, dial-a-ride and paratransit services are available within Milwaukie for both local and regional trips. Two agencies, Clackamas County and the Tri-County Metropolitan District of Oregon Transit (TriMet), provide these services. TriMet provides transit service to and from Milwaukie, with fixed-route transit services including routes 28, 29, 31, 32, 33, 34, 70, 75, 99, and 152. These routes, their approximate headways, the locations of stops, shelters, the transit center, and park-and-rides are shown in Figure 3-5. This map also shows Neighborhood District Association boundaries to provide additional context for the location of existing transit facilities.

Table 3-1, below, shows each bus route's schedule, approximate headway, and main destinations.[3] Most of the bus lines serving the city operate with average headways of 30 minutes or less (three have 15 minute headways) during the peak weekday commute hours. Bus service is limited on the weekends. When in service, the bus routes listed above transport riders to several local and regional destinations, including downtown Milwaukie, Clackamas Town Center, downtown Portland, Oregon City, Clackamas Transit Center, Milwaukie Providence Hospital, Lloyd Center, Clackamas Community College, and the Milwaukie Center.

[3] A headway is the amount of time between bus arrivals.

Table 3-1 Service Route Schedules and Destinations

Existing Public Transit Service in Milwaukie					
Line # and Name	Weekday		Weekend		Destinations Served (partial list)
	Schedule	Approx. Headway (min.)	Schedule	Approx. Headway (min.)	
28 Linwood	6:00 a.m.-7:00 p.m. Peak and Off-peak	60	No Service	N/A	Milwaukie Transit Center Clackamas Town Center
29 Lake/ Webster	~~6:00 a.m. - 7:30 p.m.~~ 6:30 a.m.-8:00 p.m. Peak and Off-peak	60	No Service	N/A	Milwaukie Transit Center Clackamas Town Center
31 ~~Estacada~~ King Rd	6:00 a.m.-10:00 p.m. Peak ~~and Off-peak~~ Off-peak	30 60	Sat: 6:30 a.m.-10:00 p.m. Peak Off-peak	30 60	Milwaukie Transit Center Clack. Town Ctr. Transit Center Downtown Portland
32 Oatfield	~~6:00-9:30 p.m.~~ 7:00 a.m.-7:30 p.m. Peak Off-peak	30 60	Sat: ~~9:00 a.m. - 7:00 p.m.~~ 9:30a.m.-5:30 p.m. Peak and Off-peak	60	Milwaukie Transit Center Clackamas Comm. College Downtown Portland Oregon City Transit Center
33 McLoughlin	~~5:00 a.m.-12:30 a.m.~~ 4:30 a.m.-2:00 a.m. Peak Off-peak	15 30	Sat & Sun: ~~6:30 a.m.-12:30 a.m.~~ 5:30 a.m.-1:30 a.m. Peak Off-peak	15 30	Clackamas Comm. College Downtown Portland Oregon City Transit Center Milwaukie Transit Center
34 River Rd	~~6:00 a.m.-7:00 p.m.~~ 5:30 a.m.-8:00 p.m. Peak and Off-peak ~~Off-peak~~	60 ~~30~~	~~Sat: 9:00 a.m.-7:00 p.m.~~ ~~Peak and Off-peak~~ No Service	~~60~~ N/A	Oregon City Transit Center Milwaukie Transit Center
~~**41** Tacoma~~	~~6:00 a.m.-6:30 p.m.~~ ~~Peak~~ ~~Off-peak~~	~~30~~ ~~45~~	~~No Service~~	~~NA~~	~~Milwaukie Transit Center~~ ~~Downtown Portland~~
70 12th Ave	~~5:00 a.m.-12:30 p.m.~~ 5:00 a.m.-11:00 p.m. Peak Off-peak	15 30	Sat & Sun: ~~6:00 a.m.-12:30 a.m.~~ 8:30 a.m.-11:00 p.m. Peak Off-peak	15 60	Milwaukie Transit Center Lloyd Center Columbia River Correction Center
75 Cesar Chavez (39th Ave)/ Lombard	~~5:00 a.m.-9:30 p.m.~~ 4:30 a.m.-1:30 a.m. Peak Off-peak	~~10~~-15 30	Sat & Sun: ~~6:30 a.m.-7:00 p.m.~~ 5:30 a.m.-1:30 a.m. Peak Off-peak	15 30	Milwaukie Transit Center Milwaukie Providence Hospital St. Johns
99 McLoughlin Express	Peak only	20	No Service	N/A	Clackamas Comm. College Downtown Portland
152 Milwaukie Shuttle	~~6:30 p.m.-5:00 p.m.~~ 6:30 a.m.-6:30 p.m. Peak Off-peak	30 60	No Service	N/A	Milwaukie Transit Center Clackamas Town Center Milwaukie Center

Milwaukie is divided into seven officially recognized Neighborhood District Associations (NDAs) and two business and industrial centers, each with varying levels of transit coverage. Table 3-2 summarizes the transit service and amenities available in the different neighborhoods. All of the neighborhoods in Milwaukie have access to transit, with some neighborhoods having more service than others. Research has shown that a transit rider will walk up to 1/4 ~~of one~~ mile to a transit stop.[4] Figure 3-5 illustrates existing transit facilities.

[4] Planning Commission TOD Committee, Walking Distance Research, http://www.fairfaxcounty.gov/planning/tod_docs/walking_distance_abstracts.pdf, Fairfax County, Virginia.

Transportation System Plan

FIGURE 3-5

TRANSIT ROUTES AND SHELTERS

Added Neighborhood Boundaries

December 2007

LEGEND

Transit Facilities

- Bus Routes < 30 Min. Frequency
- Bus Routes > 30 Min. Frequency
- Transit Center
- Stop
- Shelter
- Park and Ride

Other Map Features

- Schools
- Major Roads
- Streets
- Railroad
- Springwater Corridor
- Kellogg Creek Trail
- County Line
- Parks
- Water
- City Limits

DKS Associates
TRANSPORTATION SOLUTIONS

Table 3-2 Neighborhood Service Routes and Public Transit Amenities

Neighborhood	Transit Route #'s	Stops	Facilities
Ardenwald	31, 75, 28	39	2 Shelters
Hector Campbell	31	12	No Extra Facilities
Historic Milwaukie	29, 31, 32, 33, 34, 70, 75, 99, 28, 152	36	1 Transit Center with Shelters 1 park-and-ride
Island Station	33, 34, 99	13	No Extra Facilities
Lake Rd	29, 32	30	No Extra Facilities
Lewelling	28, 31, 75	30	No Extra Facilities
Linwood	28, 31	26	No Extra Facilities
McLoughlin Industrial	31, 32, 33, ~~41,~~ 99	17	3 Shelters
Milwaukie Business & Industrial	31, 152	22	No Extra Facilities

Milwaukie's bus transit center is located in downtown Milwaukie on the blocks surrounding City Hall. In addition to the transit center, a single shared-use park-and-ride is located along Lake Rd south of downtown. TriMet has plans to construct a second park-and-ride facility on Main St at the former Southgate Theater site. Currently there are only six shelters provided within Milwaukie. TriMet typically considers locating transit shelters at stops with 35 or more boardings per day.[5] One stop meets this minimum boarding threshold, but does not offer a shelter.[6] This stop is located near the intersection of Harrison St and 24th Ave.

Transit service quality, or its Level of Service (LOS), is measured as the headway between arriving buses. Headway is the average amount of time that a person could expect to wait to catch a bus. For instance, a transit service with a low headway (<10 min) provides a high LOS ("A"), because vehicles are arriving frequently (approximately 1 vehicle every 10 minutes). The average headways and corresponding LOS (based on the *Highway Capacity Manual* methodology[7]) for each of the routes serving Milwaukie are listed in Table 3-3.

[5] *Design Criteria*, TriMet, August 2002.
[6] Based on Fall 2006 weekday bus boarding information as provided by TriMet
[7] *2000 Highway Capacity Manual*, Transportation Research Board, 2000, Chapter 27.

Table 3-3 TriMet Service Routes and Weekday Peak Period Level of Service

Line # and Name	Average Headway (minutes)			Level of Service (LOS) (based on headways)		
	a.m.	Midday	p.m.	a.m.	Midday	p.m.
28 Linwood	~~50~~62	~~60~~71	~~60~~75	~~E~~F	F	~~E~~F
29 Lake/Webster Rd	~~50~~62	~~60~~71	~~60~~76	~~E~~F	F	~~E~~F
~~**31** Estacada EB~~	~~27~~	~~30~~	~~19~~	~~D~~	~~E~~	~~C~~
~~**31** Estacada WB~~	~~20~~	~~30~~	~~30~~	~~D~~	~~E~~	~~E~~
31 King Rd	28	28	29	D	D	D
~~**32** Oatfield SB~~	~~34~~	~~60~~	~~22~~	~~E~~	~~E~~	~~D~~
~~**32** Oatfield NB~~	~~17~~	~~51~~	~~33~~	~~C~~	~~E~~	~~E~~
32 Oatfield	36	58	30	E	E	E
33 McLoughlin	~~15~~18	~~15~~20	~~15~~18	C	~~C~~D	C
~~**34** River Road SB~~	~~35~~	~~50~~	~~30~~	~~E~~	~~E~~	~~E~~
~~**34** River Road NB~~	~~31~~	~~56~~	~~31~~	~~E~~	~~E~~	~~E~~
34 River Rd	70	72	70	F	F	F
~~**41** Tacoma~~	~~30~~	~~45~~	~~29~~	~~E~~	~~E~~	~~D~~
70 12th/NE 33rd Ave ~~NB~~	~~15~~18	~~15~~19	~~15~~17	C	C	C
75 ~~39th Ave~~Cesar Chavez/Lombard	~~12~~14	~~15~~17	13	B	C	B
~~**99** McLoughlin Express SB~~	~~*~~	~~*~~	~~13~~	~~*~~	~~*~~	~~B~~
~~**99** McLoughlin Express NB~~	~~18~~	~~*~~	~~*~~	~~C~~	~~*~~	~~*~~
99 McLoughlin Express	26	*	21	D	*	D
~~**152** Milwaukie SB~~	~~30~~	~~60~~	~~>60~~	~~E~~	~~E~~	~~F~~
~~**152** Milwaukie NB~~	~~60~~	~~48~~	~~30~~	~~F~~	~~E~~	~~E~~
152 Milwaukie	36	69	27	E	F	D

Note: a.m. period = 06:00-08:30, Midday period = 08:30-16:00, p.m. period = 16:00-18:00
Level of Service (LOS) for transit service based on headway:

- LOS A = less than 10 minutes
- LOS B = 10-14 minutes
- LOS C = 14-19 minutes
- LOS D = 20-29 minutes
- LOS E = 30-60 minutes
- LOS F = greater than 60 minutes

*No service.

Special Transit Services

Special transit services are available to residents of Milwaukie through the Milwaukie Center Transportation Program, and TriMet Lift Program. The Milwaukie Center Transportation Program is part of the Clackamas County Transportation Consortium, which is dedicated to providing coordinated transportation services to seniors and ADA-eligible persons. Transit opportunities are also available to the residents of Hillside Manor and Hillside Park, a low-income housing area located near the corner of Hillside Court and 32nd Ave. The Milwaukie Center, located within North Clackamas Park, is a community center that offers different social services and a place for social gatherings. The different transit programs available through the Milwaukie Center include:

- **The Dial-a-Ride program**, which offers rides to service area residents who are over age 60 or disabled. The service offered is available within the city of Milwaukie and its urban growth boundary, and runs between locations, such as the Milwaukie Center, shopping locations, and the residents' homes.

- **The Transportation Reaching People (TRP) program**, which is a volunteer service available to seniors and people with disabilities, and consists of drivers from Clackamas County Volunteer Connection. It takes people to their appointments on a donation basis.
- **The Catch-a-Ride program**, which offers similar services to residents of Hillside Manor, Hillside Park, and other Milwaukie area residents. It serves a number of different locations within the city, including the Milwaukie Transit Center and Clackamas Town Center.

TriMet, the primary public transportation provider in the region, has a special transit program available to Milwaukie residents:

- **The TriMet Lift program**, which provides small bus transportation services that are equipped to handle persons with disabilities. Those eligible for program services have physical or mental disabilities that prevent their use of fixed-route transit service (as required by the Americans with Disabilities Act). This service is available seven days per week and the TriMet service area is a 0.75-mile radius around existing bus routes. Eligible users are to call in advance to schedule for Lift Program pick-up.

Summary of Public Transit Findings

The following summarizes key transit findings related to the level of activity and deficiencies documented for this mode of travel. These findings will be utilized to help guide how future improvements can address the deficiencies for this mode of travel.

- The majority of Milwaukie is served by some form of transit that is accessible within 1/4 mile of transit stops provided by TriMet, with the exception of an area to the east bounded by Railroad Ave to the south, 42nd Ave to the west, Monroe St to the north and Stanley Ave to the east. The existing railroad line that parallels Hwy 224 in this area restricts transit accessibility to the south for this area, and existing transit routes that run along Linwood Ave and King Rd are beyond the 1/4-mile radius that a pedestrian would typically travel to access transit. A second area in the northeast corner of Milwaukie, roughly centered on Johnson Creek Blvd and 55th Ave, lacks adequate transit service. This area includes many of the properties that recently annexed into the city.
- In total, approximately ~~13%~~ 15% of land coverage in Milwaukie does not have access to transit within 1/4 mile of existing transit stops, with approximately half of that lacking coverage occurring in the area identified above.
- Generally, Milwaukie is served with headways (time between buses) along existing transit routes of 30 minutes or better. However, some roadways have headways longer than 30 minutes. These facilities are: Lake Rd, Oatfield Rd, Linwood Ave, International Way, and Harvey St/Logus Rd.
- There are currently six transit stops that have shelters. Two additional stops have existing ridership that meet TriMet's standard for placing shelters:
  - Harrison St/24th Ave
  - 42nd Ave/Llewellyn St

MOTOR VEHICLES

The following section addresses all aspects of the motor vehicle network throughout Milwaukie. The topics addressed include:

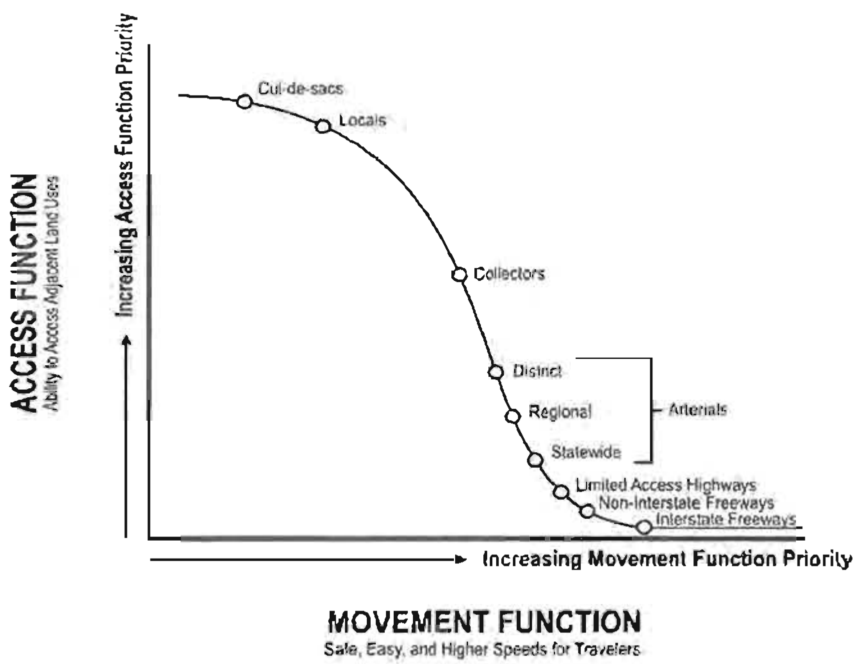
- Roadway functional classification

- Roadway characteristics
- Motor vehicle volume
- Measures of effectiveness
- Safety
- Heavy vehicles

Roadway Functional Classification

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

Figure 3-6: Functionality of Access versus Movement



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

- **Mobility Increases:** As the level of mobility increases, the distance between destinations as well as the proportions of freight and through traffic generally increases.
- **Integration of Pedestrian and Bicycle Facilities Decreases:** Provisions for adjoining sidewalks and bike facilities are required up through the arterial class; however, the frequency of intersection or midblock crossings for nonmotorized vehicles steadily decreases with higher functional classes. Expressway and freeway facilities typically do not

allow pedestrian and bike facilities adjacent to the roadway, and any crossings are grade-separated to enhance mobility and safety.

- **Access Decreases**: As mobility increases, access to parking, loading, and land are reduced.
- **Facility Design Standards Increase:** Roadway design standards increase in technical complexity to accommodate wider and faster facilities for exclusive use by motor vehicles. The opposite end of the scale is the most basic two-lane roadway with unpaved shoulders that requires minimal technical design.

The existing Milwaukie functional class system for roadway facilities is shown in Figure 3-~~6~~7. A street-by-street comparison to ODOT, Metro and the City of Milwaukie classifications for arterial and collector streets is shown in Table 3-4. Additionally, Table 3-4 compares the right-of-way (ROW) width to the actual pavement width for each facility.

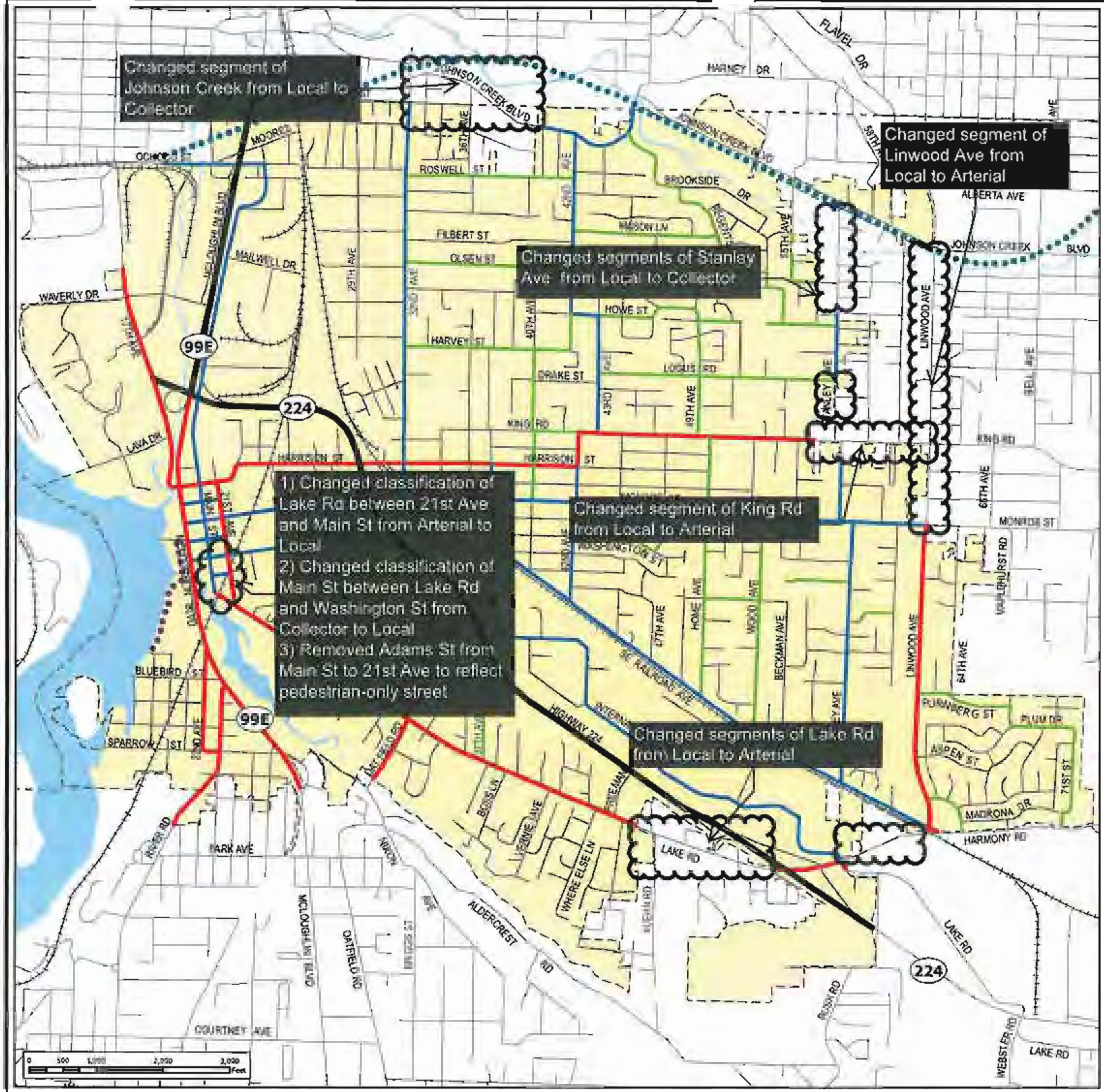
Figure 3-~~7~~8 illustrates roadway ownership and maintenance of the various roads in Milwaukie. McLoughlin Blvd and Hwy 224 are State facilities. Hwy 224 is classified as a Principal Arterial. McLoughlin Blvd is classified as a Principal Arterial north of Hwy 224 and a Major Arterial south of Hwy 224. As such, the preferred regional mobility route through Milwaukie from Portland is along McLoughlin Blvd to Hwy 224, and along Hwy 224 to I-205 and destinations outside of the city of Milwaukie. The majority of arterial and collector roadways outside the city limit but within the city's Urban Growth Management Area are owned and operated by Clackamas County or ODOT. The City is responsible for the majority of the roads inside the city limits.

Transportation System Plan

Figure 3-67

FUNCTIONAL CLASSIFICATION

December 2007



LEGEND

Functional Classification

- Regional Routes
- Arterials
- Collectors
- Neighborhood Routes
- Local

Other Map Features

- Railroad
- Springwater Corridor
- Kellogg Creek Trail
- County Line
- Water
- City Limits

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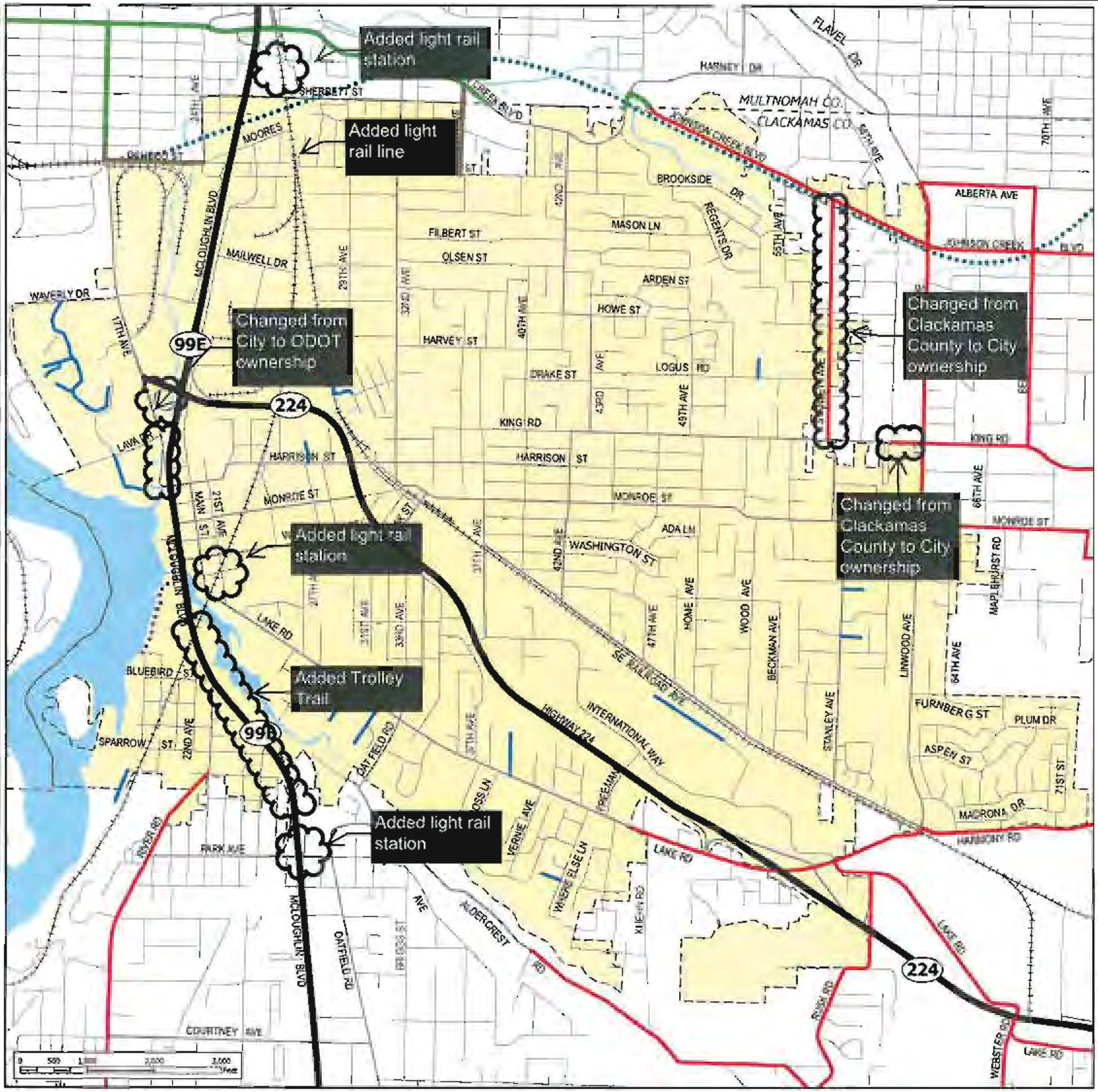

Transportation System Plan

FIGURE 3-7 8

ROADWAY OWNERSHIP/ JURISDICTION

December 2007

LEGEND

Jurisdiction

- State of Oregon
- Clackamas County
- City of Portland
- Joint Milwaukie/Portland
- Private

NOTE: All other roads within Milwaukie are under authority of the City.

Other Map Features

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

Added schools

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TRANSPORTATION SOLUTIONS

Table 3-4 Functional Classification Comparison Arterial and Collector Streets

Roadway	ODOT	Metro	Clackamas County	City of Milwaukie	ROW/ Pavement Width (ft)
McLoughlin Blvd	Urban Principal Arterial—Other	Principal Arterial (Highway)/ Major Arterial	Major Arterial	Freeway/ Regional Route	110-120/ 65-140
Hwy 224	Urban Principal Arterial—Other Fwy or Expy	Principal Arterial (Highway)	Freeway/ Expressway	Freeway/ Regional Route	165/80-100
17th Ave	—	~~Regional Collector~~ —	Minor Arterial	Arterial	35-60/60
21st Ave	—	Minor Arterial	Minor Arterial	Arterial	60/45
22nd Ave	—	~~Regional Collector~~ —	Minor Arterial	Arterial	60/25-40
Harrison St	—	Minor Arterial	Minor Arterial	Arterial	60/20-50
Harmony Rd	—	Major Arterial	Major Arterial	Arterial	60/35-60
Johnson Creek Blvd	—	~~Regional Collector~~ —	Minor Arterial	Arterial	60/30-50
King Rd	—	Minor Arterial	Minor Arterial	Arterial	60/20-50
Linwood Ave	—	Minor Arterial	Minor Arterial	Arterial	60/35-50
Lake Rd	—	Minor Arterial	Minor Arterial	Arterial	60/30-60
Oatfield Rd	—	Minor Arterial	Minor Arterial	Arterial	60/35-40
Railroad Ave	—	Minor Arterial	Collector	Collector	60/20-35
River Rd	—	~~Regional Collector~~ —	Minor Arterial	Arterial	60/20-35
32nd Ave	—	—	Collector	Collector	60/25-40
34th Ave	—	—	Collector	Collector	60/35-40
37th Ave	—	—	Local	Collector/ Neighborhood Route	60/30-40
42nd Ave	—	—	Collector	Collector/ Neighborhood Route	60/30-35
43rd Ave	—	—	Collector	Collector	40-60/25-30
Bell Ave	—	—	Collector	Collector	60/30-40
Home Ave	—	—	Local	Neighborhood Route	50/20-25
Jackson St	—	—	Collector	Collector	60-80/15-60
Jefferson St	—	—	Collector	Collector	50-70/20-45
Main St	—	—	Collector	Collector	80/30-55
Monroe St	—	—	Collector	Collector	60-70/20-45
Oak St	—	—	Collector	Collector	60/35-50
Rusk Rd	—	—	Collector	Collector	40/25-30
Stanley Ave	—	—	Collector	Collector	60/20
Washington St	—	—	Collector	Collector	60/20-40

Sources: ODOT, Oregon Highway Plan, 1999, and Metro~~, 1997 Milwaukie Transportation Plan, 2000~~ 2010 Regional Transportation Plan (RTP), Regional ~~Motor Vehicle~~ System Concepts and Policies.~~ Refer to RTP for complete description of lower class roadways~~

Roadway Characteristics

Field inventories of posted speed limits, number of roadway lanes, and intersection controls were conducted to determine characteristics of major roadways in the TSP study area. These characteristics define roadway capacity and operating speeds through the street system, which affect travel path choices for drivers in Milwaukie.

Posted Speed Limits

A limited inventory of the posted speeds in Milwaukie can be seen in Figure 3-~~8~~9. Collector roadways such as King ~~St~~ Rd, Railroad Ave, and Monroe St have posted speeds ranging from 25 to 40 miles per hour (mph). The majority of local access roadways in Milwaukie are posted at 25 mph. Arterial roadways such as McLoughlin Blvd, Hwy 224, and Johnson Creek Blvd are posted at higher speeds ranging from 30 to 50 mph.

Intersection Controls

Figure 3-~~9~~10 illustrates the existing intersection controls at major roads in Milwaukie. Traffic signals exist mainly along McLoughlin Blvd and Hwy 224. Harrison St, Lake Rd, and Linwood Ave have a few signals and one of the intersections along Johnson Creek Blvd is also signalized. The study intersections for this TSP Update include eighteen signalized intersections and four intersections without signals.

Roadway Width

The widest roadways are McLoughlin Blvd and Hwy 224. Harrison St widens near Hwy 224, but is primarily a two-lane road. King St has three lanes, as do some sections of Lake Rd. The remaining roads in the city are one or two lane roads.

Stormwater Management

A roadway is not only limited to what can be seen on the surface; there are also other aspects which can affect a roadway's performance and longevity, such as its the base, the materials and methods used in construction, and drainage features. Many of these topics go beyond the scope of a transportation system plan; however, the issue of drainage will be briefly touched upon. A properly designed, constructed, and maintained stormwater drainage system—which can include a combination of gutters, curbs, storm drains, and storm sewers—minimizes water pollution and reduces the risk of flooding and erosion that can interrupt functioning of the transportation system.

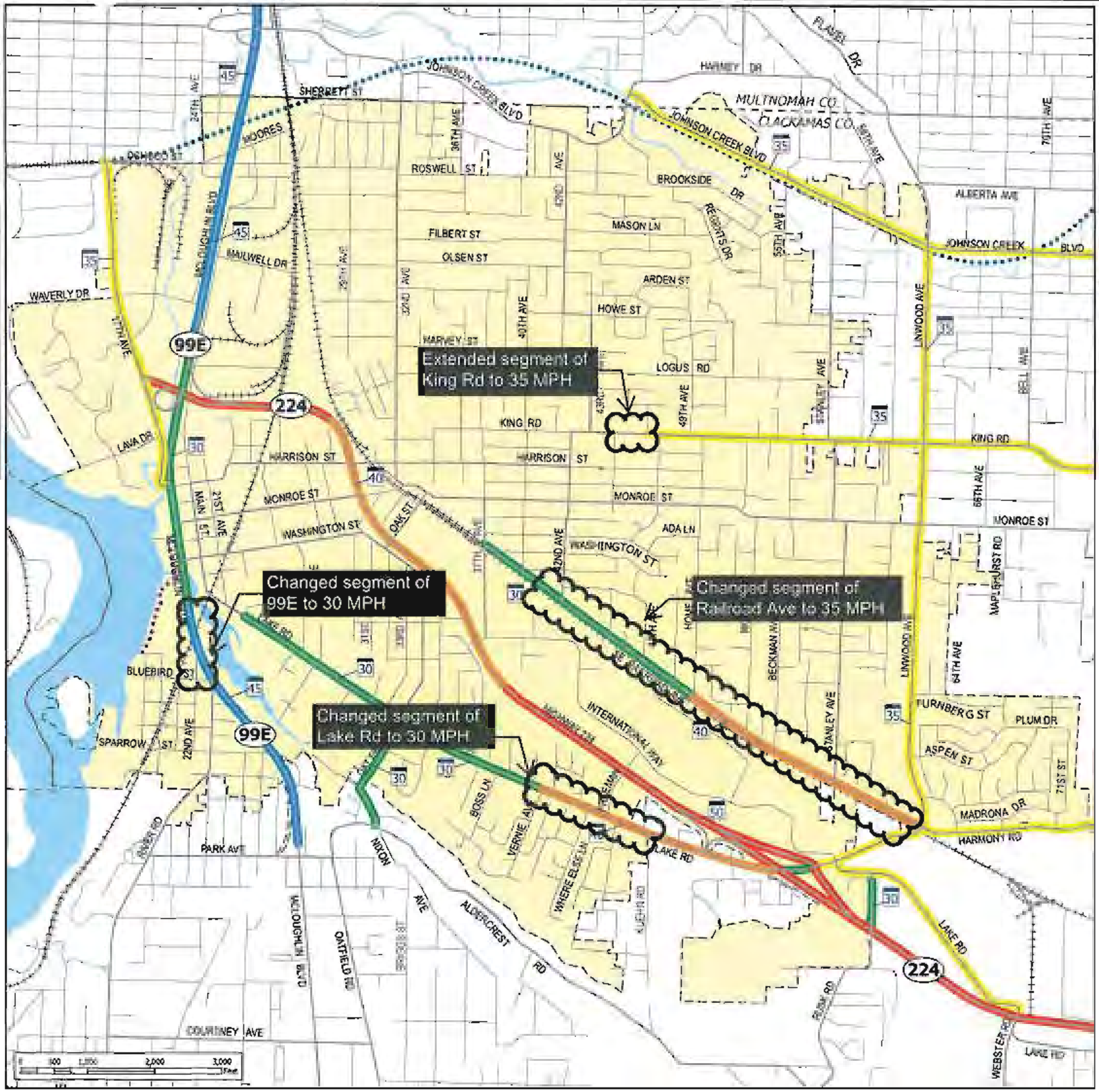
Figure 3-~~10~~11 shows the locations of the City of Milwaukie's stormwater system. This map also shows locations identified by City staff where rainwater drainage has been problematic. Many of these locations correlate to streets with no gutters, curbs, or sidewalks. ~~In general a properly designed, constructed, and maintained stormwater drainage system, which can include a combination of gutters, curbs, storm drains, and storm sewers allows for good drainage of stormwater from city streets.~~ Railroad Ave, for instance, has drainage issues along its length from 37th Ave ~~to~~ nearly to Linwood Ave. Many of the streets with drainage issues do not have curbs, gutters, or sidewalks. However, there are many other locations throughout the city that do not have these amenities and do not have drainage issues.

Transportation System Plan

FIGURE 3-8 9

POSTED SPEED INVENTORY

December 2007



LEGEND

Speed Limits

- 30 MPH
- 35 MPH
- 40 MPH
- 45 MPH
- 50 MPH

Note: all other roads assumed to be 25 MPH

Other Map Features

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

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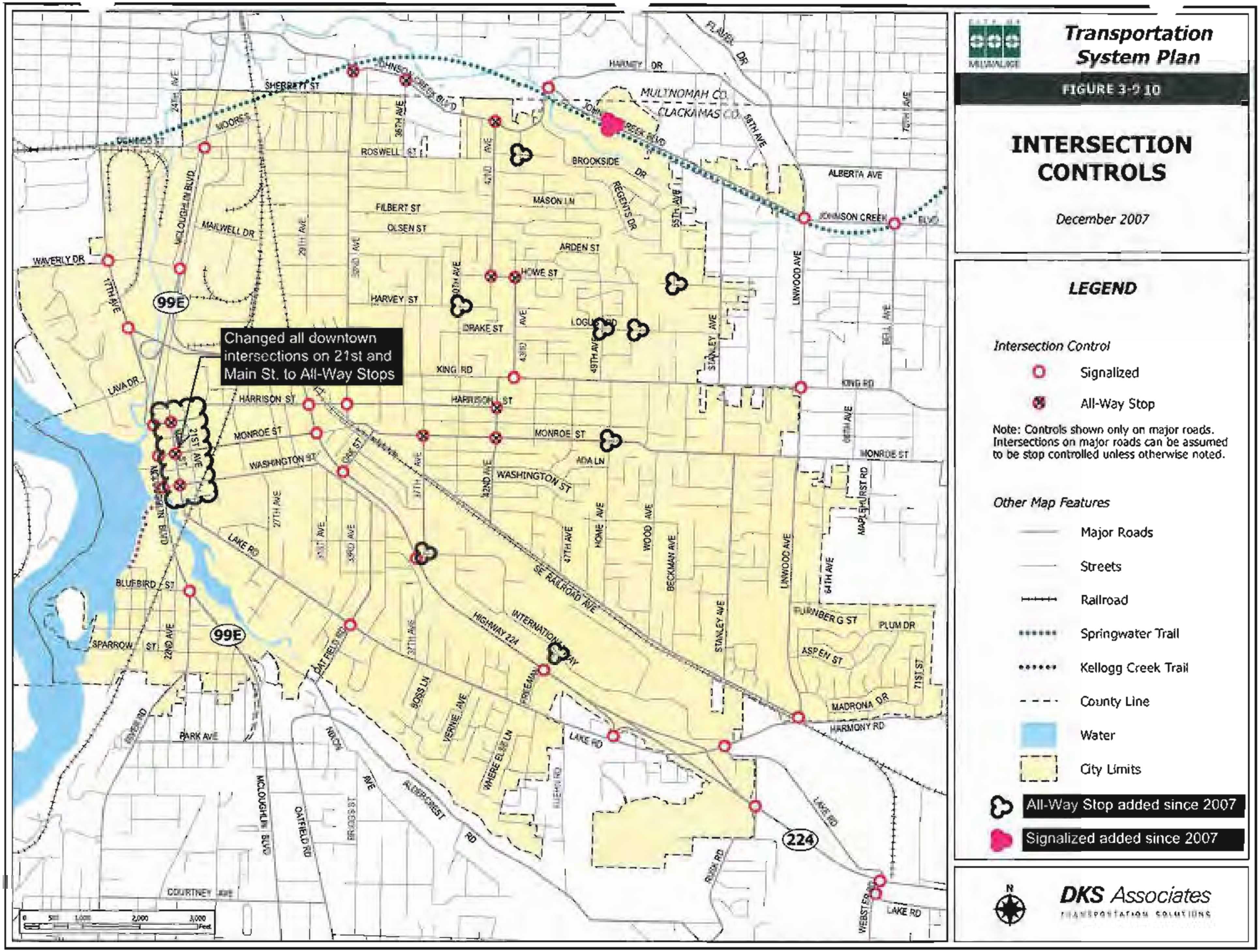
TRANSPORTATION SOLUTIONS



Transportation System Plan
FIGURE 3-9 10
INTERSECTION CONTROLS
December 2007
LEGEND
Intersection Control
Signalized
All-Way Stop
Note: Controls shown only on major roads. Intersections on major roads can be assumed to be stop controlled unless otherwise noted.
Other Map Features
Major Roads
Streets
Railroad
Springwater Trail
Kellogg Creek Trail
County Line
Water
City Limits
All-Way Stop added since 2007
Signalized added since 2007
Changed all downtown intersections on 21st and Main St. to All-Way Stops
MULTNOMAH CO.
CLACKAMAS CO.
99E
224
SHERRETT ST
JOHNSON CREEK BLVD
HARNEY DR
FLAVEL DR
ROSWELL ST
BROOKSIDE DR
ALBERTA AVE
FILBERT ST
OLSEN ST
MASON LN
REGENTS DR
ARDEN ST
HOWE ST
HARVEY ST
DRAKE ST
LOGUS RD
WAVERLY DR
MAILWELL DR
MCLOUGHLIN BLVD
KING RD
HARRISON ST
MONROE ST
WASHINGTON ST
ADA LN
LAKE RD
SE RAILROAD AVE
INTERNATIONAL WAY
HIGHWAY 224
BLUEBIRD ST
SPARROW ST
PARK AVE
FURNBERG ST
PLUM DR
ASPEN ST
MADRONA DR
HARMONY RD
LINWOOD AVE
STANLEY AVE
BECKMAN AVE
WOOD AVE
HOME AVE
MAPLEHURST RD
OATFIELD RD
WEBSTER RD
COURTNEY AVE
ALDERCREST RD
17TH AVE
21ST AVE
22ND AVE
27TH AVE
29TH AVE
37TH AVE
42ND AVE
43RD AVE
49TH AVE
55TH AVE
64TH AVE
71ST ST
DKS Associates
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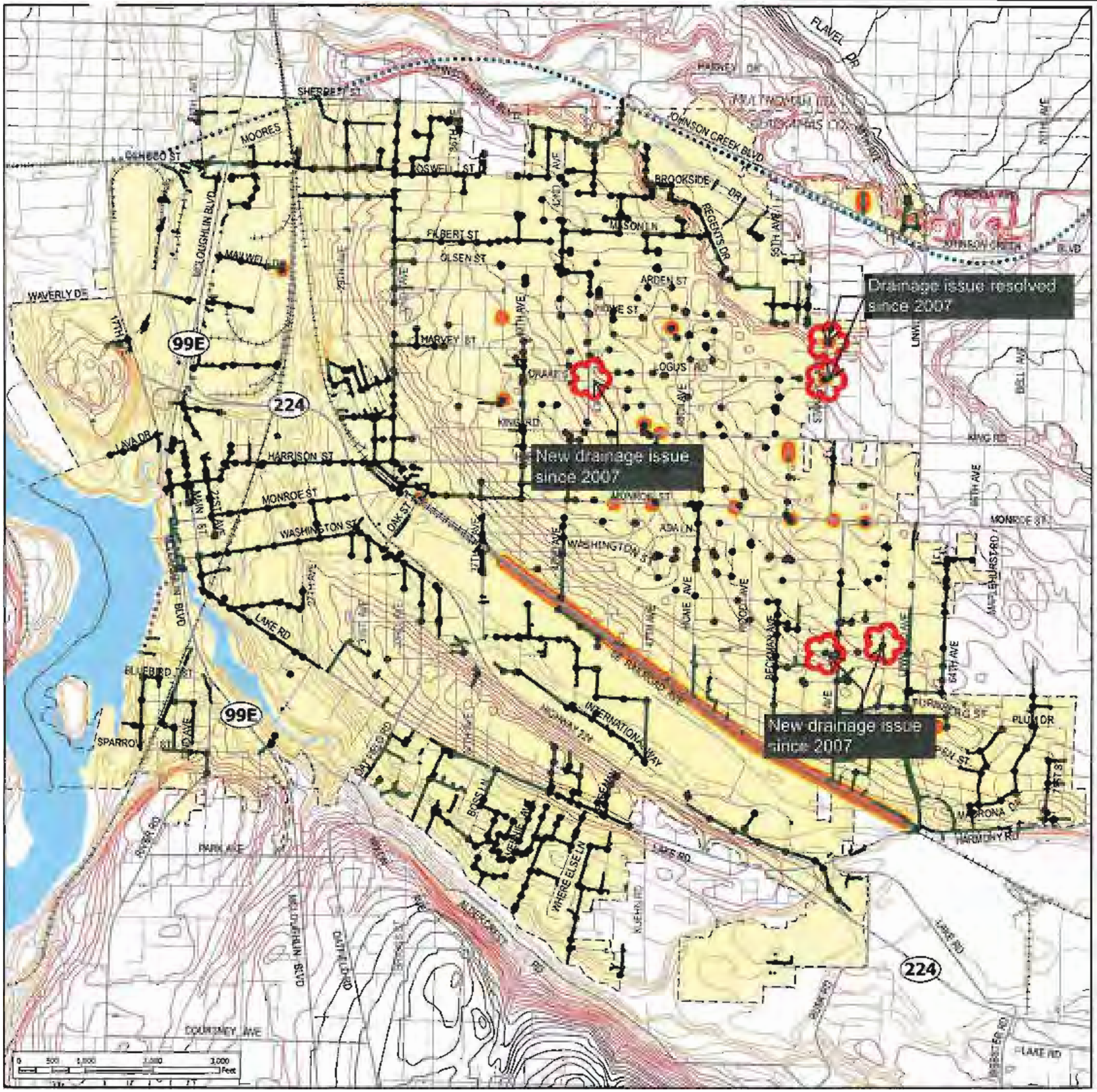

MILWAUKIE

Transportation System Plan

FIGURE 3-~~10~~ 11

STORMWATER AND TOPOGRAPHY

December 2007

LEGEND

Stormwater Features

- Manholes and Dry Wells
- Pipes
- Locations with Drainage Issues

Elevation Above Sea Level

- < 50 feet
- 50 - 100 feet
- 100 - 200 feet
- > 200 feet

Other Map Features

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

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TRANSPORTATION SOLUTIONS

Pavement Conditions

The City of Milwaukie has conducted an extensive visual inspection of its roadways as part of an ongoing Pavement Management System (PMS). PMS is a~~ program~~ tool for making cost-effective decisions about pavement maintenance and rehabilitation. Pavement conditions are recorded in the TSP to document existing conditions, but no recommendations are made about the schedule of surface maintenance projects. The PMS tool is utilized by the Street Surface Maintenance Program (SSMP), which was established in 2006 to fund the assessment, maintenance, and repair of street surfaces in the city. It is the function of the SSMP to determine the schedule of surface maintenance projects. Figure 3-12 shows the location and extent of current, completed, and future SSMP projects.

~~To that effect~~ As part of the ongoing SSMP project selection process, sections of a roadway have been rated on a Pavement Condition Index (PCI), a scale that rates a roadway's condition from 0 to 100. High numbers correlate to newer streets in good condition (~~8-10~~70-100), while lower numbers (450 or less) indicate roads that have deteriorated to the point of needing rehabilitation or replacement. Milwaukie's complete PCI survey is ~~included in the Technical Appendix~~updated on an annual basis.

An ~~weighted~~ average PCI[8] was calculated for the three different city street classifications—arterial, collector, and residential/local—based on the length of street covered by a specific PCI rating. These findings are summarized in Table 3-5. From the table, it can be seen that, on average, the road condition for all three street types is relatively close. On average, ~~collector~~ arterial streets have the highest rating, followed by ~~local streets~~ collectors and then ~~arterials~~ residential/local streets.

Table 3-5 Average Pavement Condition Index

Classification	~~Surveyed~~ Length (~~feet, citywide~~ lane miles)	~~Weighted~~ Average Pavement Condition Index
Arterial	~~21,460~~12.23	~~6.2~~78
Collector	~~62,659~~24.97	~~6.9~~64
Residential/Local	~~285,398~~111.1	~~6.5~~58

Source: City of Milwaukie PCI Survey, 2013

Table 3-6 lists the breakdown of PCI ratings throughout the city for each street type by length of roadway and percentage. This more detailed look into the pavement condition shows that the majority of the arterial (73.1%), collector (~~64~~61.8%) and residential/local (~~58~~61.8%) streets can be considered in good to excellent condition. ~~Only 44% of Milwaukie's arterial streets, on the other hand, fall into this category.~~ Over half of Milwaukie's streets rank in the very good to ~~excellent~~ good category. In general ~~24~~36%, or~~ nearly 12~~ 26.73 miles, of the streets in the city are considered to be in poor to very poor condition. The street sections with the lowest PCI included ~~51st Ave, 40th Ave, and 49th Ave~~ Maple Ct, 56th Ave, and Lloyd St.

Table 3-6 Pavement Condition Index Rating by Functional Classification

Rating (PCI Score)	Street Type ~~and Length in Feet and Percentage~~(as rated by segment)			
	Arterial ~~21,460 ft~~	Collector ~~62,659 ft~~	Residential/Local ~~284,448 ft~~	Total ~~368,567 ft~~

8 $\cancel{AveragePCI} = \frac{\sum (PCI * Length)}{\sum Length}$

~~Excellent (8-10)~~ Very Good (85-100)	~~15~~61.7%	~~31~~44.4%	~~40~~45.4%	**~~36~~46.4%**
Good ~~(7-7.9)~~(70-85)	~~20~~11.4%	~~33~~25.3%	~~18~~16.4%	**~~21~~17.5%**
~~Fair (5-6.9)~~Poor (50-70)	~~20~~6.9%	~~25~~26.7%	~~17~~14.8%	**~~18~~16.3%**
Very Poor ~~(4-9-4)~~(0-50)	~~0~~20%	43.6%	~~9~~23.4%	**~~7~~19.8%**
~~Very Poor (0-3.9)~~	~~28%~~	~~6%~~	~~18%~~	**~~17%~~**

Source: City of Milwaukie PCI Survey, 2013

Motor Vehicle Volume

Twenty-four-hour traffic count data was collected at select locations within the city. It is useful to analyze this data to determine traffic flow throughout the day on the transportation network. Figure 3-~~11a~~13a is an hour-by-hour breakdown of traffic volumes along McLoughlin Blvd and Hwy 224, and shows two distinct peaks in traffic volumes on the Milwaukie's two highest traffic volume streets.[9] These two peaks represent the a.m. and p.m. peak commuter traffic. The traffic volumes observed on McLoughlin Blvd show the typical a.m. and p.m. peak spike in commuter vehicular traffic demand. Hwy 224 also shows a.m. and p.m. peak spikes in demand, it is however unusual that the a.m. peak hour is greater than the p.m. peak hour. This type of travel pattern is unusual, because the a.m. peak hour usually consists of commuter traffic, whereas, the p.m. peak hour traffic volume contains many of the a.m. commuters, as well as those with retail and other miscellaneous destinations.

Figure 3-~~11b~~13b shows the 24-hour, two-way existing traffic volumes on streets in Milwaukie from 2005 and 2006. The locations of these counts correspond to locations counted on an annual basis by ODOT[10] and/or Clackamas County.[11] When compared to 24-hour traffic counts taken for the 1997 TSP, there has been growth on many of the streets within city limits. Figure 3-~~11c~~13c shows the location and change in traffic volume at select locations recorded in 1995 (basis for 1997 Milwaukie TSP).

In addition, an inventory of peak-hour traffic counts at study area intersections was conducted in the Fall/Winter of 2006. The traffic turn movement counts establish baseline information for future monitoring and identify current existing problem areas. Turn movement counts were conducted at twenty-two intersections during the evening peak period (4:00-6:00 p.m.) to determine existing operating conditions and are shown in Figures 3-~~12a~~14a and 3-~~12b~~14b. The p.m. peak-hour turn movements are useful when analyzing the operational characteristics of an intersection, since they generally represent the hour of highest traffic volume demand. It is assumed that if an intersection operates sufficiently during the p.m. peak hour it will operate sufficiently during the rest of the day. Study intersections were chosen in coordination with the City staff to address major roadways and noted areas of concern.

The p.m. peak-hour signal warrants were evaluated for all study area intersections without signals. The intersections of Harrison St/Main St and 32nd St/Johnson Creek Blvd both met the p.m. peak-hour signal warrants. This indicates that further study of these intersections is recommended to see if they would meet other ODOT required signal warrants. The peak-hour warrants can be found in ~~the Technical~~ Appendix G.

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[9] The 24-hour tube count data was collected in 2001 and was not refreshed as part of the 2007 update. Analysis of available data from Clackamas County and ODOT as well as from the PMLR project demonstrated that there have been no significant changes overall in traffic volumes since 2006-07. It was not necessary to refresh these data at this time; a more extensive update to the TSP in the future should revisit this issue.

[10] ODOT Annual Traffic Counting Program.

[11] Clackamas County Annual Traffic Counting Program.

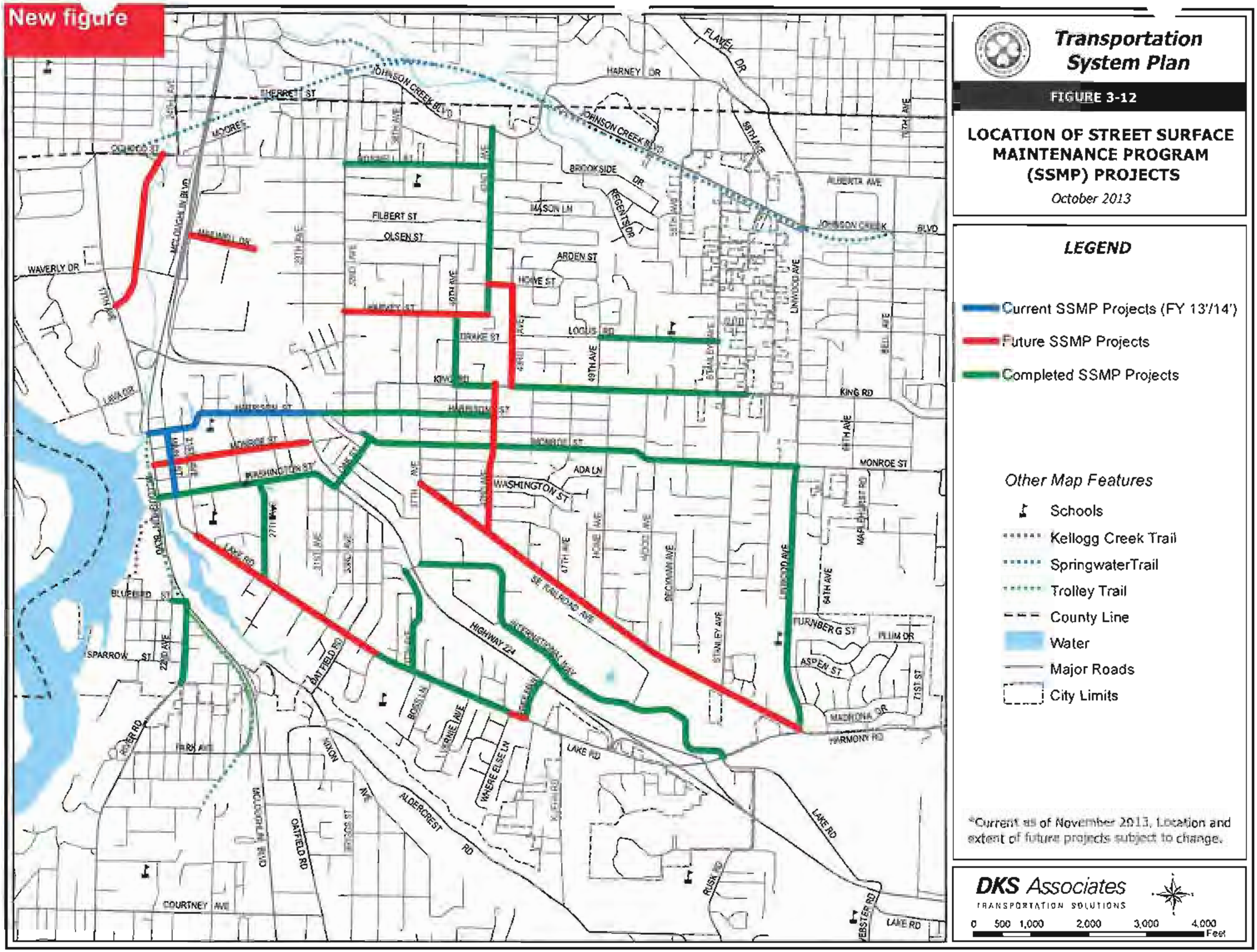
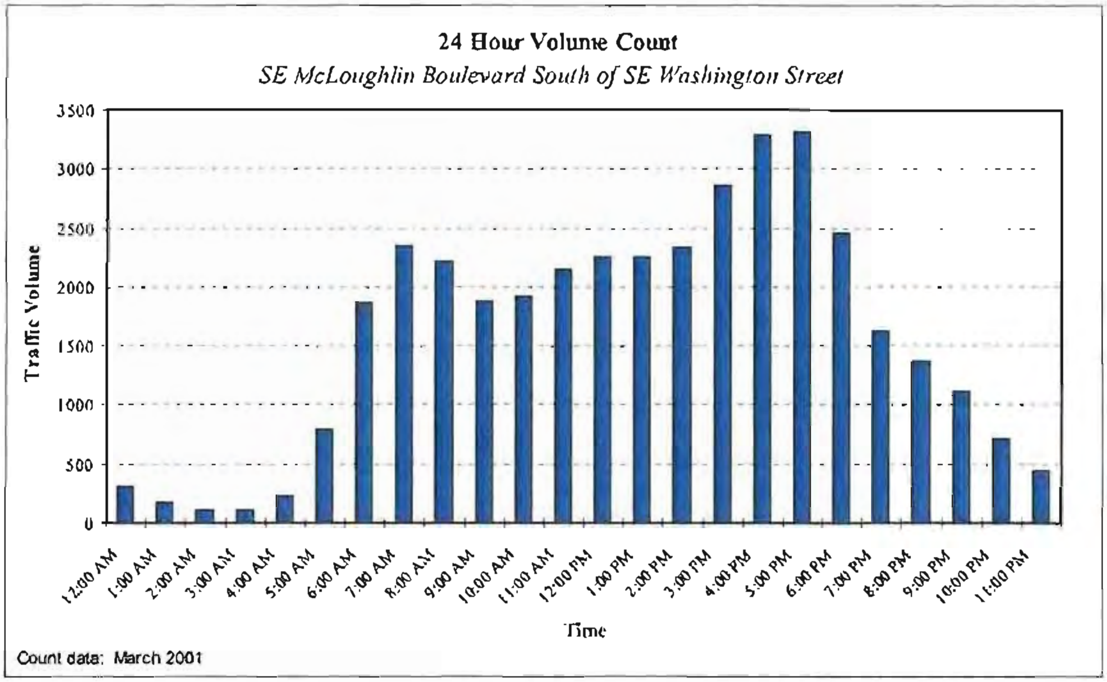
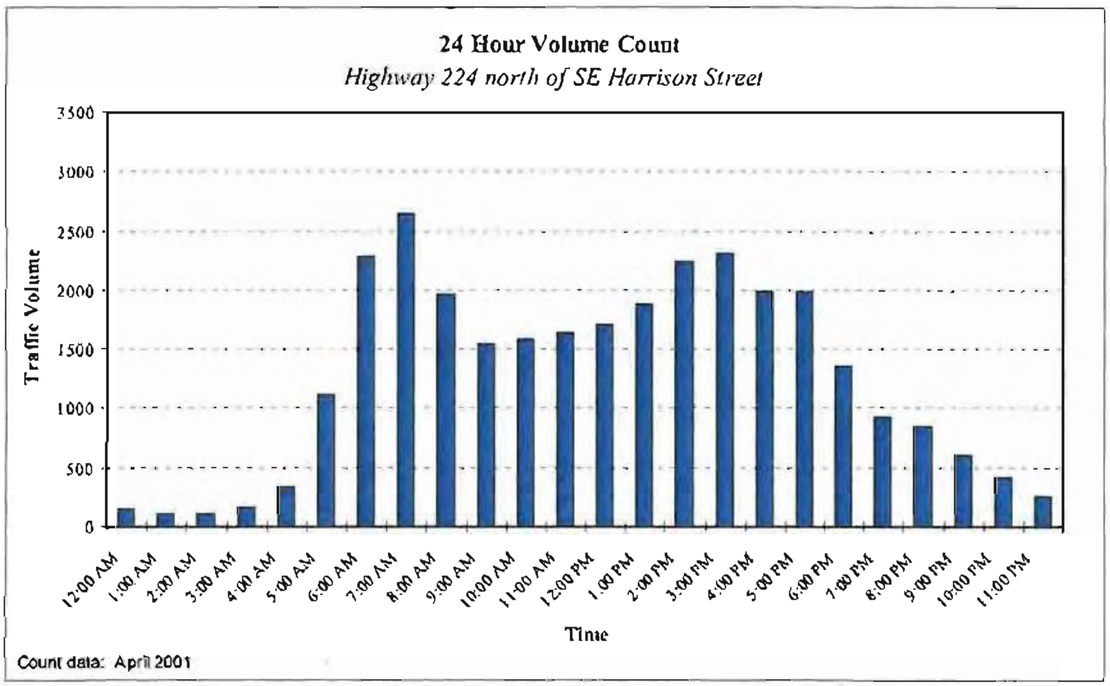

New figure
Transportation System Plan
FIGURE 3-12
LOCATION OF STREET SURFACE MAINTENANCE PROGRAM (SSMP) PROJECTS
October 2013
LEGEND
Current SSMP Projects (FY 13'/14')
Future SSMP Projects
Completed SSMP Projects
Other Map Features
Schools
Kellogg Creek Trail
SpringwaterTrail
Trolley Trail
County Line
Water
Major Roads
City Limits
*Current as of November 2013. Location and extent of future projects subject to change.
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000
Feet
JOHNSON CREEK BLVD
HARNEY DR
FLAVEL DR
BROOKSIDE DR
FILBERT ST
OLSEN ST
ARDEN ST
HOWE ST
DRAKE ST
KING RD
HARRISON ST
MONROE ST
WASHINGTON ST
LAKE RD
HIGHWAY 224
INTERNATIONAL WAY
SE RAILROAD AVE
LINWOOD AVE
HARMONY RD
ALDERCREST RD
WAVERLY DR
COURTNEY AVE
WEBSTER RD

Figure 3-~~11a~~13a 24-Hour Tube Count Data on McLoughlin Blvd and Hwy 224

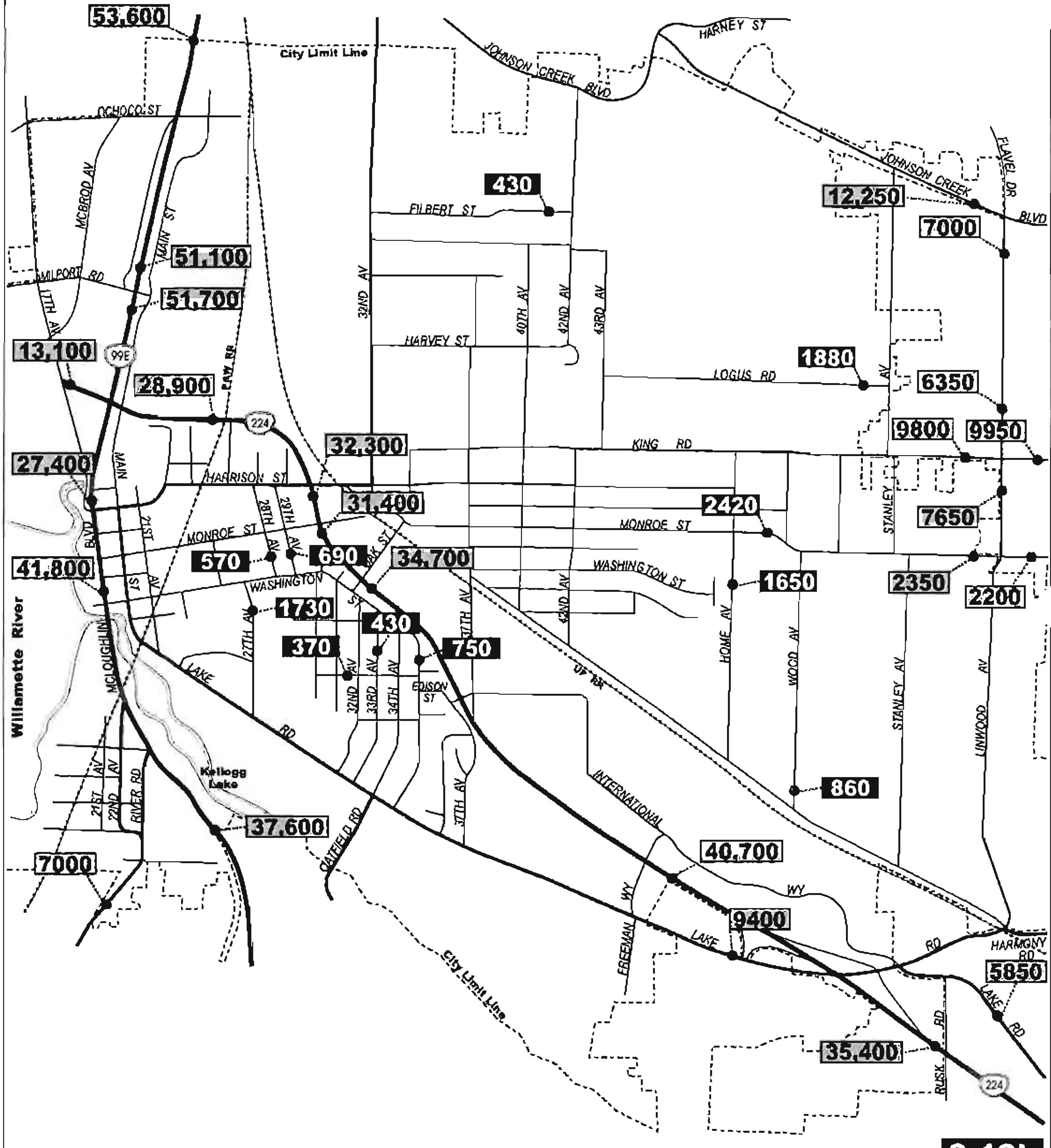




No changes

Transportation System Plan

MILWAUKIE



3-13b

Figure 3-11b

24 HOUR COUNT VOLUMES

LEGEND

- 00 - 24 Hour Count Volume & Count Location (Fall 2006)
- 00 - 24 Hour Count Volume & Count Location (2005)

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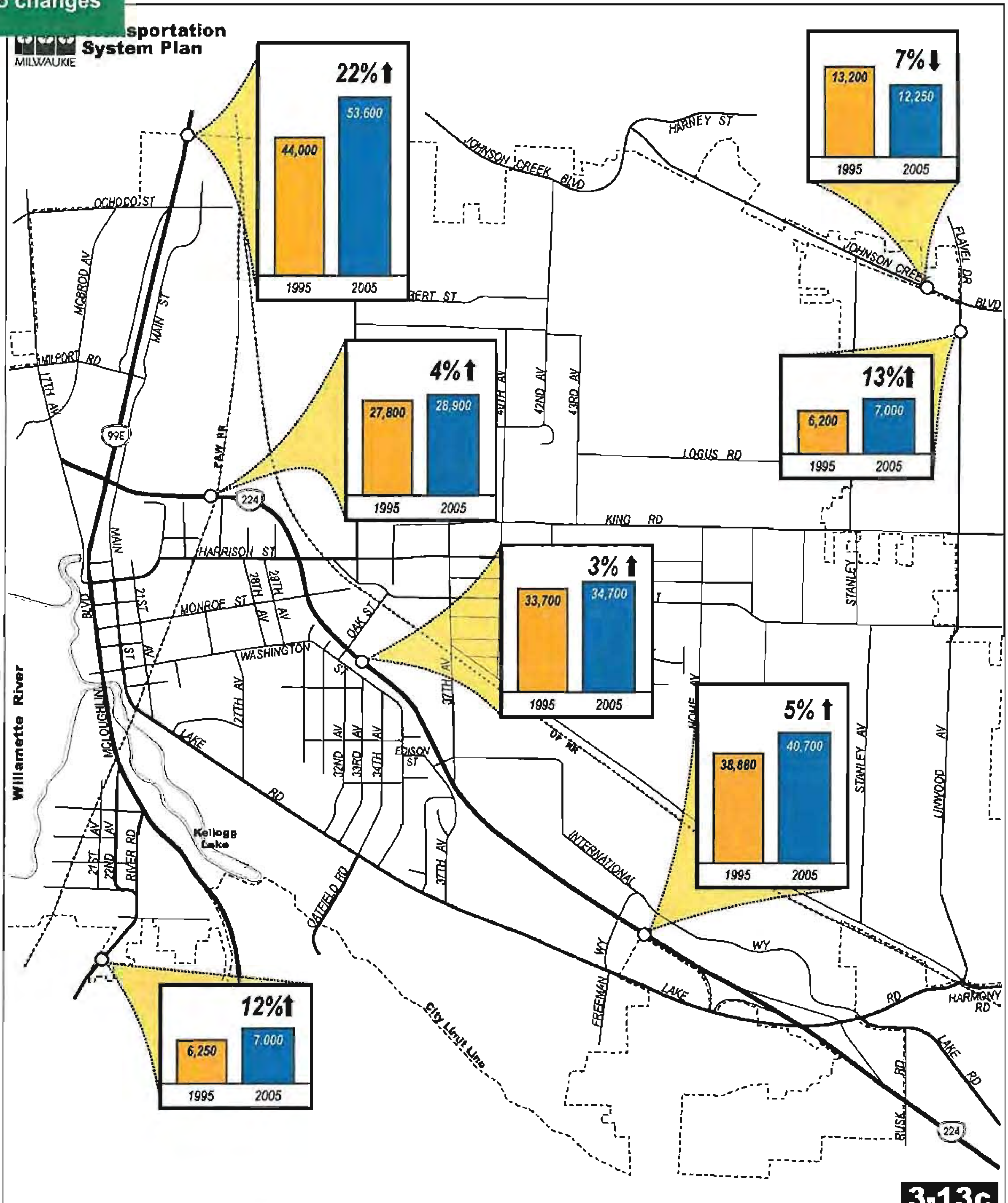
NO SCALE

March 2007

No changes



LEGEND

00 - 24 Hour Count Volume (1995)

00 - 24 Hour Count Volume (2005)

DKS Associates
TRANSPORTATION SOLUTIONS

NO SCALE

Figure ~~3-11c~~ 3-13c

24 HOUR COUNT VOLUMES HISTORIC COMPARISON

March 2007

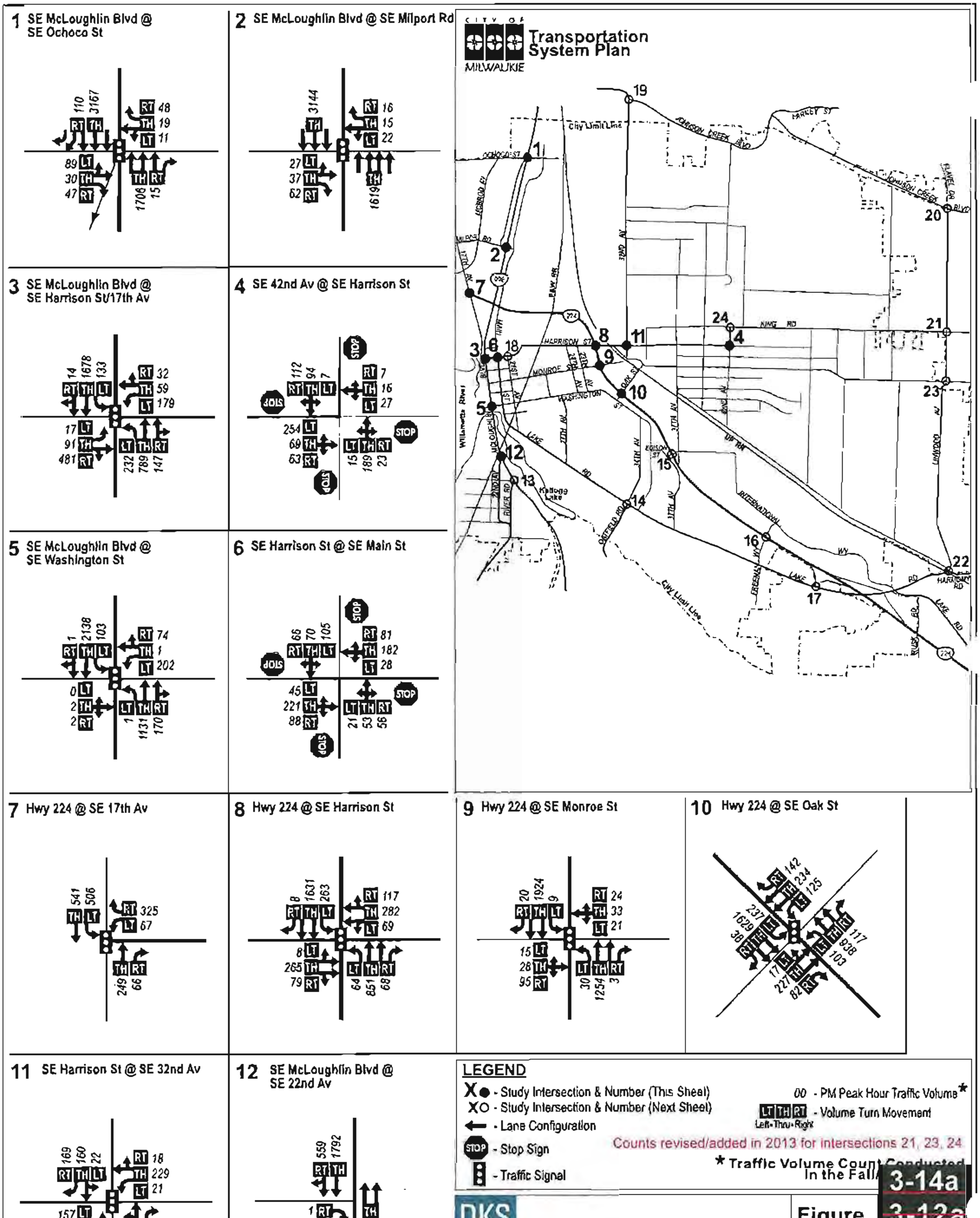


Figure ~~3-12a~~ 3-14a

EXISTING PM PEAK HOUR TRAFFIC VOLUMES

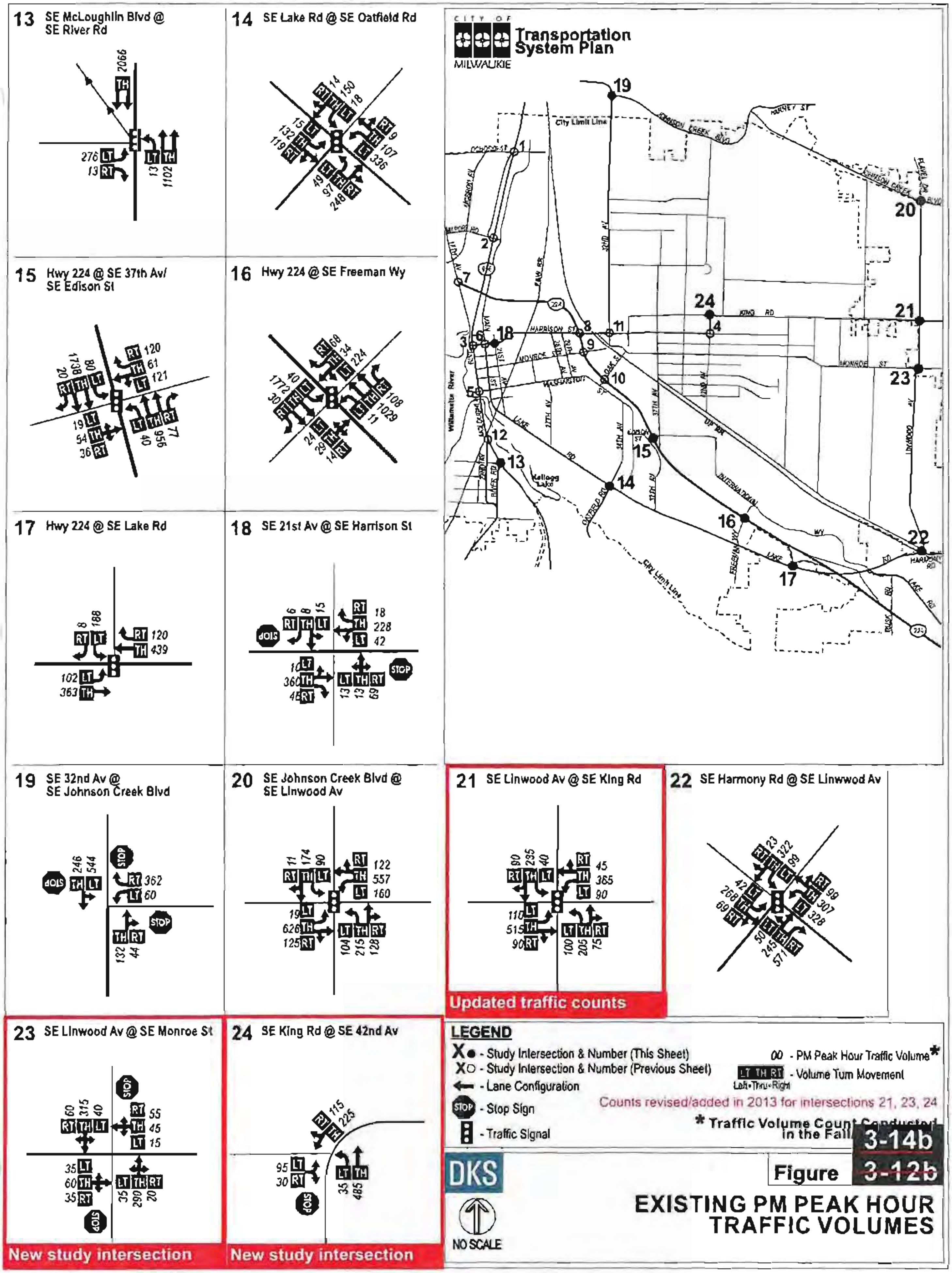


Figure ~~3-12b~~ 3-14b

EXISTING PM PEAK HOUR TRAFFIC VOLUMES

Land Use

In addition to major regional highways, such as Hwys 224 and 99E, land use within Milwaukie is a key factor in understanding current transportation patterns and roadway traffic volumes as it plays a large role in driving transportation choices. The adopted land use zoning designations within the city boundaries are shown in Figure 3-~~13~~15.

Measures of Effectiveness

Level of service (LOS) is used as a measure of effectiveness for the operation of both signalized and unsignalized intersection operation. It is similar to a "report card" rating based upon average vehicle delay.

- LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak-hour travel demand.
- LOS D and E are progressively worse peak-hour operating conditions.
- LOS F represents conditions where average vehicle delay exceeds 80 seconds per vehicle entering a signalized intersection and demand has exceeded capacity.

LOS F is typically evident in long queues and delays. LOS D or better is generally the accepted standard for signalized intersections in urban conditions.

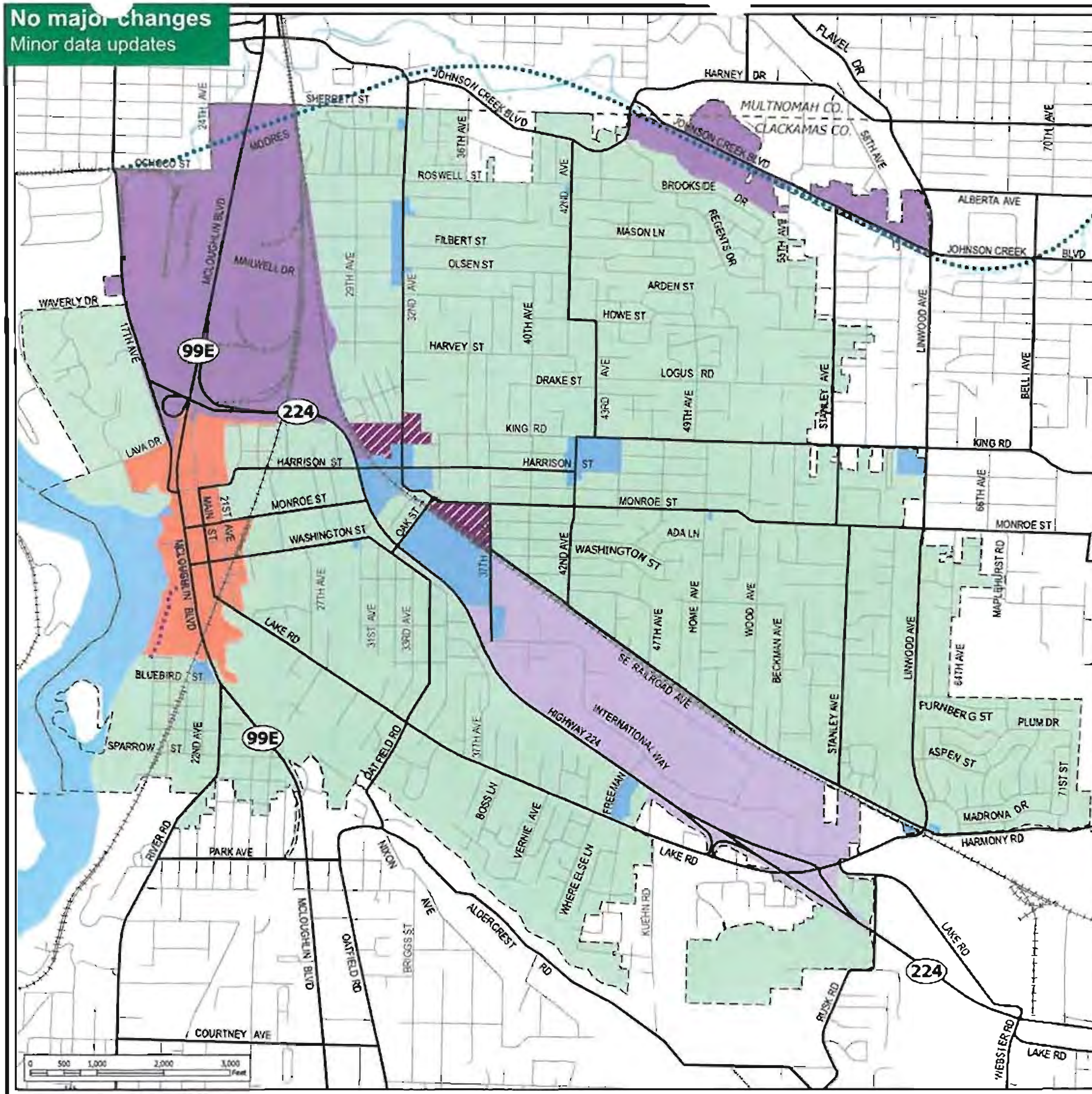
At intersections without signals, a LOS E and even LOS F can occur for a specific turning movement; however, the majority of traffic may not be delayed (in cases where major street traffic is not required to stop). When these conditions exist, it generally provides a basis to study the intersections further to determine the availability of acceptable gaps for vehicles that are stopped and waiting to enter the traffic flow. It also indicates an intersection where traffic signal warrants should be conducted to determine if the intersection is reaching a point where it could be considered for signalization. A summary of level of service descriptions for signalized and unsignalized intersections is provided in ~~the Technical~~ Appendix F.

Intersections within the city are subject to one or more measure of effectiveness standards from the City, Metro, and ODOT. Milwaukie has a LOS D standard during the peak operating conditions for all intersections that fall within the City's jurisdiction.[12] Metro also uses a LOS standard, but further refines its requirements to include the top two peak hours. Their LOS standard is F for the first peak hour and E for the second peak hour.[13] ODOT uses a volume to capacity ratio (V/C) as a measure of effectiveness, which is similar to LOS, but is a ratio of the volume of vehicles traveling through an intersection to its calculated capacity. Similar to Metro, ODOT has two sets of maximum acceptable V/C ratios for the Hwys 99E and 224 in Milwaukie. These standards are outlined in Table 3-7.

Turn movement counts taken at the study intersections and conducted during the evening peak periods were used to determine the existing 2006 LOS based on the 2000 Highway Capacity Manual methodology for signalized and unsignalized intersections.[14]

[12] Milwaukie Municipal Code, Section 19.1407.4(A).
[13] Regional Transportation Plan, Metro, 2000, Table 1.2.
[14] *2000 Highway Capacity Manual*, Transportation Research Board, 2000.

No major changes
Minor data updates



CITY OF MILWAUKIE

Transportation System Plan

FIGURE 3-~~13~~ 15

ZONING MAP

December 2007

LEGEND

Zoning

- Business Industrial
- Manufacturing
- Commercial
- Downtown
- Residential
- Mixed Use

Other Map Features

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

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Traffic counts and level of service calculation sheets can be found in ~~the Technical~~ Appendix G. A list of results for existing p.m. peak-hour intersection operation at the twenty-two study intersections is shown in Table 3-7. All but four study intersections operate at an LOS of D or better. The intersection of Johnson Creek Blvd/32nd Ave operates at LOS F during the peak hour.

Table 3-7 Existing P.M. Peak-Hour Study Area Intersection Operations

Intersection	Minimum Acceptable Measure of Effectiveness (MOE)			Level of Service (LOS)	Average Delay (Seconds)	Volume/ Capacity (V/C)
	City[15]	Metro[16]	ODOT[17]			
Two-Way Stop Controlled Intersections						
McLoughlin Blvd @ 22nd Ave		F/E	0.99/0.99	A/D	26.4	0.01
Harrison St @ 21st Ave	D			A/C	18.0	0.10
All-Way Stop Controlled Intersections						
Harrison St @ Main St	D			B	13.2	0.39
42nd Ave @ Harrison St	D			B	14.3	0.22
Johnson Creek Blvd @ 32nd Ave	D			F	>50	0.77
Signalized Intersections						
McLoughlin Blvd @ Ochoco St		F/E	1.10/0.99	B	10.1	0.85
McLoughlin Blvd @ Milport Rd		F/E	1.10/0.99	A	4.4	0.78
McLoughlin Blvd@ Harrison St		F/E	1.10/0.99	D	47.1	0.99
McLoughlin Blvd @ Washington St		F/E	1.10/0.99	C	20.0	0.88
Hwy 224 @ 17th Ave		F/E	0.99/0.99	C	20.7	0.59
Hwy 224 @ Harrison St		F/E	0.99/0.99	D	40.0	0.89
Hwy 224 @ Monroe St		F/E	0.99/0.99	B	19.0	0.75
Hwy 224 @ Oak St		F/E	0.99/0.99	D	44.1	0.88
Harrison St @ 32nd Ave	D	F/E		B	10.5	0.45
McLoughlin Blvd @ River Rd		F/E	0.99/0.99	D	35.5	0.99
Lake Rd @ Oatfield Rd		F/E		D	36.0	0.62
Hwy 224 @ 37th Ave		F/E	0.99/0.99	C	25.5	0.82
Hwy 224 @ Freeman Way		F/E	0.99/0.99	C	30.5	0.94
Hwy 224 @ Lake Rd		F/E	0.99/0.99	B	16.1	0.68
Johnson Creek Blvd @ Linwood Ave	D	F/E		D	53.6	0.97
Linwood Ave @ King Rd	D	F/E		D	47.5	0.83
Linwood Ave @ Harmony Rd	D	F/E		E	64.5	0.94

Signalized and All-Way Stop Intersection LOS:

- LOS = Level of Service
- Delay = Average vehicle delay in the peak hour for entire intersection
- V/C = Volume to Capacity Ratio
- MOE = (ODOT & Metro) First Peak Hour/Second Peak Hour

Unsignalized Intersection LOS:

[15] Milwaukie Municipal Code, Section 19.1407.4(A).

[16] Regional Transportation Plan, Metro, 2000, Table 1.2.

[17] 1999 Oregon Highway Plan Alternative Highway, Maximum Volume to Capacity Ratios Within Portland Metropolitan Region, Oregon Department of Transportation, January 2006, Table 7.

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

Safety

ODOT ranks intersections in their Safety Priority Index System (SPIS) based on the most current three years of collision data. The SPIS values range from one to one hundred, with lower values equating to lower collision rates. The score is derived from the number of collisions, the type of collisions, collision severity, and traffic volumes. Each year, a list of the top 10% SPIS sites is generated and the top 5% sites are investigated by ODOT for safety problems. If ODOT identifies a correctable problem, a benefit/cost analysis is performed and appropriate projects are initiated, often with funding from the Highway Safety Improvement Program. None of the 22 study intersections were identified as being on the SPIS top 10% list.

In addition to SPIS data, intersection safety is also analyzed using intersection collision rates. Collision rates are measured as the number of collisions per million entering vehicles (MEV). This measure allows comparison of intersections with varying volumes. ODOT provided collision data for the study intersections along the State facilities, McLoughlin Blvd and Hwy 224. All collisions involving a fatality, injury, or property damage greater than $1,500 are included in the reports supplied by ODOT. The crash rates and corresponding data can be seen in Table 3-8. Further investigation should be conducted at the intersection of Hwy 224/Lake Rd, since the corresponding crash rate is greater than 1.0, indicating that the intersection might have safety problems.

Table 3-8 SPIS Rating of Milwaukie TSP Update Study Area Intersections

Inter-section Number	ODOT SPIS Rating	Street	Cross Street	Intersection Collisions (2002-2005)[1]	Fatal	Injury	Corridor Collisions 2002-2005[2]	Collision Rate 2002-2005[3]
17	~~52.6~~ 74.81	Hwy 224	Lake Rd	15	1	7	21	1.12
10	~~51.01~~ 34.42	Hwy 224	Oak St	22	0	12	16	0.52
2	~~46.52~~ 50.42	McLoughlin Blvd	Milport Rd	9	0	4	18	0.17
3	~~37.61~~ 49.48	McLoughlin Blvd	Harrison St	8	0	3	24	0.19
15	~~34.56~~ 20.2	Hwy 224	Edison St	1	0	1	7	0.03
8	~~33.58~~ 52.82	Hwy 224	Harrison St	10	0	4	18	0.25
13	~~30.23~~ 23.72	McLoughlin Blvd	River Rd	5	0	0	15	0.13
12	~~29.39~~ 14.47	McLoughlin Blvd	22nd Ave	1	0	1	16	0.03
7	~~23.32~~ 11.03	Hwy 224	17th Ave	2	0	1	9	0.10
1	~~22.89~~ 21.27	McLoughlin Blvd	Ochoco St	5	0	4	8	0.09
16	~~18.75~~ 21.7	Hwy 224	Freeman Way	4	0	3	5	0.11
5	~~18.18~~ 39.68	McLoughlin Blvd	Washington St	2	0	1	6	0.05
9	~~16.76~~ 26.95	Hwy 224	Monroe St	5	0	2	7	0.13
4	N/A	42nd Av	Harrison St	4	0	1	N/A	0.42
6	N/A	Harrison St	Main St	6	0	4	N/A	0.53
11	N/A	Harrison St	32nd Ave	12	0	8	N/A	0.80
14	N/A	Lake Rd	Oatfield Rd	7	0	1	N/A	0.49
18	N/A	21st Ave	Harrison St	3	0	2	N/A	0.33
19	N/A	32nd Ave	Johnson Creek Blvd	0	0	0	N/A	0.00*
20	N/A	Johnson Creek Blvd	Linwood Ave	7	0	6	N/A	0.27
21	N/A	Linwood Ave	King Rd	2	0	1	N/A	0.09
22	N/A	Harmony Rd	Linwood Ave	19	0	10	N/A	0.72

[1] Collisions within the intersection: reported by City/County/State Police to ODOT.
[2] Collisions along McLoughlin Blvd or Hwy 224 within 0.05 miles of the intersection: reported by City/County/State Police to ODOT.
[3] Collision Rate = (Number of Collisions x 1,000,000)/(Number of Years of Data x 365 x Annual Average Daily Traffic)
*No crashes were recorded at this intersection.

Heavy Vehicles

The economical movement of raw materials and finished products depends on efficient truck movement to and through urban areas. The designation of through truck routes provides for efficient movement while at the same time maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. McLoughlin Blvd and Hwy 224 are identified by ODOT,[18] Metro, and the City of Milwaukie as truck routes. The City identifies truck routes on roads under its jurisdiction. Truck routes are illustrated in Figure 3-~~14~~16.

[18] *1999 Oregon Highway Plan*, The Oregon Department of Transportation, May 1999.

Truck (or heavy vehicle) volumes were collected as part of the intersection turn movement counts. Any vehicle with more than two axles was considered a heavy vehicle. The number of trucks was totaled and divided by the total number of vehicles in the traffic stream to get the percentage of trucks. Seven of the twenty-two studied intersections present truck volumes exceeding 100 vehicles per hour (vph), with volumes exceeding 150 vph at the Hwy 99E and Ochoco St intersection.

Transportation System Plan

FIGURE 3-~~14~~ 16

TRUCK ROUTES

December 2007

LEGEND

Freight Routes

- Major Regional
- Minor Preferred (Local)
- Weight-Restricted Minor Preferred (Local)

Freight Volumes

- 0 - 50 Heavy Vehicles/Hour
- 51 - 100 Heavy Vehicles/Hour
- 101 - 150 Heavy Vehicles/Hour
- > 150 Heavy Vehicles/Hour

Other Map Elements

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

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Summary of Motor Vehicle Findings

The following summarizes key motor vehicle findings related to the level of activity documented as well as deficiencies for this mode of travel. These findings will be utilized to help guide future improvements to address the deficiencies for this mode of travel in the transportation network.

- The functional classification of roadways found in the city of Milwaukie allows for the proper hierarchy of roadways that balances mobility and access. Currently the business industrial area south of Railroad Ave, north of Hwy 224, east of 37th Ave and west of Lake Rd has roadways without functional classification. International Way serves as an existing facility that provides connectivity within this area, and access to arterials and collectors.
- Street drainage issues appear to be located in the southeast area of the city, and are typically due to locations not being connected to the stormwater pipe system. An area of specific concern today is the area along Railroad Ave from Harmony Rd to 37th Ave.
- There is currently one study area intersection that does not meet jurisdictional operating standards: Johnson Creek Blvd/32nd Ave. Additionally, four other intersections are reaching capacity:
  - McLoughlin Blvd/Harrison St
  - McLoughlin Blvd/River Rd
  - Hwy 224/Freeman Way
  - Johnson Creek Blvd/Linwood Ave
- Many of the study intersections in Milwaukie have low reported collision rates. Two intersections have collisions of 10 or more. These are the intersections of Hwy 224/Lake Rd (which also included a fatality) and Hwy 224/Harrison St.
- The majority of heavy vehicle counts collected at study area intersections occur along major regional truck routes (such as McLoughlin Blvd and Hwy 224), however the intersection of Lake Rd/Oatfield Rd had a high number of heavy vehicles counted during the p.m. peak hour (100-150 heavy vehicles). Neither of these facilities are designated as truck routes, indicating that trucks could be utilizing these facilities as a "cut-through" route due to congestion and/or access issues on the major regional truck routes.

~~FREIGHT AND~~ RAIL

There is one other mode of transportation in Milwaukie: the railway system. Figure 3-~~15~~17 shows the rail facilities and crossings in Milwaukie.

There are three rail freight lines, two Union Pacific Railroad (UPRR) lines and one Oregon Pacific Railroad (OPR) line that currently traverse Milwaukie. The UPRR main line, also named the C line, is the main line between Portland and Eugene. It extends from northern Milwaukie, south and east through the city to the east and operates twenty-~~five~~four freight trains a day and six Amtrak passenger trains per day with maximum authorized speeds of 45 and 50 mph, respectively. There are four at-grade railroad crossings along this line on Harrison Ave, Oak St, 37th Ave, and Harmony Ave, all of which are gated.

The UPRR Tillamook line, also known as the FD line, is leased to Portland & Western Railroad (PNWR). It extends from Portland in the north through Milwaukie and exits to the south. PNWR operates ~~three~~ four trains per day along this line with a maximum authorized speed of 45 mph. There are twelve railroad crossings along this line, including one underpass, four overpasses, and three crossings without gates on Wren St, Bluebird St, and Bobwhite St.

The rail line operated by Oregon Pacific passes through the northwestern corner of the city of Milwaukie and has three at-grade railroad crossings, two which are without gates. These crossings without gates are at Milport Rd and McBrod Ave.

There are no airports, pipelines, ferries, or ports within Milwaukie's city limits or its UGMA.

Summary of ~~Freight and~~ Rail Findings

The following summarizes key findings related to other modes of travel in Milwaukie. These findings will be utilized to help guide future improvements to address the deficiencies for this mode of travel in the transportation network.

- The maximum authorized speeds within Milwaukie for many of the existing rail lines are 45-50 miles per hour. Many of the existing crossings in the city are at-grade facilities that are gated. However, there are six at-grade crossings that do not have gates. Three occur in the north Milwaukie industrial area east and west of McLoughlin Blvd, and the other three occur in the Island Station neighborhood to the south.
- Typical vertical clearance for underpasses (whether they are roadway or railway) is 14 feet.[19] This is a typical clearance to allow for trucks to clear the underpass, even if they are not on a freight-classified facility. The three underpasses at Lake Rd, Sparrow St, and Lark St do not meet this typical vertical clearance.
- The traffic generated by heavy trucks cutting through neighborhoods has both real and perceived impacts on neighborhood livability, including noise, vibration, safety, aesthetics, and air quality. Accessibility issues on Hwy 224 and McLoughlin Blvd, as well as weight restrictions on Johnson Creek Blvd, cause trucks to divert onto local streets not intended or preferred for freight traffic.

[19] Based on *A Policy on Geometric Design of Highways and Streets*, Fourth Edition, American Association of State Highway and Transportation Officials (AASHTO), page 389.

No major changes
Minor data updates

Transportation System Plan

FIGURE 3-~~15~~ 17

RAIL ROUTES & CROSSINGS

December 2007

LEGEND

Rail Facilities

- Existing Railroad

Rail Crossings

- At Grade - Ungated
- At Grade - Gated
- Road Overpass
- Road Underpass (with clearance)
- Number of Trains Daily

Other Map Features

- Major Roads
- Streets
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

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PARKING

City Parking Policies

On-street parking is generally available in residential areas of Milwaukie. The Milwaukie Municipal Code includes requirements for off-street parking for both residential and commercial properties. Milwaukie's Zoning ~~Code~~ Ordinance incorporates both minimum and maximum parking requirements based on specific uses.

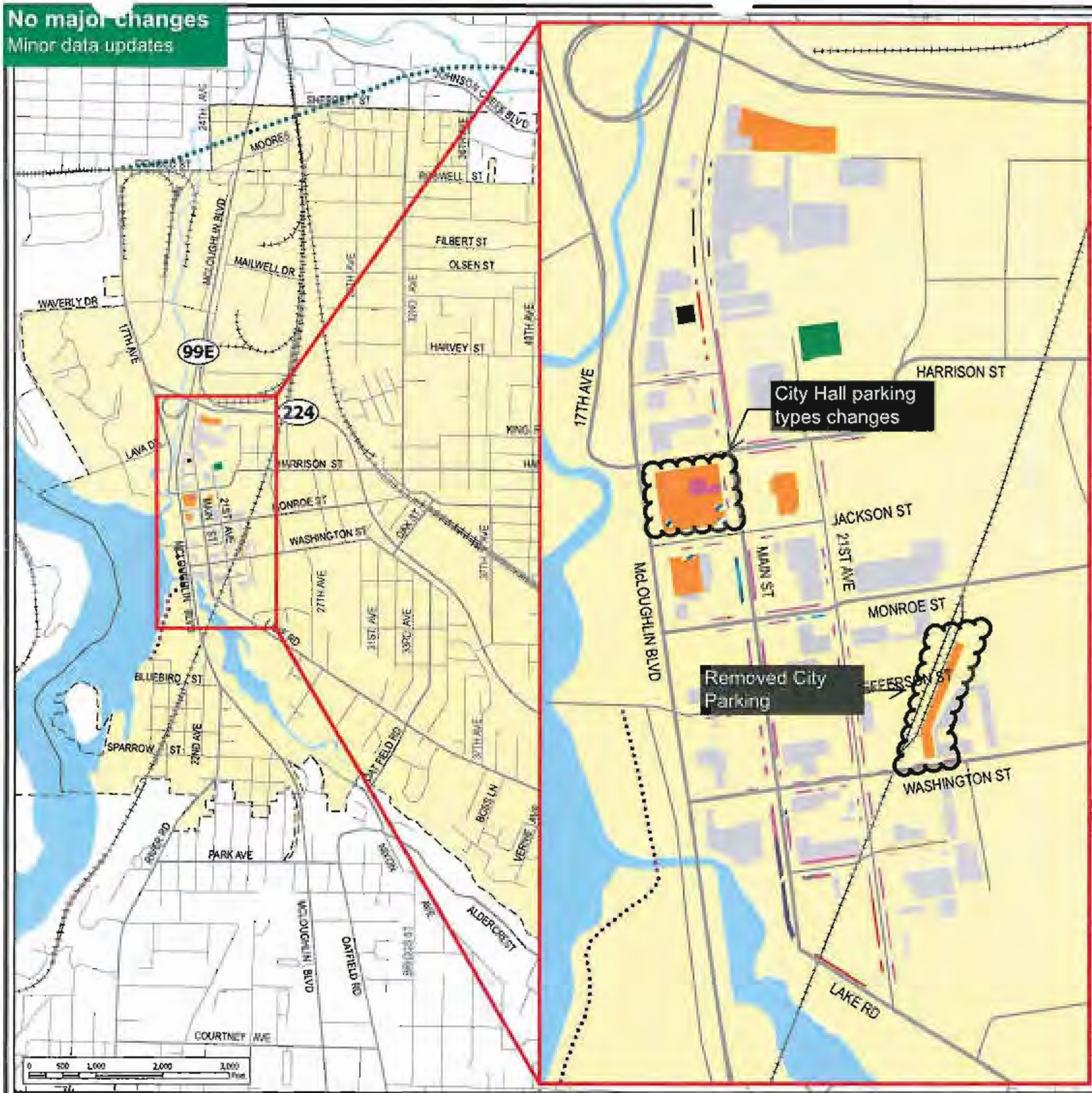
Downtown Milwaukie Parking

Downtown Milwaukie, the area bounded by McLoughlin Blvd, 21st Ave, Hwy 224, and Lake Rd, has parking characteristics that are different from other areas of the city. The off-street parking requirements in the Downtown Zones are the same as the rest of the city, except that no off-street parking is required in the Downtown Storefront Zone or in the Downtown Office Zone~~s~~ north of Washington St and east of McLoughlin Blvd. The Code also limits the development of parking facilities in the Downtown Residential and Downtown Open Space Zones.

The majority of the on-street parking in the downtown area is short-term in nature, which consists of 15-minute to 4-hour parking. The majority of the off-street parking is private surface parking serving businesses in the downtown area. Figure 3-~~16~~18 illustrates the locations of on- and off-street parking. Table 3-9 summarizes the parking supply as well as the type and public/private nature of the parking.

Since 1993, the City has operated a permit system to allow employees of downtown businesses to park in three to four downtown parking lots, as well as in specifically marked on-street spaces. This parking permit program includes ~~185~~151 parking spaces downtown. Permits can be obtained through the City of Milwaukie for a cost of $25 per month. All off-street public parking is available on a first-come, first-served basis only. There are no reserved spaces.

It is the City's practice to conduct regular detailed inventory and utilization studies of the parking within the downtown core area. The ~~October 2006~~ December 2012 utilization study found that there are many pockets of utilization in specific areas of downtown, particularly in the core commercial area along Main Street between Washington and Harrison Streets. However, there is an overall abundance of underutilized and available parking in the peak hour (11:00 a.m. to 12:00 p.m.).



Transportation System Plan

FIGURE 3-16 18

PARKING MAP

December 2007

Some categories changed

LEGEND

Parking Type

- 1 Hour
- 15 Min.
- 2 Hour
- 4 Hour
- 8 Hour
- Private
- City
- Disabled
- Loading Zone
- Garage
- Public
- Unmarked

Other Map Features

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

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As Table 3-9 indicates, the greatest concentration of underutilized parking spaces is in private lots, which represents ~~77~~84% of all parking in downtown. Private lots (both surface parking and garages) comprise ~~1,008~~1,221 total parking ~~stalls~~ spaces and reach peak occupancy of just ~~42.4~~42.0%. This leaves ~~593~~708 unused spaces in the private supply.

Table 3-9 Inventory of Existing Downtown Parking

Type of Parking		Total Inventory	Percentage of Inventory
On-Street			
Short-term (4 hours or less)		~~303~~ 366	~~80%~~ 95%
~~Long-term~~		~~59~~	~~16%~~
Unmarked		11	3%
ADA parking		~~15~~ 8	~~4%~~ 2%
	Subtotal	~~377~~ 385	100%
Off-Street			
Short-term (public)		~~11~~ 29	~~1%~~ 2%
Long-term (public)		~~270~~ 123	~~20%~~ 9%
City employee parking		42	3%
ADA parking (public)		28	2%
Private parking garage		~~21~~ 59	~~2%~~ 4%
Private surface parking		~~1008~~ 1,162	~~77%~~ 80%
	Subtotal	~~1,310~~ 1,443	100%
All Parking		**1,828**	**100%**

Source: City of Milwaukie
Data Collected: ~~November 13, 2006~~ December 13, 2012

Table 3-10 summarizes the utilization of downtown parking in ~~October 2006~~ December 2012.

Table 3-10 Use of Parking ~~Stalls~~ Spaces by Type

Type of Parking	Total Number of ~~Stalls~~ Spaces	Total Spaces Occupied at Peak Hour	Total ~~Stalls~~ Spaces Empty at Peak Hour	Peak-Hour Occupancy (%)
15 Minutes (on-street)	~~10~~ 14	~~5~~ 3	~~5~~ 11	~~50.0~~ 21.4
1 Hour (on-street)	~~5~~ 4	~~5~~ 3	~~0~~ 1	~~100.0~~ 75.0
2 Hours (on-street)	~~284~~ 270	~~194~~ 135	~~90~~ 135	~~68.3~~ 50.0
2 Hours, or all day with permit (on-street)	11	5	6	45.4
2-Hour loading zones (on-street)	~~4~~ 5	0	~~4~~ 5	0
4 Hours (on-street)	~~38~~ 9	~~29~~ 6	~~9~~ 3	~~76.3~~ 66.7

4 Hours, or all day with permit (on-street)	53	37	16	69.8
~~8 Hours~~	~~21~~	~~21~~	~~0~~	~~100.0~~
Unmarked (on-street)	11	~~11~~ 9	~~0~~ 2	~~100.0~~ 81.8
~~Disabled Stalls~~ ADA Spaces (on-street)	~~15~~ 8	~~0~~ 1	~~15~~ 7	~~0~~ 12.5
Subtotal On-Street	***~~366~~ 385***	***~~267~~ 199***	***~~108~~ 186***	***~~70.3~~ 51.7***
City permit ~~required~~ (off-street)	~~185~~ 87	~~109~~ 60	~~76~~ 27	~~58.9~~ 69.0
~~Public~~/Library/public (off-street)	~~43~~ 65	~~20~~ 27	~~23~~ 38	~~46.5~~ 41.5
City employee ~~parking~~ (off-street)	~~42~~ 42	~~18~~ 15	~~24~~ 27	~~42.9~~ 35.7
ADA spaces (off-street)	28	4	24	14.3
Subtotal Public Off-Street[1]	***~~292~~ 222***	***~~147~~ 106***	***~~123~~ 116***	***~~52.9~~ 47.7***
Private lots (surface, garage)	~~1029~~ 1,221	~~436~~ 513	~~593~~ 708	~~42.4~~ 42.0
Subtotal Private Off-Street	***~~1029~~ 1,221***	***~~436~~ 513***	***~~593~~ 708***	***~~42.4~~ 42.0***
All Parking	**~~1,687~~ 1,828**	**~~850~~ 818**	**~~824~~ 1,010**	**~~50.4~~ 44.7**

Source: City of Milwaukie. Occupancy data was collected for the peak hour (11:00 a.m.-12:00 p.m ~~noon~~) on ~~October 19, 2006~~ December 13, 2012.
[1] ~~Public off-street parking count includes 8 ADA spaces and 14 two-hour parking spaces.~~

Parking Demand

Parking ratios express the actual number of parking spaces available to serve demand for land uses (i.e., office, retail, residential, and/or mixed use development). The number of ~~stalls~~ spaces represented by a parking ratio may exceed actual demand for parking or fall short of that demand. Demand ratios, on the other hand, are generally expressed in the context of peak-hour use of a specific built supply of parking. In other words, demand ratios represent an estimate of the actual number of ~~stalls~~ spaces occupied at the peak hour relative to occupied land uses. Effectively managing the relationship between land uses and built and occupied parking supply is a fundamental challenge of parking management.

An understanding of actual demand also allows a city to estimate the impact of new development on an existing supply of parking. For downtown Milwaukie, two indicators help describe parking demand:

- **The actual current Built Ratio** of publicly available parking ~~stalls~~ spaces, in relation to total built land uses in downtown Milwaukie.
- **The actual current Demand Ratio** for parking ~~stalls~~ spaces per total built land use based on actual usage data from the most recent update of parking utilization.

Parking demand ratio calculations revealed two different, but equally useful, correlations:

- **Built ~~Stalls~~ Spaces to Built Land Use:** This represents the total number of existing parking ~~stalls~~ spaces correlated to total existing land use square footage (occupied or vacant) within the study area. There are approximately 399,074 gross square feet of commercial uses in the Downtown Zones and a total of ~~1,687~~1,828 parking ~~stalls~~ spaces. Based on these numbers, there are approximately ~~4.22~~4.58 parking ~~stalls~~ spaces per 1,000 square feet of built land.

- **Combined Demand to Built Land Use:** This represents peak-hour occupancy within the Downtown Zones, combining the on and off-street supply (actual parked vehicles correlated with actual occupied building area). Parking ~~stalls~~ spaces in downtown are utilized at a rate of ~~51.2~~44.7% in the peak hour (~~863~~818 vehicles parked). Building vacancy in downtown is approximately 11%, (approximately 355,176 of 399,074 gross square feet of building area occupied). Therefore, the actual current peak-hour demand ratio is approximately ~~2.43~~2.3 parking ~~stalls~~ spaces per 1,000 square feet of built land use.

Table 3-11 summarizes the analysis used to determine the built ratio of parking to built land use (i.e., 399,074 ~~total~~ gross square feet) and general demand for that parking based on the peak-hour occupancy/demand for all parking inventoried in the study area.

Table 3-11 Downtown Parking Demand—Mixed Land Use to Built Supply

Sites in Downtown	Gross Square Footage (built)/ Gross Square Footage (occupied)[20]	Total ~~Stalls~~ Spaces Inventoried in Downtown[21]	Built Ratio of Parking (sq ft)	Total ~~Stalls~~ Spaces Parked in Peak Hour	Actual Ratio of Parking Demand/ 1,000 sq ft
92	399,074/355,176	~~1,687~~ 1,828	~~4.22/1,000 sq ft~~ 4.58/1,000 sq ft	~~863~~ 818	~~2.43/1,000 sq ft~~ 2.3/1,000 sq ft

To date, parking in downtown Milwaukie has been built at an average rate of over ~~4.00 stalls~~ 4.5 spaces per 1,000 square feet of development. This rate appears to have been effective, though significant stall availability currently exists within the on- and off-street parking system.

Land uses in downtown Milwaukie are generating parking demand ratios of ~~2.43 stalls~~ 2.3 spaces per 1,000 gross square feet of commercial/retail development. It is important to recognize that the current parking demand number is also reflective of the current level of use by other modes (i.e., transit, bike, carpool, and walking). If the City had higher expectations and success in increasing alternative mode uses in the future, the parking "demand" ratio would be influenced downward from its current level.

Summary of Parking Findings

The following summarizes key findings related to parking in Milwaukie. These findings will be utilized to help guide future improvements to address the deficiencies for this element related to the transportation environment.

- On-street parking comprises approximately ~~22~~21% of the total parking supply (private and public) in the downtown area, while off-street parking comprises the remaining ~~78~~79%.
- The total utilization of on-street parking in the downtown area is on average ~~70~~52% throughout the day. While public off-street parking utilization is approximately ~~53~~48% during the day. By comparison, the private off-street parking utilization is approximately ~~43~~42% over the day.

[20] Assumes downtown vacancy rate of 11%, per City of Milwaukie data base.

[21] This number represents all on-street spaces~~,~~ as well as public and private off-street lots in operation within the study zone and summarized in Table 3-11, above.

- Parking ~~stall~~ space types with the highest utilization throughout the day are 1-hour, ~~8~~4-hour, and unmarked parking ~~stalls~~ spaces. All three of these types of parking are generally ~~100~~65-80% occupied during the day and represent approximately ~~10~~20% of the total on-street parking supply. Two-hour ~~and four hour~~ parking ~~stalls~~ spaces are generally ~~65-75~~50% occupied during the day. ~~These usage statistics indicate a higher likely use of short term and long term parking than mid term (2-4 hours) parking.~~

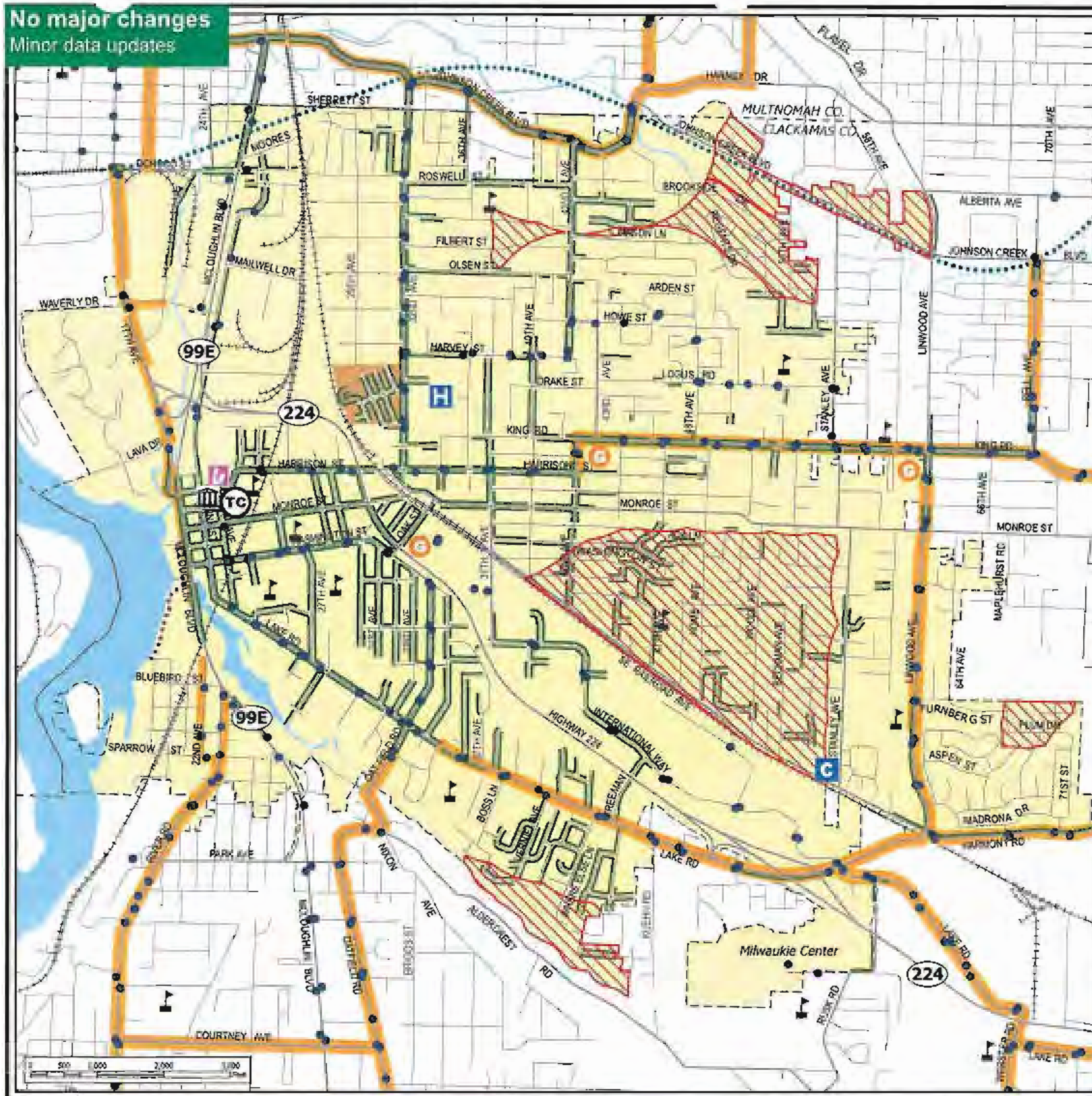
ENVIRONMENTAL JUSTICE

As stated by the Environmental Protection Agency, "Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."[22] Within the context of the TSP, Environmental Justice is an effort to identify underserved and vulnerable populations so Milwaukie can improve transportation services while avoiding future impacts.

Figure 3-~~17~~19 identifies the location of low-income housing (indicating populations most likely to be dependant on public transportation), areas of Milwaukie that are outside of the public transit coverage area, as well as the location of features such as hospitals, schools, and libraries. Transit coverage is based on comparing land that has a high enough density to support transit service versus a 1/4-mile walking distance buffer around transit stops.[23] One significant gap in transit coverage area can be seen in the residential area north of Railroad Ave, stretching east/west from Stanley Ave to 42nd Ave. Other smaller gaps in transit coverage can be seen to the northeast and along the perimeter of the city.

[22] U.S. EPA, Environmental Justice, Compliance and Enforcement, Website, 2007.
[23] Planning Commission TOD Committee, Walking Distance Research, http://www.fairfaxcounty.gov/planning/tod_docs/walking_distance_abstracts.pdf, Fairfax County, Virginia

No major changes
Minor data updates



MILWAUKIE

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FIGURE 3-17 19

TRANSPORTATION DISADVANTAGED

December 2007

EXISTING (2007)

LEGEND

- Transit Disadvantaged (more than 1/4 mile walk from bus stop)
- Bus Stops
- Transit Center
- Existing Sidewalks
- Existing Bicycle Lanes
- Low-Income Housing
- Hospital
- Convalescent Care
- School
- Library
- Grocery
- City Hall

Other Map Features

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

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In addition to regular public transit services, programs run by TriMet and the Milwaukie Center[24] provide transportation to senior citizens and disabled persons. ~~The Milwaukie Center offers the Dial-a-Ride program that runs from Hillside Park (a Clackamas Housing Authority property shown in Figure 3-17) to the Milwaukie Center and the grocery store on a weekly basis. In addition, the Transportation Reaching People program allows the scheduling of rides from their homes to medical appointments for the disabled and citizens over the age of sixty. The Catch-a-Ride program offers similar services to those living in Hillside Park. Fees for these services are a suggested donation of $1.~~The Milwaukie Center's transportation program provides four transit opportunities. Daily buses provide door-to-door service to and from the Center for lunch, shopping, and other activities. These buses have wheelchair-lift capacity, and phone-in requests are available with 24-hour notice. User fees are charged for the daily service. Rides are $1.50 one way or $3 per day to the Milwaukie Center. Rides are $2 one way to the grocery store or $4 round trip. Riders may purchase a 5-, 10-, or 20-ride card. Scholarships are available for riders who need financial assistance.

TriMet operates a fixed-route shuttle service (#152) between the Milwaukie Transit Center and Clackamas Town Center which stops at the Center. Transportation Reaching People (TRP) offers volunteer-provided services to take elderly/disabled residents for medical appointments, shopping, and personal needs. TriMet LIFT is a door-to-door transportation service for people who are unable to ride regular buses due to disability. ~~Additionally, TriMet offers the LIFT Paratransit Program.~~ This program targets those who are unable to use public transportation due to a disability or disabling health condition, and covers areas 3/4 of a mile past the outermost portions of TriMet's bus and light rail (MAX) services. These services are available on appointment from 4:30 am to 2:30 am, seven days a week. Cost is $1.60 each way.

Summary of Environmental Justice Findings

The following summarizes key findings related to environmental justice in Milwaukie. These findings will be utilized to help guide future improvements to address the deficiencies for this element related to the transportation environment.

- Almost all of the facilities and/or land uses that would typically be dependent or rely upon transit/transportation facilities have support of these types of transportation facilities. ~~However, Campbell Elementary School located on 47th Ave just north of Railroad Ave is not adequately served by transit.~~
- The lack of pedestrian and bicycle connectivity within the city also contributes to the lack of transportation options for the transit dependant population in the city.

ENVIRONMENTAL RESOURCES

As a Transportation Planning Rule (TPR) requirement, a city's transportation system shall minimize adverse economic, social, environmental, and energy consequences.[25] An Environmental Resources Map is included here as Figures 3-~~18~~20 through 3-~~20~~22, showing Title 3 areas, the local Goal 5 inventory, National Wetland Inventory, identified historic properties, and known cultural resources.

The goal of Title 3 of the Metro Functional Plan is to protect water quality and floodplain areas. Since floodplains reduce flood hazards, control soil erosion, and reduce pollution of the region's

[24] http://ncprd.com/wp-content/uploads/2011/02/transflyer.pdf
[25] OAR 660-012-0035, Environmental Considerations for Transportation Planning.

waterways, the region's health and public safety are protected. It can be seen in Figure 3-~~18~~20 that there are Title 3 areas dispersed throughout the city, including bands along Johnson Creek, the Willamette River, around Kellogg Lake, and along Kellogg Creek. Many of the Title 3 areas are also encompassed by floodplain, vegetation, and wetland zones. Endangered species habitat also correlates closely with the location of the Title 3 areas.

Local jurisdictions are required by Statewide Planning Goal 5 to adopt plans to protect natural resources and conserve scenic and historic areas and open spaces. Fish and wildlife habitats are among the natural resources that are protected by Goal 5. Figure 3-~~19~~21 identifies the Goal 5 areas within Milwaukie.

Summary of Environmental Resources Findings

The following summarizes key findings related to environmental resources in Milwaukie. These findings will be utilized to help guide future improvements to address the deficiencies for this element related to the transportation environment.

- The 100-year flood plain affects lands to the west of McLoughlin from Waverly Dr to Washington St, then crosses to the east side of McLoughlin Blvd from Washington St to Oatfield Rd. This is of particular concern for any potential improvements associated within this area.
- Two large wetland and wetland buffer areas have been identified. One is located on the southeast corner of 37th Ave/Railroad Ave, while the other is located on the south side of Railroad Ave near 47th Ave. When considering potential improvements in this area, the City should be cautious about impacts to these areas.

No major changes
Minor data updates

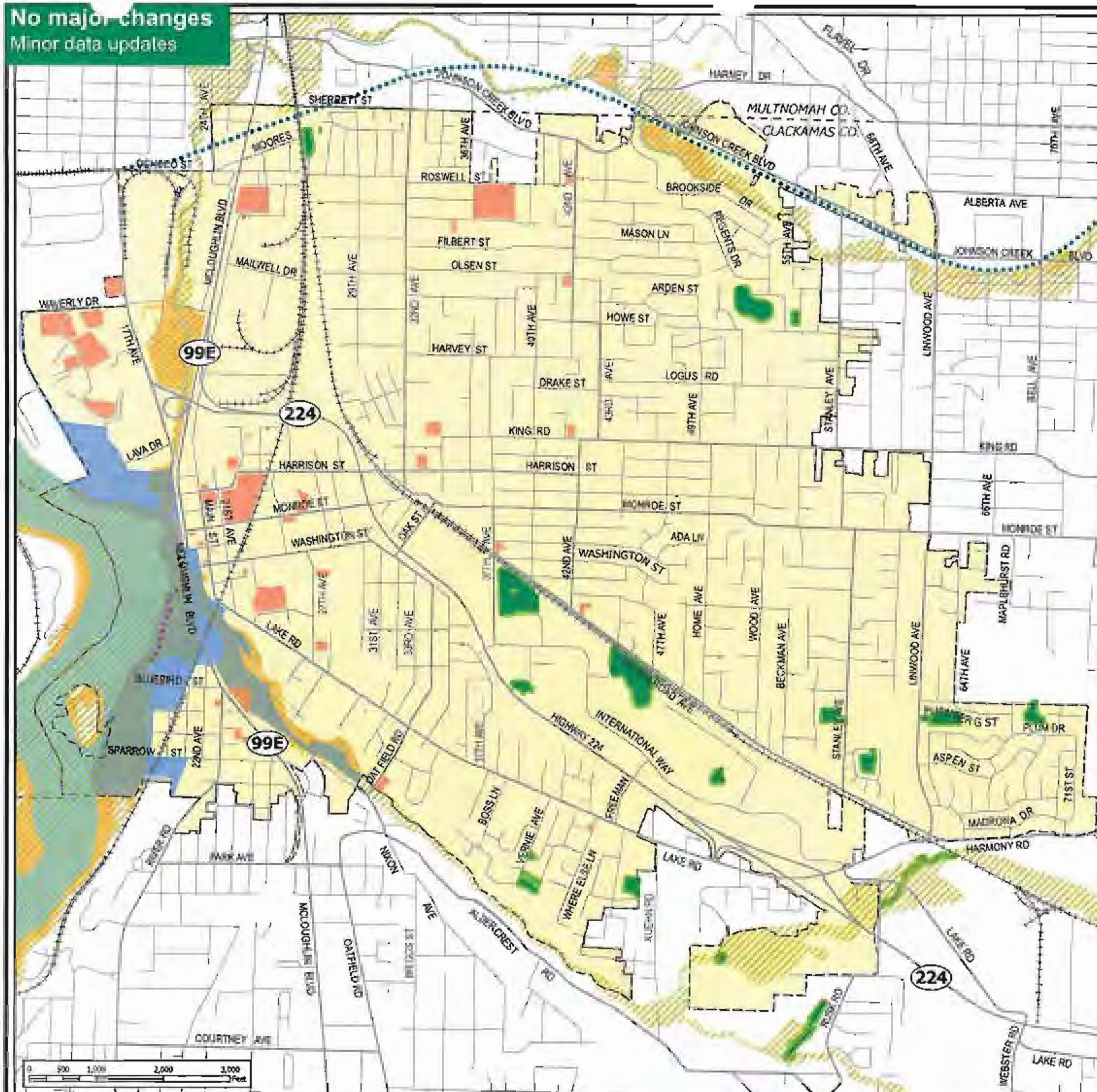

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FIGURE 3-~~18~~ 20

WETLANDS, FLOOD & CULTURAL FEATURES

December 2007

LEGEND

- Willamette Greenway
- Wetland
- Wetland Buffer
- Historic Resource
- 100 Year Flood Plain*
- 1996 Flood Extent

Other Map Features

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

* Source: Metro RLIS; FEMA with local input.

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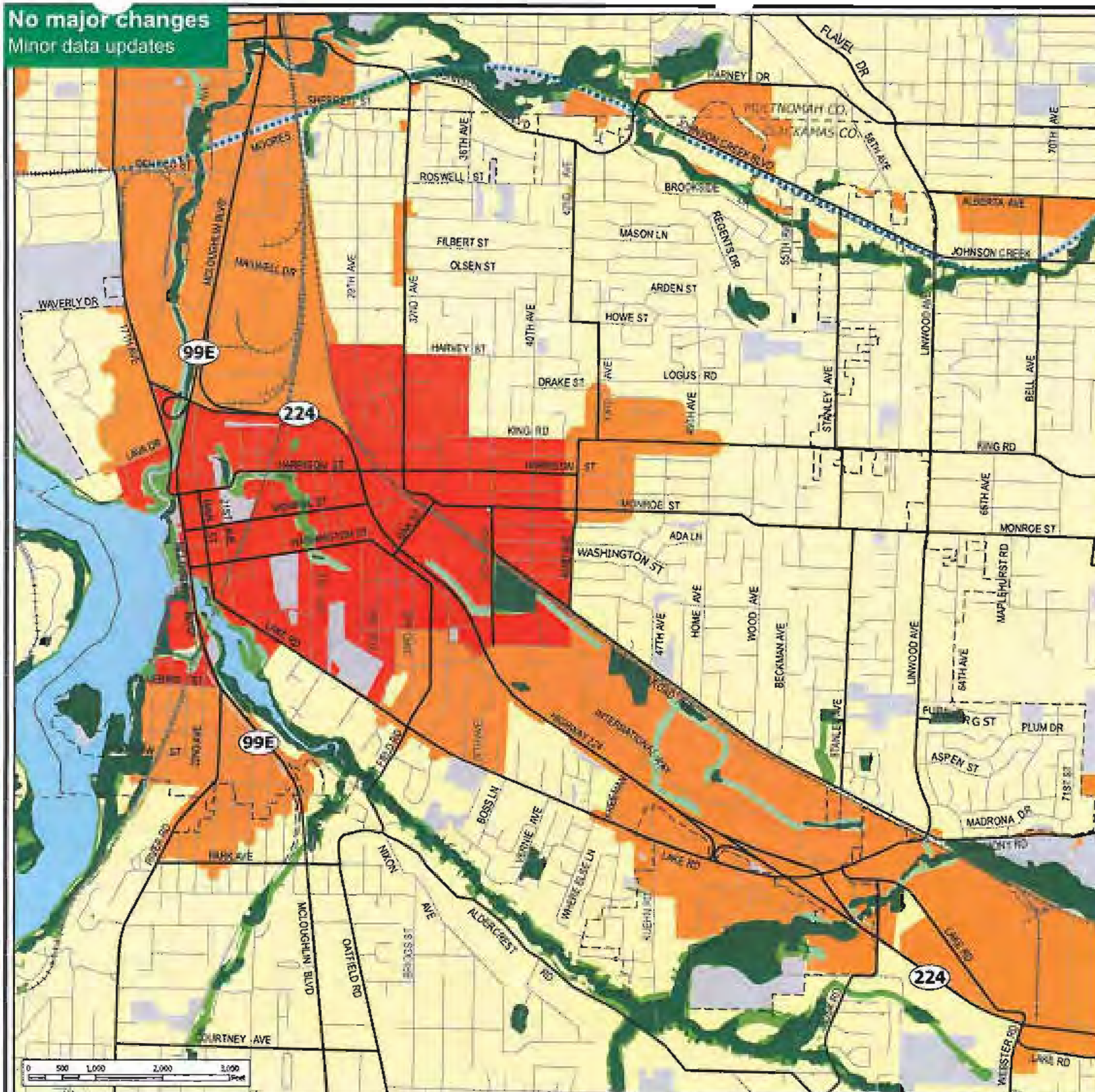

MILWAUKIE

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FIGURE 3-19 21

ENVIRONMENTAL RESOURCES - GOAL 5

December 2007

LEGEND

Goal 5 Development Value

- High
- Medium
- Low
- Not Ranked

Goal 5 Conservation Value

- High
- Moderate
- Low

Other Map Features

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

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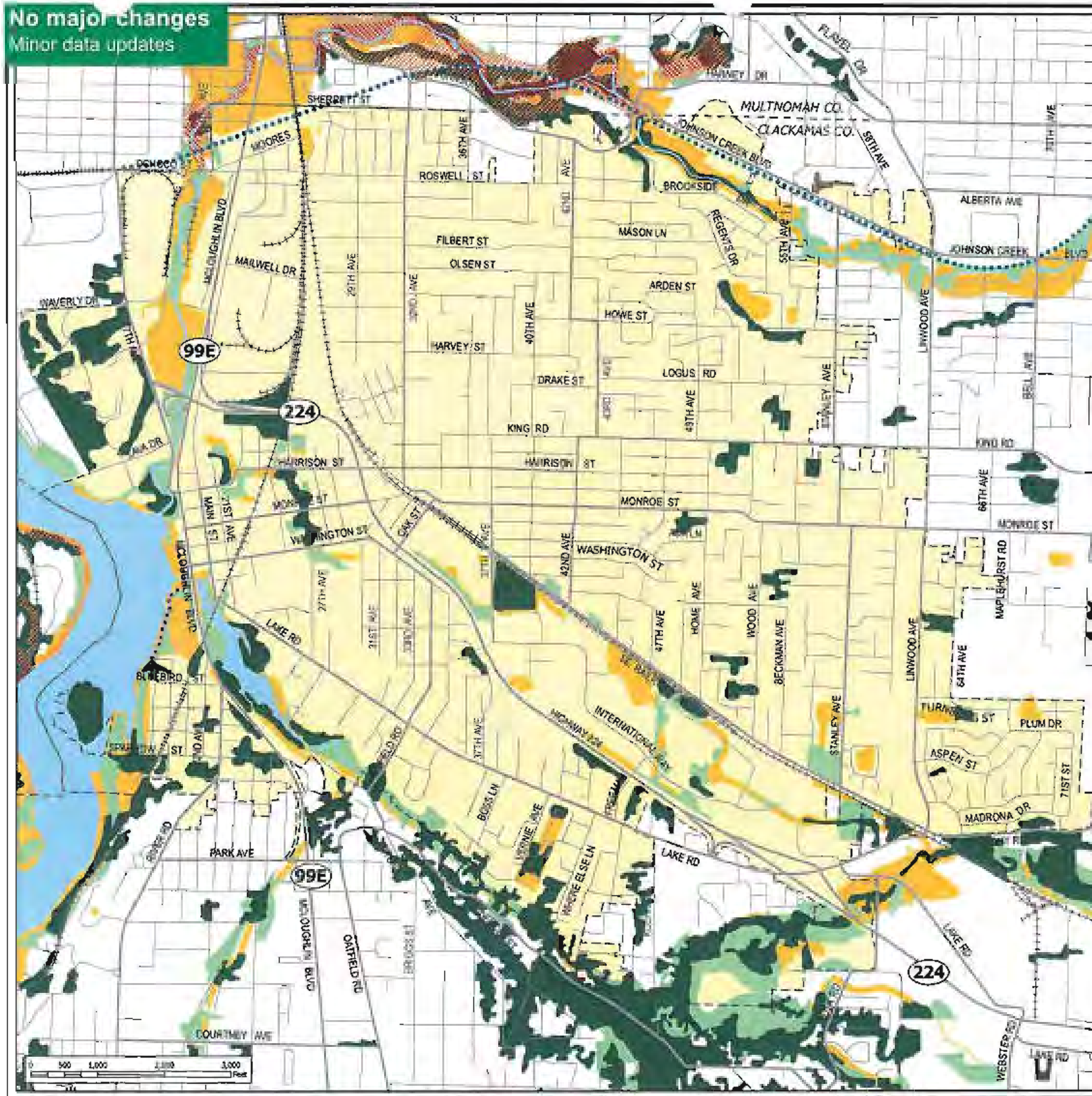
No major changes
Minor data updates



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MILWAUKIE

FIGURE 3-20 22

ENVIRONMENTAL RESOURCES - ZONING & VEGETATION

December 2007

LEGEND

Vegetation

- High
- Medium
- Low

METRO Environmental Zone

- Conservation
- Protection
- Title 3

Other Map Features

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Water
- City Limits

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4 Future Forecasting Process

TRAVEL DEMAND AND LAND USE

Metro's urban area transportation forecast model is used to determine future traffic volumes in Milwaukie. This forecast model translates assumed land uses into person trips, selects travel modes and assigns motor vehicles to the roadway network. These traffic volume projections form the basis for identifying potential roadway deficiencies and ~~for~~ evaluating alternative circulation improvements. This chapter will describe the forecasting process, including key assumptions and the land use scenario developed from the existing Comprehensive Plan designations and allowed densities.

PROJECTED LAND USE GROWTH

Land use is a key factor in developing a functional transportation system. Considerations must include the amount of land to be developed, the type of land uses that will be developed, and the relationship between mixed land uses and associated demands on the transportation system.

Projected land uses developed for the study area reflect Milwaukie's Comprehensive Plan and Metro's land use assumptions for the year ~~2030~~2035.[1] Complete land use data sets have been developed for the following conditions.

- Existing ~~2005~~2010 (base travel forecast for the region).
- Future ~~2030~~2035 Conditions.

The following sections summarize the forecasted growth in land uses that influence travel within the City of Milwaukie.

GROWTH WITHIN MILWAUKIE

The base year travel model is updated periodically to reflect the most current and up-to-date inputs related to land use for the region. For this study, the available base model provided by Metro represents land uses for ~~2005~~2010. This land use database includes the number of

[1] Metro works cooperatively with local agencies to determine local existing and future land uses that incorporate existing land uses and reflects input from local agencies. These land uses are then regionally adopted and updated when new travel demand models are developed.

dwelling units (housing), retail employees, service employees, and other employees. Table 4-1 summarizes the aggregated land use data for the ~~2005~~2010 base and future ~~2030~~2035 scenarios within the study area. This land use data is divided into smaller areas called Transportation Analysis Zones (TAZs), which contain a portion of the households, retail, service and other employees. This land use creates varying trip modes such as motor vehicle, pedestrian, bicycle and transit trips. ~~A detailed summary of the uses for each Transportation Analysis Zone (TAZ) within the Milwaukie study area is provided in the Technical Appendix.~~

Table 4-1 Milwaukie TSP Study Area Land Use Summary

Land Use	~~2005~~2010	~~2030~~2035	Increase	Percent Increase
Households (HH)	~~9,209~~ 9,791	~~10,791~~ 11,668	~~1,582~~ 877	~~17%~~ 19%
Retail Employees (RET)	~~1,697~~ 1,405	~~2,313~~ 1,902	~~616~~ 497	~~36%~~ 35%
Service Employees (SER)	~~2,769~~ 3,860	~~4,627~~ 4,943	~~1,858~~ 1,083	~~67%~~ 28%
Other Employees (OTH)	~~7,643~~ 6,754	~~8,531~~ 7,792	~~888~~ 1,038	~~12%~~ 15%

Source: Metro (subset of TAZ data that approximates Milwaukie city limits)

The overall operation of the transportation system is affected as land uses change ~~in proportion to each other (i.e. a significant increase in employment relative to household growth)~~. Retail land use typically generates a higher number of trips per acre of land than households and other land uses during the p.m. peak period. The location and design of retail land use in a community can greatly affect future transportation system operation. Additionally, if an area within the city is homogeneous in land use character (i.e. all employment or residential), the transportation system typically supports significant trips coming to or from the area rather than within the area. Integration of residential, commercial, and employment land uses within a small geographic area promotes sustainable livability, where residents can work, shop, and play locally. Among other significant benefits, this reduces long-distance traveling by residents who would otherwise be seeking services outside their locality.

Table 4-1 displays the projected employment growth (approximately ~~3,400~~2,600 jobs) in Milwaukie ~~in the next 20 years~~ that is projected to occur over a 25-year period. The transportation system should be monitored to make sure that land uses in the plan are balanced with transportation system needs. A primary purpose of a TSP is to determine those needs and help identify transportation projects for all modes that help balance future needs with the forecasted ~~2030~~2035 land uses.

Within the study area there are approximately ~~thirty-one (31)~~ 36 ~~original~~ TAZs used by Metro for planning purposes. The number of TAZs in the study area has increased from 31 since the last TSP update, due to Metro's continued refinement of the regional travel demand model. ~~These 31 TAZs were disaggregated into 90 TAZs as part of this plan to better locate land uses (and the potential for motor vehicle trips) at a more refined level.~~ The ~~original and disaggregated~~ TAZ boundaries are shown in Figure 4-1.

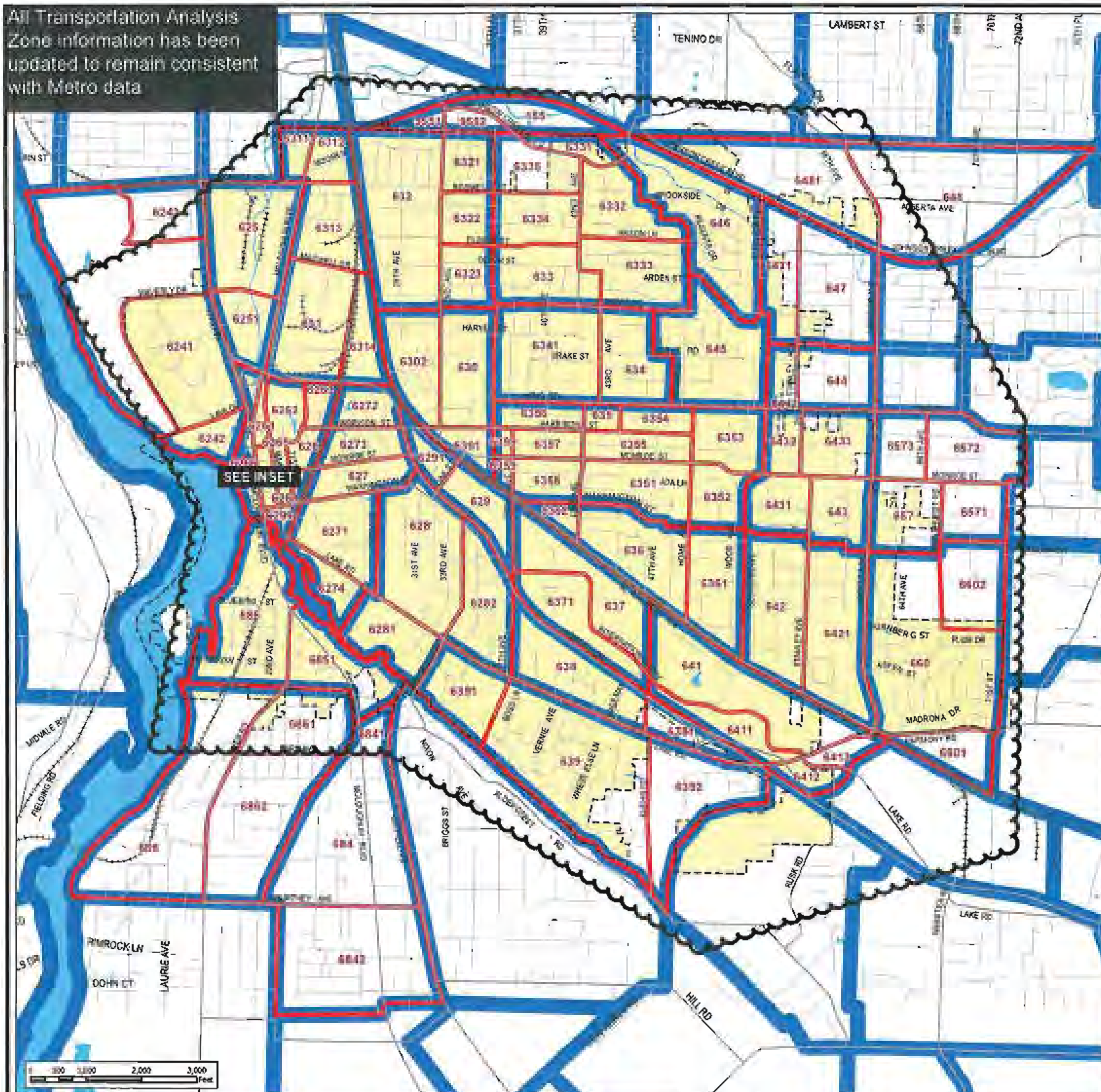
METRO AREA TRANSPORTATION MODEL

Accurately forecasting travel demand of estimated future population and employment is important for determining future ~~traffic~~ transportation system needs. The objective of the transportation planning process is to provide necessary information to aid decision-making of where and when transportation system improvements should be made to meet future travel demand. Metro uses VISUM, a computer-based transportation modeling program to process large amounts of data related to land use and person trips for ~~all~~ several modes of travel for the Portland Metropolitan area. The modeling process for the Milwaukie TSP uses the ~~2005~~2010 and ~~2030~~2035 travel demand models during the 2-hour p.m. peak period to develop future forecasts within Milwaukie. These models ~~were also used for~~ are "Beta" versions that have been updated since the adoption of Metro's ~~2004~~2035 Regional Transportation Plan (RTP).[2]

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

1. **Trip Generation**: Converts land use type into total person trips.
2. **Trip Distribution**: Determines the origins and destinations within the region.
3. **Mode Choice**: Determines which mode of travel (i.e. motor vehicle, bicycle, pedestrian, transit, carpool, etc.) each trip will use.
4. **Traffic Assignment**: Assigns the trips by mode to specific routes in the transportation network that match the trip distribution locations.

[2] Use of the Beta model is consistent with guidance from Metro. Memo: *Administrative Interpretation of 2035 Regional Transportation Plan, No 2012-2 – Guidance for Transportation System Plans and Corridor Plans about regional population and employment forecasts recommended for use in planning efforts in 2012.* John Williams, Metro, May 2, 2012.



Transportation System Plan

MILWAUKIE

FIGURE 4 - 1

TRANSPORTATION ANALYSIS ZONES

December 2007

LEGEND

- Original Metro Transportation Analysis Zones
- Disaggregated Transportation Analysis Zones
- #### Transportation Analysis Zone Number
- Major Streets
- Streets
- Railroad
- Water
- City Limits

MAP INSET

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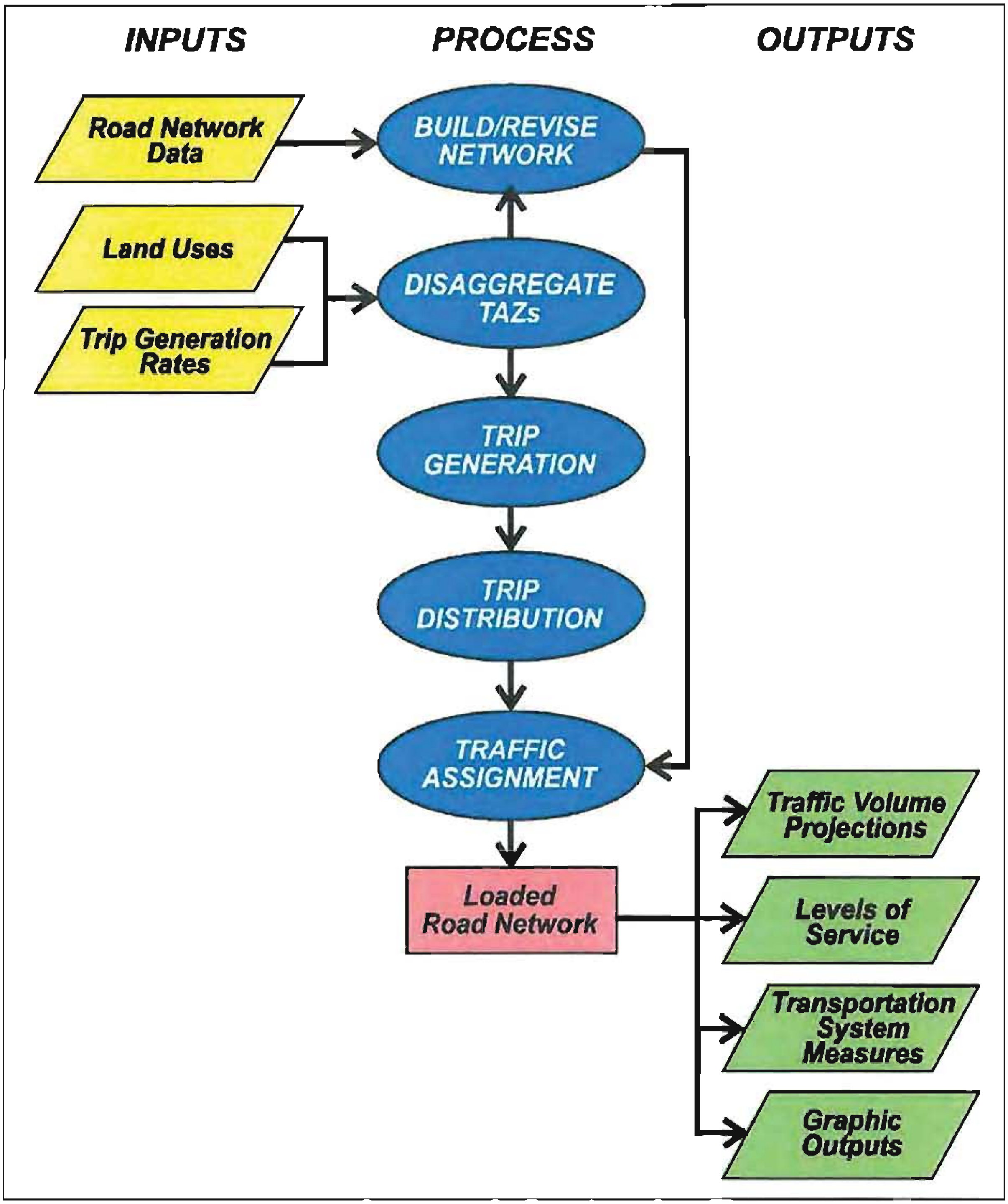
Figure 4-2: Travel Forecasting Model Process



The base roadway network in the existing ~~2005~~2010 traffic model reflects the current street and roadway system. The future ~~2030~~2035 roadway system in the Metro model consists of a "low build" condition that is typically consistent with the RTP financially constrained system. It includes both projects for which funding has been identified and the funded projects listed in the ~~1997~~2007 Milwaukie TSP. Projects in both the RTP and the TSP were then validated in the study process. Forecasts of p.m. peak period traffic flows were produced for every major roadway segment within Milwaukie. Traffic volumes were projected on all arterials and most collector streets. While most ~~Some~~ local streets ~~were~~ are not included in the model, ~~but~~ many are represented by TAZ connectors in the model process.

TRIP GENERATION

The trip generation process translates land use quantities (number of dwelling units, retail employees, service employees and other employees) into vehicle trip ends (number of vehicles entering or leaving a TAZ ~~or sub-TAZ~~) using trip generation rates established during the model verification process. The Metro trip generation process is elaborate, entailing detailed trip characteristics for various types of housing, retail, service, other employment, and special activities. Typically, most traffic impact studies rely on the Institute of Transportation Engineers (ITE) research for analysis.[3] The model process is tailored to variations in travel characteristics and activities in the region. For reference, Table 4-2 provides a summary of the approximate average evening peak-hour trip rates used in the Metro model. These are averaged over a broad area and do not account for pass-by trips; thus, they are different than driveway counts represented by ITE for similar land uses. This data provides a reference for the trip generation process used in the model.

Table 4-2 Approximate Average P.M. Peak Period Trip Rates Used in Metro Model

	Average Trip Rate/Unit		
Unit	In	Out	Total
Household (HH)	~~0.57~~ 0.69	~~0.27~~ 0.35	~~0.85~~ 1.04
Retail Employee (RET)	~~0.75~~ 0.89	~~1.15~~ 1.23	~~1.90~~ 2.12
Service Employee (SER)	~~0.33~~ 0.19	~~0.51~~ 0.47	~~0.84~~ 0.66
Other Employee (OTH)	~~0.09~~ 0.13	~~0.35~~ 0.39	~~0.44~~ 0.52

Source: DKS Associates/Metro Regional Travel Demand Model

Table 4-3 summarizes the total estimated ~~2005~~2010 and ~~2030~~2035 motor vehicle trips for Milwaukie as well as the estimated growth in vehicle trips during the two-hour p.m. peak period. Using the forecasted land use and calculated trip rate values, the total number of in- and out-trips can be produced for each TAZ in the region. Vehicle trips in Milwaukie are expected to grow by approximately ~~nine percent~~16% between ~~2005~~2010 and ~~2030~~2035 if the land develops according to the ~~2030~~2035 land use assumptions. Assuming a 25-year horizon to the ~~2030~~2035 scenario, this represents annualized growth rate of approximately ~~0.36 percent~~0.61% per year.

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

Table 4-3 Milwaukie Vehicle Trip Generation (2-Hour P.M. Peak Period)

	~~2005~~2010 Trips	~~2030~~2035 Trips	Percent Increase
Milwaukie TSP update Study Area	~~26,166~~ 21,328	~~28,530~~ 24,816	~~9%~~ 16%

Source: Metro Regional Travel Demand Model

TRIP DISTRIBUTION

This step estimates how many trips travel from one area in the model to any other area. Distribution is based on the number of trip ends generated in each TAZ zone pair, and on factors that relate the likelihood of travel between any two TAZs to the travel time between the zones.

In projecting long-range future traffic volumes, it is important to consider potential changes in regional travel patterns. Although the location and amount of traffic generation in Milwaukie are essentially a function of future land use in the city, the distribution of trips is influenced by expected congestion on roadways and regional growth, particularly in neighboring areas such as Portland, Oregon City, and the unincorporated Clackamas County areas. The model and trip distribution can also be used to help define the number of internal, external, and through trips for Milwaukie. These types of trips are as follows:

- **Internal trips** are trips that start and end within the city limits of Milwaukie.
- **External trips** are trips that either start in Milwaukie and end outside the city, or start outside the city and end within the city.
- **Through trips** are trips that pass through Milwaukie and have neither an origin nor a destination in Milwaukie.

Table 4-4 quantifies the internal, external, and through trips for all roadways within Milwaukie, as forecasted by the Metro regional travel demand model for ~~2005~~2010 and ~~2030~~2035. The number of internal versus external or through trips reveals that few people actually both live and work in Milwaukie. The much larger number of external than internal trips represents the people who live outside of Milwaukie and work in the city, or live in Milwaukie but work outside of the city. The high number of through trips through the city indicates that Milwaukie functions as a conduit for a significant number of people between their jobs and homes, both of which are outside the city limits of Milwaukie. Comparing the percentage of trips for the model year ~~2030~~2035 versus ~~2005~~2010 shows there is a slight decrease (2%) in the percentage of ~~internal and~~ external trips during the p.m. peak period. It also shows that the percentage of through trips slightly increases over the 25-year time span. ~~It is important to note that the percentage of through trips is projected to increase much faster than the external trips types and become the dominant trip form within the city during the PM peak period.~~

Table 4-4 Milwaukie Vehicle Trip Distribution (2-Hour P.M. Peak Period)

Trip Type	~~2005~~2010	~~2030~~2035	~~Delta~~% Change
Internal Trips (I-I)	~~9%~~ 10%	~~7%~~ 10%	~~-2%~~ 0%
External Trips (X-I or I-X)	~~46%~~ 51%	~~43%~~ 49%	~~-3%~~ -2%
Through Trips (X-X)	~~45%~~ 39%	~~50%~~ 41%	~~+5%~~ +2%

Source: DKS Associates/Metro Regional Travel Demand Model

I = Internal location
X = External location

MODE CHOICE

This step in the modeling process determines how many trips will be made by various modes (single-occupant vehicle, transit, carpool, pedestrian, bicycle, etc.). The ~~2005~~2010 mode splits are incorporated into the base model and adjustments to that mode split may be made for a future scenario dependant upon any anticipated changes in transit or carpool use. These considerations are built into the forecasts used for ~~2030~~2035. Based upon analysis of the forecasted mode choice in ~~2030~~2035, a study was performed to determine the level of non-single-occupant-vehicle (non-SOV) mode share. The travel model provides estimates of the various modes of travel that can be generally assessed at the transportation analysis zone level. Figure 4-3 summarizes the level of non-SOV mode share estimated for ~~2030~~2035 using the regional travel demand forecast model in comparison to the modal targets established in the RTP through Table 1-3 of the ~~2004~~2008 RTP. Generally, the areas served by transit service have the highest levels of non-SOV mode choice. The targets are based on the 2040 design type for areas around the region, as follows for each design type and non-SOV target:

- 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%).

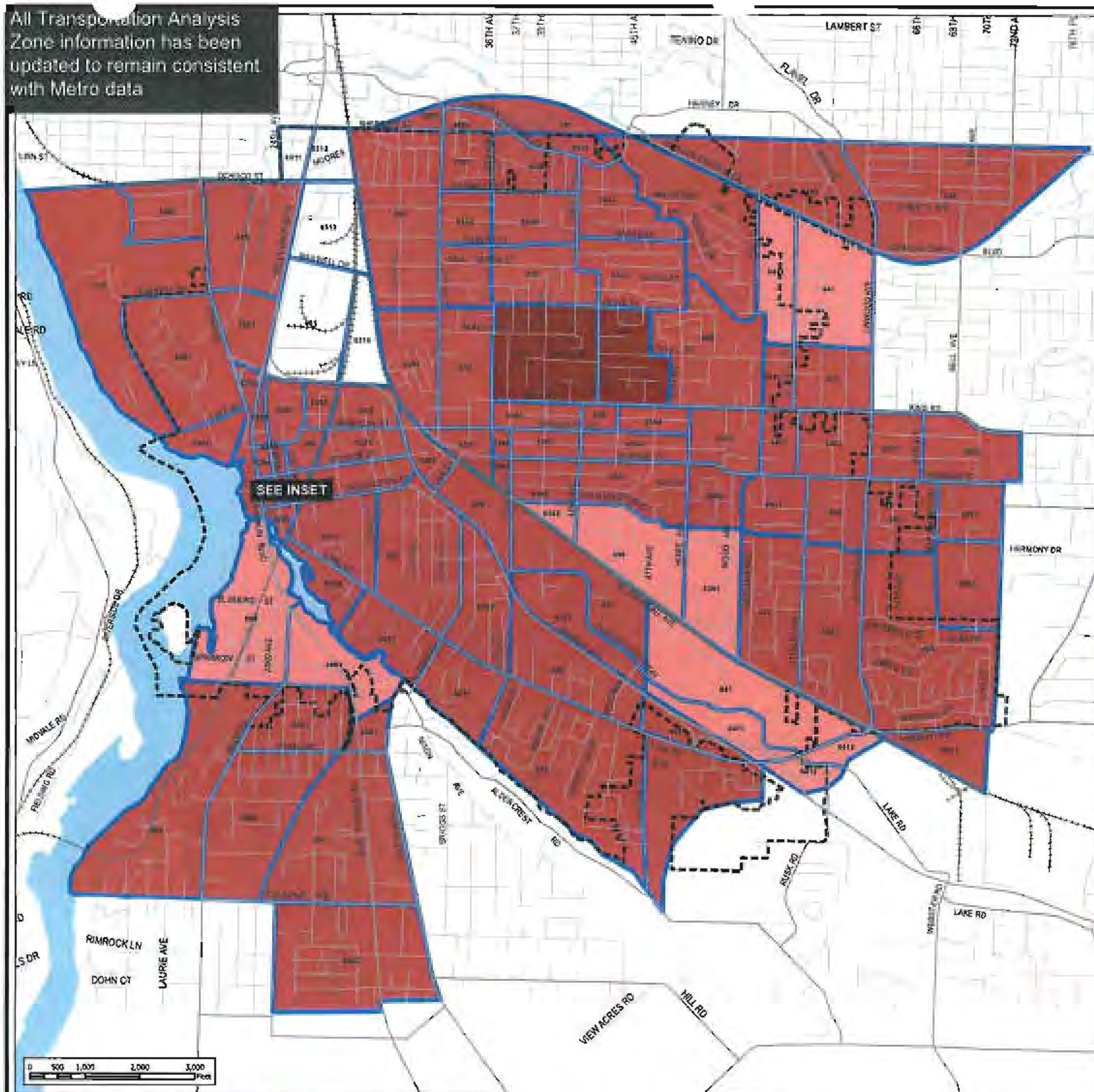
These non-SOV targets are aggregated by design type groupings (as listed above) and colored in Figure 4-3 as orange (45-55% target) and yellow (40-45% target). For each TAZ, the 2035 non-SOV share is listed. In general, the change from year 2010 is 2% growth or less. The 2035 non-SOV share for each TAZ 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.

Generally, the areas served by transit service have the highest levels of non-SOV mode choice.

TRAFFIC ASSIGNMENT

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

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



Transportation System Plan

FIGURE 4 - 3

2030 RTP FINANCIALLY CONSTRAINED NON-SOV PERCENTAGE

December 2007

LEGEND

- Disaggregated Metro TAZ
- #### Transportation Analysis Zone Number
- City Limits

2030 Committed Non-SOV (Single Occupancy Vehicle) Percentages by TAZ

- Less than 40 percent
- 40 to 45 percent
- 46 to 55 percent
- Greater than 55 percent

MAP INSET

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TRANSPORTATION SOLUTIONS

MODEL VERIFICATION

The base ~~2005~~2010 traffic volumes from the regional model were compared against actual traffic volume counts at specific locations on key arterials and at key intersections. These key intersections and corridors created "screenlines" (imaginary lines drawn across the transportation system that intersect many roadways). The screenlines are used to back-check the actual volume against the model volume to make sure that the model is predicting traffic volumes and travel patterns that reflect actual existing conditions. Most arterial traffic volumes meet screenline tolerances for forecast adequacy.[4] If roadways and/or intersection volumes are not within this tolerance, modifications to the roadway network in the base model are made to help adjust and calibrate the model to bring those volumes to within acceptable tolerance levels. These same changes in the base model are made to the future model if those changes do not conflict with a planned project in the future model (e.g., a roadway being widened or improved). Based on this performance, the existing and future models are used for future forecasting and assessment of circulation change.

MODEL APPLICATION TO MILWAUKIE

Intersection turn movements were extracted from the model at study area intersections for both the base year ~~2005~~2010 and forecast year ~~2030~~2035 scenarios. A "post processing" technique[5] is utilized to refine model travel forecasts to the volume forecasts utilized for ~~2030~~2035 intersection analysis. "Post processing" is a technique that uses existing traffic count data, base year model data, and future year model data to estimate future volumes by adding the increment of future traffic volume growth to the existing count data. This approach minimizes the effects of any model error by adding the increment of growth projected based on changes in land use to the base year counts.

[4] Typically within a 10% variance.

[5] National Cooperative Highway Research Program (NCHRP) 255, Highway Traffic Data for Urbanized Area Project Planning and Design, Transportation Research Board, Washington DC, 1982.

5 Pedestrian Element

Walking is the most affordable and accessible of all transportation modes. It is also clean, low-impact, and healthy for the individual. A safe and comfortable pedestrian environment allows people of all ages and abilities to travel independently. This chapter summarizes strategies used in evaluating the future needs of the city of Milwaukie's pedestrian network, recommends improvements for the network, outlines pedestrian needs for the next ~~20~~ 22 years, and identifies projects that address the city's needs.

GOALS AND POLICIES

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Listed below are the specific TSP Goals that guide the City's policies on pedestrian access and connectivity:

- **Goal 1 Livability** guides the City to provide convenient, accessible and coordinated pedestrian facilities and to minimize barriers to pedestrian travel.
- **Goal 2 Safety** calls for the design and maintenance of safe and accessible walkways.
- **Goal 3 Provide Travel Choices** directs the City to provide an integrated network of walkways that connect people with transit.
- **Goal 4 Quality Design** calls for pedestrian facilities to be integrated with street and development planning in a context-sensitive manner.
- **Goal 5 Reliability and Mobility** calls for enhanced connectivity, which particularly benefits pedestrians.
- **Goal 6 Sustainability** guides the City to increase the use of walking as a low-impact form of travel.

NEEDS

There are generally three different types of pedestrian trips: residential, service, and recreational trips. The deficiencies in Milwaukie's pedestrian system affect each group differently, but common to all three are the needs for connectivity, access and safety. The most common overall need is to provide a safe and interconnected system that makes pedestrian travel a viable option, especially for residential trips less than 1/2 mile in length and recreational trips less than one mile in length.

Facilities

Throughout Milwaukie, pedestrian facilities are generally deficient. Although some arterial and collector streets in the city provide limited sidewalks as shown in Figure 3-2, the north and east areas have many collectors and arterials lacking sidewalks. Many of the neighborhood and local streets throughout the city do not have pedestrian facilities. The perimeter of the city is well-served by three off-street multiuse paths, the Springwater Trail, Kellogg Creek Trail into Riverfront Park, and Trolley Trail, though gaps in the trail network exist to the east and south. Improvements are needed throughout the city, but especially on key connecting corridors that link neighborhoods to schools, parks, and commercial centers.

The Portland-Milwaukie Light Rail (PMLR) project, which is currently under construction, is building new sidewalks and pedestrian crossings around the new station in the south downtown area and will also significantly improve pedestrian facilities at the new station areas at Tacoma St and Park Ave.

City policy directs most development to fill in sidewalk gaps directly adjacent to new development. There is currently no policy to allow development to fill gaps in the pedestrian network if the gap is not adjacent to the developing site. The City should explore a different policy to collect fees from new development to help improve connections and crossings that may not be adjacent to the developing parcel.

Connectivity

Milwaukie's pedestrian network is disconnected, largely due to the lack of convenient crossings of large regional facilities: Hwy~~s~~ 99E~~ and~~, Hwy 224, and the Union Pacific Railroad. The wide design and high vehicle speeds of these roadways result in potentially unsafe and unpleasant pedestrian crossings. Without direct connections across these barriers, pedestrians are forced to travel out of direction and sometimes use busy arterial and collector streets to meet their destinations. Even where pedestrian crossings do exist, many are deficient. The use of asphalt on railroad crossings is a concern for pedestrians, since asphalt is more likely to buckle than concrete and results in uneven walking surfaces. Uneven walking surfaces are particularly problematic for elderly and disabled individuals. Numerous dead-end and curvilinear streets throughout the city also contribute to the disconnected pedestrian network. Connectivity improvements are needed in two key areas: (1) crossing improvements at most highways, railroads, and arterials,[1] and (2) connections to schools, parks, and transit routes.

~~Facilities~~

~~Throughout Milwaukie, pedestrian facilities are disconnected and deficient. Although some arterial and collector streets in the city provide limited sidewalks as shown in Figure 3-2, the north and east areas have many collectors and arterials lacking sidewalks. Many of the neighborhood and local streets throughout the city do not have pedestrian facilities. The perimeter of the city is well-served by two off-street multiuse paths, the Springwater Trail, and the Milwaukie Riverfront trail, though gaps in the trail network exist to the east and south. Improvements are needed throughout the city, but especially on key connecting corridors that link neighborhoods to schools, parks, and commercial centers.~~

~~Policy~~

~~City policy directs most development to fill in sidewalk gaps directly adjacent to new development. There is currently no policy to allow development to fill gaps in the pedestrian~~

[1] Any potential new crossing location would need to meet Oregon Department of Transportation (ODOT) crossing guidelines and criteria to make sure the crossing is warranted and safe.

~~network if the gap is not adjacent to the developing site. The City should explore a different policy to collect fees from new development to help improve connections and crossings that may not be adjacent to the developing parcel.~~

FACILITIES

The most common type of pedestrian facility is a concrete sidewalk that is separated from the roadway by an extruded curb. Sidewalks must be built to current City of Milwaukie design standards and comply with the Americans with Disabilities Act, which requires at least 4 ft of unobstructed sidewalk.[2] Wider sidewalks are desirable to promote pedestrian travel on all roadways.

Some of Milwaukie's streets are not only important local connections, but are also designated as regionally important pedestrian streets. Streets identified in the Metro 2004 RTP as transit/mixed use corridors (streets in downtown Milwaukie, 17th Ave, Harrison St, King Rd, and 32nd Ave) are areas that are served by quality transit service and will generate substantial pedestrian traffic near neighborhood-oriented retail development, schools, parks, and bus stops. These corridors should include such pedestrian design features as wide sidewalks with buffering from traffic, pedestrian-scale lighting, benches, bus shelters, and street trees.

Milwaukie has three identified off-street multiuse paths in the Metro ~~2004~~ RTP regional trails and greenways system: the Springwater Trail, the Trolley Trail, and the Kellogg Creek greenway. The majority of the Springwater Trail within the city has been constructed. However, there is a gap between the Milwaukie section of the Springwater Trail and the section along the east bank of the Willamette River. The Trolley Trail, a project led by the North Clackamas Parks District, is currently under construction. The final segment of the Trolley Trail within the city will be completed in conjunction with the PMLR project. These facilities will be designed and built according to regional standards, as well as local jurisdictional standards.

RECOMMENDATIONS

Strategies

Milwaukie's pedestrian system is challenged by an incomplete arterial/collector sidewalk system, a lack of local street connectivity, arterial crossings with potential safety and connectivity issues, and a lack of complete multiuse trails (see Chapter 3).

The City has several strategies for addressing pedestrian system needs and guiding project prioritization. The prioritization process helps to focus community investment on those projects that are most effective at addressing critical needs, while deferring other projects of lesser importance. The strategies for pedestrian facilities include:

- Key pedestrian corridors to connect neighborhoods with schools, parks, activity centers, and major transit stops.
- Arterial crossing and safety enhancements.
- Fill gaps in the network where some sidewalks exist.
- Pedestrian corridors that connect to major recreational uses.
- Enforcement of laws that protect pedestrians.
- Education about pedestrian safety and available walking routes.

[2] *Americans with Disabilities Act*, Uniform Building Code

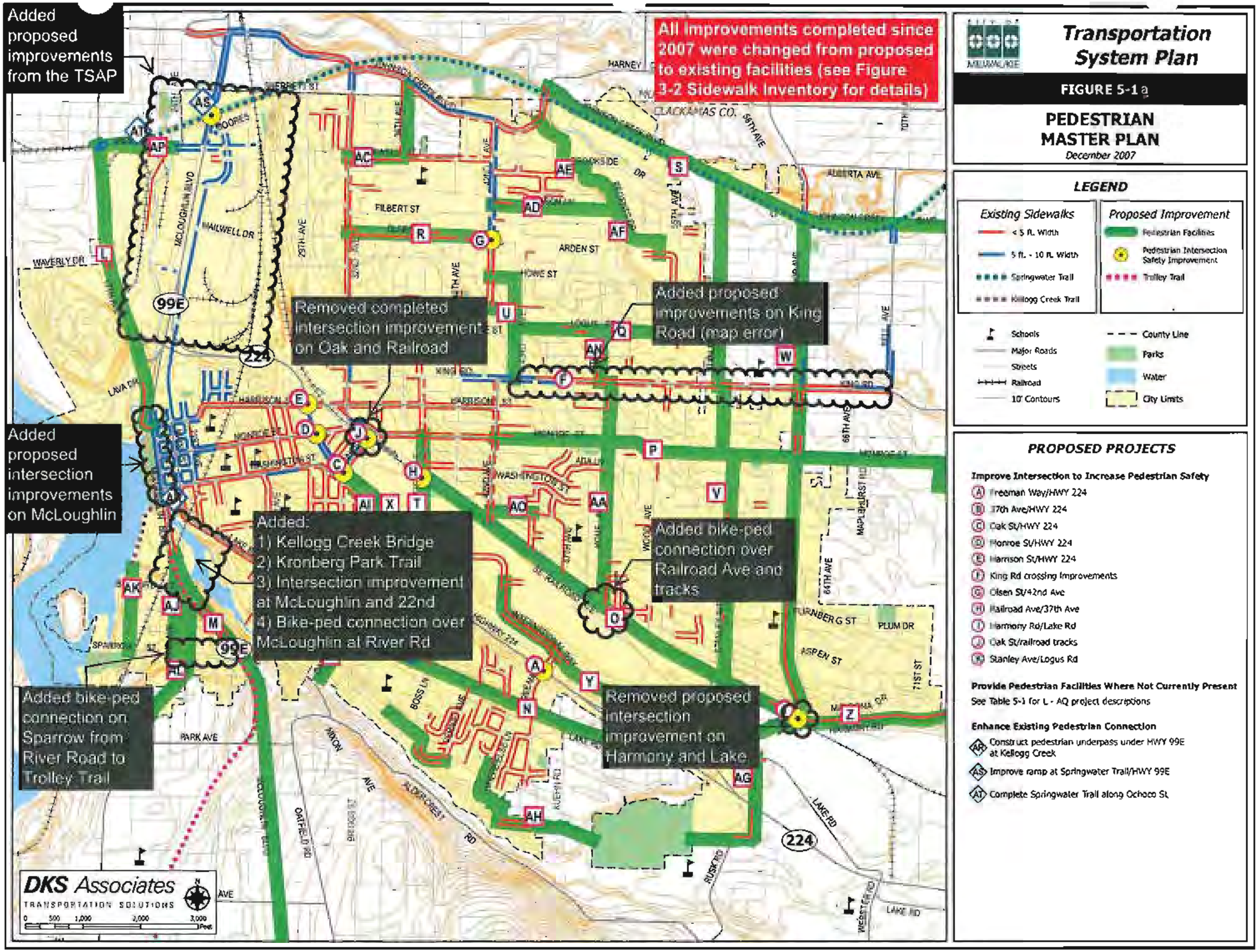
These strategies would be implemented by projects that address needs and deficiencies. The projects fall into three categories:

- **Capital:** projects that require construction of some sort of physical infrastructure. Capital projects typically require ongoing maintenance that must be programmed into the maintenance schedule.
- **Operational:** projects which involve actions that make the existing transportation infrastructure more useable. They can include upkeep of existing facilities, educational campaigns, or distributing information about the use of the transportation network. They are typically smaller in scale and dollars than capital projects, and are implemented more broadly than in one specific location.
- **Policy:** Projects that improve the pedestrian environment that typically do not result in a physical improvement, but rather in a fundamental change in the way pedestrian travel is perceived or treated within Milwaukie. Proposed policy projects are listed below.
    - Ensure overhanging vegetation and other sidewalk obstructions are removed; ensure sidewalk safety hazards are repaired.
    - Enforce speeding laws, utilizing tools such as photo radar, to make the streets generally safer; enforce laws related to pedestrian crossings and crosswalks.
    - Utilize safe routes to schools programs and resources to increase pedestrian safety around schools.
    - Support mixed-use development and services near residential areas to encourage walking; reexamine vehicle-centered policies, such as high amounts of required parking.
    - Construct sidewalks or appropriate walkways everywhere; i.e., complete streets as development occurs or capital funds become available.
    - Educate the general public about pedestrian safety; inform the general public about traffic laws related to pedestrians.

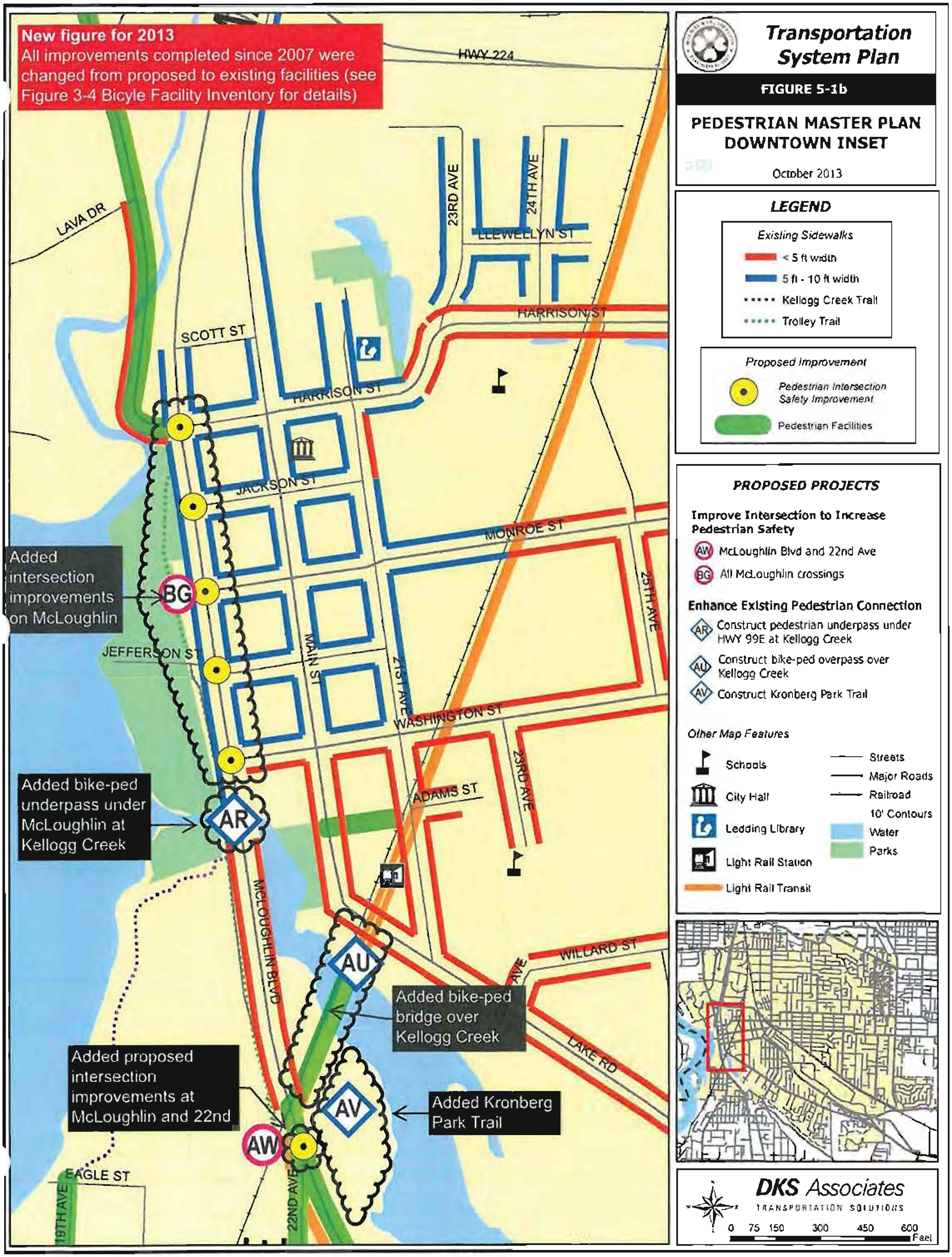
Master Plan

The Pedestrian Master Plan includes a list of projects that could address system needs and achieve the strategies for improving the pedestrian system (see Figure 5-1a). An inset map showing more detail in the downtown area is provided in Figure 5-1b. Some projects from the master plan were selected for inclusion in a Pedestrian Action Plan, which consists of projects that the community has identified for the City to give priority in allocating funding and/or pursuing additional funding. As development occurs, streets are rebuilt, and as other opportunities (grant programs) arise, projects on the master plan should be pursued as well.

The planning-level cost estimates provided for each project in Table 5-1 are based on general unit costs for transportation improvements but do not reflect the unique project elements that can significantly add to project costs. For each of these projects, the City will refine the cost estimate to include right-of-way requirements and costs associated with special design details.



Transportation System Plan
FIGURE 5-1 a
PEDESTRIAN MASTER PLAN
December 2007
LEGEND
Existing Sidewalks
< 5 ft. Width
5 ft. - 10 ft. Width
Springwater Trail
Kellogg Creek Trail
Proposed Improvement
Pedestrian Facilities
Pedestrian Intersection Safety Improvement
Trolley Trail
Schools
Major Roads
Streets
Railroad
10' Contours
County Line
Parks
Water
City Limits
PROPOSED PROJECTS
Improve Intersection to Increase Pedestrian Safety
A Freeman Way/HWY 224
B 37th Ave/HWY 224
C Oak St/HWY 224
D Monroe St/HWY 224
E Harrison St/HWY 224
F King Rd crossing improvements
G Olsen St/42nd Ave
H Railroad Ave/37th Ave
I Harmony Rd/Lake Rd
J Oak St/railroad tracks
K Stanley Ave/Logus Rd
Provide Pedestrian Facilities Where Not Currently Present
See Table 5-1 for L - AQ project descriptions
Enhance Existing Pedestrian Connection
AR Construct pedestrian underpass under HWY 99E at Kellogg Creek
AS Improve ramp at Springwater Trail/HWY 99E
AT Complete Springwater Trail along Ochoco St
Added proposed improvements from the TSAP
All improvements completed since 2007 were changed from proposed to existing facilities (see Figure 3-2 Sidewalk Inventory for details)
Removed completed intersection improvement on Oak and Railroad
Added proposed improvements on King Road (map error)
Added proposed intersection improvements on McLoughlin
Added:
1) Kellogg Creek Bridge
2) Kronberg Park Trail
3) Intersection improvement at McLoughlin and 22nd
4) Bike-ped connection over McLoughlin at River Rd
Added bike-ped connection over Railroad Ave and tracks
Added bike-ped connection on Sparrow from River Road to Trolley Trail
Removed proposed intersection improvement on Harmony and Lake
DKS Associates
TRANSPORTATION SOLUTIONS
CLACKAMAS CO.
HARNEY
FILBERT ST
ARDEN ST
HOWE ST
WAVERLY DR
MCLOUGHLIN BLVD
29TH AVE
ALBERTA AVE
KING RD
HARRISON ST
MONROE ST
WASHINGTON ST
LAVA DR
SPARROW ST
PARK AVE
BOSS LN
FURNBERG ST
PLUM DR
ASPEN ST
MAPLEHURST RD
64TH AVE
66TH AVE
71ST ST
LAKE RD
RUSK RD
WEBSTER RD
OATFIELD RD
99E
224



New figure for 2013
All improvements completed since 2007 were changed from proposed to existing facilities (see Figure 3-4 Bicycle Facility Inventory for details)
Transportation System Plan
FIGURE 5-1b
PEDESTRIAN MASTER PLAN DOWNTOWN INSET
October 2013
LEGEND
Existing Sidewalks
< 5 ft width
5 ft - 10 ft width
Kellogg Creek Trail
Trolley Trail
Proposed Improvement
Pedestrian Intersection Safety Improvement
Pedestrian Facilities
PROPOSED PROJECTS
Improve Intersection to Increase Pedestrian Safety
AW McLoughlin Blvd and 22nd Ave
BG All McLoughlin crossings
Enhance Existing Pedestrian Connection
AR Construct pedestrian underpass under HWY 99E at Kellogg Creek
AU Construct bike-ped overpass over Kellogg Creek
AV Construct Kronberg Park Trail
Other Map Features
Schools
City Hall
Ledding Library
Light Rail Station
Light Rail Transit
Streets
Major Roads
Railroad
10' Contours
Water
Parks
DKS Associates
TRANSPORTATION SOLUTIONS
0 75 150 300 450 600 Feet
HWY 224
LAVA DR
23RD AVE
24TH AVE
LLEWELLYN ST
HARRISON ST
SCOTT ST
JACKSON ST
MONROE ST
25TH AVE
JEFFERSON ST
MAIN ST
21ST AVE
WASHINGTON ST
ADAMS ST
23RD AVE
WILLARD ST
LAKE RD
MCLOUGHLIN BLVD
EAGLE ST
19TH AVE
22ND AVE
Added intersection improvements on McLoughlin
Added bike-ped underpass under McLoughlin at Kellogg Creek
Added bike-ped bridge over Kellogg Creek
Added proposed intersection improvements at McLoughlin and 22nd
Added Kronberg Park Trail
BG
AR
AU
AV
AW

Table 5-1 Pedestrian Master Plan Projects

Map ID[3]	Priority	Type	Project Name	Project Description[4]	From	To	Cost(~~s~~) ($1,000s[5])
High Priority Projects							
N/A	High	P	Study of Pedestrian Crossings on Hwy 224	Examine alternatives for improving pedestrian crossings at five intersections along Hwy 224 (Harrison St, Monroe St, Oak St, 37th Ave, Freeman Way)	Harrison St	Freeman Way	$50
A	~~Low~~High	C	~~Hwy 224~~ Intersection Improvements at Hwy 224 and Freeman Way	Improve pedestrian crossing.	Location-specific	Location-specific	$20
B	~~Low~~High	C	~~Hwy 224~~ Intersection Improvements at Hwy 224 and 37th Ave	Improve pedestrian crossing.	Location-specific	Location-specific	$20
C	~~Low~~High	C	~~Hwy 224~~ Intersection Improvements at Hwy 224 and Oak St	Improve pedestrian crossing.	Location-specific	Location-specific	$20
D	~~Low~~High	C	~~Hwy 224~~ Intersection Improvements at Hwy 224 and Monroe St	Improve pedestrian crossing.	Location-specific	Location-specific	$~~15~~ 20
E	~~Low~~High	C	~~Hwy 224~~ Intersection Improvements at Hwy 224 and Harrison St	Improve pedestrian crossing.	Location-specific	Location-specific	$20
L	High	C	17th Ave ~~Sidewalks~~Improvements	Fill in sidewalk gaps on both sides of street; fill in gaps in existing bicycle network with bike lanes; and/or provide multiuse path. ~~and i~~Improve intersections safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.	Ochoco St	McLoughlin Blvd	$~~920~~ 1,000

[3] See Figure 5-1.

[4] The projects in this table assume traditional sidewalks on both sides of the street. In some cases it may be appropriate to construct a nontraditional pedestrian facility on one side of the street. See Chapter 10 Street Design for more information on the City's approach to designing pedestrian facilities.

[5] Project costs are order-of-magnitude estimates and are in ~~2007~~2012 dollars. Future costs may be more due to inflation. ~~Costing details can be found in the Technical Appendix.~~ In the case of operational projects, estimated costs are for the entire 22-year planning period.

Map ID[3]	Priority	Type	Project Name	Project Description[4]	From	To	Cost~~(s)~~ ($1,000s[5])
O	High	C	Railroad Ave ~~Sidewalks~~ Capacity Improvements	Pedestrian aspect: Fill in sidewalk gaps on both sides of street or construct multiuse path on one side~~(part of Railroad Avenue road widening project)~~.	37th Ave	Harmony Rd	~~$1,625~~ 1,800
P	High	C	Monroe St ~~Sidewalks~~ Neighborhood Greenway	Fill in sidewalk gaps on both sides of street.	42nd Ave	City limit	~~$1,631~~ 1,800
U	~~Low~~High	C	43rd Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	Howe St/42nd Ave	King Rd/43rd Ave	~~$550~~ 600
V1	High	C	Stanley Ave ~~Sidewalks~~ Neighborhood Greenway (north)	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	~~Railroad Ave~~ King Rd	~~$4,304~~ $1,900
V2	High	C	Stanley Ave Neighborhood Greenway (south)	Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,800
W2	~~Low~~ High	C	Linwood Ave Sidewalks (south)	Fill in sidewalk gaps on both sides of street (part of Linwood Ave road-widening project).	King Rd	Railroad Ave	$2,150
Y	~~Low~~High	C	International Way Sidewalks	Fill in sidewalk gaps on both sides of street.	Criterion Ct	Lake Rd	~~$767~~ 840
Z	~~Low~~High	C	Harmony Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	Linwood Ave	City limits	~~$38~~ 40
AL	~~Low~~High	C	River Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	McLoughlin Blvd	City limits	~~$626~~ 690
AR	High	C	Kellogg Creek Dam Removal and Hwy 99E Underpass	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/pedestrian ~~pedestrian~~ undercrossing between downtown Milwaukie and Riverfront Park.	~~Site~~Location-specific	~~Site~~Location-specific	~~$9,000~~ 9,900
AU	High	C	Kellogg Creek Bike/Ped Bridge	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500
AV	High	C	Kronberg Park Trail	Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E.	Kellogg Creek Bridge	River Rd	$300
AW	High	C	Intersection Improvements at McLoughlin Blvd and 22nd Ave	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200

Map ID[3]	Priority	Type	Project Name	Project Description[4]	From	To	Cost(~~s~~) ($1,000s[5])
AX	High	C	Improved Connection to Springwater Trail at 29th Ave and Sherrett St	Pave the connection to Springwater Trail at 29th Ave and Sherrett St. (TSAP)	Location-specific	Location-specific	$20
AY	High	C	Improved Connection from Springwater Trail to Pendleton Site (Ramps)	Construct ramps to improve existing connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$630
AY	High	C	Improved Connection from Springwater Trail to Pendleton Site (Widened Undercrossing)	Widen existing undercrossing to improve connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$100
AZ	High	C	Improved Connection from Springwater Trail to Tacoma Station	Construct stairs to connect Springwater Trail to Tacoma station. (TSAP)	Location-specific	Location-specific	$80
BL	High	C	Adams St Connector	Construct pedestrian- and bicycle-only facility on Adams St between 21st Ave and Main St	21st Ave	Main St	$450
N/A	~~Low~~High	C	Intersection Curb Ramp Improvements	Install curb ramps at all intersections with sidewalks (approximately 700 intersections).	Citywide	Citywide	$5 3,500
Medium Priority Projects							
F	~~High~~Med	C	King Rd Blvd Treatments	Install street boulevard treatments; widen sidewalks and improve multiple crossings.	~~42nd~~43rd Ave	Linwood Ave	~~$500~~ 550
~~J~~	~~Med~~	~~C~~	~~Railroad Crossing Pedestrian Improvements at Oak~~	~~Improve intersection for pedestrians.~~	~~Location-specific~~	~~Location-specific~~	~~$15~~
M	Med	C	McLoughlin Blvd Sidewalks	Fill in sidewalk gaps on both sides of street.	Washington St	Southern city limits	~~$596~~ 650
N	Med	C	Lake Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	~~Kuehn Rd~~ Where Else Ln	Hwy 224	~~$2,049~~ 2,200
Q	~~High~~Med	C	Logus Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	43rd Ave	49th Ave	~~$771~~ 850
T	Med	C	37th Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	Lake Rd	Harrison St	~~$794~~ 870
AE	Med	C	Brookside Dr Sidewalks	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	Regents Dr	~~$15~~ 20

Map ID[3]	Priority	Type	Project Name	Project Description[4]	From	To	Cost~~(s)~~ ($1,000s[5])
AT	~~High~~Med	C	Springwater Trail Completion	Contribute to regional project to complete Springwater Trail ("Sellwood Gap") along Ochoco St.	17th Ave	19th Ave	~~$80~~ 90
BA	Med	C	Bicycle and Pedestrian Overpass over Railroad Ave	Establish a dedicated bicycle and pedestrian connection across Railroad Ave and the railroad tracks.	Railroad Ave	International Way	$2,200
BB	Med	C	Bicycle/Pedestrian Improvements to Main St	Construct multiuse path or other improved bike/ped facilities on Main St to provide safer connection between downtown and Tacoma station. (TSAP)	Hanna Harvester Dr	Tacoma station	$2,900
BC	Med	C	Bicycle/Pedestrian Connection from Eastern Neighborhoods to Tacoma Station Area	Establish bike/ped connection over existing railroad tracks and light rail to Tacoma station area. (TSAP)	Olsen St & Kelvin St	Mailwell Dr	$4,000
BD	Med	C	Improved Connection from Springwater Trail to McLoughlin Blvd	Construct stairs or other facility to connect Springwater Trail to west side of McLoughlin Blvd. (TSAP)	Location-specific	Location-specific	$500
BE	Med	C	Bicycle/Pedestrian Connection over Johnson Creek	Construct bike/ped bridge over Johnson Creek along Clatsop St at 23rd Ave to connect Tacoma station area with adjacent neighborhood. (TSAP)	Location-specific	Location-specific	$400
BF	Med	C	Improved Bicycle/Pedestrian Connections on West Side of Tacoma Station Area	Improve bike/ped connections to adjacent neighborhood to west of Tacoma station area at Ochoco St and Milport Rd. (TSAP)	Location-specific	Location-specific	$500
N/A	~~High~~Med	C	Downtown Streetscape Improvements	Install sidewalk bulbouts, lighting, and pedestrian amenities.	Downtown	Downtown	~~$6,700~~ 7,300[6]
N/A	Med	O	Pedestrian Walkway Amenities	Install amenities, such as benches, along key walking routes.	Citywide	Citywide	~~$50~~ 60
Low Priority Projects							
G	Low	C	Intersection Improvements at Olsen St and 42nd Ave	Improve pedestrian crossing.	Location-specific	Location-specific	$20

[6] Estimated $500,000 per block face.

Map ID[3]	Priority	Type	Project Name	Project Description[4]	From	To	Cost(~~s~~) ($1,000s[5])
H	Low	C	Intersection Improvements at Railroad and 37th Aves	Improve pedestrian crossing.	Location-specific	Location-specific	$10
~~I~~	~~Low~~	~~C~~	~~Intersection Improvements at Harmony and Lake~~	~~Improve pedestrian crossing.~~	~~Location-specific~~	~~Location-specific~~	~~$15~~
K	Low	C	Intersection Improvements at Stanley Ave and Logus Rd	Improve pedestrian crossing.	Location-specific	Location-specific	$~~15~~ 20
R	Low	C	Olsen St Sidewalks	Fill in sidewalk gaps on north side of street.	32nd Ave	42nd Ave	$~~432~~ 470
S	Low	C	Johnson Creek Blvd Sidewalks	Fill in sidewalk gaps on both sides of street.	Harney ~~Dr~~St	City limits	$~~378~~ 410
W1	Low	C	Linwood Ave Sidewalks (north)	Fill in sidewalk gaps on both sides of street (part of Linwood Ave road-widening project).	Johnson Creek Blvd	~~Railroad Ave~~ King Rd	$~~2,960~~ 1,050
X	Low	C	Hwy 224 Sidewalks	Fill in sidewalk gaps on both sides of street.	Oak St	37th Ave	$~~420~~ 460
AA	Low	C	Home Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	Railroad Ave	King Rd	$~~756~~ 830
AB	Low	C	Harvey St Sidewalks	Fill in sidewalk gaps on both sides of street.	32nd Ave	42nd Ave	$~~534~~ 590
AC	Low	C	Roswell St Sidewalks	Fill in sidewalk gaps on both sides of street.	32nd Ave	36th Ave	$~~192~~ 210
AD	Low	C	Mason Lane Sidewalks	Fill in sidewalk gaps on both sides of street.	42nd Ave	Regents Dr	$~~671~~ 740
AF	Low	C	Regents Dr Sidewalks	Fill in sidewalk gaps on both sides of street.	Brookside Dr	Winsor Dr	$~~494~~ 540
AG	Low	C	Rusk Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	Lake Rd	North Clackamas Park	$~~662~~ 730
AH	Low	C	Pedestrian Connection to North Clackamas Park	Create pedestrian connection between the school and the park.	~~North Clackamas Park~~ Rowe Middle School	~~Rowe Middle School~~ North Clackamas Park	$~~1,284~~ 1,400

Map ID[3]	Priority	Type	Project Name	Project Description[4]	From	To	Cost(~~s~~) ($1,000s[5])
AI	Low	C	Washington St Sidewalks	Fill in sidewalk gaps on both sides of street.	~~35th~~ 32nd Ave	~~37th~~ 35th Ave	$~~115~~ 130
AJ	Low	C	22nd Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	McLoughlin Blvd	Sparrow St	$~~325~~ 360
AK	Low	C	19th Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	Kellogg Creek Trail	Sparrow St	$~~305~~ 330
AM	Low	C	Oatfield Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	Guilford Ct	City limits	$~~132~~ 150
AN	Low	C	49th Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	Logus Rd	King Rd	$~~250~~ 270
AO	~~Med~~Low	C	Franklin St Sidewalks	Install sidewalks on both sides of street to connect to ~~Hector~~ Campbell Elementary School.	42nd Ave	45th Ave	$~~200~~ 220
AP	Low	C	Ochoco St Sidewalks	Construct sidewalks on Ochoco St to connect bus stops to Goodwill.	19th Ave	McLoughlin Blvd	~~$$$~~ $1,300
AQ	Low	C	Edison St Sidewalks	Fill in sidewalk gaps on both sides of street.	35th Ave	37th Ave	$~~116~~ 130
~~AS~~	~~Low~~	~~C~~	~~Springwater Trail Ramp Improvement at McLoughlin~~	~~Improve ramp at Springwater Trail and McLoughlin Blvd.~~	~~Location specific~~	~~Location specific~~	~~$15~~
AY	Low	C	Improved Connection from Springwater Trail to Pendleton Site (Tunnel)	Construct tunnel under Springwater Trail to improve connection to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$1,200
BG	Low	C	Intersection Improvement at all Crossings of McLoughlin Blvd	Improve all existing crossings of McLoughlin Blvd (e.g., extended time for crossing, signage). (ODOT to do.)	Location-specific	Location-specific	–
BH	Low	C	Bike/Ped Path on Sparrow St	Establish a dedicated bicycle and pedestrian connection on Sparrow St, connecting River Rd to Trolley Trail	River Rd	Trolley Trail	$350
BI	Low	C	Bike/Ped Overpass over McLoughlin Blvd at River Rd	Establish a dedicated bicycle and pedestrian connection across McLoughlin Blvd.	Kronberg Park	River Rd	$2,500

Map ID[3]	Priority	Type	Project Name	Project Description[4]	From	To	Cost~~(s)~~ ($1,000s[5])
BJ	Low	C	Crossing Improvements for McLoughlin Blvd at Ochoco St and Milport Rd	Construct improvements at Ochoco St and Milport Rd to improve bike/ped crossing of McLoughlin Blvd (per ODOT, this will require full intersection improvements). (TSAP)	Location-specific	Location-specific	$8,320
BK	Low	C	Bicycle/Pedestrian Connection between McLoughlin Blvd and Stubb St	Establish bike/ped connection to McLoughlin Blvd sidewalk at west end of Stubb St. (TSAP)	Location-specific	Location-specific	$20
N/A	~~Med~~Low	O	Pedestrian Walkway Signage	Provide maps and wayfinding signage on streets that identify ways to get around the city.	Citywide	Citywide	$10

Notes:

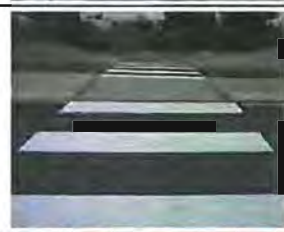
C = Capital Project
O = Operational Project
P = Policy Project

High = High priority
Med = Medium priority
Low = Low priority

TSAP = Tacoma Station Area Plan

The Pedestrian Master Plan project list includes several enhanced pedestrian crossing projects. These crossings are located on major roadways with volumes and speeds that would require significant crossing enhancements based on published guidelines in the *Traffic Control Devices Handbook.*[7] Table 5-2 provides a description of possible crossing enhancements.

Table 5-2 Potential Measures for Enhancing Pedestrian Crossings

Improvement	Description	Illustration	Cost Range
Marked Crosswalk	White thermoplastic markings at street corner. Alternative material could include nonwhite color or textured surfaces.		$1,000 to ~~$1,500~~2,000 per crossing. Textured crossing materials beyond thermoplastic markings could be more expensive depending on materials used.
New Corner Sidewalk Ramp	Construct ADA compliant wheelchair ramps consistent with City standards.		$3,000 to $5,000 per corner.
Median Refuge	Construct new raised median refuge area. Minimum width 6 ft, and minimum length of 30 ft. Curb can be mountable to allow emergency vehicles to cross, if required.		~~$5,000 to $15,000~~ $10,000 to $20,000, depending on overall length and amenities.
Pedestrian Countdown Timer Signal	Install supplemental pedestrian signal controls to indicate the time remaining before crossing vehicles get 'green' signal indication.		~~$1,000~~2,500 per signal head ($10,000 per intersection)
Curb Extensions	Construct curb extension on road segments with on-street parking. Reduces pedestrian crossing area, and exposure to vehicle conflicts.		~~$5,000 to $8,000,~~ $20,000 to $30,000, depending on design amenities and aesthetic treatments.

Source: DKS Associates

[7] *Traffic Control Devices Handbook*, Institute of Transportation Engineers, 2001; Chapter 13, Table 13-2.

ACTION PLAN

The Pedestrian Action Plan (Table 5-3) identifies the highest priority projects that are reasonably expected to be funded with local funds by ~~2030~~2035, which meets the requirements of the State's Transportation Planning Rule.[8] The action plan project list is ~~the result of~~ based upon a 2007 citywide project ranking process. In 2007, ~~A~~all of the modal master plan projects were ranked by the TSP Advisory Committee after consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added.~~The highest-ranking pedestrian projects that are reasonably expected to be funded (see Chapter 13) with local funds are shown in Table 5-3.~~

Table 5-3 Pedestrian Action Plan

Map ID	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
L	17th Ave ~~Sidewalks~~ Improvements	Fill in sidewalk gaps on both sides of street; fill in gaps in existing bicycle network with bike lanes; and/or provide multiuse path, ~~and~~ ~~i~~Improve intersections safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.	Ochoco St	McLoughlin Blvd	$1,000	~~Direct~~ Match
BL	Adams St Connector	Construct pedestrian- and bicycle-only facility on Adams St between 21st Ave and Main St	21st Ave	Main St	$450	Match
O	Railroad Ave ~~Sidewalks~~ Capacity Improvements	Pedestrian aspect: Fill in sidewalk gaps on both sides of street or construct multiuse path on one side~~(part of Railroad Avenue road widening project)~~.	37th Ave	Harmony Rd	$1,800	Match
P	Monroe St ~~Sidewalks~~ Neighborhood Greenway	Fill in sidewalk gaps on both sides of street.	42nd Ave	City limits	$1,800	Match
AR	Kellogg Creek Dam Removal and Hwy 99E Underpass	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/~~pedestrian~~ undercrossing between downtown Milwaukie and Riverfront Park.	~~Site~~Location-specific	~~Site~~Location-specific	$9,900	Match
V1	Stanley Ave Neighborhood Greenway (north)	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	King Rd	$1,900	Match
V2	Stanley Ave Neighborhood Greenway (south)	Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,800	Match
A-E	Intersection Improvements at Hwy 224 Crossings	Improve pedestrian crossings at Freeman Way, 37th Ave, Oak St, Monroe St, and Harrison St	Location-specific	Location-specific	$100 ($20 each)	Match

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

AU	Kellogg Creek Bike/Ped Bridge	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500	Match
AV	Kronberg Park Trail	Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E	Kellogg Creek Bridge	River Rd	$300	Match
AW	Intersection Improvements at McLoughlin Blvd and 22nd Ave	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200	Match
W2	Linwood Ave Sidewalks (south)	Fill in sidewalk gaps on both sides of street (part of Linwood Ave road-widening project).	King Rd	Railroad Ave	$2,150	Match
N/A	Study of Pedestrian Crossings on Hwy 224	Examine alternatives for improving pedestrian crossings at five intersections along Hwy 224 (Harrison St, Monroe St, Oak St, 37th Ave, Freeman Way)	Harrison St	Freeman Way	$50	Match
~~AT~~	~~Springwater Trail Completion~~	~~Contribute to regional project to complete Springwater Trail ("Sellwood Gap") along Ochoco Street.~~	~~17th Ave~~	~~19th Ave~~		~~Direct~~
~~Q~~	~~Logus Road Sidewalks~~	~~Fill in sidewalk gaps on both sides of street.~~	~~43rd Ave~~	~~49th Ave~~		~~Match~~
~~N/A~~	~~Downtown Streetscape Improvements~~	~~Install sidewalk bulbouts, lighting, and pedestrian amenities.~~	~~Downtown~~	~~Downtown~~		~~Match~~
~~F~~	~~King Road Boulevard Treatments~~	~~Install street boulevard treatments; widen sidewalks and improve crossings.~~	~~43rd Ave~~	~~Linwood Ave~~		~~Match~~

REGIONAL TRANSPORTATION PLAN (RTP) COMPLIANCE

The projects identified in the master plan list and further refined in the action plan list are ~~compatible~~ consistent with the ~~2004~~ Metro 2035 Regional Transportation Plan (RTP). The RTP includes specific goals that can be used to measure the success of regional planning efforts to improve the overall transportation system. Specifically, the master plan and action plan projects identified in this chapter comply with Metro's goals for regional mobility and non-single-occupant-vehicle (non-SOV) modal targets. Chapter 8 includes a discussion of the performance measures and targets that the City has adopted to achieve the relevant RTP goals.

Three of the goals in the 2035 RTP relate to the regional pedestrian system in particular:

- Reduce the number of pedestrian fatalities plus serious injuries by 50% compared to 2005.
- Triple the walking mode share compared to 2005.
- Increase by 50% the number of essential destinations accessible within 30 minutes by trails or within 15 minutes by sidewalks for all residents compared to 2005.

All of the master plan and action plan projects identified in this chapter will contribute significantly toward meeting these regional goals.

6 Bicycle Element

The bicycle is a human-powered vehicle that allows people of all ages to move independently, at relatively low cost and with little impact to the environment. Bicycling promotes the well-being of people who live and work in Milwaukie, with the added benefit of reducing auto traffic on city streets. This chapter outlines bicycle needs in Milwaukie over the next ~~20~~ 22 years and recommends policy, operational and facility improvements to the city's bicycle system.

TSP GOAL AND POLICY FRAMEWORK

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Several of these TSP Goals guide the City's policies on bicycle access and connectivity, specifically the following:

- **Goal 1 Livability** calls for convenient bicycling facilities, and removal of barriers that impede capacity.
- **Goal 2 Safety** directs the City to design safe bicycle connections between parks, schools, and other activity centers in Milwaukie.
- **Goal 3 Travel Choices** calls for an integrated citywide network of bikeways.
- **Goal 4 Quality Design** directs the City to integrate bicycle facilities into both public and private street and development projects.
- **Goal 6 Sustainability** calls for the City to increase bicycling as a means of transportation.

NEEDS

Milwaukie needs a safe and interconnected bicycle system that provides options for all types of bicyclists. The deficiencies in Milwaukie's existing bicycle system can be categorized into three areas: Connectivity, Crossings, and Street Designations. Each of these categories is described in this section.

Connectivity

The lack of east/west and north/south on-street bicycle facilities creates significant gaps in the bicycle system for travel both in and around the city. There are two east/west roadways that include bike lanes in the city: King Rd and Lake Rd. However, neither of these facilities reaches the downtown area and/or connects with other facilities that could allow for travel to other destinations. There are also two north/south roadways that have bike lanes: Linwood Ave and 17th Ave. Similar to the east/west roadways, these corridors are not continuous.

~~Two~~ Three off-street facilities serve Milwaukie (the Springwater Corridor, the Trolley Trail, and the Kellogg Creek Trail), but they are not continuous. For example, while the connectivity of the Springwater Corridor was ~~recently~~ upgraded in 2006 with completion of the "Three Bridges" project (three bridges constructed to cross over the Union Pacific Railroad, McLoughlin Blvd, and Johnson Creek), the trail ends just east of 17th Ave. Additionally, there are a limited number of connections through the city to the Springwater Corridor, especially to the west of 45th Ave. The Trolley Trail, which will be completed in conjunction with the Portland-Milwaukie Light Rail (PMLR) project, ends at Riverfront Park, nearly one mile south of the Springwater Corridor. The Kellogg Creek Trail connects the Milwaukie Riverfront area to the Island Station neighborhood but does~~n't~~ not easily connect to points south.

Major facilities, such as McLoughlin Blvd, Hwy 224, and the railroads, create barriers to bicycling through the city, particularly for east-west travel. This lack of connectivity (both on-street and off-street) causes significant problems for bicyclists and limits this mode of travel, especially where they make it more difficult for bicyclists to access major transit stops downtown.

Crossings

Throughout the city, there is a need for convenient and safe crossings at arterials and collectors. There are many locations where bicycle routes cross arterials, highways, or railroad tracks, and few of these crossings were designed to accommodate bicyclists. Typically, such intersections have limited sight-distance, inadequate pavement space for bicycles, no means for tripping a signal, or no direct safe connection. The following locations were identified as ~~particular~~ specific problem crossings:

- 17th Ave/Hwy 224
- 17th Ave/Harrison St/Hwy 99E
- Railroad crossing of 21st Ave at Adams
- Johnson Creek Blvd/Springwater Corridor
- King Rd/Stanley Ave
- Linwood Ave/Springwater Corridor
- King Rd/Linwood Ave
- Monroe St/Linwood Ave
- Linwood Ave/Harmony Rd

Street Designations

The designation of certain roadways for bicycle travel does not serve all of the needs for bicycle travel in and around the city. Many trips that connect to parks, schools, retail activity centers, etc., occur off of arterial and collector streets. These trips should generally be accommodated on lower volume streets, preferably on designated routes. Such facilities could be considered "shared" facilities or could have a specific designation such as a "bike boulevard" or "neighborhood greenway," where actual treatments to the roadway are made that enhance the bicycle environment and make additional connections to bicycle destinations.

BICYCLE FACILITY IMPROVEMENT TOOLBOX

Types of Bicyclists

Bicyclists are a varied group of people with different skill levels, abilities, bicycling experience, and trip types. For example, there are everyday commuters, avid recreational riders, children going to school, and families riding around in their neighborhoods. Their needs and comfort level with the bicycle infrastructure in Milwaukie will vary as a result of these differences. The City needs to accommodate these different types of bicyclists by providing adequate facilities for all different types of riders.

Bicycle trips are typically longer than walking trips and shorter than motor vehicle trips, and are attractive at distances up to three miles. Bicycle facilities can generally be categorized as multiuse paths, cycle tracks, bike lanes, shared roadways, and ~~bike boulevards~~ neighborhood greenways. Each of these facilities serves a particular purpose for bicycle travel. Bike lanes, cycle tracks, and multiuse paths ~~both~~ can all accommodate ~~this length of~~ trips of up to three miles. However, if the trip is shorter, or if the destination or origin of the trip is not next to a roadway with a bike lane, many bicycle trips can also be made on local streets. Table 6-1 summarizes each of these facilities with a general description of the elements inherent to each facility.

Table 6-1 Bikeway Types

Bikeway	Description
Multiuse path	Off-street route, typically recreational-focused, which can be used by several transportation modes, including bicycles, pedestrians, and other nonmotorized modes (i.e., skateboards, roller blades, etc.).
Cycle track	Exclusive bike facility within the roadway, with elements of both a separated path and a bike lane. Separated from motor vehicle traffic by parked cars, bollards, landscaping, or other barriers.
Bike lane	Area within street right-of-way specifically designated for bicycle use.
Shared roadway	Roadways where bicyclists and autos share the same travel lane. May include a wider outside lane and/or bike boulevard treatment (priority given to through bikes on local streets).
~~Bike Boulevard~~ Neighborhood greenway	Lower-order, lower-volume streets with various treatments to promote safe and convenient bicycle travel and enhance pedestrian travel as well. Usually accommodate bicyclists and motorists in the same travel lanes, often with no specific vehicle or bicycle lane delineation. Assign higher priority to through bicyclists, with secondary priority assigned to motorists. Also include treatments to slow vehicle traffic to enhance the bicycling environment.

Bicycle Facility Design Considerations

Multiuse Paths

As their name implies, multiuse paths are designed to accommodate many types of users, and are typically constructed along an independent path such as a stream or greenway. Paths can also be built parallel to a roadway, but are most effective when built independent of a road, separating bicyclists from auto traffic. The American Association of State Highway Transportation Officials (AASHTO)[1] and the Oregon Department of Transportation (ODOT)[2] state that mixed-use paths can be designed along roadways, provided several design considerations are met:

Figure 6-1 Multiuse Path

Photo credit: Vince Schreck, www.pdxfamilyadventures.com

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

Cycle Tracks

Figure 6-2 Cycle Track

Photo credit: Michael O'Hare, www.citiesforpeople.net

Cycle tracks can take a number of forms, depending on the nature of the existing street infrastructure. They combine some elements of a fully separated path with those of a bike lane in the roadway. The key element of a cycle track is that it uses parked cars, bollards, landscaping, curbing, or other barriers to provide some separation from motor vehicle traffic. Cycle tracks may be one-way or two-way, and they may be located at road level, sidewalk level, or an intermediate level. They are distinct from the sidewalk and are designed exclusively as bike facilities. A recommended minimum width is 7 feet, with an additional 2-ft "door zone" buffer (where adjacent to parked cars). Pavement markings on the cycle track provide guidance for bicyclists, as well as for motorists and pedestrians that may cross the cycle track at driveways or intersections.

There are currently no cycle tracks in Milwaukie, and no potential cycle track routes have been identified to date. However, this type of facility represents an option for future bike

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

[2] *Oregon Bicycle and Pedestrian Plan, An Element of the Oregon Transportation Plan*, Oregon Department of Transportation, Adopted June 14, 1995.

improvements that might be most appropriate in certain settings to provide safer bike routes in high-traffic corridors.

Bike Lanes

When possible, bike lanes should be directly adjacent to the curb, rather than adjacent to parked cars or combined with sidewalks. The recommended width of six feet provides sufficient travel space and additional room for bicyclists to steer clear of the curb or parked cars while maintaining a comfortable distance from adjacent moving traffic. Wide bike lanes also enable bicyclists to maneuver around drainage grates, manhole covers, glass and debris. Provision of bike lanes also benefits motor vehicles, which gain greater shy distance/emergency shoulder area, and pedestrians, who gain a buffer between walking areas and moving vehicles. Where right-of-way is limited, the bike lane can be reduced to 5 feet. Alternatively, widening the curb travel lane (for example, from 12 feet to 14 or 15 feet) can provide better bicycle accommodations and a greater measure of safety as well. However, with higher-volume roadways (e.g., streets with more than 3,000 Average Daily Trips), dedicated bike lanes are much more desirable than wide outside lanes.

Figure 6-3 Bike Lane

Photo credit: LA-32 Neighborhood Council, http://la32nc.org/category/transportation/

The signing and marking of bike lanes should follow the *Manual on Uniform Traffic Control Devices* (MUTCD). Design features in the roadway can improve bicycle safety as well. For example, using curb storm drain inlets rather than catch basins significantly improves bicycle facilities.

Shared Roadways

Shared roadways can be designed to safely accommodate both bicycle and auto traffic. Figure 6-~~1~~5 illustrates an example of an appropriate warning sign with a supplemental "Share the Road" plaque that may be used to draw more attention to the fact that slow-moving forms of transportation may be using the roadway. When used, the supplemental plaque must be installed below the warning sign on the same signpost. Directional pavement markings may also be considered on shared roadways to supplement the bicycle warning signs when desired. The pavement markings illustrated in Figure 6-~~1~~5 below are typically called "Sharrows" or "Shared Lane Markings" and are utilized on bicycle travel routes that have on-street parking but no designated bike lanes. Sharrows are commonly used on streets where dedicated bike lanes are desirable but are not possible for any number of reasons. The marking helps to align bicyclists, to shift their travel pattern out of the direction of a parked car door opening into their travel path.

Figure 6-4 Shared Roadway

Photo credit: Portland Bureau of Transportation, www.portlandoregon.gov/transportation/

Figure 6-~~4~~5 Bicycle Signs and Markings

Bicycle Warning Sign | "Share the Road" Plaque | Bike Route Sign | Bicycle Pavement Marking | Bicycle Wayfinding Signage

It should be noted, however, that while posting "Bike Route" signage for bicyclists is an acceptable way for the City to demarcate bike routes, such signs should be coupled with pavement markings and/or way finding signage for bicyclists to get the most value out of the City's investment. Although this is an adopted MUTCD sign, it does not provide much information. Adding wayfinding information such as distances to various destinations, directional arrows, and estimated travel times makes the sign much more useful. These signs are most effective when placed in useful locations, such as where a bike route makes a turn that is not intuitive to riders.

~~Bike Boulevards~~ Neighborhood Greenways

The term "neighborhood greenway" has recently evolved from the "bike boulevard" concept of treatments, which improve the network of safe bicycle routes by ~~Bike boulevards~~ generally utiliz~~e~~ing streets with lower traffic volumes and vehicle speeds, such as minor collectors or local streets that pass through residential neighborhoods. The neighborhood greenway treatments also make these routes safer for pedestrians and motorists (for example, through inclusion of traffic-calming devices), while at the same time incorporating low-impact stormwater treatment measures such as bioswales and raingardens. The general traffic calming provided by neighborhood greenway improvements adds to neighborhood livability.

Figure 6-6 Neighborhood Greenway

Image credit: Bicycle Transportation Alliance/Owen Walz, owenwalzdesign.com

Traffic controls along a ~~bike boulevard~~ neighborhood greenway assign priority to bicyclists while encouraging through-vehicle traffic to use alternate parallel routes. Traffic calming and other treatments along the corridor reduce motor vehicle speeds so that motorists and bicyclists generally travel at the same speed, creating a safer and more comfortable environment for all users. ~~Bike boulevards~~ Neighborhood greenways also incorporate treatments to facilitate safe and convenient crossings of major streets. ~~Bike boulevards~~ Neighborhood greenways work best in well-connected street grids, where riders can follow reasonably direct and logical routes~~. Bike boulevards~~ and where ~~also work best when~~ higher-order, parallel streets exist to serve through-vehicle traffic.

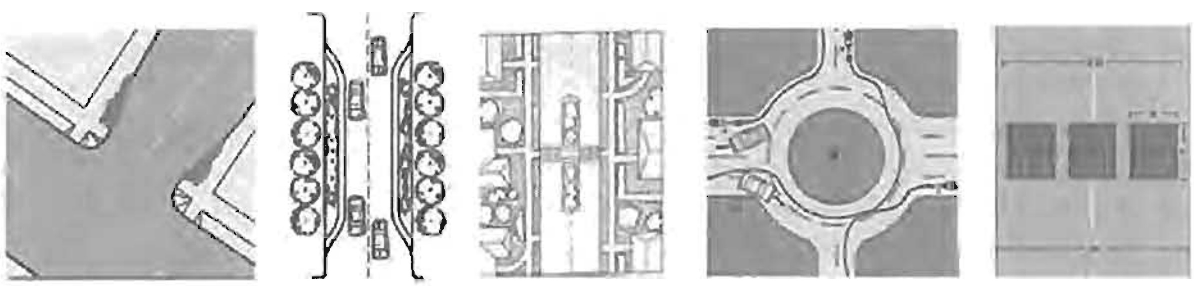
Milwaukie's ~~bike boulevard~~ neighborhood greenway network could be developed through a variety of improvements ranging from minor street enhancements (e.g., directional pavement markings) to larger-scale projects (e.g., intersection signalization). The various treatments fall into five major application levels based on their degree of physical intensity, with Level 1 representing the least physically intensive treatments that can be implemented at relatively low cost:

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

Corridors targeted for higher-level applications would also receive relevant lower-level treatments. For instance, a street targeted for Level 3 applications should also include Level 1 and 2 applications as necessary. It should be noted that some applications might not be appropriate on all streets. In other words, it may not be necessary to implement all Level 2 applications on a particular street designated for Level 2 treatment in order to create a functional ~~bike boulevard~~ neighborhood greenway.

Figure 6-7 shows examples of some of the types of intersection treatments and traffic-calming measures that could be appropriate for application on neighborhood greenway routes. Some study and analysis is necessary to determine which measures would be most effective in specific locations. Within Chapter 11 Neighborhood Traffic Management, Table 11-1 provides more examples of traffic-calming measures.

Figure 6-7 Sample Traffic-Calming Measures



Bulbout | **Choker** | **Center Median** | **Traffic Circle** | **Speed Cushion**

~~Designating a street as a "bike boulevard" does not suggest that only bicyclists should use it. In fact, the treatments applied to bike boulevards make these routes safer for pedestrians and motorists as well, and the general traffic calming adds to neighborhood livability. With that in mind, using alternative labels for "bike boulevards" might be appropriate to stress the multimodal benefit. Suggestions include "community corridors" and "neighborhood parkways."~~

Experience from other cities that have implemented neighborhood greenways shows that on-street vehicle parking can function as a traffic-calming measure. Drivers generally seem to slow down in response to the physical narrowing of the travel lane and the higher perceived risk of collision. In addition, parked cars create a barrier between moving cars on the street and pedestrians on the sidewalk. This barrier enhances both actual and perceived safety for pedestrians. Allowing or encouraging on-street vehicle parking can be one tool employed to make neighborhood greenways safe and pleasant for nonmotorized travel.

Bicycle Parking

Bicycle parking and storage facilities are an important component of an effective bicycle system. Lack of proper storage facilities discourages potential riders from traveling by bicycle. Bike racks should be located at significant activity generators including schools, parks, and commercial areas, as well as at major transit stops. Racks should be placed in highly visible locations and within convenient proximity to main building entrances. Bike racks should be designed to provide two points of contact to the bicycle so the user can lock both the wheel and the frame to the rack. Bike lockers, showers, and caches of repair equipment (patch kits, tire tubes, etc.) would be helpful at locations where long-term parking is expected, such as the future light rail (MAX) stations (downtown, on Park Ave, and at Tacoma St), downtown bus stops, ~~or~~ and major employment centers. The attractiveness of bicycle parking is also improved by providing covered parking and/or secured facilities where bicycles may be locked away.

RECOMMENDATIONS

Strategies

Bikeway improvements are aimed at closing the gaps in the bicycle network along arterial and collector roadways, establishing low-traffic routes that parallel arterials and collectors, and providing multimodal links to improve livability. To meet the TSP goals and policies outlined in Chapter 2, and address the needs outlined in this chapter, the City should take the following steps for improving the bicycle system:

- Fill in gaps in the existing bike corridor network (on arterials and collectors).
- Construct new bike lanes on strategic arterials and collectors.
- Connect key bicycle corridors to schools, parks, ~~and~~ activity centers, and major transit stops.
- Improve crossing safety and connectivity.
- Designate ~~bike boulevards~~ neighborhood greenways on lower-volume streets that connect major bicycle facilities and/or bicycle destinations.
- Maintain bike lanes, off-street paths, signage, and other facility improvements.
- Construct and improve multiuse paths for recreational and commuter use.
- Involve bicyclists in the design and planning of bicycle and road facilities.
- Educate bicyclists and motorists about bicycle routes, laws, and opportunities.
- Directly implement or encourage the establishment of a bike-share program. This strategy could range from City ownership and administration of a bike-share system to revisions to the Municipal Code to allow for bike-share facilities owned by other private or public entities.

These strategies will be used to guide and develop projects that address the needs of the bicycling community in Milwaukie as well as those of bicyclists throughout the region. The projects resulting from these strategies fall into three categories: capital, operational and maintenance, and policy. Capital strategies involve building physical infrastructure. Operational and maintenance strategies aim to make existing infrastructure more usable. Policy-oriented strategies seek to modify public processes in order to more effectively support bicycling as a viable transportation mode. Key projects in each of these categories are described below.

Capital

These projects are typically large-scale infrastructure projects or projects that require some sort of physical infrastructure to be built. Capital projects also typically require ongoing maintenance that must be programmed into the existing maintenance schedule.

Key projects

17th Ave between Waverly Dr and Harrison St is a key bicycle connection between downtown Milwaukie and the Sellwood neighborhood in Portland. This connection will be improved by constructing bike lanes and/or a multiuse path. In addition, ~~S~~several potential ~~bike boulevard~~ neighborhood greenway corridors have been identified to enhance Milwaukie's bicycle network. The corridors were identified with respect to major bicycling destinations as well as their proximity to desired bicycle travel routes. The recommended corridors are shown in Figure ~~6.2~~ 6-8a and described below:

- ~~17th Ave between Waverly Dr and Harrison St, a key bicycle connection between downtown Milwaukie and the Sellwood neighborhood in Portland. The connection should be improved by constructing bike lanes or a multiuse path.~~
- Monroe St between downtown Milwaukie and Linwood Ave.
- Stanley Ave between Railroad Ave and Johnson Creek Blvd.
- A corridor roughly following 40th Ave north from Monroe St and then splitting into two separate corridors at Harvey St. One ~~bike boulevard~~ neighborhood greenway would continue north on 40th Ave and follow Olsen St and 42nd Ave to connect with Johnson Creek Blvd. The second ~~bike boulevard~~ neighborhood greenway would follow Harvey St west from 40th Ave and follow Balfour St, 29th Ave, and Van Water St to connect with the Springwater Corridor. If 29th Ave is extended to the south, the ~~bike boulevard~~ neighborhood greenway should connect to the south as well (see Figure ~~8-3a~~ 8-4, which shows the future extension of 29th Ave).
- A corridor following 19th Ave south from Eagle St to Sparrow St, then east on Sparrow St to River Rd. This corridor could be extended east on Sparrow St with construction of a multiuse path connecting to the Trolley Trail.

These ~~bike boulevards~~ neighborhood greenways should be targeted for Level 4 applications, including signage, pavement markings, intersection treatments, and traffic calming. Each corridor currently includes some boulevard components (e.g., speed humps). Due to limited street connectivity, Level 5 bike boulevard applications (traffic diversion) are not recommended for these corridors. To identify and develop additional site-specific treatments, the City should involve the bicycling community, neighborhood groups, and the Public Works Department. Further analysis and engineering work may also be necessary to determine the feasibility of some applications.

Operational and Maintenance

These projects involve actions that make existing infrastructure more useable. They include upkeep of existing facilities, educational campaigns, or distributing information about the use of the transportation network. They are typically smaller in scale and dollars than capital projects and are implemented more broadly than in one specific location.

Key projects

- Driver and bicyclist education, including driver and biker awareness classes, "Share the Road" safety class, bike safety education for kids and adults.
- Encouraging bicycling through community events to get new bicyclists involved and interested in how to commute by bike.
- Consider applying rumble strips or other treatments to safely define bike lanes in places, such as Johnson Creek Blvd, where vehicles commonly cross into the bike lane.

Policy

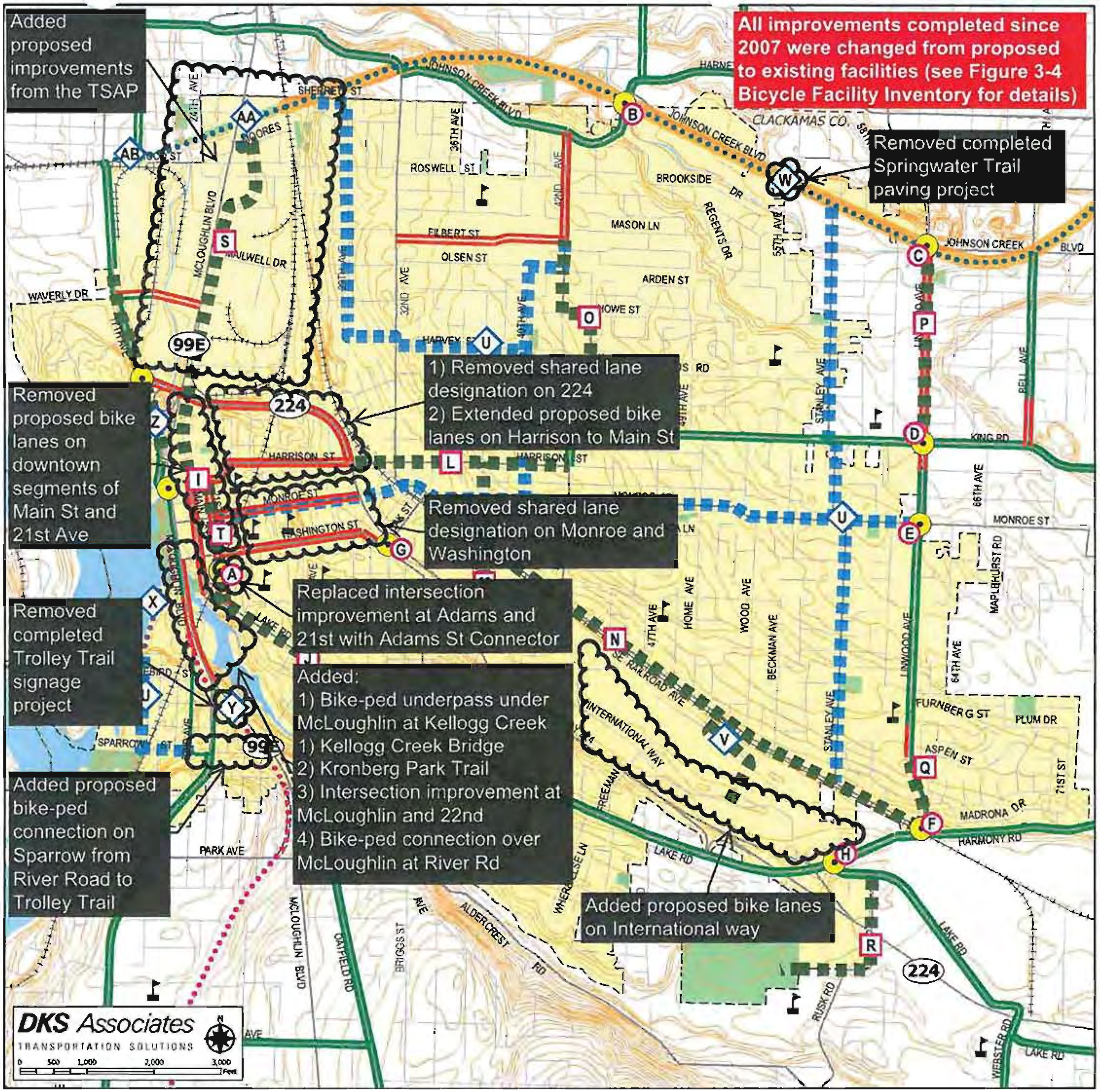
These projects do not typically improve the bicycle environment in a physical manner, but rather result in a fundamental change to the way bicycle travel is thought of and treated within the city of Milwaukie.

Key projects

- Enforce traffic laws that protect bicyclists.
- Collect and maintain bicycling traffic counts to measure the effect of improvements.
- Work with the City of Portland and Clackamas County when implementing bike boulevards, bike lanes, and multiuse paths to ensure good connectivity beyond Milwaukie.
- Consider establishing a committee to advise and advocate for implementation of the projects in this plan.

Master Plan

The Bicycle Master Plan is composed of a list of projects that address the identified needs (see Figure ~~6-2~~ 6-8a). An inset map showing more detail in the downtown area is provided in Figure 6-8b. Summarized in Table 6-2, the master plan represents the "wish list" of bicycle-related projects in Milwaukie. The planning-level cost estimates provided in Table~~s~~ 6-2 ~~and 6-3~~ are based on general unit costs for transportation improvements but do not reflect the unique elements that can significantly add to project costs. As projects are pursued, each of these project costs will need further refinement in order to detail right-of-way requirements and costs associated with special design details.



CITY OF MILWAUKIE

Transportation System Plan

FIGURE 6-2 8a

BICYCLE MASTER PLAN

December 2007

LEGEND

Existing Bicycle Facilities
- Shared Facility
- Bicycle Lane
- Springwater Trail
- Kellogg Creek Trail

Proposed Improvements
- Bicycle Intersection Safety Improvement
- Bicycle Corridor Enhancement
- Bike Boulevard
- Bicycle Lanes
- Trolley Trail

- Schools
- Major Roads
- Streets
- Railroad
- 10' Contours
- County Line
- Parks
- Water
- City Limits

PROPOSED PROJECTS

Improve Intersection to Increase Bicycle Safety
- A Adams St/21st Ave/Railroad Crossing
- B Johnson Creek Blvd/Springwater Trail
- C Johnson Creek Blvd/Linwood Ave
- D Linwood Ave/King Rd
- E Linwood Ave/Monroe St
- F Linwood Ave/Harmony Rd
- G Washington St/Oak St/HWY 224
- H International Way/Lake Rd

Provide Bicycle Lanes Where not Currently Present
- I Harrison St from HWY 99E to 21st Ave
- J Lake Rd from Main St to Guilford Dr
- K Oatfield Rd from Guilford Ct to Lake Rd
- L Harrison St from HWY 224 to 42nd Ave
- M 37th Ave from Harrison St to HWY 224
- N Railroad Ave from 37th Ave to Linwood Ave
- O 43rd Ave from King Rd to Filbert St
- P Linwood Ave from Queen Rd to Johnson Creek Blvd
- Q Linwood Ave from approximately Juniper St to Harmony Rd
- R Rusk Rd from Lake Rd to North Clackamas Park
- S Main St from Harrison St to Moores St
- T 21st Ave from Harrison St to Lake Rd

Enhance Existing Bicycle Connection
- U Install Bike Boulevard treatments at various locations
- V Construct bicycle overpass from Railroad Ave to International Way
- W Improve Springwater Trail paving
- X Improve Kellogg Creek Trail
- Y Install Trolley Trail signage
- Z Fill in gaps in existing bike network with bike lanes or multiuse path. Improve intersection safety on 17th Ave at HWY 224 and at 99E.
- AA Improve ramp at Springwater Trail/HWY 99E
- AB Complete Springwater Trail along Ochoco St

New figure for 2013
All improvements completed since 2007 were changed from proposed to existing facilities (see Figure 3-4 Bicycle Facility Inventory for details)
Transportation System Plan
FIGURE 6-8b
BICYCLE MASTER PLAN DOWNTOWN INSET
October 2013
LEGEND
Existing Bicycle Facilities
Shared Facility
Bicycle Lane
Kellogg Creek Trail
Trolley Trail
Proposed Improvement
Intersection Improvements
Bike Lanes
Neighborhood Greenway
PROPOSED PROJECTS
Improve Intersection to Increase Safety
AF McLoughlin and 22nd
Provide Bicycle Lanes Where not Currently Present
I Fill in gaps in bike lanes on Harrison St
Enhance Existing Bicycle Connection
X Improve Kellogg Creek Trail
Z Fill in gaps in existing bike network and improve intersection safety on 17th Ave and HWY 224/99E
AC Construct Kronberg Park Trail
AD Construct bike-ped overpass over Kellogg Creek
AE Construct pedestrian underpass under HWY 99E at Kellogg Creek
Added proposed bike lane extension on Harrison St to McLoughlin
Added bike-ped underpass under McLoughlin at Kellogg Creek
Added bike-ped bridge over Kellogg Creek
Added proposed intersection improvements at McLoughlin and 22nd
HWY 224
LAVA DR
SCOTT ST
HARRISON ST
JACKSON ST
MONROE ST
JEFFERSON ST
MAIN ST
21ST AVE
WASHINGTON ST
ADAMS ST
23RD AVE
24TH AVE
25TH AVE
LLEWELLYN ST
WILLARD ST
LAKE RD
MCLOUGHLIN BLVD
22ND AVE
EAGLE ST
19TH AVE
20TH AVE
DKS Associates
TRANSPORTATION SOLUTIONS
0 75 150 300 450 600 Feet

Table 6-2 Bicycle Master Plan Projects

Map ID[3]	Priority	Type	Project Name	Project Description	From	To	Cost~~(s)~~ ($1,000s[4])
High Priority Projects							
E	~~Low~~High	C	Intersection Improvements at Linwood Ave and Monroe St	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10
G	High	C	Hwy 224 Crossing Improvements at Oak and Washington Sts	Improve intersection crossing safety for bicyclists at Washington St and Oak St.	Location-specific	Location-specific	$10
J	~~Low~~High	C	Lake Rd Bike Lanes	Fill in gaps in existing bicycle network with bike lanes ~~(cost included with Lake Road road widening project)~~.	Main St	Guilford Dr	~~NA~~ $3,400
N	High	C	Railroad Ave ~~Bike Lanes~~ Capacity Improvements	Bicycle aspect: Fill in gaps in existing bicycle network with bike lanes, cycle track, multiuse path, or other facilities ~~(cost included with Railroad Avenue road widening project)~~.	37th Ave	Linwood Ave	~~NA~~ $4,800
U1	High	C	Monroe St ~~Bicycle Boulevard~~ Neighborhood Greenway (downtown)	Designate as a ~~Bicycle Boulevard~~ "neighborhood greenway" and install ~~bicycle boulevard~~ traffic-calming improvements.	21st Ave	~~Linwood Ave~~ Hwy 224	~~$300~~ $85
U2	High	C	Monroe St Neighborhood Greenway (central)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Hwy 224	42nd Ave	$80
U3	High	C	Monroe St Neighborhood Greenway (east)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	42nd Ave	Linwood Ave	$165
U4	High	C	29th/Harvey/40th ~~Bicycle Boulevard~~ Neighborhood Greenway	Designate as a ~~Bicycle Boulevard~~ "neighborhood greenway" and install ~~bicycle boulevard~~ traffic-calming improvements.	Springwater Trail	Monroe St	~~$200~~ 220
U5	~~Med~~High	C	Stanley Ave ~~Bicycle Boulevard~~ Neighborhood Greenway (north)	Designate as a ~~Bicycle Boulevard~~ "neighborhood greenway" and install ~~bicycle boulevard~~ traffic-calming improvements.	Springwater Trail	~~Railroad Ave~~ King Rd	~~$300~~ 135

[3] See Figure 6-~~2~~3a.

[4] Project costs are order-of-magnitude estimates and are in ~~2007~~2012 dollars. Future costs may be more due to inflation. ~~Costing details can be found in the Technical Appendix.~~ In the case of operational projects, estimated costs are for the entire 22-year planning period.

Map ID[3]	Priority	Type	Project Name	Project Description	From	To	~~Cost(s)~~ ($1,000s[4])
U6	High	C	Stanley Ave Neighborhood Greenway (south)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	King Rd	Railroad Ave	195
Z	High	C	17th Ave ~~Bikeway and Intersection Safety~~ Improvements	Fill in sidewalk gaps on both sides of street, fill in gaps in existing bicycle network with bike lanes, and/or provide multiuse path. Improve intersection safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.~~and eastbound connection at 17th Ave/Hwy 99E. Improve intersection safety at 17th Ave/Hwy 224.~~	~~Waverly Dr~~ Ochoco St	~~Harrison St~~ McLoughlin Blvd	~~$135~~ 1,000
~~NA~~AC	~~Low~~High	C	Kronberg Park Trail	~~Construct multimodal trail along Kellogg Creek, connecting Kronberg Park to downtown Milwaukie.~~ Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E.	~~McLoughlin Blvd~~ Kellogg Creek Bridge	~~Downtown~~ River Rd	~~$1,200~~ 300
AD	High	C	Kellogg Creek Bike/Ped Bridge	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500
AE	High	C	Kellogg Creek Dam Removal and Hwy 99E Underpass	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/ped undercrossing between downtown Milwaukie and Riverfront Park.	Location-specific	Location-specific	~~$9,000~~ 9,900
AF	High	C	Intersection Improvements at McLoughlin Blvd and 22nd Ave	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200
AG	High	C	Improved Connection to Springwater Trail at 29th Ave and Sherrett St	Pave the connection to Springwater Trail at 29th Ave and Sherrett St. (TSAP)	Location-specific	Location-specific	$20
AH	High	C	Improved Connection from Springwater Trail to Pendleton Site (Ramps)	Construct ramps to improve existing connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$630
AH	High	C	Improved Connection from Springwater Trail to Pendleton Site (Widened Undercrossing)	Widen existing undercrossing to improve connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$100
~~NA~~	~~High~~	~~C~~	~~Bike Route Signage~~	~~Install neighborhood bike route signage.~~	~~Citywide~~	~~Citywide~~	~~$150~~

Map ID[3]	Priority	Type	Project Name	Project Description	From	To	Cost~~(s)~~ ($1,000s[4])
N/A	High	O	Bike Lane Maintenance	Sweep bike lanes to remove debris.	Citywide	Citywide	~~$1100~~ 1,200
N/A	~~Low~~High	O	Bicycle-friendly Street Grates	Install bicycle-friendly street grates.	Citywide	Citywide	~~$50~~ 60
Medium Priority Projects							
I	Med	C	Harrison St Bike Lanes	Fill in gaps in existing bicycle network with bike lanes (cost included with Harrison St road widening project).	Hwy 99E	21st Ave	~~NA~~ $300
K	~~Low~~Med	C	Oatfield Rd Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	Guilford Ct	Lake Rd	~~$348~~ 380
~~S~~	~~Med~~	~~C~~	~~Main Street Bike Lanes~~	~~Fill in gaps in existing bicycle network with bike lanes.~~	~~Harrison St~~	~~Moores St~~	~~$2,131~~
U7	Med	C	19th and Sparrow ~~Bicycle Boulevard~~ Neighborhood Greenway	Designate as ~~a Bicycle Boulevard~~ "neighborhood greenway" and install ~~bicycle boulevard~~ traffic-calming improvements. This would connect the south end of Kellogg Creek Trail to River Rd.	Eagle St	River Rd	~~$737~~ 800
V	~~Low~~Med	C	Bicycle and Pedestrian Overpass over Railroad Ave	Establish a dedicated bicycle and pedestrian connection across Railroad Ave and the railroad tracks.	Railroad Ave	International Way	~~$2,025~~ 2,200
~~W~~	~~Med~~	~~C~~	~~Springwater Trail Paving Project~~	~~Improve corridor through repaving existing trail.~~	~~29th Ave~~	~~Linwood Ave~~	~~$500~~
AB	~~High~~Med	C	Springwater Trail Completion	Contribute to regional project to complete Springwater Trail ("Sellwood Gap") along Ochoco St.	17th Ave	19th Ave	~~$80~~ 90
AI	Med	C	International Way Bicycle Facilities	Construct bike lanes or other bike facilities.	37th Ave	Lake Rd	$400
AJ	Med	C	Bicycle/Pedestrian Improvements to Main St	Construct multiuse path or other improved bike/ped facilities on Main St to provide safer connection between downtown and Tacoma station. (TSAP)	Hanna Harvester Dr	Tacoma station	$2,900
AK	Med	C	Bicycle/Pedestrian Connection from Eastern Neighborhoods to Tacoma Station Area	Establish bike/ped connection over existing railroad tracks and light rail to Tacoma station area. (TSAP)	Olsen St & Kelvin St	Mailwell Dr	$4,000
AL	Med	C	Improved Connection from Springwater Trail to McLoughlin Blvd	Construct stairs or other facility to connect Springwater Trail to west side of McLoughlin Blvd. (TSAP)	Location-specific	Location-specific	$500

Map ID[1]	Priority	Type	Project Name	Project Description	From	To	Cost~~(s)~~ ($1,000s[4])
AM	Med	C	Bicycle/Pedestrian Connection over Johnson Creek	Construct bike/ped bridge over Johnson Creek along Clatsop St at 23rd Ave to connect Tacoma station area with adjacent neighborhood. (TSAP)	Location-specific	Location-specific	$400
AN	Med	C	Improved Bicycle/Pedestrian Connections on West Side of Tacoma Station Area	Improve bike/ped connections to adjacent neighborhood to west of Tacoma station area at Ochoco St and Milport Rd. (TSAP)	Location-specific	Location-specific	$500
N/A	Med	O	Bicyclist Education	Promote bicycling through bike use and route selection education.	Citywide	Citywide	$10
N/A	Med	O	Community Bicycle Rides	~~Coordinate~~ Support community bike rides to encourage bike use.	Citywide	Citywide	$5
Low Priority Projects							
~~A~~	~~Low~~	~~C~~	~~Intersection Improvements at Adams and 21st~~	~~Improve safety of crossing at intersection.~~	~~Location-specific~~	~~Location-specific~~	~~$10~~
B	Low	C	Springwater ~~Corridor~~ Trail Intersection Improvements at 45th Ave	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10
C	Low	C	Intersection Improvements at Johnson Creek Blvd and Linwood Ave	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10
D	Low	C	Intersection Improvements at Linwood Ave and King Rd	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10
~~F~~	~~Low~~	~~C~~	~~Intersection Improvements at Linwood and Harmony~~	~~Improve safety of crossing at intersection.~~	~~Location-specific~~	~~Location-specific~~	~~$10~~
H	Low	C	Intersection Improvements at International Way and Lake Rd	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10
L	Low	C	Harrison St Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	Hwy 224	42nd Ave	~~$13~~ 10
M	Low	C	37th Ave Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	Harrison St	Hwy 224	~~$2,900~~ 3,200

Map ID[3]	Priority	Type	Project Name	Project Description	From	To	Cost~~(s)~~ ($1,000s[4])
O	Low	C	43rd Ave Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	King Rd	Filbert St	~~$1,014~~ 1,100
P	Low	C	Linwood Ave Bike Lanes (north)	Fill in gaps in existing bicycle network with bike lanes.	Queen Rd	Johnson Creek Blvd	~~$1,692~~ 1,900
Q	Low	C	Linwood Ave Bike Lanes (south)	Fill in gaps in existing bicycle network with bike lanes.	Juniper St	Harmony Rd	~~$296~~ 320
R	Low	C	Rusk Rd Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	Lake Rd	North Clackamas Park	~~$936~~ 1,000
~~T~~	~~Low~~	~~C~~	~~21st Avenue Bike Lanes~~	~~Fill in gaps in existing bicycle network with bike lanes.~~	~~Harrison St~~	~~Lake Rd~~	~~$50~~
X	Low	C	Kellogg Creek Trail Improvements	Resurface trail and provide wayfinding signage to/from trail.	Milwaukie Riverfront	Treatment Plant	~~$623~~ 680
~~Y~~	~~Low~~	~~C~~	~~Trolley Trail Signage~~	~~Design and install Trolley Trail signage.~~	~~Milwaukie Riverfront~~	~~Southern city limits~~	~~$54~~
~~AA~~	~~Low~~	~~C~~	~~Springwater Trail Ramp Improvement at McLoughlin~~	~~Improve ramp at Springwater Trail and McLoughlin Blvd.~~	~~Location-specific~~	~~Location-specific~~	~~$15~~
AH	Low	C	Improved Connection from Springwater Trail to Pendleton Site (Tunnel)	Construct tunnel under Springwater Trail to improve connection to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$1,200
AO	Low	C	Bike/Ped Path on Sparrow St	Establish a dedicated bicycle and pedestrian connection on Sparrow St, connecting River Rd to Trolley Trail	River Rd	Trolley Trail	$350
AP	Low	C	Bike/Ped Overpass over McLoughlin Blvd at River Rd	Establish a dedicated bicycle and pedestrian connection across McLoughlin Blvd.	Kronberg Park	River Rd	$2,500
AQ	Low	C	Crossing Improvements for McLoughlin Blvd at Ochoco St and Milport Rd	Construct improvements at Ochoco St and Milport Rd to improve bike/ped crossing of McLoughlin Blvd (per ODOT, this will require full intersection improvements). (TSAP)	Location-specific	Location-specific	$8,320
AR	Low	C	Bicycle/Pedestrian Connection between McLoughlin Blvd and Stubb St	Establish bike/ped connection to McLoughlin Blvd sidewalk at west end of Stubb St. (TSAP)	Location-specific	Location-specific	$20
N/A	Low	O	Milwaukie Bike Map	Produce a Milwaukie Bike Map.	Citywide	Citywide	~~$50~~ 60
N/A	Low	O	Police Enforcement on Drivers	Enforce laws related to bike lanes and bicycle safety.	Citywide	Citywide	$10

Map ID[3]	Priority	Type	Project Name	Project Description	From	To	Cost~~(s)~~ ($1,000s[4])
N/A	Low	O	Bike Lane Striping	Restripe existing bike lanes and stripe bike lanes on streets where buses and bicyclists share the road.	Citywide	Citywide	$20
N/A	Low	C	Springwater Trail Signage	Install wayfinding signage for Springwater Trail.	Citywide	Citywide	$~~45~~ 20
N/A	Low	O	North Clackamas Greenway Corridor Study	Study feasibility of corridor for multiuse path construction (possibly along Kellogg Creek).	Downtown	Clackamas Regional Center	$50

Notes:

C = Capital Project
O = Operational Project
P = Policy Project

High = High priority
Med = Medium priority
Low = Low priority

TSAP = Tacoma Station Area Plan

Action Plan

The Bicycle Action Plan (Table 6-3) identifies the highest priority projects that are reasonably expected to be funded with local funds by ~~2030~~2035, which meets the requirements of the ~~updated~~ State's Transportation Planning Rule.[5] The action plan project list is ~~the result of~~ based upon a 2007 citywide project ranking process. In 2007, ~~A~~all of the modal master plan projects were ranked by the TSP Advisory Committee after consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added. ~~The highest ranking bicycle projects that are reasonably expected to be funded (see Chapter 13) with local funds are shown in Table 6-3.~~

Table 6-3 Bicycle Action Plan

Map ID	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Z	17th Ave ~~Bikeway and Intersection Safety~~ Improvements	Fill in sidewalk gaps on both sides of street, fill in gaps in existing bicycle network with bike lanes, and/or provide multiuse path. Improve intersection safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E. ~~and eastbound connection at 17th Ave/Hwy 99E. Improve intersection safety at 17th Ave/Hwy 224.~~	~~Waverly Dr~~ Ochoco St	~~Harrison St~~ McLoughlin Blvd	$1,000	Match
U1	Monroe St ~~Bicycle Boulevard~~ Neighborhood Greenway (downtown)	Designate as ~~a Bicycle Boulevard~~ "neighborhood greenway" and install ~~bicycle boulevard~~ traffic-calming improvements.	21st Ave	~~Linwood Ave~~ Hwy 224	~~$330~~ $85	Match
U2	Monroe St Neighborhood Greenway (central)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Hwy 224	42nd Ave	$80	Match
U3	Monroe St Neighborhood Greenway (east)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	42nd Ave	Linwood Ave	$165	Match
U5	Stanley Ave ~~Bicycle Boulevard~~ Neighborhood Greenway (north)	Designate as ~~a Bicycle Boulevard~~ "neighborhood greenway" and install ~~bicycle boulevard~~ traffic-calming improvements.	Springwater Trail	~~Railroad Ave~~ King Rd	~~$330~~ $135	Match
U6	Stanley Ave Neighborhood Greenway (south)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	King Rd	Railroad Ave	$195	Match
N	Railroad Ave Capacity Improvements	Bicycle aspect: Fill in gaps in existing bicycle network with bike lanes, cycle track, multiuse path, or other facilities.	37th Ave	Linwood Ave	$4,800	Match

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

AD	Kellogg Creek Bike/Ped Bridge	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500	Match
AE	Kellogg Creek Dam Removal and Hwy 99E Underpass	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/ped undercrossing between downtown Milwaukie and Riverfront Park.	Location-specific	Location-specific	$9,900	Match
U4	29th/Harvey/40th ~~Bicycle Boulevard~~ Neighborhood Greenway	Designate as ~~a Bicycle Boulevard~~ "neighborhood greenway" and install ~~bicycle boulevard~~ traffic-calming improvements.	Springwater Trail	Monroe St	$220	~~Direct~~ Match
AC	Kronberg Park Trail	Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E.	Kellogg Creek Bridge	River Rd	$300	Direct
N/A	Bike Lane Maintenance	Sweep bike lanes to remove debris.	Citywide	Citywide	$1,200	Direct
	~~Bike Route Signage~~	~~Install neighborhood bike route signage.~~	~~Citywide~~	~~Citywide~~		~~Direct~~

REGIONAL TRANSPORTATION PLAN (RTP) COMPLIANCE

The projects identified in the master plan list and further refined in the action plan list are ~~in-line~~ consistent with the Metro 2035 Regional Transportation Plan (RTP). The RTP includes specific goals that can be used to measure the success of regional planning efforts to improve the overall transportation system. Specifically, the master plan and action plan projects identified in this chapter are in line with Metro's goals for regional mobility and non-single-occupant-vehicle (non-SOV) modal targets. Chapter 8 includes a discussion of the performance measures and targets that the City has adopted to achieve the relevant RTP goals.

Three of the goals in the 2035 RTP relate to the regional bicycle system in particular:

- Reduce the number of bicyclist fatalities plus serious injuries by 50% compared to 2005.
- Triple the biking mode share compared to 2005.
- Increase by 50% the number of essential destinations accessible within 30 minutes by trails and bicycling compared to 2005.

All of the master plan and action plan projects identified in this chapter will help the region meet these goals. At the community level in Milwaukie, some of these goals are already met. For example, there is no record of bicyclist fatalities or serious injuries in 2012. And given the relatively compact nature of the city, no destination is more than 30 minutes away by bicycle. Certainly, the strategies outlined in this chapter will allow Milwaukie to contribute further to the region meeting those goals. It is the effort to increase the biking mode share where Milwaukie can play a more active role in meeting the regional goal. As more data and tools become available to help measure local biking mode share, it will become easier to gauge the success of the projects identified in this chapter in increasing that share.

7 Public Transit Element

This chapter summarizes the public transit needs within the city of Milwaukie and recommends improvements for addressing those needs over the next ~~20~~ 22 years.

INTRODUCTION

Milwaukie's public transit policies support transportation, land use, economic development, and environmental goals. The availability, convenience and desirability of public transit are key aspects of a system that must support the movement of people to, from, and through Milwaukie. Transit trips reduce single-occupant vehicle trips (which reduces traffic and energy consumption), serve community members who cannot drive (including the elderly, disabled and youth), and minimize transportation system impacts to the environment, such as vehicle emissions and soil and water pollution from impervious surface runoff.

Job creation and retention in the city are also influenced by Milwaukie's transit service. So too are the City's revitalization goals for the downtown, which rest on a moderately dense, mixed use land use pattern. The availability of high quality and dependable transit enables the development of more downtown land for new housing and commercial space with relatively less land being consumed for parking.

TSP GOALS AND POLICY FRAMEWORK

The overall transportation system and the city itself are enhanced as the public transit system improves. Several of the goals of this TSP (see Chapter 2) establish refined policies that assert the importance of transit to the success of the whole transportation system:

- **Goal 1 Livability** calls for a transportation system that is accessible to all members of the community.
- **Goal 3 Provide Travel Choices** directs the City to collaborate with transit providers to improve transit service and to generally support projects that reduce dependence on single-occupant vehicles.
- **Goal 4 Quality Design** requires developers to build appropriate transit-supportive improvements.
- **Goal 6 Sustainability** guides the City to develop an energy efficient transportation system that minimizes environmental impacts.
- **Goal 7 Efficient and Innovative Funding** calls for a cost-effective transportation system.

- **Goal 8 Compatibility** directs the City to coordinate with TriMet and other transit providers to plan for improvements to transit service.
- **Goal 9 Economic Vitality** insists that transportation facilities be built to support the land uses outlined in the Comprehensive Plan, such as the Town Center concept for downtown.

The City's Comprehensive Plan establishes the policy framework for providing transit and integrating it with other transportation modes and adjacent land uses. These policies can be found in the Air, Water and Land Resources Quality Element, Economic Base and Industrial/Commercial Land Use Element, Neighborhood Element and the Transportation, Public Facilities and Energy Conservation Element. The Comprehensive Plan includes several specific directions for guiding the City to a complete transit system, as well as general goal statements and policies toward the same end. In sum, the policies are:

- **Travel-Related:** Reduction of congestion, improved connectivity between Milwaukie and Portland.
- **Access-Related:** Accommodation of elderly and disabled citizens, service to all neighborhoods, pedestrian and bicycle connections to transit stops and routes.
- **Land-Use-Related:** Increased density of housing and jobs near transit facilities.
- **Transit-Experience-Related:** Ensure transit facilities are safe, well-maintained, and convenient.
- **Environment-Related:** Reduction of regional air pollution and development of a compact, walkable downtown.
- **Planning-Related:** Require new development to provide transit amenities as appropriate, prioritize street improvements on transit streets, coordinate on regional transit initiatives including high-capacity transit planning and coordinate with TriMet on service delivery and facility improvements.

The TSP affirms these goals, and supports them by identifying system deficiencies and needs, new service enhancements, capital improvements and policy improvements.

NEEDS

The public transit system in Milwaukie must achieve ~~five~~ four goals for it to be a complete system. A complete transit system in Milwaukie would provide or allow for:

1. Service for the greatest number of potential users.
2. Service for the neediest citizens.
3. A safe experience for all users.
4. Convenient service.

Public Transit Coverage and Service

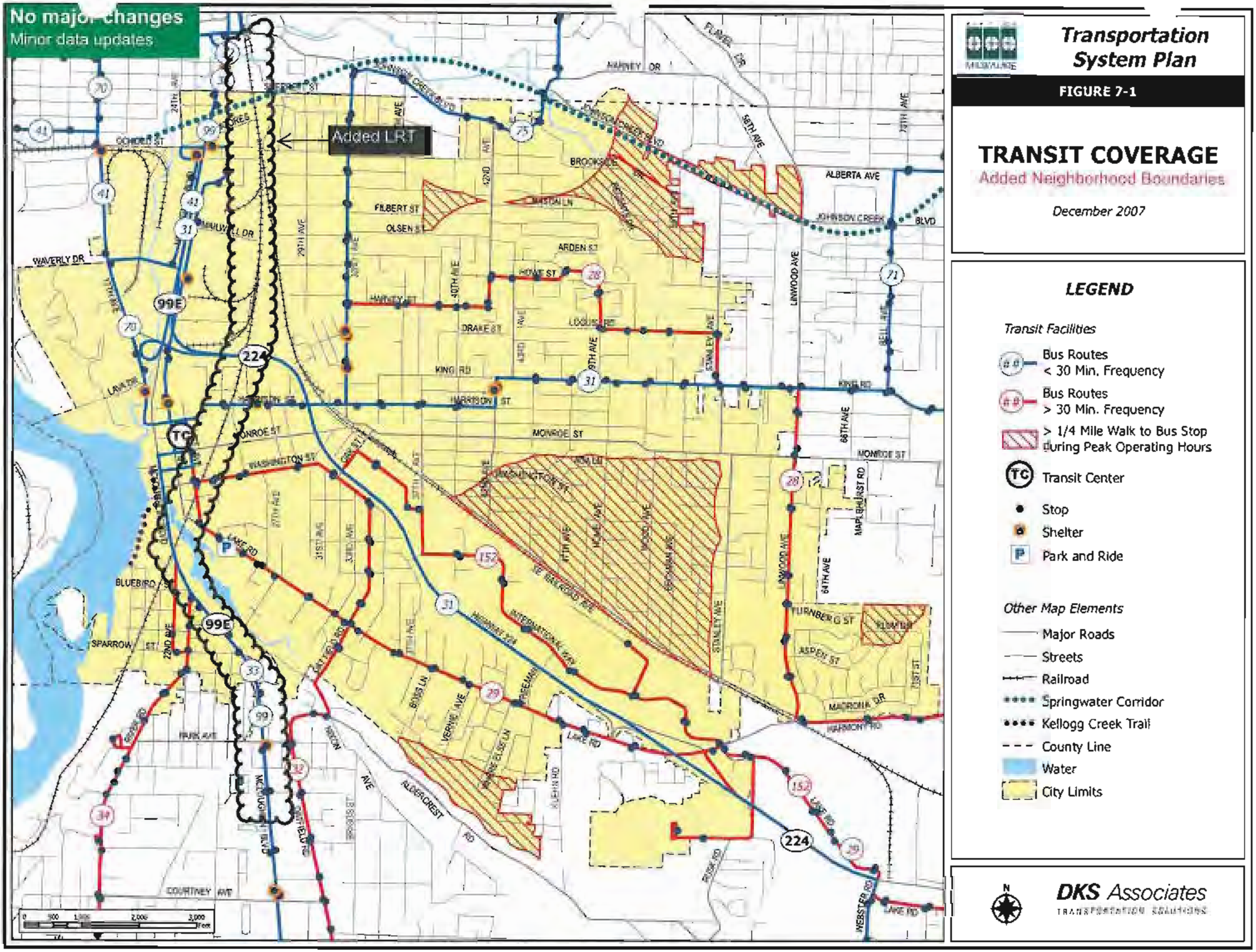
TriMet is the regional transit provider for the Portland metro area and provides transit service to and from Milwaukie, with ~~eleven~~ ten bus routes: 28, 29, 31, 32, 33, 34, ~~41,~~ 70, 75, 99, and 152. These routes, their approximate headways (time between arrivals), and the locations of stops, shelters, and the transit center and park-and-rides are shown in Figure 7-1.

The preponderance of transit needs in Milwaukie can be divided into two categories: new service (where there isn't any today) and enhanced services (where more service is desired). As described in Figure 7-1, most of Milwaukie currently enjoys nearby bus service. ~~Eleven~~ Ten bus routes currently run through the city, with buses making frequent stops and providing most of the city's neighborhoods with weekday service. The exceptions are in portions of the Hector

Campbell, Linwood, and Lewelling neighborhoods (shown in red on Figure 7-1) which have pockets that are outside a 1/4-mile walk distance to the nearest bus stop. These portions of Milwaukie, which comprise approximately ~~13~~15% of its land area, will only be served with the establishment of new, proximate bus routes and stops.

Figure 7-2 illustrates the second category of need, showing how service levels drop on existing routes during the weekend when the same criteria are applied (1/4-mile walk distance to nearest bus stop). Because five of the ~~eleven~~ ten bus lines do not run on the weekend, nearly the entire southern half of the city is left without convenient bus service. Even during periods of maximum service (called peak times), several lines do not run frequently enough to meet the needs of the Milwaukie transit users.[1] During peak hours, only six of the ~~eleven~~ ten bus routes operate with headways of 30 minutes or less, while the remaining five lines operate with headways greater than 30 minutes.

[1] Headways have been criticized, for example, as being too great (i.e. too much waiting) for the routes serving Lake Rd, Oatfield Rd, and Harvey St.



No major changes
Minor data updates
Added LRT
Transportation System Plan
FIGURE 7-1
TRANSIT COVERAGE
Added Neighborhood Boundaries
December 2007
LEGEND
Transit Facilities
Bus Routes < 30 Min. Frequency
Bus Routes > 30 Min. Frequency
> 1/4 Mile Walk to Bus Stop During Peak Operating Hours
Transit Center
Stop
Shelter
Park and Ride
Other Map Elements
Major Roads
Streets
Railroad
Springwater Corridor
Kellogg Creek Trail
County Line
Water
City Limits
DKS Associates
TRANSPORTATION SOLUTIONS
HARNEY DR
ALBERTA AVE
JOHNSON CREEK BLVD
BROOKSIDE
FILBERT ST
OLSEN ST
ARDEN ST
HOWE ST
WAVERLY DR
DRAKE ST
LOCUST ST
KING RD
HARRISON ST
MONROE ST
WASHINGTON ST
LAKE RD
BLUEBIRD ST
SPARROW ST
PARK AVE
COURTNEY AVE
FURNBERG ST
ASPEN ST
MADRONA DR
HARMONY RD
LINWOOD AVE
STANLEY AVE
INTERNATIONAL WAY
ALDERCREST RD
WEBSTER RD
29TH AVE
32ND AVE
40TH AVE
42ND AVE
22ND AVE

Transportation System Plan

FIGURE 7-2

OFF-PEAK TRANSIT COVERAGE

December 2007

LEGEND

Transit Facilities

- Bus Routes, Off-Peak Hours < 60 Min. Frequency
- Bus Routes, Off-Peak Hours > 60 Min. Frequency
- > 1/4 Walk to Bus Stop during Off-Peak Hours
- Transit Center
- Stop
- Shelter
- Park and Ride

Other Map Elements

- Major Roads
- Streets
- Railroad
- Springwater Corridor
- Kellogg Creek Trail
- County Line
- Water
- City Limits

Note: Bus routes that do not run during off-peak hours are not shown.

DKS Associates
TRANSPORTATION SOLUTIONS

Public Transit Supportive Facilities

Many TriMet facilities in Milwaukie are in need of improvement. Certain bus stops are perceived as unsafe, either because of their proximity to unpleasant site or traffic conditions, isolated location, low ridership, lack of supporting nearby land uses, or neglected physical condition. ~~This situation is most intensely observed at the downtown transit center, where bus riders report feeling unsafe because the physical layout of the facility is perceived as uncomfortable and conducive to loitering and other non-transit related activities. The laying over of buses on downtown streets is viewed as part of the problem, unnecessarily expanding the presence of buses while reducing the possibility for on street parking or downtown redevelopment and related pedestrian activity~~.

Park-and-ride facilities in the city are insufficient for Milwaukie commuters, causing these commuters to seek parking downtown or on neighborhood and collector streets, or to dispense with transit options entirely. Bike parking facilities are also reported as inadequate at existing park-and-rides.

Gaps in city facilities, especially sidewalks, contribute to underutilization of the transit system. Every transit user is a pedestrian, since many people arrive at bus stops on foot, and all wait for buses in the pedestrian realm. While the transit system does not require sidewalks on every street in the city, it is vastly improved when sidewalks are provided on both sides of streets with bus stops, and at least one sidewalk on local streets that connect to transit stops. Good lighting is essential for safety and visibility.[2] Finally, the City should maintain clear striping of bike lanes where bus routes and bike routes are co-located on a street (although this situation should be avoided where possible).

The new Portland-Milwaukie Light Rail (PMLR) line, scheduled to open in 2015, represents a new transit facility that will connect Milwaukie with downtown Portland. The new line will run from the Portland State University campus at SW 6th Ave and College St, through the South Waterfront area (with a direct link via aerial tram to the Oregon Health & Science University) and across the Willamette River to the Oregon Museum of Science & Industry, and south alongside McLoughlin Blvd to downtown Milwaukie, terminating at SE Park Ave.

System Deficiencies

Though transit service in Milwaukie needs to be improved in many ways, its greatest deficiencies are in the areas of Service Levels, Safety, and Convenience of Service. Several factors contribute to this perception and point to the community's desired areas of improvement:

- New routes are needed to serve the Hector Campbell, Linwood and Lewelling neighborhoods where the nearest bus stops are more than a 1/4-mile walk away. This is an environmental justice issue as well as a livability issue for people living in these transit-deficient pockets.
- Additional runs (i.e. increased frequencies or shorter headways) are needed for many routes, especially on evenings and weekends.

[2] Bus stop lighting is typically provided by nearby streetlights, if the street is well lit. However, nighttime illumination can still be poor or nonexistent, and the cost of hard-wiring bus stops with lights is significant and impractical in many locations. TriMet has recently started to install solar lighting systems primarily along frequent bus corridors, using environmentally friendly LED (light emitting diodes) inside select shelters. The city should work with TriMet to have these systems installed where needed in Milwaukie.

- Bus shelters or improved shelters and related features are needed for certain locations, notably where daily boardings exceed TriMet's standards for shelter upgrades.

- Shelters at main stops along bus routes need adequate lighting and TransitTracker[3] information.

- The downtown Transit Center needs to be "dissolved" by establishing a bus layover facility somewhere outside of the downtown~~ and improving the bus stop facilities (shelters, benches, etc.) that will remain downtown~~.

- More park-and-ride parking lots are needed in certain locations.

- ~~High capacity transit (light rail) is needed for the McLoughlin corridor, extending south of downtown Milwaukie with a large park-and-ride that can intercept northbound park-and-riders before reaching the city.~~

- Bus rapid transit is needed for routes to connect with Oregon City and Clackamas Town Center.

- Coordination between bicycle facilities and transit services is needed.

- The expansion of Milwaukie's sidewalk system needs to consider the importance of sidewalks on transit streets and local streets adjacent to transit streets.

- Convenient service needs to serve Milwaukie's significant elderly population.

RECOMMENDATIONS

The City's policies on public transit, compared to the current state of the system, reveal a disparity between the City's goals for transit service and use, and the system's ability to meet those goals today. To close this gap, the City and TriMet should simultaneously pursue three types of improvements that will increase transit service and benefit Milwaukie residents, employees, and the greater population:

- **Service Enhancements:** Make transit more convenient for users through new routes and stops, and enhanced service on established routes.

- **Capital Improvements:** Enhance the transit experience for users. These improvements take the form of capital projects that upgrade transit facilities in the city (e.g. shelters, bus stops, park-and-rides).

- **Policy Improvements:** Establish new policies or policy direction that clarifies and expands how the City can help facilitate transit use and a transit experience that better meets the needs of local system users.

The City and TriMet are collaborators in making these improvements, although their relative interests and authorities are shared in differing proportions for each. Service Enhancements are largely in TriMet's control, with the City providing direction and little else. Policy Improvements have the opposite character, as these are within the City's realm of authority, with the transit

[3] "TransitTracker" is the name of TriMet's Global Positioning System technology for tracking how far a bus or MAX train is from a stop. This real-time information is then made available to riders on the street via electronic displays installed in bus shelters and MAX stations, online, or over the phone. "Transit Priority Intersections" enable preferential treatment of buses at intersections by extending the green time along the bus route, or actuating the green light at intersections upon detection of an approaching bus.

agency providing input. Implementation of Capital Improvements is more equally shared, with the two entities working closely together to select and construct the improvements with funds from either government or a third party grantor to which either or both governments may apply.

A complete list of all three improvement types is included as Table 7-1, Public Transit Master Plan Projects, located at the end of this chapter. The high priority Service Enhancement and Capital Improvement projects are illustrated in Figure 7-3, also located at the end of this chapter. The high priority recommendations are also summarized below.

Service Enhancements

TriMet's service enhancements are determined through its five-year Transit Investment Plan (TIP), which lays out the agency's strategies and programs to meet regional transportation and livability goals. The Regional Transportation Plan and local transportation system plans guide the TIP, which is updated annually and seeks to meet current and future demands for service. Through its TIP updates, TriMet partners with jurisdictions like Milwaukie to develop criteria for expanding transit service. The City should coordinate with TriMet on the annual TIP update process on the programming of Milwaukie's desired service enhancements.

Two new east-west bus routes are envisioned for Milwaukie: one utilizing Johnson Creek Blvd east of 42nd Ave, and one utilizing Railroad Ave. The Johnson Creek line would extend to 82nd Ave to serve the numerous jobs between 42nd and 82nd Aves and connect with the I-205 light rail (MAX) line. The Railroad Ave route would require a complete upgrade of the street itself, with sidewalks, stormwater drainage, and bus shelters. The route is envisioned to connect to the east with Harmony Rd, to serve Clackamas Community College, Clackamas Town Center and the eastern suburbs. Downtown Milwaukie is envisioned as the western terminus for the new line (see Figure 7-3).

A third east-west service enhancement—bus rapid transit—is requested for the Line 31 rush hour route, which utilizes Hwy 224. ~~TriMet anticipates that this part time route will convert to high frequency service with t~~The opening of the I-205 light rail in 2009 has increased the need for TriMet to consider converting this part-time route to high-frequency service, subject to available funding for operations and bus fleet expansion.

Service enhancements for north-south routes include conversion of Lines 33 and 99 in the McLoughlin Blvd corridor to high-frequency light rail service~~(i.e. light rail)~~[4] (with continued high-frequency non-light-rail transit to Oregon City) and extending service on Linwood Ave north of King Rd, continuing on Flavel Dr into Portland. There may be a need for a circulator bus to connect light rail riders to employment locations south of the Tacoma St area when Lines 33 and 99 are discontinued.

In general, more service is desired on existing routes. Reduced headways (more frequent bus runs) are desired for the routes serving Lake Rd, Oatfield Rd, Linwood Ave, International Way, and Logus Rd. Additionally, weekend service is desired for more routes, including those serving King Rd, Oatfield Rd, McLoughlin Blvd, 17th Ave, and 32nd Ave.

Other service enhancements would improve the reliability and/or ridership on Milwaukie transit routes. These include extending the hours of service for certain routes (e.g. between 6 p.m. and 10 p.m.), adding TransitTracker technology at more stops, and establishing transit priority

[4] ~~"High Capacity Transit" generally refers to Light Rail Transit and/or Bus Rapid Transit and typically carries more passengers with larger vehicles and/or more frequent service than a standard fixed route bus system. HCT can operate along exclusive rights of way such as a rail track or dedicated busway, or on existing streets with mixed traffic. The main goal of HCT is to provide faster, more convenient, and more reliable service for a larger number of passengers.~~

intersections along transit corridors. Where TriMet can improve its system efficiencies and operations, for instance through signal prioritization, interlining routes, curb extensions and other similar devices, the City will provide willing consultation and collaboration. The City acknowledges that the transit system is a regional entity and that service enhancements that benefit the overall system are generally a benefit to the City's small piece of the system.

Capital Improvements

Capital improvements within Milwaukie can be thought of as user amenities that improve the convenience and attractiveness of the transit system, which in turn bolsters ridership. Typical examples of capital improvements include park-and-rides, bus shelters, attractive signage with timetable information, benches, bike racks, trash receptacles, and public art.

The selection of capital improvements depends on needs and availability of funds. TriMet prioritizes bus stop upgrades, for example, based on the number of boardings at the location, the type of service provided at the location (e.g. local bus, express bus, frequent bus, MAX, etc.) and special circumstances such as the presence of a nearby senior center.

Most of the bus stops in Milwaukie are considered "basic stops," and currently have minimal amenities (poles with signs only and a schedule display). TriMet typically provides a shelter at a bus stop that sees an average of 35 daily boardings.[5] Based on 2006 boarding data, there is one stop in Milwaukie that should have a shelter but does not: Harrison St/24th Ave.[6] This stop should be upgraded to a shelter.

~~The user amenities at the transit center in downtown Milwaukie are substandard according to TriMet's Bus Stop Amenities Development Criteria and Bus Stop Classification Guidelines. Because the existing transit center sees over 4,800 weekly boardings and is a major transfer hub, the existing transit center should have a full range of both bus stop features and externally managed features (those not provided by TriMet). Bus stop features in a high use location like downtown Milwaukie would include customized shelters, trash cans, real time (Transit Tracker) displays, freestanding benches, bike racks and lockers, public phones, art work elements and ticket vending machines. Externally managed features should include crosswalks, curb extensions, low maintenance landscaping, and public restrooms.~~

~~The City and TriMet should work together to construct the complete set of bus stop features and externally managed features in downtown Milwaukie. The existing transit center would be effectively "dissolved" by adding these features, moving the downtown bus layover function out of the downtown core, and potentially disaggregating the location of the bus stops. In its place, downtown Milwaukie would see continued bus transfer activity, but at high quality stops with new, state of the art facilities. These capital improvements (a new bus layover facility and improved downtown user amenities) are Milwaukie's highest priority capital improvements for the transit system.~~

Park-and-ride lots are very valuable for commuters. There is currently one small shared-use park-and-ride in Milwaukie, located south of downtown on Lake Rd. This type of small, shared use park-and-ride is useful for residents making short car trips to connect with local bus service.

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[5] Although ridership is the primary criterion for determining shelter placement warrants, TriMet also considers other factors like LIFT service usage, funding and maintenance by others, development of adjacent property and opportunities for consolidating bus stops.

[6] The Linwood/King stop currently has 29 daily boardings, according to TriMet. The City and TriMet should track the data for this stop on an annual or semiannual basis given the intensification of land use at the Wichita Shopping Center in 2007.

A second park-and-ride, the 300-plus-space ~~"Milwaukie" (~~Southgate~~)~~ park-and-ride ~~is scheduled to be~~ was constructed in 2008 and is located north of Hwy 224 and east of McLoughlin Blvd. This type of park-and-ride is designed for regional use, attracting users from farther distances who are often seeking to connect with higher capacity transit service like frequent service bus, or light rail. When Lines 33 and 99 are discontinued after the start of light rail service to Milwaukie, consideration should be given to converting the Southgate park-and-ride for use as local employee parking.

Additional park-and-ride lots of both types should be considered for better serving Milwaukie commuters and Clackamas County commuters bound for Portland. ~~Suggested locations for large regional park-and-ride lots included McLoughlin Blvd/Park Ave and the K-Mart site at Highway 224/Johnson Rd. Potential sites for smaller park-and-ride lots, intended for Milwaukie residents, are at the southeast corner of Linwood Ave/King Rd, and on 37th Ave behind the Milwaukie Marketplace.~~

A downtown park-and-ride ~~on Washington St between Main St and McLoughlin Blvd (on the former "Cash Spot" site)~~ is a special case. A park-and-ride structure downtown ~~in this location~~ could serve both local and regional transit users, as well as downtown employees and visitors. A structure of this type is envisioned to support the ~~McLoughlin Blvd high frequency transit project (i.e.~~ PMLR~~)~~, but under a special set of circumstances that would allow the City to share the facility for public parking, eventually phasing out the commuter parking as downtown Milwaukie develops (see Chapter 12 Downtown Parking). This option will require additional research regarding location and funding options.

Policy Improvements

By adopting policies that reinforce its transit goals and the improvements described in this TSP update, the City reaffirms its commitment to a complete transit system and takes new steps toward realizing that vision.[7] Key policy recommendations are described below. Other policy suggestions, each contributing toward establishing the complete system, are summarized in "Other Transit Policies."

~~"Dissolve" the Downtown Transit Center~~

~~Two transit policy recommendations received widespread support in the TSP update process. The first was discussed in the Capital Improvements section—elimination of the downtown transit center with the associated construction of a bus layover facility in a non-downtown location that creates minimal disturbance to nearby uses, and downtown bus facility improvements.~~

Serve the "Transit Disadvantaged" Portions of Milwaukie

~~The second~~ One high priority policy is the elimination of "transit disadvantaged" portions of the city, based on weekday peak-hour service, by providing new transit service for these areas. The City's Comprehensive Plan ~~currently~~ establishes that ~~transit service be convenient and accessible~~ the transportation system provide travel choices and allow people to reduce the

[7] The term "reaffirm" is emphasized here. The City of Milwaukie currently enacts several important transit-supportive policies and provisions located elsewhere in this TSP, in the Milwaukie Municipal Code (Subsection 19.~~1412~~ 1504.10) and the Comprehensive Plan. These include goals such as street connectivity (which enables bus routes and pedestrian access from neighborhood to transit streets), safe pedestrian crossings at regular intervals along principal roadways, development standards that implement ~~s~~State Transportation Planning Rule requirements for building entrances that face transit streets (not parking lots), and appropriate levels of density along transit streets to support transit use.

number of trips made by single-occupant vehicles.[8] This policy ~~improvement strengthens~~ bolsters the City's position that underserved areas be the focus of new transit investments.

Provide Park-and-Rides Downtown and on Milwaukie's Fringe

Park-and-ride policies are suggested that would facilitate structured parking in downtown (see Downtown Parking chapter), and guide the size of new park-and-rides in other locations—smaller within the city to serve Milwaukie residents, and larger on the city's fringe to serve North Clackamas County commuters. These "fringe" park-and-rides, if associated with light rail, (such as that under study for Park Ave and McLoughlin Blvd) should be annexed to the City of Milwaukie to ensure effective and efficient policing.

Improve Public Transit Safety

The Milwaukie Police Department should be consulted and enlisted in the effort to ensure passengers' sense of safety at and on all TriMet facilities in the city. A policy should be adopted that specifically discourages loitering at transit facilities.

Maintain Public Transit Facilities

The maintenance of transit facilities can be improved through the enlistment of city neighborhoods, through a policy that would enable Neighborhood District Associations to initiate improvements by contacting TriMet directly. The transit agency would, in turn, commit to make best efforts to complete the needed maintenance or repair.

Request Dedication for Bus Stop Improvements

The City already requires easements or dedications for new or upgraded bus stops when an adjacent site applies for land use or development permits. Where desired bus stop improvements are adjacent to sites being developed or redeveloped for which an easement or dedication is not required, City policy should be updated to ensure that easements or dedications are requested of project developers and property owners.[9] The NDAs can be effective advocates for the transit system in this process.

Reinvest Public Transit "Savings" Within Milwaukie

The city's level of transit service, while high, falls well short of achieving the goals of the community and the Comprehensive Plan. Consequently, the City takes the position that any savings derived from new capacity, (either through light rail, bus rapid transit, or other new enhancement) be contained and reinvested within the Milwaukie service area. The City would prefer that investments in service upgrades not all come in the form of route conversions to high-frequency transit. Although these conversions are supported, the City's preference would be that savings associated with these conversions (from eliminated bus operations, for example), be retained and reinvested in needed bus system enhancements elsewhere in town. The ultimate goal of this policy would be to achieve a net gain of distributed service throughout the city—both through new projects like light rail, and increased bus service as a result of the new projects.

[8] This policy is included in the ~~2006 version of the~~ Comprehensive Plan~~,~~ as ~~Transportation Element,~~ Goal Statement ~~13~~ Travel Choices. ~~Proposed 2007 amendments to the Comprehensive Plan would list this as policy b under Goal 3, Travel Choices (see TSP Chapter 2).~~

[9] Frequently TriMet is unable to improve bus stops because the property required to make the improvement is privately owned.

Other Public Transit Policies

- **Shared Use Park-and-Ride Facilities**: Explore the use of local church parking lots as park-and-ride facilities, in conjunction with a policy to suitably size these facilities based on their location.
- **Frequency of Service**: Add a policy to increase headways on all transit routes in the city so that buses run at least every 30 minutes.
- **Bike/Bus Connection:** Identify priority intersections for making connections between bike and bus transportation modes. Ensure that bike parking is installed at all park-and-ride facilities.
- **East-West Travel**: Add a policy that recognizes the need for east-west transit travel south of downtown Portland. Center-to-center commuting is an example of east-west travel.
- **Equitable Ticket Pricing:** Add a policy to ensure that ticket prices from park-and-rides south of downtown are the same as those north of downtown.
- **Interagency Coordination:** Continue to support the Milwaukie Center Bus Service and TriMet's LIFT service through interagency referrals, coordination, and signage as necessary.

Master Plan

TriMet's TIP includes many new services expansions in Milwaukie and the surrounding area over the next ~~20~~ 22 years. The Public Transit Master Plan includes potential improvements identified by the transit working group, which included participation from TriMet Table 7-1 summarizes the transit master plan for both capital projects and service enhancements.

CITY OF MILWAUKIE

Transportation System Plan

FIGURE 7-3

PUBLIC TRANSIT MASTER PLAN

December 2007

LEGEND

Existing Facilities	Proposed Improvements
Bus Stop	Park and Ride
Park and Ride	New or Rerouted Bus Route
Bus Route	Bus Rapid Transit Route
Bus Route Number	High Capacity Transit Route

- Schools
- Springwater Trail
- Kellogg Creek Trail
- Major Roads
- Streets
- Railroad
- County Line
- Parks
- Water
- City Limits

Table 7-1 Public Transit Master Plan Projects

Priority	Type	Project Name	Project Description	From	To	Cost(s) ($1,000s[10])
High Priority Projects						
High	C	Downtown Transit Center Improvements	Construct new bus layover facility outside of the downtown core. ~~Improve downtown bus stops and shelters consistent with level 3 features and including ample bike parking.~~	Location-specific	Location-specific	$1,250
~~High~~	~~C~~	~~Railroad Avenue Transit Improvements~~	~~Improve Railroad Ave for bus service to extend to Clackamas Town Center and points east. Part of Railroad Ave widening project identified in Table 8-8.~~	~~42nd Ave~~	~~Eastern city limits~~	~~TBD~~
High	SE	Railroad Ave ~~Bus Service~~ Capacity Improvements	~~Identified bus route need.~~ Transit aspect: Provide bus service to extend to Clackamas Town Center and points east.	Harrison St	Eastern city limits	TBD
High	SE	Johnson Creek Blvd Bus Service	Identified bus route need.	45th Ave	Eastern city limits	TBD
High	SE	Park-and-Ride Bus Service	Reroute bus line #70 to serve the Milwaukie park-and-ride on Main St.	Location-specific	Location-specific	TBD
~~Low~~High	O	Milwaukie Transportation Management Association Program	Implement a transportation management association for downtown employers.	Milwaukie Town Center	Milwaukie Town Center	$200
High	SE	Downtown Loop Bus	Establish bus service from downtown to Tacoma and Park Ave stations.	Downtown	Tacoma station, Park Ave station	TBD
High	SE	Neighborhood Loop Bus	Establish bus service between eastern neighborhoods and downtown.	Eastern city limits	Downtown	TBD
Medium Priority Projects						
~~Med~~	~~C~~	~~Park-and-Ride Facilities~~	~~Add new park-and-ride capacity at former Southgate theater site. Other potential new park-and-ride locations are: Kmart parking lot, SE corner of Linwood Ave and King Rd, SW corner of Park Ave and Hwy 99E, and 37th Ave behind Milwaukie Marketplace.~~	~~Location-specific~~	~~Location-specific~~	~~TBD~~
Med	C	Harrison St Transit Shelter at 24th Ave	Install transit shelter at Harrison St and 24th Ave, as this stop currently meets minimum boarding requirements.	Location-specific	Location-specific	~~TBD~~ $5

[10] Project costs are order-of-magnitude estimates and are in ~~2007~~2012 dollars. Future costs may be more due to inflation. ~~Costing details can be found in the Technical Appendix.~~ In the case of operational projects, estimated costs are for the entire 22-year planning period.

Priority	Type	Project Name	Project Description	From	To	Cost~~(s)~~ ($1,000s[10])
Med	SE	Weekend Service Improvements	Increase weekend bus service on bus lines #31, #32, #33, #70, and #75.	Citywide	Citywide	TBD
Low Priority Projects						
~~Med~~Low	C	Bike Lane Striping	Restripe existing bike lanes and ~~S~~stripe bike lanes on bus routes where ~~bikes and~~ buses and bicyclists share the road.	Citywide	Citywide	~~TBD~~ $20
Low	C	Bus Shelter Safety Improvements	Add TransitTracker and LED lighting units at main stops along bus routes.	Citywide	Citywide	TBD
Low	C	Hwy 224 Rapid Bus Improvements	Construct improvements that enhance rapid bus service east to Clackamas Town Center.	Milwaukie Town Center	Clackamas Town Center	TBD
~~Low~~	~~O~~	~~Tualatin-Portland Commuter Rail Extension Study~~	~~Study feasibility of adding peak-hour only service on existing tracks.~~	~~Tualatin~~	~~Union Station via Lake Oswego and Milwaukie~~	~~TBD~~
Low	SE	Linwood/Flavel Bus Service	Identified bus route need.	Northern city limits	King Rd	TBD
Low	SE	Bus Line Service Improvements	Add frequent service to bus line #31. Add more runs to bus lines #152, #32, and #33 between 6pm and 10pm.	Location-specific	Location-specific	TBD
Low	SE	Transit Priority Signalization	Implement transit priority signalization along key transit corridors.	Citywide	Citywide	TBD
~~NA~~	~~C~~	~~Milwaukie Light Rail Extension or High Capacity Transit Improvements~~	~~Construct light rail or high capacity transit improvements between Portland and Milwaukie.~~	~~Rose Quarter MAX Station~~	~~Milwaukie Town Center~~	~~$880,000[11]~~
N/A	C	McLoughlin Blvd Rapid Bus Improvements	Construct improvements that enhance rapid bus service south to Oregon City.	Milwaukie Town Center	Oregon City Town Center	TBD

Notes:

C = Capital Project — High = High priority
SE = Service Enhancements — Med = Medium priority
P = Policy Project — Low = Low Priority
TBD = Costs to be determined. These projects are under the jurisdiction of and/or will be funded by TriMet.

[11] ~~The 2004 Regional Transportation Plan (RTP) lists the cost of this project as $515,000,000.~~

Action Plan

The Public Transit Action Plan identifies the highest priority projects that are reasonably expected to be funded with local funds by ~~2030~~2035, which meets the requirements of the ~~updated~~ State's Transportation Planning Rule.[12] The action plan project list is ~~the result of~~ based upon a 2007 citywide project ranking process. In 2007, ~~A~~all of the modal master plan projects were ranked by the TSP Advisory Committee after consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added. ~~The highest-ranking public transit projects that are reasonably expected to be funded (see Chapter 13) with local funds are shown in Table 7-2.~~

Table 7-2 Public Transit Action Plan

Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Downtown Transit Center Improvements	Construct new bus layover facility outside of the downtown core. ~~Improve downtown bus stops and shelters consistent with level 3 features and including ample bike parking.~~	Location-specific	Location-specific	$1,250	Match
Railroad Ave Capacity Improvements	Provide bus service to extend to Clackamas Town Center and points east.	Harrison St	Eastern city limits	TBD	Direct (TriMet)
Downtown Loop Bus	Establish bus service from downtown to Tacoma and Park Ave stations.	Downtown	Tacoma station, Park Ave station	TBD	Direct (TriMet)
Neighborhood Loop Bus	Establish bus service between eastern neighborhoods and downtown.	Eastern city limits	Downtown	TBD	Direct (TriMet)
~~Railroad Avenue Transit Improvements~~	~~Improve Railroad Ave for bus service to extend to Clackamas Town Center and points east. Part of Railroad Ave widening project identified in Table 8-8.~~	~~42nd Ave~~	~~Eastern city limits~~		~~Match~~

REGIONAL TRANSPORTATION PLAN (RTP) COMPLIANCE

The projects identified in the master plan list and further refined in the action plan list are ~~in line~~ consistent with the Metro 2035 Regional Transportation Plan (RTP). Specifically, the projects identified are in line with Metro's goals for regional mobility and non-single-occupant-vehicle (non-SOV) modal targets.

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

8 ~~Auto~~ Street Network Element

The ~~Auto~~Street Network element of the TSP focuses on maintaining traffic flow and mobility on arterial and collector roadways, protecting residential neighborhoods from excessive through traffic and travel speeds, providing reasonable access to and from residential areas, improving safety, and promoting efficient through-street movement. This chapter summarizes strategies used to evaluate the future needs of Milwaukie's street network, and recommends projects to improve the operations of the motor vehicle system (for automobiles, trucks, buses, and other vehicles).

TSP GOAL AND POLICY FRAMEWORK

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Several of these TSP Goals guide the City's policies on auto mobility and access, and street connectivity, specifically the following:

- **Goal 1 Livability** directs the City to protect residential areas from excessive speed, and minimize the "barrier" effect transportation facilities have on the community.
- **Goal 2 Safety** calls for the use of coordinated street design standards and access control measures.
- **Goal 3 Travel Choices** directs the City to integrate pedestrian and bicycle facilities into existing and new roadways.
- **Goal 4 Quality Design** addresses the need to relate the design of a street to its intended users.
- **Goal 5 Reliability and Mobility** directs the City to enhance street connectivity and maintain traffic flow, especially on arterials and collectors.
- **Goal 7 Efficient and Innovative Funding** calls for an emphasis on maintaining existing facilities.

FUNCTIONAL CLASSIFICATION

Any discussion of the City's street network should begin with the definition of the different types, or functional classifications. Functional street classifications encompass both the design characteristics of streets and the character of service the streets are intended to provide. The City's functional classifications form a hierarchy of streets ranging from those that are primarily for travel mobility (arterials) to those that are primarily for access to property (local streets). The functional classification system is developed with the recognition that individual streets do not act independently of each other but form a network of streets that work together to serve travel needs on a local, citywide and regional level.

These classifications guide design standards, levels of access, traffic control, law enforcement, and the provision for federal, State, and regional transportation funding. The City's functional classification system includes regional routes, arterials, collectors, neighborhood routes, and local streets. Figure 8-~~3b~~1 shows current functional classifications~~ with proposed changes~~, including a few small changes from the last TSP update in 2007. Specifically, due to construction of the Portland-Milwaukie Light Rail (PMLR) alignment through downtown, the classification of Lake Rd between 21st Ave and Main St has been changed from "arterial" to "local," the classification of Main St between Lake Rd and Washington St has been changed from "collector" to "local," and the section of Adams St between Main St and 21st Ave has been changed from a "collector" street to not being a street (that section is permanently closed to vehicular traffic). ~~Figure 8-3b shows updated functional classifications of all streets in Milwaukie with proposed changes.~~ Table 8-1 described the general characteristics and functions of each of these classifications.

Table 8-1 City of Milwaukie Functional Classifications

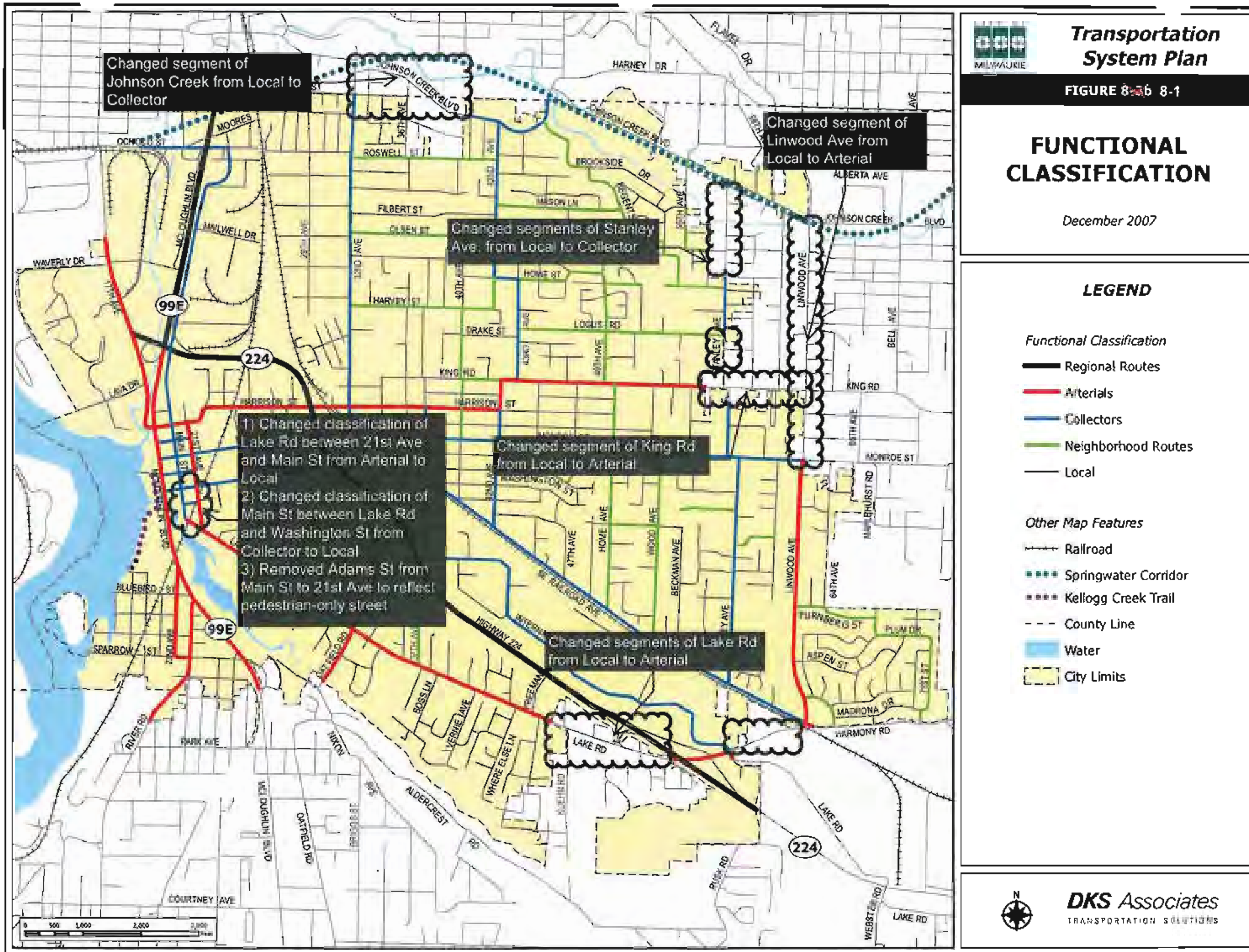
Classification	Description	Typical Total Vehicles per Day	Typical Number of Lanes	Other Street Elements
Regional Routes	• High volume, generally high-speed facilities. • May be used for travel within the city, but typically they are used for trips between cities, especially those that are separated by a significant distance. • Rank high on the mobility scale because they have multiple travel lanes in both directions and limited access points. • Rank low on the access scale because access to private property is generally prohibited. • The City's regional route designation matches the regional definition of these roads by Metro and ODOT	20,000	4 or more	
Arterials	• High volume, moderate speed streets that carry vehicles within the city and between adjacent cities in the surrounding metropolitan area. • Some are under the jurisdiction of and/or maintained by other agencies, such as ODOT, Clackamas County, and the City of Portland. • Rank high on the mobility scale but also provide limited access to a wide range of land uses. • Link major commercial, residential, industrial, and institutional areas. • Typically spaced about one mile apart to assure mobility and reduce the incidence of cut-through traffic on neighborhood routes and local streets.	10,000	3 or more	Bicycle lanes and sidewalks

Classification	Description	Typical Total Vehicles per Day	Typical Number of Lanes	Other Street Elements
	• Management objective is to provide for safe and efficient traffic flow along with pedestrian and bicycle movements. Within downtown, local access is a priority.			
Collectors	• Moderate volume, moderate speed streets that provide access and circulation within and between residential neighborhoods, commercial areas, and industrial areas. • Serve a citywide function of connectivity and are typically spaced about 1/2 mile apart. • Distribute trips between the neighborhood street system and the arterial street system, linking a wide range of land uses. • Access control for collectors is not as high a priority as for arterials, but is especially needed near street intersections. • Since collectors often traverse residential neighborhoods, neighborhood traffic management measures are often needed to manage traffic impacts through these areas.	5,000-10,000	2-3[1]	Bike lanes or shared roadway; sidewalks
Neighborhood Routes	• Moderate volume, low speed streets. • Do not provide citywide circulation, as they mainly serve the immediate neighborhood in which they are located. Typically have residential frontage. • Connect neighborhoods to collectors and arterials. • Neighborhood routes are similar to local streets in design, but they are generally longer in length and have higher traffic volumes. In order to retain the neighborhood character and livability of these streets, additional design treatments in the form of traffic management devices are often needed to manage traffic volume impacts.	1,500 to 5,000	2	Shared roadway, sidewalks, on-street parking
Local Streets	• Low volume, low speed streets that emphasize access to adjacent land uses over mobility. • All streets that are not regional routes, arterials, collectors or neighborhood routes are classified as local streets. • Connect neighborhoods to collectors and arterials. • Most local streets are adjacent to residential uses and serve residential transportation needs; however, there are a number of local streets that exclusively serve the city's two industrial areas. • Local streets rank high on the access scale, so driveways and intersections are more closely spaced than on other types of streets.	Less than 1,500	2	Shared roadway, pedestrian facilities, on-street parking.

The design of a roadway can vary from segment to segment due to adjacent land uses and demands, the objective is to have a standard that defines key characteristics provides consistency, and also defines application criteria to provide the flexibility needed to suit

[1] As a result, these streets are likely to need turn lanes at some intersections or center left-turn lanes as volumes approach 10,000 vehicles per day

conditions. Street design standards and options are discussed in further detail in Chapter 10 Street Design.



MILWAUKIE

Transportation System Plan

FIGURE ~~8-6~~ 8-1

FUNCTIONAL CLASSIFICATION

December 2007

DKS Associates
TRANSPORTATION SOLUTIONS

TRANSPORTATION NETWORK NEEDS

This section ~~identifies the increase in vehicle volume as forecasted by the 2030 financially constrained Metro RTP model. It also~~ identifies the study area ~~intersection~~ deficiencies for the ~~2030~~2035 baseline ~~case~~ scenario, ~~and identifies Milwaukie's connectivity challenges. The 2030 base case scenario~~ which only includes transportation system improvements that ~~are expected~~ have committed funding (such as STIP and CIP) to be constructed and implemented as a "low build" condition ~~with the current funding levels~~. The increase in vehicle volume as forecasted by the 2035 Metro RTP ("low build") travel demand model and resulting intersection operations are also summarized. ~~Both regional and local traffic volumes are projected to increase on many of Milwaukie's streets. Figure 8-1 shows the percent increase in PM peak hour volume between 2006 and 2030.~~

2035 Baseline Network Assumptions

The 2035 base case scenario includes transportation improvements that are reasonably expected to be funded and constructed by the year 2035.[2] This scenario includes both the Transportation Demand Management (TDM) improvements identified later in this chapter and a subset of capacity projects identified in the Regional Transportation Plan (RTP) financially constrained system, shown below in Table 8-2

Table 8-2 RTP Financially Constrained Motor Vehicle Capacity Improvements

RTP Project #	Location	Improvement	Jurisdiction	Timeline	2007 Cost ($1,000s)
10002	Johnson Creek Blvd (45th Ave to 82nd Ave)	Widen from 3 to 5 lanes and widen bridge over Johnson Creek	Clackamas Co.	2018-2025	$30,000
10003	Harmony Rd (Hwy 224 to 84th Ave)	Widen to 3 lanes with bike lanes and sidewalks where needed	Clackamas Co.	2008-2017	$20,000
10005	West Monterey (82nd Ave to Fuller Rd)	New two-lane extension	Clackamas Co.	2018-2025	$6,200
10009	Fuller Rd (Otty Rd to Johnson Creek Blvd)	Widen Street and add turn lanes, sidewalks, on-street parking, central median, and landscaping	Clackamas Co.	2008-2017	$4,000
10019	West Sunnybrook Rd (82nd Ave to Harmony Rd)	Construct 3-lane extension	Clackamas Co.	2008-2017	$6,970
10869	Sunrise Project (JTA Portion)	Improvements consistent with Supplemental EIS (2-lane mainline from I-205 to 122nd)	ODOT	2008-2017	$150,000

[2] Forecasting for the 2035 base case scenario takes into consideration PMLR as a factor as part of the region's transportation system.

2035 Baseline Traffic Volumes

As can be seen in Figure 8-~~1~~2a, traffic volumes at the study locations are projected to increase by approximately ~~9~~10% to ~~42~~70% during the p.m. peak hour, with most locations generally projected to have approximately 10% to 25% growth. This corresponds to increases of approximately ~~100~~140 vehicles during the p.m. peak hour on King Rd and ~~350~~230 to 570 vehicles on Linwood Ave. The traffic volumes on McLoughlin Blvd ~~will~~ are projected to increase by over ~~1,000~~500 vehicles north of Hwy 224, and by ~~500~~230 vehicles south of River Rd. On Hwy 224, about ~~740~~500 more vehicles are expected in the p.m. peak hour east of McLoughlin Blvd, and ~~670~~430 vehicles are expected west of the interchange with Lake Rd. The largest projected traffic increase is on Harmony Rd east of Linwood Ave (to over 1,000 vehicles), which is related to future transportation projects that will change capacity and circulation in the area such as the Harmony Rd extension to Sunnybrook Rd and the construction of the Jobs & Transportation Act (JTA) portion of the Sunrise Corridor. The forecasted increase in volume means that many of the study intersections will fail to meet the performance standards of the City of Milwaukie or the Oregon Department of Transportation (ODOT) in 2035.

2035 Baseline Corridor Operations

Assessing traffic volumes alone does not consider the ability for transportation facilities to handle traffic demand. A volume-to-capacity (V/C) plot provides a comparison between traffic demand and available capacity. These plots are generally used as a high-level measure to provide an overall quality of the transportation system, since the plots do not consider the full spectrum of operational details (such as traffic control, signal timing, etc) that affect transportation facility performance. Rather, such plots provide a general assessment that can identify corridors or segments that may have insufficient capacity or require additional analysis.

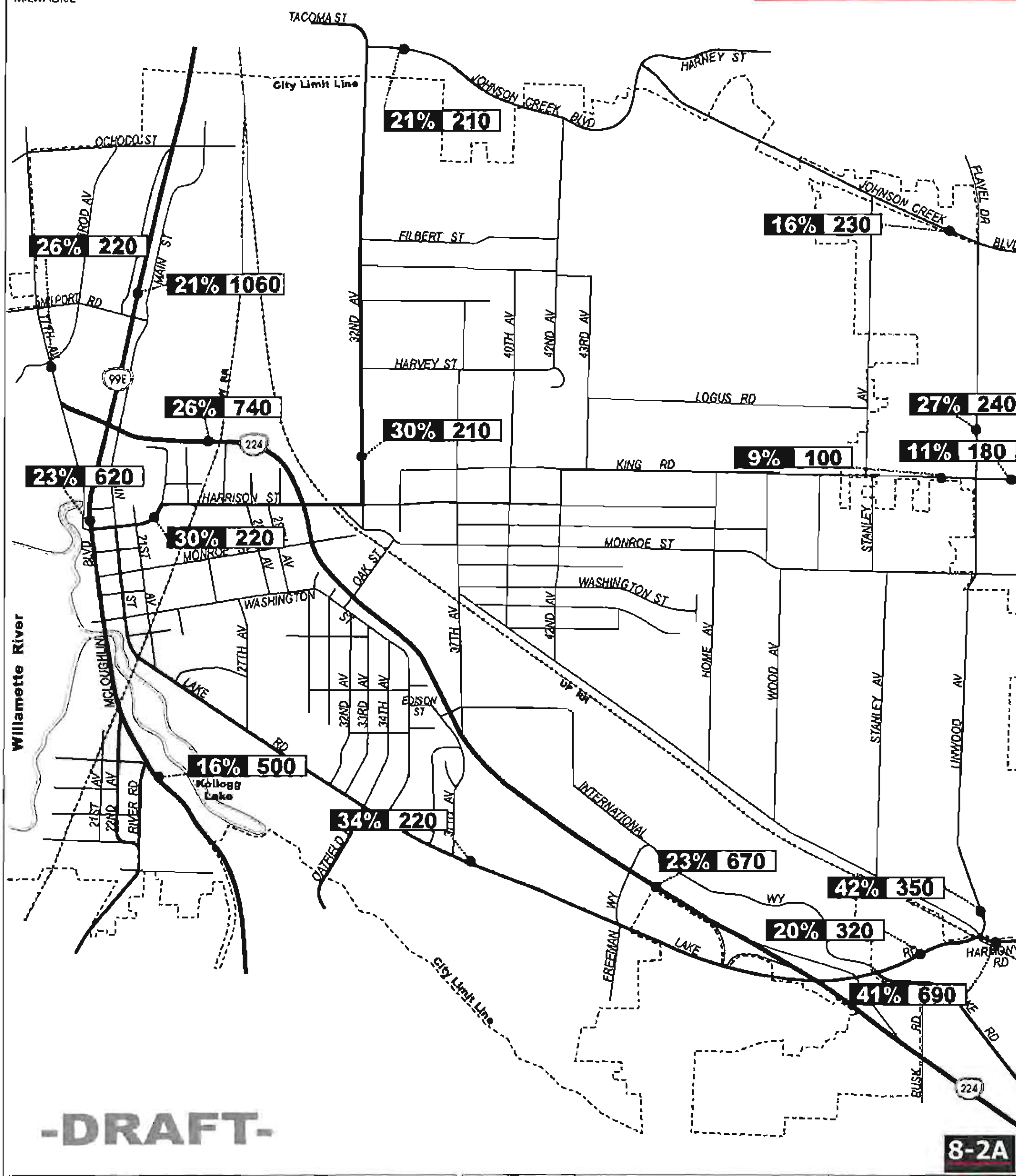
Figure 8-2b shows the 2035 p.m. peak period V/C for major corridors in the study area. Many streets in Milwaukie would continue to have a V/C ratio below 0.85, indicating generally uncongested conditions during the peak hour. Two primary corridors, Linwood Ave and Hwy 224, would be approaching capacity, with V/C ratios nearing 1.0. Both Hwy 99E and 17th Ave would be over capacity (V/C > 1.0). These corridors would be unable to fully accommodate traffic demand during the p.m. peak hour. The excess traffic demand would extend the duration of congestion at these locations or would divert to other routes that have additional capacity.

~~Figure 8-2 depicts the study area intersections with good, adequate, or poor operational performance during the PM peak hour in the year 2030. As can be seen in this figure, many of the study intersections will operate under poor conditions in 2030. The high growth in volumes along regional facilities such as McLoughlin Blvd (Highway 99E) and Highway 224 not only bring those facilities close to capacity but will also create significant delay on side streets. The future operational analysis for each intersection is outlined in the following sections.~~

CITY OF MILWAUKIE

Transportation System Plan

Updated with 2035 forecast information



8-2A

LEGEND

00% - Percentage Increase 2006 - 2030

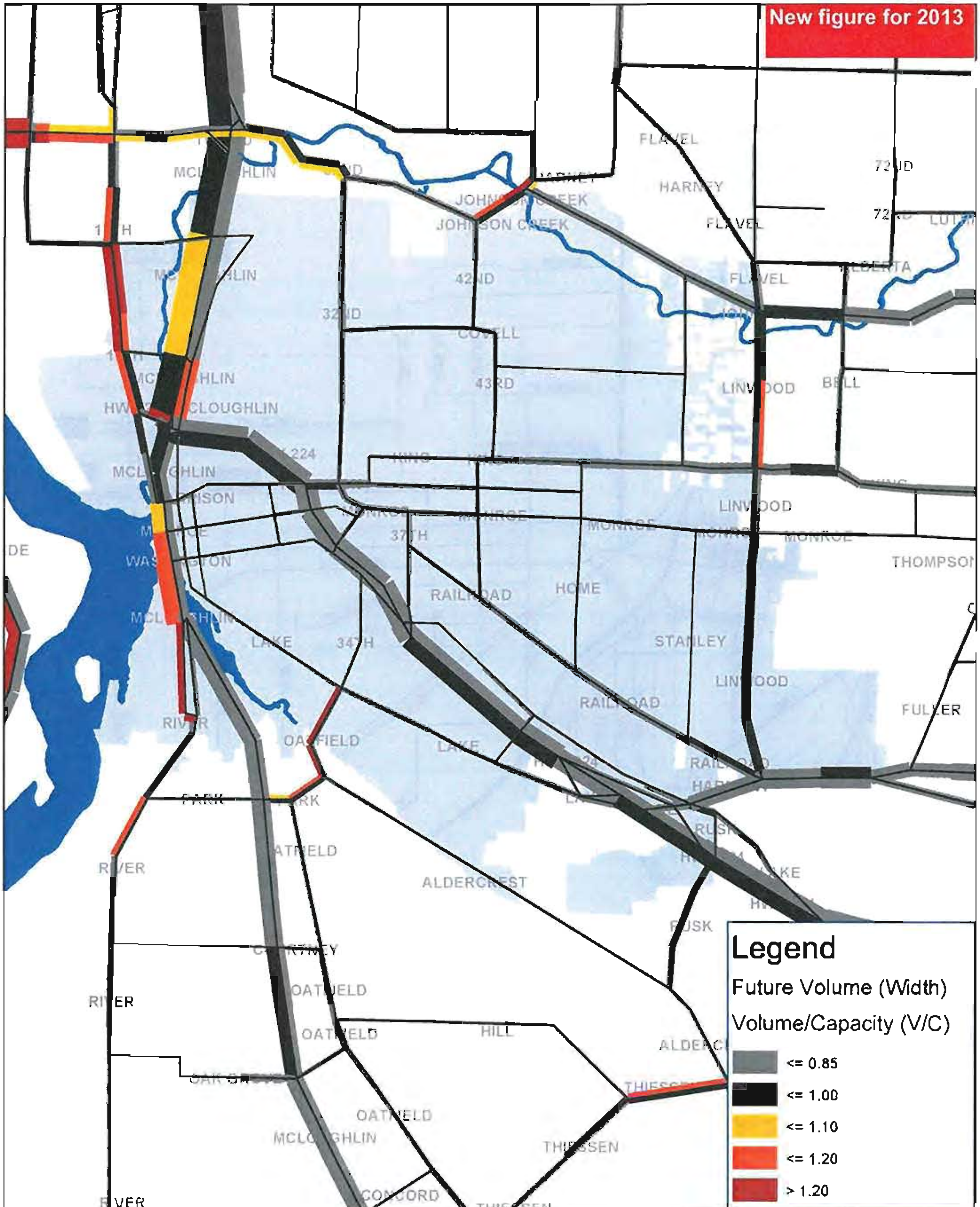
00 - Volume Difference 2006 - 2030

DKS Associates
TRANSPORTATION SOLUTIONS

NO SCALE

Figure 8-1

PERCENT INCREASE IN P.M. PEAK HOUR VOLUMES



Milwaukie TSP	PROPOSED UPDATE (2013) FIGURE 8-2B
Note: Raw Travel Demand Model Plot	2035 PM Peak Hour Volume/Capacity for Major Roads

~~The local street network in Milwaukie is nearly built out and is not well connected in many neighborhoods. Access opportunities for entering or exiting neighborhoods are limited. There are many long blocks or cul-de-sacs outside of the downtown area that force out-of-direction travel when traveling between and within neighborhoods. Additionally, Milwaukie has many barriers that limit connectivity such as McLoughlin Blvd, Highway 224, and the UPRR tracks. The combination of these barriers and the lack of connectivity cause many intracity trips to travel along the few through streets that do connect across these barriers.~~

~~FUTURE INTERSECTION CAPACITY ANALYSIS~~

~~This section presents the results of the capacity analysis conducted by the City to determine the potential intersection improvements that would be necessary as part of a long-range master plan. The improvements outlined in the following section are a guide to be used in defining the specific types of rights-of-way and street improvements that will be needed as traffic growth and infill development occurs.~~

~~2030 Base Case~~

~~The 2030 base case scenario includes transportation improvements that are reasonably expected to be funded and constructed by the year 2030. This scenario includes both the Transportation Demand Management (TDM) improvements identified later in this chapter and capacity projects identified in the Regional Transportation Plan (RTP) financially constrained system, shown below in Table 8-2.~~

~~Table 8-2 RTP Financially Constrained Motor Vehicle Capacity Improvements~~

~~RTP Project #~~	~~Location~~	~~Improvement~~	~~Jurisdiction~~	~~Timeline~~	~~Cost ($1,000s)~~
~~5045~~	~~Linwood Ave/ Harmony Rd/ Lake Rd Intersection~~	~~Add NB right turn lane, add EB right turn lane, add WB left turn lane and grade separate UPRR~~	~~Clackamas Co./ Milwaukie~~	~~2010-15~~	~~$28,000~~
~~5069~~	~~Harmony Rd (Sunnyside Rd to Highway 224)~~	~~Widen to five lanes to improve safety and accessibility~~	~~Clackamas Co.~~	~~2010-15~~	~~$7,392~~

~~Clackamas County is studying both of the projects listed in Table 8-2 with the Harmony Rd Area Transportation Improvements project.[3] The Environmental Impact Study for the project began in October 2006 and is scheduled for completion in fall 2008.~~

2035 Baseline System Measures

Travel Time Reliability

Travel time reliability on Hwy 99E (McLoughlin Blvd) and Hwy 224 was assessed using the travel demand model and creating daily (for each hour) traffic profiles using the Hours of Congestion tool developed by DKS Associates working in conjunction with ODOT. The daily

[3] ~~The widening of Harmony Road is not included in this document as a City project because it is outside of the City's jurisdiction. As such, this document does not contain a specific recommendation about this project. The City and its citizens, however, are actively working with the County on many fronts to minimize this project's physical extent. As a result, alternatives to widening continue to be evaluated as part of the Environmental Impact Study underway for this project.~~

traffic profiles were used to estimate the travel time along the corridor by time of day to create daily corridor speed profiles. In addition, a summary metric of buffer index (BI) was produced to quantify the travel time variability throughout the day. In general, a higher BI score indicates more variability (less reliability) in travel times.

Table 8-3 Summary of Travel Time Reliability Measures by Corridor

Corridor	Direction	Year 2010		Year 2035		Change (2035-2010)	
		Ave Speed (mph)	Buffer Index*	Ave Speed (mph)	Buffer Index*	Ave Speed (mph)	Buffer Index[4]
Hwy 99E	Northbound	28	2.5	22	**2.6**	-6	+0.1
	Southbound	30	1.9	23	**2.2**	-7	+0.3
Hwy 224	Eastbound	40	0.6	30	**2.3**	-10	+1.7
	Westbound	42	0.2	36	1.0	-6	+0.8

Based on an assessment of the average daily travel time, each corridor would drop approximately 5-10 miles per hour. The largest drop in speed is projected to occur along Hwy 224 in the eastbound direction (10 miles per hour speed reduction), which also has the largest increase in buffer index, indicating that future travel times will be much less reliable than current conditions.

Vehicle Miles Traveled per Capita (VMT/capita)

Another system measure of effectiveness is vehicle miles traveled (VMT), which 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.

A system planning-level evaluation of the transportation conditions in the existing year and the "low build" alternative scenario was conducted using the travel demand model. This analysis considered the magnitude of system impacts, rather than the site-specific benefit that a particular improvement project could provide to the localized area. The VMT/capita for the base year (2010) was 3.44; under the "low build" scenario, the VMT/capita for 2035 is 2.99, a 13% drop from the base year.

2035 Baseline Intersection Capacity Analysis

This section presents the results of the capacity analysis to determine the potential intersection improvements that would be necessary as part of a long-range master plan. The improvements outlined in the following section are a guide to be used in defining the specific types of rights-of-way and street improvements that will be needed as traffic growth and infill development occurs.

Table 8-~~3~~4 summarizes the results of the needs analysis to forecast how the TSP study intersections will perform, given the ~~2030~~2035 base case scenario. Based on the analysis, ~~the majority~~ approximately half (14 of 24) of the study intersections would ~~not~~ meet acceptable jurisdictional operating standards in ~~2030~~2035; however, 10 of the 24 intersections would not meet standard. The locations that would not meet standard are generally located along the

[4] A buffer index (BI) score of 0.0 is free-flow, with larger numbers indicating increased speed variability. Generally, a buffer index between 1.0 and 2.0 represents corridors with significant peak period congestion and values above 2.0 represent severe congestion that spreads into multiple hours. Corridors with a buffer index greater than 2.0 are shown highlighted in bold font.

major regional facilities, Hwy 99E and Hwy 224. The Minimum Acceptable Measures of Effectiveness for intersections during the peak hour are as follows:

- City of Milwaukie = Level of Service D
- Metro/~~ = Level of Service F/E~~ODOT = 0.99/0.99 (1.10/0.99 in designated Town Centers & Specific Corridors)

Table 8-~~3~~4 ~~2030~~2035 Base Case Intersection Level of Service (P.M. Peak Hour)

Intersection	Existing ~~2006~~2012			Future ~~2030~~2035 Base Case		
	Level of Service (LOS)	Average Delay (Seconds)	Volume/ Capacity (V/C)	Level of Service (LOS)	Average Delay (Seconds)	Volume/ Capacity (V/C)
Two-Way Stop Controlled Intersections						
McLoughlin Blvd @ 22nd Ave	A/D	26.4	0.01	A/E	~~45.0~~ 38.7	~~0.10~~ 0.01
Harrison St @ 21st Ave	A/C	18.0	0.10	A/~~D~~C	~~27.9~~ 17.1	~~0.21~~ 0.25
King Rd @ 42nd Ave	A/B	14.3	0.26	A/C	18.6	0.44
Monroe St @ Linwood Ave	A/D	31.2	0.51	A/F	>50	>1.0
All-Way Stop Controlled Intersections						
Harrison St @ Main St	B	13.2	0.39	~~E~~C	~~35.7~~ 17.0	~~0.65~~ 0.71
42nd Ave @ Harrison St	B	12.8	0.22	~~E~~C	~~47.0~~ 23.7	~~0.39~~ 0.86
Johnson Creek Blvd @ 32nd Ave	F	>50.0	0.77	F	>50.0	~~1.03~~ 1.45
Signalized Intersections						
McLoughlin Blvd @ Ochoco St	B	10.1	0.85	~~D~~C	~~39.8~~ 26.8	~~1.02~~ 1.04
McLoughlin Blvd @ Milport Rd	A	4.4	0.78	~~B~~A	~~13.8~~ 7.9	~~0.98~~ 0.91
McLoughlin Blvd@ Harrison St	D	47 1	0.99	~~F~~E	~~>80.0~~ 79.0	~~1.21~~ 1.18
McLoughlin Blvd @ Washington St	C	20.0	0.88	~~D~~E	~~60.9~~ 68.4	~~1.10~~ 1.14
Hwy 224 @ 17th Ave	C	20.7	0.59	C	~~22.0~~ 23.2	~~0.71~~ 0.74
Hwy 224 @ Harrison St	D	40.0	0.89	~~F~~E	~~>80.0~~ 74.7	~~1.18~~ 1.13
Hwy 224 @ Monroe St	B	19.0	0.75	~~D~~C	~~39.3~~ 27.1	~~0.98~~ 0.87
Hwy 224 @ Oak St	D	44.1	0.88	E	~~74.6~~ 58.3	~~1.12~~ 1.01
Harrison St @ 32nd Ave	B	10.5	0.45	~~C~~B	~~24.8~~ 18.6	~~0.66~~ 0.70
McLoughlin Blvd @ River Rd	D	35.5	0.99	~~E~~F	~~75.5~~ >80.0	~~1.13~~ 1.14
Lake Rd @ Oatfield Rd	D	36.0	0.62	D	~~46.0~~ 42.2	~~0.79~~ 0.81
Hwy 224 @ 37th Ave	C	25.5	0.82	~~E~~F	~~61.1~~ >80.0	~~1.05~~ 1.26
Hwy 224 @ Freeman Way	C	30 5	0.94	~~F~~D	~~>80.0~~ 52.7	~~1.17~~ 1.06
Hwy 224 @ Lake Rd	B	16.1	0.68	~~C~~D	~~30.5~~ 35.3	~~0.87~~ 0.89
Johnson Creek Blvd @ Linwood Ave	D	53.6	0.97	F	>80.0	~~1.06~~ 1.55

Linwood Ave @ King Rd	D	47.5	0.83	E	~~70.3~~ 61.1	~~0.98~~ 0.94
Linwood Ave @ Harmony Rd	E	**64.5**	0.94	~~C~~F	~~27.3~~ >80.0	~~0.73~~ 1.55

Notes: A/A=major street LOS/minor street LOS.
Signalized and all-way stop delay = average vehicle delay in seconds for entire intersection.
Unsignalized delay = highest minor street approach delay.
Intersections shown in **bold type** exceed jurisdictional standards ~~or have V/C ratios >1.0.~~
Intersections and corresponding LOS or V/C are illustrated in Figure 8-23

Milwaukie's needs, in terms of capacity~~-related~~ improvements, are generally greater on~~-along~~ regionally significant routes such as Hwy 99E (McLoughlin Blvd) and Hwy 224 due to the role these routes play in carrying people to destinations throughout the region while passing through the city.

Two of the study intersections currently do not meet the City's Minimum Acceptable Measure of Effectiveness of LOS D: (1) Johnson Creek Blvd at 32nd Ave, and (2) Linwood Ave at Harmony Rd.

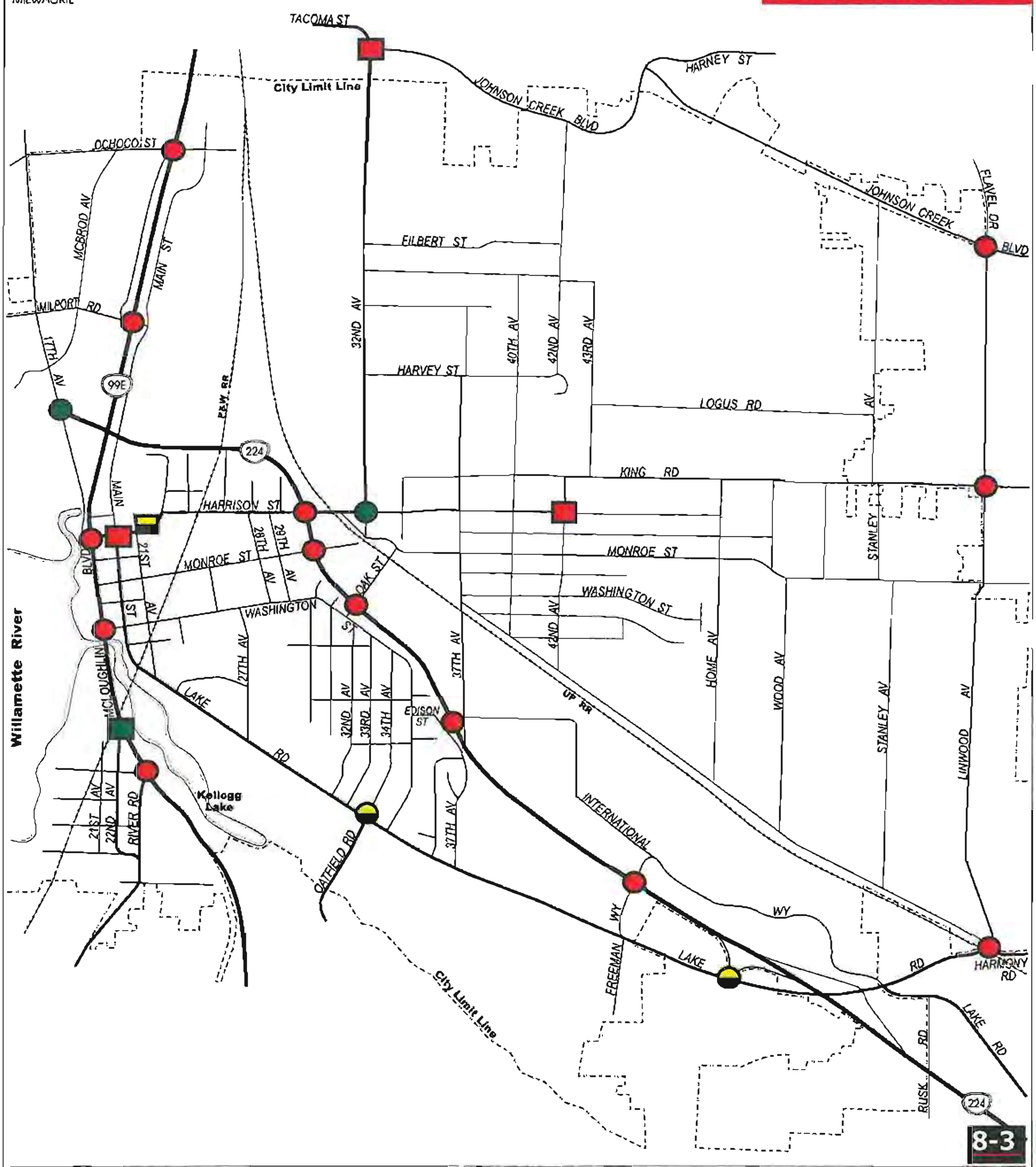
- **Johnson Creek Blvd at 32nd Ave**: As part of the PMLR project, a traffic signal and westbound left-turn lane are planned to be constructed for this intersection by TriMet. Table 8-4 considers the intersection as-is and so represents the projected LOS if the planned improvements are NOT made.
- **Linwood Ave at Harmony Rd:** This intersection is within the jurisdiction of Clackamas County and is being addressed as part of the County's current TSP update project. Milwaukie City Council has indicated willingness to consider the current LOS E to be acceptable, given neighborhood concerns about the traffic implications of a major improvement to the intersection.

Figure 8-3 depicts the study area intersections with good, adequate, or poor operational performance during the p.m. peak hour in the year 2035. As can be seen in this figure, approximately half (10 of 24) of the study intersections will operate under poor conditions in 2035. The high growth in volumes along regional facilities such as McLoughlin Blvd and Hwy 224 will not only bring those facilities close to capacity but will also create significant delay on side streets. The future operational analysis for each intersection is outlined in the following sections.

The introduction of the light rail line may affect operational performance at key intersections downtown. As a result, a future update to the TSP may need to include new intersections on the study list (e.g., Washington St and Main St, Washington St and 21st Ave).

CITY OF MILWAUKIE **Transportation System Plan**

Updated with 2035 forecast information



8-3

LEGEND

- Good Operations (LOS A, B, or C, & V/C < 0.84)
- Acceptable Operations (LOS D & 0.84 < V/C < 0.95)
- Poor to Failed Operations (LOS E or F & V/C > 0.95)
- Unsignalized Intersection
- Signalized Intersection

*Note: Table 8-2 contains the LOS and V/C for each intersection.

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Figure ~~8-2~~

2030 FUTURE NO-BUILD OPERATIONS STUDY AREA INTERSECTIONS

NO SCALE

Table 8-5 summarizes the existing and future needs that have been identified and lists potential strategies to address each need.

Table 8-5 Summary of Motor Vehicle System Gaps and Needs

Reference ID	Location	Need	Potential Strategies to Address Need				
			Intersection Control	Lane Channelization	Alternative Route Improvements	Transportation System Management & Operations (TSMO)	Corridor Extension/ Widening
		Existing Intersection Needs					
N1	Johnson Creek Blvd @ 32^{nd} Ave	Intersection capacity	X	X	X	X	
N2	Linwood Ave @ Harmony Rd	Intersection capacity		X	X	X	
N3	Hwy 224 @ Lake Rd	Safety improvements	X	X			
		Future Intersection Needs					
N4	Monroe St @ Linwood Ave	Intersection capacity	X	X	X	X	
N5	Hwy 224 @ Harrison St	Intersection capacity		X	X	X	
N6	McLoughlin Blvd (Hwy 99E) @ Harrison St	Intersection capacity		X	X	X	
N7	McLoughlin Blvd (Hwy 99E) @ Washington St	Intersection capacity		X	X	X	
N8	McLoughlin Blvd (Hwy 99E) @ River Rd	Intersection capacity		X	X	X	
N9	Hwy 224 @ 37^{th} Ave	Intersection capacity		X	X	X	
N10	Hwy 224 @ Freeman Way	Intersection capacity		X	X	X	
N11	Johnson Creek Blvd @ Linwood Ave	Intersection capacity		X	X	X	
N12	Linwood Ave @ King Rd	Intersection capacity		X	X	X	
		Future Corridor Needs					
N13	Johnson Creek Blvd	Corridor capacity			X	X	X
N14	Linwood Ave	Corridor capacity			X	X	X
N15	McLoughlin Blvd (Hwy 99E)	Corridor capacity			X	X	X
N16	Oatfield Rd	Corridor capacity			X	X	X
		Arterial/Collector Grid System Gaps					
N17	Johnson Creek Blvd (near 42^{nd} Avenue) to Lake Rd (near Oatfield Rd)	North-south arterial connection					X
N18	McLoughlin Blvd (Hwy 99E) to Linwood Ave (between Johnson Creek Blvd and Harrison St/King Rd)	East-west collector connection					X

N19	Railroad Ave (near Home Ave) to Aldercrest Rd (near Kellogg Rd)	North-south collector connection					X

STRATEGIES

The future street system needs in Milwaukie cannot be met through a single "fix-all" cure. Instead, a set of interrelated strategies need to be implemented to meet performance standards, serve future growth and conform to the city's future needs. Strategies for managing the forecasted future travel demand are multifaceted.

The impact of future growth to Milwaukie would be severe without investment in both capital improvements and operating improvements. Strategies for meeting automobile facility needs include Transportation System Management and Operations (TSMO), Transportation Demand Management (TDM), and adding capacity to roads and intersections.

The following sections outline the types of improvements that could be used to manage the system given future growth. Phasing of implementation is necessary, since funding and staging constraints limit the City's ability to implement all improvements at once. This requires prioritization of projects and periodic updating to reflect current needs. Most importantly, it should be understood that as regional growth outpaces local growth, the improvements outlined in the following sections are a guide to managing the increased traffic volume in the city as it occurs over the next ~~20~~ 22 years.

Transportation System Management and Operations (TSMO)

Transportation System Management and Operations (TSMO) focuses on low cost strategies within the existing transportation infrastructure to enhance operational performance. The strength of a TSMO approach is it focuses on maximizing urban mobility while treating all modes of travel as a coordinated system. TSMO strategies include signal improvements, traffic signal coordination, traffic calming, access management, local street connectivity, and intelligent transportation systems (ITS). Traffic signal coordination and ITS projects typically provide the most significant tangible benefits to the traveling public. The primary focus of TSMO measures are improvements that result in regional-scale benefits. However, there are a number of TSMO measures that could be used in a smaller scale environment such as Milwaukie.

Intelligent Transportation Systems (ITS)

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

Clackamas County has prepared an ITS plan for the urbanized area of Clackamas County. The Clackamas County ITS Plan[5] has identified arterial signal control ITS projects on major streets throughout the county. Within the TSP study area, McLoughlin Blvd, Hwy 224, Johnson Creek Blvd, King Rd, and Harmony Rd have been identified for planned fiber optic cable, transit priority corridor status, and closed-circuit cameras at several major intersections.

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

Other ITS projects to consider within Milwaukie may include:

- Transit signal priority
- Signal coordination and optimization
- Traffic monitoring and surveillance
- Information availability
- Incident management

To support future ITS projects, including traffic signal operations, the City of Milwaukie and Clackamas County could require that roadway improvement projects include the installation of three-inch conduit along arterial and selected collector roadways to serve new ITS equipment in the corridor. A three-inch conduit would ensure adequate wiring capacity to accommodate future ITS projects.

Neighborhood Traffic Management

There are some Neighborhood Traffic Management elements, such as speed humps, in place in Milwaukie. The City should continue this effort with additional traffic-calming measures (where applicable) and work with the community to find the traffic-calming solution that best meets their needs and maintains roadway function. Neighborhood Traffic Management techniques are covered in more detail in Chapter 11.

Access Management

Access Management is a policy tool that seeks to balance mobility (efficient, safe, and timely travel) with property access. Proper implementation of access management techniques should result in reduced congestion, accident rates, roadway widening, air pollution, and energy consumption.

The presence of numerous driveways can erode the capacity of arterial and collector roadways. Access management is the practice of limiting the number and spacing of driveways and intersections on arterial and collector facilities to maintain the capacity of the facilities and preserve their functional integrity. Preservation of capacity is particularly important for maintaining the traffic flow on higher volume roadways such as Linwood Ave and King Rd. The city needs a balance of streets that provide access with streets that serve mobility.

Several access management strategies have been identified to improve local access and mobility in Milwaukie:

- Develop specific access management plans for regional routes, arterial and collector streets in Milwaukie to maximize the capacity of the existing facilities and protect their functional integrity.
- Work with land use development applications to consolidate driveways where feasible.
- Provide left-turn lanes where warranted for access onto cross streets.
- Construct raised medians to limit driveway access to right-in/right-out turning movements, as appropriate.

New development and roadway projects on city streets should meet the City's adopted access spacing standards, which are summarized in Table 8-~~4~~6.

Table 8-~~4~~6 Access Spacing Standards for City Street Facilities

Access Treatment	Functional Classification	Intersection				Desirable Signal Spacing[6]	Median Control
		Public Road		Private Drive			
		Type	Spacing	Type	Spacing		
Full control (freeway)	Arterials	Interchange	2-3 mi	None	N/A	None	Full
Partial control	Arterials	At grade	530-1000 ft	Lt/Rt Turns	300 ft	1000 ft	Partial/None
Partial control	Collectors	At grade	300-600 ft	Lt/Rt Turns	150 ft	1,000 ft	None

Many existing roadways and driveways do not meet these standards because they were installed when traffic volumes were substantially lower and before the City established access spacing criteria. As traffic volumes increase, controlling access on arterial and collector roadways will be important to maintaining a safe and functioning street network.

Access Management for State Facilities

The Oregon Highway Plan (OHP) defines access spacing standards on State facilities for roadways such as McLoughlin Blvd and Hwy 224. These standards are shown in Table 8-~~5~~7. Preserving capacity on State facilities is especially important, since substandard performance due to a lack of capacity could force drivers to look for alternative routes along city streets.

Table 8-~~5~~7 Access Spacing Standards for ODOT Facilities

Facility	Location	Highway Classification	National Highway System	Truck Route	Freight Route	Access Spacing Standard (ft)
~~(~~McLoughlin Blvd~~)~~ (Hwy 99E)	North city limits to Hwy 224	Statewide	Yes	Yes	Yes	990
	Hwy 224 to Scott St	District	No	Yes	No	500
	Scott St to River Rd	District (Special Transportation Area)*	No	Yes	No	175*
	River Rd to South city limits	District	No	Yes	No	500
~~ORE~~ Hwy 224	17th Ave to ~~Hwy 99E~~ McLoughlin Blvd	District	No	No	Yes	500
	~~Hwy 99E~~ McLoughlin Blvd to East city limits	Statewide (Expressway)	Yes	Yes	Yes	2640

*Minimum access management spacing for public road approaches is the existing city block spacing or the city block spacing as identified in the local comprehensive plan. Public road connections are preferred over private driveways, and in Special Transportation Areas, driveways are discouraged. However, where driveways are allowed and where land use patterns permit, the minimum access management spacing for driveways is 175 feet (55 meters) or midblock if the current city block is less than 350 feet (110 meters).[7]

[6] Generally, signals should be spaced to minimize delay and disruptions to through traffic. Signals may be spaced at intervals closer than those shown to optimize capacity and safety.

[7] Oregon Department of Transportation (ODOT), 1999 Oregon Highway Plan (OHP).

Traffic Signal Spacing

Traffic signals that are spaced too closely on a corridor can result in poor operating conditions and safety issues due to the lack of adequate storage for queuing vehicles. Milwaukie is built-out, and as a result there will not likely be many new roads constructed within the city However, as traffic volumes increase as a result of in-fill development and regional growth, new signals on the existing street system may be necessary to manage traffic flow. When this is the case, the City will evaluate traffic signal warrants to determine if a traffic signal is an appropriate solution. Traffic signals should only be implemented when deemed necessary by the City Engineering Director to enhance safety and promote mobility. P.M. peak-hour signal warrants have already been met for the intersections at Johnson Creek Blvd/32nd Ave and Harrison St/42nd Ave. Future year 2035 traffic volume projections at the intersection of Linwood Ave/Monroe St would trigger peak-hour signal warrants.

Local Street Connectivity

The local street network in Milwaukie is nearly built out and is not well connected in many neighborhoods. ~~Intracity connectivity is limited in Milwaukie because of its long blocks, cul-de-sacs, and major facilities, such as McLoughlin Blvd, Highway 224, and the UPRR tracks.~~ Access opportunities for entering or exiting neighborhoods are limited. There are many long blocks or cul-de-sacs outside of the downtown area that force out-of-direction travel when traveling between and within neighborhoods. Additionally, Milwaukie has many barriers that limit connectivity such as McLoughlin Blvd, Hwy 224, and the Union Pacific Railroad (UPRR) tracks. The combination of these barriers and the lack of connectivity cause many intracity trips to travel along the few through streets that do connect across these barriers. ~~Therefore many intracity trips are forced to travel the few through streets that do connect across these barriers.~~

Increasing connectivity between neighborhoods has many benefits, including: reducing out-of-direction travel and VMT, enhancing accessibility between various travel modes, balancing traffic levels between streets, and reducing public safety response time.

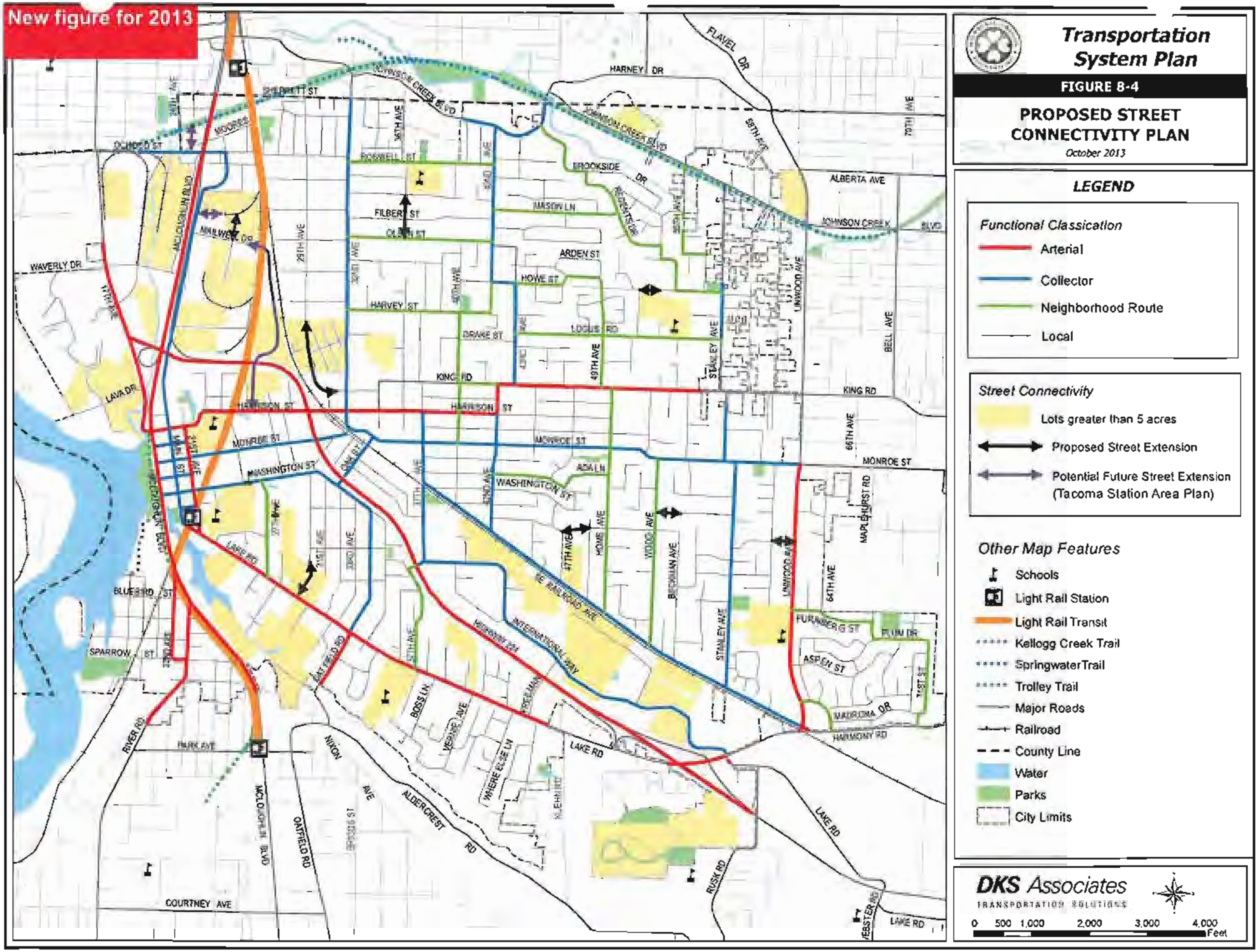
Topography and environmental conditions limit the potential for connectivity in several areas of Milwaukie. However, in several areas there is potential to connect streets over time. Figure 8-~~3a~~4 shows the Proposed ~~Local~~ Street Connectivity Plan for Milwaukie. Some of the localized congestion on roads such as Linwood Ave, King Rd, 32nd Ave, or Monroe St could be improved through enhanced street connectivity. Several short roadway connections are needed to connect disjointed local streets and reduce out-of-direction travel for vehicles, pedestrians, and bicyclists. In limited cases, a short length of new road would be necessary for improved connectivity.

The arrows on Figure 8-~~3a~~4 represent potential connections and the general direction for the placement of the connection. In each case, the specific alignments and design will be determined upon development review. If a connection is made that increases neighborhood connectivity, such a change could trigger reclassification of a street from a "local" to a "neighborhood ~~collector~~ route." When the opportunity arises during land development, the City requires new local connections that will result in a grid of vehicle access every 530 feet and bicycle/pedestrian access every 300 feet.[8]

The arrows shown on Figure 8-~~3a~~4 indicate priority local and neighborhood connections only. Local connections for existing stub end streets, cul-de-sacs, or extended cul-de-sacs in the road network are, for the most part, not identified on this figure. Pedestrian connections from any cul-de-sac should be considered mandatory as future development and redevelopment occurs. The goal is improved connectivity for all modes of transportation.

[8] This standard meets the Metro RTP access spacing requirements for new residential or mixed use developments.

There are several large parcels (5 acres or greater) in Milwaukie that are either undeveloped or that are developed but have land value that exceeds the building value based on an assessment of available GIS data. Figure 8-4 shows the locations of these parcels. Each of these sites already has frontage on a public street, but only 1 or 2 of the parcels are located where a future street connection would be useful and practical. Figure 8-4 shows where future street connections are desired near these sites. The City's Public Works Standards and the standards for public facility improvements found in the City's Zoning Ordinance will ensure that adequate street connections are established as needed at the time of development or redevelopment of any of these particular sites.


New figure for 2013
Transportation System Plan
FIGURE 8-4
PROPOSED STREET CONNECTIVITY PLAN
October 2013
LEGEND
Functional Classication
Arterial
Collector
Neighborhood Route
Local
Street Connectivity
Lots greater than 5 acres
Proposed Street Extension
Potential Future Street Extension (Tacoma Station Area Plan)
Other Map Features
Schools
Light Rail Station
Light Rail Transit
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Major Roads
Railroad
County Line
Water
Parks
City Limits
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet
HARNEY DR
FLAVEL DR
JOHNSON CREEK BLVD
ALBERTA AVE
BROOKSIDE DR
MASON LN
FILBERT ST
ARDEN ST
HOWE ST
HARVEY ST
DRAKE ST
LOGUS RD
KING RD
HARRISON ST
MONROE ST
WASHINGTON ST
ADA LN
WAVERLY DR
LAVA DR
LAKE RD
BLUEBIRD ST
SPARROW ST
RIVER RD
PARK AVE
COURTNEY AVE
MCLOUGHLIN BLVD
OATFIELD RD
ALDERCREST RD
RUSK RD
FURNBERG ST
ASPEN ST
MADRONA DR
HARMONY RD
PLUM DR
BELL AVE
LINWOOD AVE
STANLEY AVE
49TH AVE
47TH AVE
HOME AVE
WOOD AVE
BECKMAN AVE
INTERNATIONAL WAY
SE RAILROAD AVE
MONROE ST
66TH AVE
MAPLEHURST RD
64TH AVE
70TH AVE
58TH AVE
BOSS LN
VERNE AVE
WHERE ELSE LN
KLEHM RD
NIXON AVE
WEBSTER RD
LAKE RD

Arterial and Collector Street Connectivity

According to the principles established in Metro's 2035 RTP, arterial streets should be spaced no farther than 1 mile apart and collector streets should be accessible within 1/2 mile of any point in Milwaukie.[9] Given the pattern of existing development in Milwaukie and the various constraints that have influenced it to date, there are not many opportunities to improve the existing network of arterial and collector streets.

The following is an assessment of the gaps identified using the Metro 2035 RTP standards:

- **Gap 1** (arterial gap on Johnson Creek Blvd between 32nd Ave and 45th Ave): The 2007 TSP update downgraded the classification of Johnson Creek Blvd between 40th Ave and Brookside (the section within Milwaukie city limits) from arterial to collector to better coordinate with the street's neighborhood collector designation in the City of Portland and to reflect the low-density residential land surrounding the corridor.
- **Gap 2** (arterial gap on 42nd Ave between Johnson Creek Blvd and King Rd): From Johnson Creek Blvd, 42nd Ave does not connect directly to King Rd; instead, the connection is made by either going 1 block east on Howe St to 43rd Ave or 2 blocks west on Harvey St to 40th Ave. Extending 42nd Ave as an arterial would require significant property acquisition in an established low-density residential neighborhood. There are also 3 historic properties along 42nd Ave between Johnson Creek Blvd and King Rd.
- **Gap 3** (arterial gap on 42nd Ave between Harrison St and Railroad Ave): The existing route is a collector street that goes through an established low-density residential neighborhood.
- **Gap 4** (arterial gap between Railroad Ave and Lake Rd): Establishing an arterial connection would involve crossing an active rail line and going through an existing industrial park. A new connection would require improvement of a very problematic intersection (International Way, 37th Ave, and Hwy 224) as well as crossing Hwy 224 and going into an established residential neighborhood at a different angle than the existing grid alignment there.
- **Gap 5** (collector gap along Kelvin/Howe/Willow St between Hwy 99E and Linwood Ave): Establishing a collector connection would involve bisecting the city's primary manufacturing/industrial area and crossing two active freight rail lines and the new light rail. The existing residential streets are not well aligned to allow easy crossing of other intersecting collectors. The eastern end of the connection would be through an unimproved roadway with a steep slope adjacent to a large wetland property on the north.
- **Gap 6** (collector gap at Home Ave between Railroad Ave and Lake Rd): The connection south from Home Ave would have to cross an active rail line and a protected water quality resource, then cross Hwy 224. A connection between Hwy 224 and Lake Rd would be at an angle to the existing alignment in an established low-density residential neighborhood.
- **Gap 7** (collector gap at Vernie/Maplewood from Lake Rd to Aldercrest Dr): A collector connection would be very close to protected wetlands, go through an existing low-density residential neighborhood, and have to cross Kellogg Creek to get to Aldercrest Dr (in Clackamas County's jurisdiction).

This assessment of gaps does not represent a proposal to establish arterials or collectors in the identified areas. Rather, it is presented to show existing conditions in Milwaukie with respect to specific connectivity standards in Metro's 2035 RTP.

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[9] Regional Transportation Functional Plan, Title 1, 3.08.110 C.

Transportation Demand Management

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

Generally, TDM focuses on promoting alternative modes of travel for large employers as a way to reduce the VMT. This is due in part to the Employee Commute Options (ECO) rules that were passed by the Oregon Legislature in 1993 to help protect the health of Portland area residents from air pollution and to ensure that the area complied with the Federal Clean Air Act.[10]

Currently, Metro supports an online tool, "Drive less. *Connect*," (through the Regional Travel Options program) that promotes a ride-matching service connecting carpoolers and bike buddies. Since its launch in 2011, commuters avoided using approximately 50,000 gallons of gasoline and saved roughly $308,000 collectively by joining carpools, biking, and riding transit.

Research has shown that a comprehensive set of complementary policies implemented over a large geographic area can have a measured effect on the ~~number of~~ VMT to/from that area.[11] However, the same research indicates that for TDM measures to be effective, they should go beyond the low-cost, noncontroversial measures commonly used such as carpooling, establishing transportation coordinators or associations, and designation of priority parking spaces.

The more effective TDM measures include parking and congestion pricing, improved services for alternative modes of travel, and other market-based measures. However, TDM includes a wide variety of actions that are specifically tailored to the individual needs of an area. In general, TDM elements and programs have a potential trip reduction ranging between 1% and 10%. To help implement TDM measures in the future, the City should consider setting TDM goals and policies for new development.

With an increase in the number of projected regional trips through the city, ~~regionwide~~ regional TDM measures should help to reduce congestion and be a benefit to the City of Milwaukie and the region. The RTP includes TDM projects for the Milwaukie area in the ~~2030~~2035 financially constrained plan. These measures are identified in Table 8-~~6~~8.

[10] Oregon Administrative Rules, Chapter 340, Division 30.

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

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

~~RTP #~~ Metro Project ID	Location	Improvement	Jurisdiction	Timeline	Cost ($1,000s)
~~5103~~ 10020	Countywide	Advanced transportation system management and ITS program	Clackamas County	~~2004-2009~~ 2008-2017	$6,514
~~5035~~	~~Milwaukie TC~~	~~McLoughlin Blvd Rapid Bus~~	~~TriMet~~	~~2010-2015~~	~~+~~
~~5062~~	~~Milwaukie TC~~	~~Milwaukie TMA Startup~~	~~TriMet/Milwaukie~~	~~2016-2025~~	~~$200~~
~~1003~~ 10901	Regionwide	Milwaukie Light Rail Extension	TriMet	~~2010-2015~~ 2008-2017	~~$515,000~~ 1,148,000
~~1009~~ 10159	Regionwide	Springwater Trail Access Improvements	Portland	~~2004-2009~~ 2008-2017	~~$2,310~~ 3,032
~~5026~~	~~Regionwide~~	~~Portland Traction Co. Shared-Use Trail~~	~~Metro~~	~~2004-2009~~	~~$1,386~~
~~8025~~	~~Regionwide~~	~~Transit Center Upgrades~~	~~TriMet/SMART~~	~~2004-2030~~	~~$20~~
~~8035~~ 11331	Regionwide	Frequent/~~Rapid~~ Service Bus Capital Improvements (Phase 1)	TriMet/~~SMART~~	~~2016-2030~~ 2008-2017	~~$26,207~~ 16,000
11230	Regionwide	Frequent Service Bus Capital Improvements (Phase 2)	TriMet	2008-2017	$15,000
11332	Regionwide	I-205 BRT	TriMet	2008-2035	$30,000
~~8038~~ 10990	Regionwide	~~TriMet~~ Park-and-Ride ~~Lots~~ Management Strategy Implementation	TriMet	~~2004-2030~~ 2008-2035	~~$5,782~~ 1,000
10988	Regionwide	Incremental Increases in Park-and-Ride Lots and Capacities	TriMet	2008-2017	$20,000
~~8043~~ 11333	Regionwide	Bus Stop Improvements	TriMet/SMART	~~2004-2030~~ 2008-2035	~~$7,939~~ 14,000
~~8046~~ 11042	Regionwide	Bus Priority Treatments	TriMet/~~SMART~~	~~2016-2030~~ 2008-2035	~~$19,891~~ 5,029
~~8049~~ 11043	Regionwide	Priority Pedestrian Access to Transit Improvements	TriMet	~~2004-2030~~ 2008-2035	~~$20,000~~ $5,000
~~8055~~	~~Regionwide~~	~~Transportation Management Associations Innovative Programs~~	~~Metro/TriMet~~	~~2004-2030~~	~~$3,000~~
~~8056~~	~~Regionwide~~	~~Future Transportation Management Associations Start-Up and Sustainability~~	~~Metro/TriMet~~	~~2004-2030~~	~~$4,000~~

~~+Included with RTP # 8035~~

The Metro regional travel model includes assumptions about which modes of transportation people choose to use. Targets for trips using non-single-occupant-vehicle (non-SOV) modes have been set for some 2040 Plan areas. For Milwaukie, the model forecast assumes completion of the projects included in the RTP financially constrained scenario, with a non SOV Modal Target of 45% to 55% in the designated Town Center area and 40% to 45% in Industrial/Employment areas. All other areas within Milwaukie do not have a non-SOV target.[12]

[12] Information related to non-SOV target percentages and designated areas can be found in the Metro Regional Transportation Plan, Table 1 3 page 1-65, and on Figure 3 5 page 3-14.

Milwaukie will only be able to achieve these targets through a continued effort to implement TDM strategies and promote alternative modes of travel.

Parking Requirements

The City of Milwaukie currently has off-street parking ratios (minimum and maximum) and standards that are consistent with the Transportation Planning Rule (TPR) and RTP parking ratio requirements. Chapter 12 outlines the specific parking strategies for downtown Milwaukie.

Roadway and Intersection Operational and Capacity Improvements

The TSP process identified a number of roadway and intersection capacity improvements. This section summarizes the evaluation of intersection of the three types of capacity and connectivity improvements:

- City Street and Intersection Improvements
- McLoughlin Blvd (Hwy 99E) Alternatives
- Hwy 224 Alternatives
- Hwy 224/99E Refinement Plan

Conceptual diagrams illustrating the recommended improvements can be found in Appendix ~~C~~D, Conceptual ~~Intersection Diagrams~~ Design Options.

City Street and Intersection Improvements

Most of the study intersections that are on city streets will require improvements to meet City standards under forecasted ~~2030~~2035 conditions. Table 8-~~7~~9 summarizes the improvements needed for these study intersections to meet City standards; more detailed descriptions of the improvements follow.

Table 8-~~7~~9 Improvements Needed for City Intersections to Meet City Standards~~[13]~~

Intersection	Improvement	Before	After
42nd ~~Ave @ Harrison St~~ Linwood Ave @ Monroe St	• Signalization	~~E~~A/F	B
Johnson Creek Blvd @ 32nd Ave*	• Signalization with ~~bridge widening for turn lane or roundabout~~ westbound left-turn lane	F	~~C~~D
Johnson Creek Blvd @ Linwood Ave	• Add eastbound (EB) right-turn lane • Add westbound (WB) right-turn lane • Add northbound (NB) right-turn lane	F	D
~~Harrison St @ Main St~~	• ~~Add WB shared through/right-turn lane~~ ~~OR~~ • ~~Add EB Right-turn lane~~	~~E~~	~~D~~
Linwood Ave @ King Rd	• Protected/permissive left-turn phasing northbound (NB) and southbound (SB)	E	~~E~~D

*This intersection is in the City of Portland. As such, improvements will be determined by the City of Portland. Project is planned by TriMet as part of the PMLR project.

- ~~42nd Ave/Harrison St: Installing a traffic signal at this intersection would improve the LOS from E to B; no additional lanes or other improvements would be necessary.~~

~~[13] The intersection of McLoughlin Blvd @ Washington St will have a v/c of 1.10 in year 2030 (see Table 8-2). Because this intersection is within the Town Center of Milwaukie, it meets ODOT's higher V/C standard for Town Centers (ODOT Oregon Highway Plan, Table 7) and no improvements are recommended.~~

- **Linwood Ave/Monroe St:** This location would meet traffic signal warrants for the p.m. peak hour with year 2035 traffic volumes. The addition of the traffic signal would allow Monroe Street traffic to access or cross Linwood Avenue by providing gaps in traffic. The addition of the traffic signal would significantly reduce delay and improve operations on Monroe St (LOS F to LOS B), though additional delay would be added to traffic on Linwood Ave that does not currently stop.

- **Johnson Creek Blvd/32nd Ave:** This intersection is in the city of Portland which has an operating standard of LOS D. P.M. peak-hour signal warrants are currently met at this intersection. Installing a traffic signal and a ~~southbound~~ westbound left-turn lane would improve the LOS at this intersection from F to ~~C~~D.[14] This improvement is consistent with TriMet plans as part of the PMLR project. As an alternative improvement, ~~W~~widening the existing bridge north of 32nd Ave would be necessary to provide a southbound left-turn lane at this intersection and realign the intersection so that 32nd Ave would form a T-intersection with Johnson Creek Blvd. While ~~T~~this realignment would be more conducive to serve traffic demands along Johnson Creek Blvd, the primary travel corridor, bridge widening would significantly increase the project cost. A roundabout may be an alternative for this location.

  While not studied, the two all-way stop controlled intersections east of 32nd Ave (36th and 42nd Aves) would likely require similar treatment (traffic signal with turn lanes) to meet operational standards. As with the 32nd Ave intersection, the scale of the improvements does not fit well in the residential neighborhood setting. Limiting the project to signals alone would not bring the intersection operations to the desired standard but would relieve traffic congestion.

  The City of Portland has jurisdiction of Johnson Creek Blvd from Tacoma St to just west of 40th Ave, the section that includes the 32nd Ave intersection. Portland does not have plans to modify the bridge or the roadway. Clackamas County has jurisdiction north of Brookside Dr and continuing eastward. The County's TSP includes a project to widen the bridge over Johnson Creek.

  Milwaukie has jurisdiction over the intersection of Johnson Creek Blvd/42nd Ave, and will coordinate with Portland and Clackamas County if improvements are considered in this corridor. The project listed in the master plan is for signalization only at 42nd Ave. This project is intended to balance the needs of the affected neighborhood and other stakeholders. The number and location of the existing stop signs along Johnson Creek Blvd serve to reduce traffic speeds, which is valued by the adjacent neighborhood. Therefore, before a traffic signal is installed at the intersection of Johnson Creek Blvd and 42nd Ave, the City shall conduct a study that analyzes the advantages of the traffic signal to the adjacent neighborhood and the City's transportation system.

- **Johnson Creek Blvd/Linwood Ave:** Adding eastbound, ~~and~~ westbound, and northbound right-turn lanes would improve the operations at this intersection from F to D. No additional improvement would be necessary for the operation of this intersection to meet City standards. Any intersection improvements should protect, if not improve, the Springwater Trail crossing through this intersection.

[14] Signalization alone would improve the delay from ~~245~~approximately 135 seconds to ~~120~~110 seconds, and the intersection would still operate at LOS F in the TSP forecast year, ~~2030~~2035. Changes to the intersections in this corridor should be coordinated to ensure that they work together to improve safety and are designed for the posted speed (25 mph).

- **Linwood Ave/King Rd**: Aside from modifying phasing at this intersection or increasing street connectivity throughout the city with parallel routes to Linwood Ave and King Rd, there are no simple solutions to improve operation of this intersection.

McLoughlin Blvd (Hwy 99E) Alternatives

While most intersections along McLoughlin Blvd (Hwy 99E) do not meet future operating standards (V/C of 1.1 within the Town Center), the intersections of McLoughlin Blvd with Ochoco St and Milport St are near capacity but still operate within the ODOT operating standards. Because access is severely restricted from McLoughlin Blvd, the City and ODOT ~~are investigating~~ have investigated options for improving freight-related access and circulation for the North Industrial Area. Since both of these intersections are forecasted to meet standards in ~~2030~~2035, improvements ~~will~~ focus on access and circulation, not capacity improvements. These potential improvements are outlined in more detail in Chapter 9 Freight Element and Appendix ~~C~~D.

The intersection of McLoughlin Blvd and 17th Ave is primary portal to downtown Milwaukie from McLoughlin Blvd, especially for vehicles traveling to Milwaukie from the north. Improvements to this intersection would be difficult because of the intersection's geometry[15] and phasing, and the proximity of Johnson Creek Blvd.

The phasing for eastbound and westbound traffic is currently split phase (one side operates independent of the other side). This phasing arrangement increases the amount of time required for vehicles traveling on Harrison St/17th Ave and also decreases the potential time for northbound and southbound vehicle movements.

Shifting traffic away from this intersection and can improve how it functions (its V/C ratio). One way to do this would be to restrict eastbound left turns from 17th Ave onto McLoughlin Blvd Travelers needing to make this turn could instead be directed through the intersection, to turn left at the next intersection (Harrison St/Main St) and left on Scott St, and right onto northbound McLoughlin Blvd. Forcing this movement would allow for the split phasing at the intersection of Harrison St and McLoughlin Blvd to be removed and improve intersection operations. This option could redirect up to 20 drivers, who normally access McLoughlin Blvd via this intersection, into downtown Milwaukie during the p.m. peak hour.

The interchange of McLoughlin Blvd and Hwy 224 currently connects southbound traffic on McLoughlin Blvd to eastbound on Hwy 224 and westbound traffic on Hwy 224 to northbound on McLoughlin Blvd. It does not provide for a direct connection of the northbound McLoughlin Blvd or eastbound Hwy 224 to southbound McLoughlin Blvd traffic. The construction of a full interchange between McLoughlin Blvd and Hwy 224 would shift vehicles to the interchange and improve operations at the intersection of McLoughlin Blvd and 17th Ave. This interchange, along with the rest of the McLoughlin Blvd/Hwy 224 corridor between Tacoma St and 17th Ave should be studied as part of a Hwy 224/99E~~/224~~ Refinement Plan to determine the most cost-effective set of improvement options for the corridor and the City of Milwaukie.

Improvement of the intersection of 17th Ave and Harrison St could involve any number of options, including an increase in the intersection's capacity, improved local connectivity, and parallel routes to decrease demand at the intersection. The City should work with ODOT and Metro to create a solution to maintain operational levels at this intersection while minimizing possible negative impact of any improvements to the intersection. Any improvement

[15] 17th Ave is perpendicular to McLoughlin Blvd for only a short distance of less than 100 feet. After this distance, the road makes a 90-degree bend to the north and runs parallel to McLoughlin Blvd. This geometry is a result of the close proximity of Johnson Creek and the Willamette River.

recommended by the Hwy 224/99E Refinement Plan should also include improvements to this intersection.

McLoughlin Blvd and River Rd

Without improvements, the intersections of McLoughlin Blvd ~~with 22nd Ave and~~/River Rd would ~~both~~ operate at unacceptable levels during the p.m. peak hour in ~~2030~~2035 (V/C of 1.14 exceeds Town Center target of 1.1). A sketch-level operational analysis conducted for two potential improvement alternatives found that either would improve the intersection to the point of meeting operational mobility standards. The two alternatives are described below.

- **Alternative 1:** One possible improvement would leave the intersection of McLoughlin Blvd and 22nd Ave open in its current configuration. The intersection of McLoughlin Blvd and River Rd would require a second northbound left-turn lane and additional right-of-way to operate within ODOT standards (a V/C ratio of ~~0.99~~1.10). This option would ~~not~~ improve the operations of the intersection (~~the~~ V/C ratio of 1.06) ~~as much as with~~ in a similar manner to the ~~first~~ second option~~, because~~ (the current geometry requires an exclusive pedestrian phase that limits the intersection operations for motor vehicles).[16] However, this alternative would be less disruptive and is preferred by the Island Station Neighborhood District Association.

- **Alternative 2:** The second alternative would involve consolidating the three intersections into one. Currently, vehicles turning from 22nd Ave onto McLoughlin Blvd are limited to right-in and right-out turns. River Rd has one shared lane to access McLoughlin Blvd, and vehicles access River Rd from McLoughlin Blvd via Bluebird St. The consolidation of the three intersections would greatly decrease the number of access points (and conflict points) to McLoughlin Blvd, and therefore result in safer, more efficient operations. To improve operations to acceptable standards, a second northbound left-turn to access McLoughlin Blvd would be necessary at this new intersection. An eastbound right-turn lane would also be necessary to accommodate the high right-turn volume from the highway, and would result in a V/C ratio of 1.06.

Hwy 224

~~All but two~~ Four of the seven study intersections along Hwy 224 are projected to exceed ODOT's V/C ratio requirements (1.1 within the Town Center, 0.99 outside of the Town Center) during ~~2030~~2035 peak-hour operations. Both short-term and long-term solutions are necessary to achieve an acceptable level of mobility on Hwy 224, while allowing for cross-city connectivity.

Short-Term Solutions

Short-term solutions are designed to relieve congestion at multiple intersections. They may not completely alleviate congestion, but can be implemented with relatively low cost at specific locations (versus the generally high cost, large-scale long-term solution). The intersections of Harrison St at Hwy 224 and Oak St at Hwy 224 are the two locations for short-term solutions. The short-term solution is to provide signal-protected left turns. This would require three types of changes: signal phasing, optimizing the signal timing to balance mobility and cross-street connectivity, and some physical modifications at the Harrison St intersection. The physical changes would convert the existing shared through/left-turn lanes at Harrison St into left-turn lanes and restripe the intersection as necessary to align the left-turn lanes. The intersection of Hwy 224/Oak St already has left-turn lanes on Oak St and would not require restriping. ODOT

[16] It should be noted that ODOT STIP project titled "OR99E: Kellogg Creek - MP 9.19" (key# 12855) will eliminate the exclusive pedestrian phase and provide signal interconnection between the River Rd intersection and the intersection of McLoughlin Blvd at Washington St. This project is scheduled for construction in 2007.

approval would be required for modifications to both intersections. A detailed traffic study would be required to ensure that the new phasing does not detrimentally affect the intersection operations and a signal progression study would be required.

Modifying the intersection of Hwy 224 and 37th Ave may be an additional short-term improvement. The northern leg of the intersection of Hwy 224 and 37th Ave is difficult because 37th Ave currently splits just north of the highway into 37th Ave and International Way. This geometric layout is confusing and increases the potential for possible conflicts. The consolidation of these two approaches into one would improve safety and traffic operations by creating a simpler intersection with one northern approach.

Long-Term Solutions

Long-term solutions for Hwy 224 ~~need to~~ address mobility along the corridor and cross street connectivity within the city, and require major investments that exceed the forecasted revenue. ~~A number of~~ The alternatives ~~have been developed as a starting point for long-term solutions for Highway 224. These alternatives are not all-inclusive and are meant to serve as an example of possible improvement options.~~ that have been explored in order to meet the Oregon Highway Plan v/c target are outlined below. Alternatives 1-3 have been determined to be infeasible due to the improvement cost and limited forecasted revenue out to 2035. Alternative 4 is the recommended approach for the Hwy 224 corridor for the current planning period, along with establishing alternative mobility targets through a refinement plan.

- **Alternative 1—Seven-Lane:** The Hwy 224 seven-lane cross section alternative would involve increasing the number of through lanes for each direction from two to three, beginning north of Harrison St to south of Lake Rd. This option would require the acquisition of right-of-way, and increase the crossing distance at the intersections. It would solve the future operational deficiencies at the study intersections out to ~~2030~~2035.

  While widening Hwy 224 does allow for adequate intersection operations at study area intersections, it would create an even greater barrier to local connectivity. For this reason, some additional alternatives were evaluated to help reduce the potential side street delay and improve the potential east/west connectivity across Hwy 224. In addition, capacity improvements such as widening facilities along the entire corridor are not consistent with Metro's regional prioritization of transportation improvements (which place more focus on intersection or system management improvements).

- **Alternative 2—Modified Split Diamond Interchange**: Construction of a modified split diamond interchange between Harrison St and 37th Ave would involve elevating Hwy 224 from Harrison St to 37th Ave and constructing two tight urban interchanges (which require less right-of-way space than standard freeway interchanges). Monroe St and Oak St would pass under Hwy 224 with a frontage road under Hwy 224 to connect between Harrison St and 37th Ave. To improve connectivity within the city, this option includes the construction of an at-grade rail crossing along Monroe St and the extension of Monroe St to 32nd Ave. This configuration allows for much better intersection operations due to the removal of the Hwy 224 traffic through the intersections. A planning-level operational analysis revealed that the intersections would operate within the State's mobility standards.

- **Alternative 3—Hwy 224 Overpass/Underpass:** Grade separation of the highway would improve the localized intersection operations, but would divert traffic bound for or leaving Hwy 224 to other streets. An overpass over Hwy 224 could be placed at several locations, including Harrison St, Freeman Way and International Way/37th Ave. An option to the overpasses would be to construct Hwy 224 below grade with City streets passing over the highway. This alternative improves intracity connectivity by removing the barrier effect caused by Hwy 224.

- **Alternative 4—Hwy 224 TSMO Improvements:** Improve arterial corridor operations by expanding traveler information and upgrading traffic signal equipment and timings. Install upgraded traffic signal controllers, establish communications to the central traffic signal system, provide arterial detection (including bicycle detection where appropriate), and routinely update signal timings. Provide real-time and forecasted traveler information on arterial roadways including current roadway conditions, congestion information, travel times, incident information, construction work zones, current weather conditions, and other events that may affect traffic conditions. TSMO improvements also include ongoing maintenance and parts replacement (such as monitoring systems; providing power; and replacing cameras, loops, or other data collectors and devices).

Hwy 224/99E Refinement Plan

The City and ODOT should complete a Refinement Plan to ~~evaluate the problems in the Highway 224 and 99E corridor, and identify specific projects to solve them~~ determine and recommend alternative mobility targets.[17] The Refinement Plan would provide options for alternative mobility targets, which could include expanding the number of hours beyond the current two-hour measure, establishing a travel-time measure, or other measures. This plan should ~~focus on an influence area that includes McLoughlin Blvd from Tacoma St to 17th Ave, and Highway 224 from McLoughlin Blvd to Lake Rd. The Refinement Plan needs to address the projected intersection deficiencies and meet the goals of both ODOT and the City of Milwaukie. The goals of this TSP direct the City~~ also consider ways to reduce the highway's barrier effect for all modes through an increased level of connectivity across the facility, consistent with City goals. The Refinement Plan should be completed within one to five years of the adoption of the October 2013 updates to the TSP.

~~The 2004 Regional Transportation Plan presents the regional perspective on a future Hwy 224/99E corridor Refinement Plan, which should serve as the starting point for the Refinement Plan. According to the RTP, this corridor plan should address the following design considerations:~~[18]

~~Institute aggressive access management throughout corridor, including intersection grade separation along Highway 224 between Harrison St and I-205.~~

- ~~Design access points to McLoughlin Blvd and Highway 224 to discourage traffic spillover onto Lake Rd, 34th Ave, Johnson Creek Blvd, 17th Ave and Tacoma St.~~

- ~~Monitor other local collector routes and mitigate spillover effect from congestion on McLoughlin Blvd and Highway 224.~~

- ~~Expand highway capacity to a total of three general purpose lanes in each direction from Harold St to I-205, with consideration of express, HOV lanes or peak period pricing for new capacity.~~

- ~~Provide a more direct transition from McLoughlin Blvd to Highway 224 at Milwaukie to orient long trips and through traffic onto Highway 224 and northbound McLoughlin.~~

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[17] Provisions for alternative mobility targets are allowed per the Regional Functional Plan, Title 1, 3.08.230 and Oregon Highway Plan, Policy 1F3. The Oregon Transportation Commission shall approve the alternative mobility targets in order for them to become effective.
[18] ~~See RTP; Ch. 6, p.6-36.~~

- ~~Provide improved transit access to Milwaukie and Clackamas regional centers, including rapid bus in the short term, and light rail service from Clackamas regional center to Central City in the long term.~~

~~The goal of the Refinement Plan would be to achieve these regional goals while simultaneously meeting Milwaukie's transportation goals, as described in this TSP.~~

RECOMMENDATIONS

To meet the TSP goals and policies outlined in Chapter 2, the City should take the following steps for improving the ~~auto~~ street network:

- Manage and improve the entire roadway system consistent with the City's transportation policies and street classifications.
- Work with ODOT and Clackamas County to implement their access control standards on their facilities to reduce conflicts among vehicles and trucks, as well as conflicts between vehicles and pedestrians.
- Identify local street system improvements that are cost-effective in improving State facility conditions. These projects could be candidates for State financial assistance.
- Work with Metro to develop travel forecasts for the City that are used to assess future regional travel needs. The City will participate in verifying housing and employment forecasts to be used when Metro updates the Regional Transportation Plan.
- Coordinate with ODOT regarding implementation of the Oregon Highway Plan for expressways and Special Transportation Areas, including developing alternative mobility targets for Hwy 224 and McLoughlin Blvd.

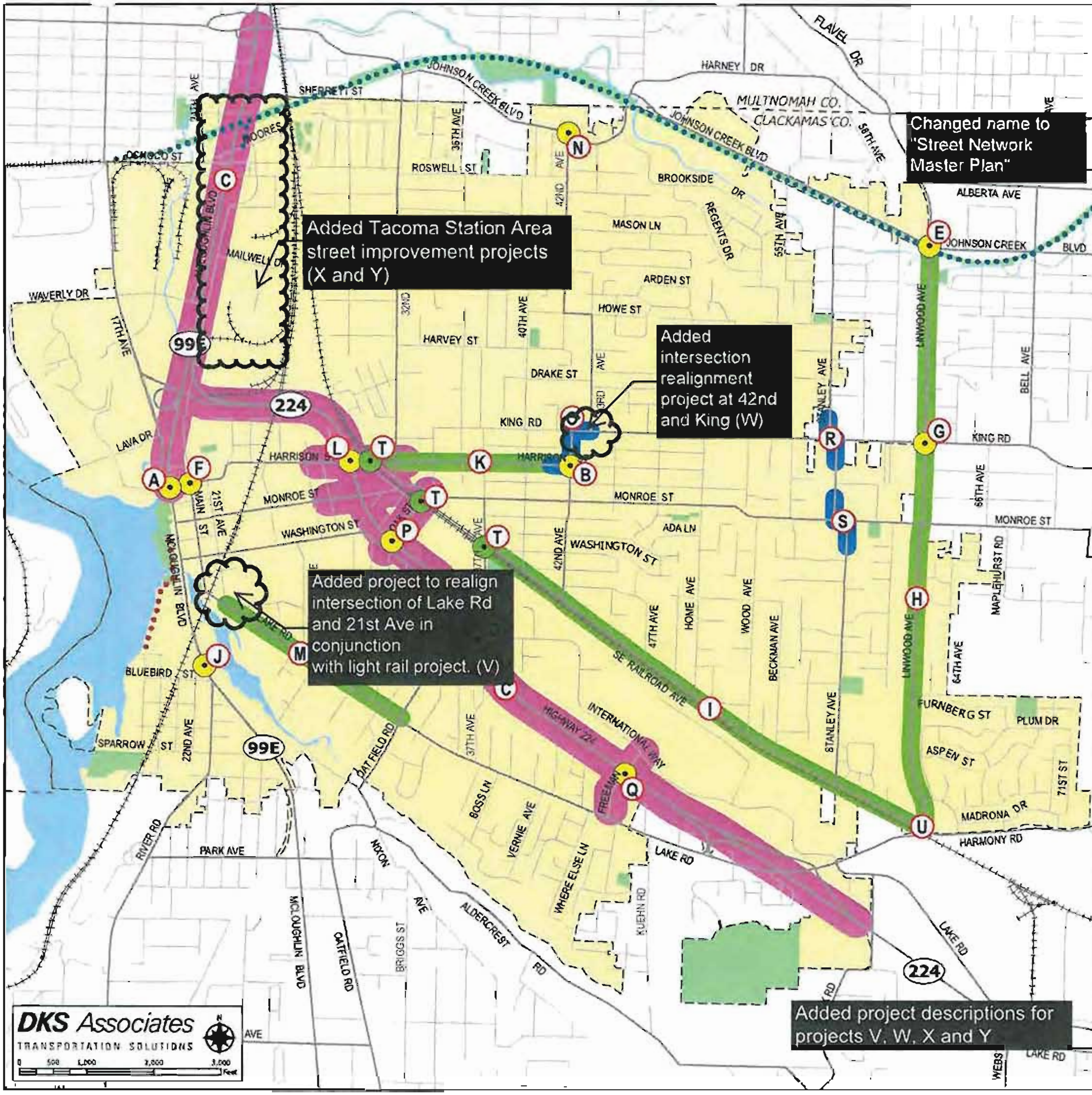
~~Changes to Functional Classification~~

~~Three streets are recommended to be reclassified with the adoption of this TSP. For each, the updated classification would better correspond with the existing and planned land uses surrounding each street. International Way, the primary access street in the Business Industrial zone north of Highway 224, should be upgraded from Local to Collector. Johnson Creek Blvd from 40th Ave to Brookside (the section within Milwaukie city limits) should be downgraded from Arterial to Collector to better coordinate with the street's Neighborhood Collector designation in the City of Portland and reflect the low density residential land surrounding the corridor. McLoughlin Blvd (Hwy 99E) between Hwy 224 and the southern city limits should be classified as an Arterial, instead of a Regional Route. This change complies with regional designations and has ODOT concurrence. The updated classification of each road is reflected in Figure 8-3b.~~

Master Plan

The ~~Motor Vehicle~~ Street Network Master Plan is the list of projects needed to mitigate motor vehicle street network deficiencies. Figure 8-~~4~~5 depicts the approximate locations of the ~~Motor Vehicle~~ Street Network Master Plan projects, which are also summarized in Table 8-~~8~~10. This list is a "wish list" of motor vehicle related projects in Milwaukie. Some projects from the master plan were selected for inclusion in the ~~Motor Vehicle~~ Street Network Action Plan, which consists of projects that the community has identified as its top priorities for allocating and/or pursuing funding. As development occurs, streets are rebuilt, or other opportunities arise, projects on the master plan should be addressed.

The planning-level cost estimates in Table 8-~~8~~10 are based on general unit costs for transportation improvements, but do not reflect the unique project elements that can significantly add to project costs. For each of these projects, the City will refine the cost estimate to include right-of-way requirements and costs associated with special design details at the time of development.



MILWAUKIE

Transportation System Plan

FIGURE ~~8-4~~ 8-5

~~AUTO~~ STREET NETWORK MASTER PLAN

December 2007

LEGEND

Proposed Street Network Improvements

- Roadway Widening Project
- Travel Route Improvement
- Corridor Refinement Plan
- Intersection Improvement
- Rail Crossing Improvement
- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Parks
- Water
- City Limits

PROPOSED PROJECTS

- A Prohibit left turn movement at 17th Ave/McLoughlin Blvd and include in Refinement Plan
- B Signalize Harrison St/42nd Ave
- C Conduct Refinement Plan for HWY 99E/HWY 224 focused on motor vehicle and freight mobility.
  - HWY 99E Project Limits: Tacoma St to 17th Ave
  - HWY 224 Project Limits: HWY 99E to Lake Rd Interchange
- D Reconfigure intersection to consolidate 37th Ave/ Industrial Way
- E Add eastbound/westbound right turn lanes and integrate the trail crossing
- F Create westbound shared through/right lane; or Add eastbound right turn pocket
- G Implement protected/permitted phasing for northbound and southbound left turns
- H Widen Linwood Ave to standard three lane cross section
- I Widen Railroad Ave to standard three lane cross section
- J Redesign intersections of River Rd and 22nd Ave to consolidate intersections; or Add northbound left turn pocket on River Rd
- K Widen Harrison St to standard three-lane cross section
- L Add left turn-lanes and protected signal phasing on Harrison St approaches
- M Widen Lake Rd to standard three-lane cross section
- N Replace 3-way stop with signal when warranted and appropriate. (Coordinate with the City of Portland)
- O Enhance connection between King Rd and Harrison St
- P Add protected signal phasing on Oak St approaches
- Q Improve intersection/modify access at HWY 224 and Freeman Way
- R Enhance connection along Stanley Ave at King Rd
- S Enhance connection along Stanley Ave at Monroe St
- T Implement railroad crossing safety and quiet zone project
- U Upgrade crossing to grade separated facility

Table 8-~~8~~10 ~~Auto~~ Street Network Master Plan Projects

Map ID[19]	Priority	Type	Project Name	Project Description	From	To	Cost(s) ($1,000s)[20]
High Priority Projects							
C	High	C	Hwy 224 & Hwy 99E Refinement Plan	Conduct refinement study ~~that focuses on~~ to establish alternative mobility targets for Hwy 224 and McLoughlin Blvd for locations not meeting applicable State targets, and explore ways to minimize~~ing~~ barrier effect and improve~~ing~~ auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to ~~17th Ave~~ River Rd	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	~~$250~~ 270
D	High	C	~~Hwy 224~~ Intersection Improvements at Hwy 224 and 37th Ave	Consolidate the two northern legs of 37th Ave and International Way into one leg at Hwy 224.	Location-specific	Location-specific	~~$1,946~~ 2,100
H	High	C	Linwood Ave Capacity Improvements (north)	Widen to standard three lane cross section. Widen bridge over Johnson Creek.	Johnson Creek Blvd	King Rd	~~$8,500~~ 9,300
H	High	C	Linwood Ave Capacity Improvements (south)	Widen to standard three lane cross section.	King Rd	Harmony Rd	~~$11,400~~ 12,500
P	High	C	~~Hwy 224~~ Intersection Improvements at Hwy 224 and Oak St	Add left-turn-lanes and protected signal phasing on Oak St approaches.	Location-specific	Location-specific	$20
R	~~Low~~High	C	Stanley Ave Connectivity at King Rd	Enhance connection along Stanley Ave at King Rd.	Location-specific	Location-specific	~~$53~~ 60
S	~~Low~~High	C	Stanley Ave Connectivity at Monroe St	Enhance connection along Stanley Ave at Monroe St.	Location-specific	Location-specific	~~$53~~ 60
~~T~~	~~High~~	~~C~~	~~Railroad Crossing Safety and Quiet Zone Project~~	~~Construct railroad crossing safety improvements at Oak St, Harrison St, and 37th Ave.~~	~~Location specific~~	~~Location specific~~	~~$285~~
V	High	C	Intersection Improvements at McLoughlin Blvd and 22nd Ave	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200

[19] See Figure 8-4.

[20] Project costs are order-of-magnitude estimates and are in ~~2007~~2012 dollars. Future costs may be more due to inflation. ~~Costing details can be found in the Technical Appendix.~~ In the case of operational projects, estimated costs are for the entire 22-year planning period.

Map ID[19]	Priority	Type	Project Name	Project Description	From	To	Cost~~(s)~~ ($1,000s)[20]
Medium Priority Projects							
A	Med	C	~~McLoughlin Blvd~~ Intersection Improvements at McLoughlin Blvd and 17th Ave	Prohibit left-turn movement from 17th Ave to northbound McLoughlin Blvd and include in Hwy 224 & Hwy 99E Refinement Plan.	Location-specific	Location-specific	~~$15~~ 20
E	Med	C	~~Johnson Creek Blvd~~ Intersection Improvements at Johnson Creek Blvd and Linwood Ave	Add eastbound right-turn lane and westbound right-turn lane.	Location-specific	Location-specific	~~$803~~ 880
~~F~~	~~Med~~	~~C~~	~~Harrison Street Intersection Improvements at Main~~	~~Add westbound shared through/right-turn lane or eastbound right turn lane.~~	~~Location-specific~~	~~Location specific~~	~~$34~~
G	Med	C	Intersection Improvements at Linwood Ave and King Rd	Implement protected/permissive left-turn phasing for northbound and southbound approaches.	Location-specific	Location-specific	~~$16~~ 20
J	Med	C	~~McLoughlin Blvd~~ Intersection Improvements at McLoughlin Blvd and River Rd	Consolidate a single access point for the area at Bluebird St with full intersection treatment and signalization or add second northbound left-turn lane at River Rd.	Location-specific	Location-specific	~~$898~~ 980
K	Med	C	Harrison St Capacity Improvements	Widen to standard three lane cross section.	32nd ~~St~~Ave	42nd ~~St~~Ave	~~$2,565~~ 2,800
L	Med	C	Intersection Improvements at Harrison St and Hwy 224	Add left-turn lanes and protected signal phasing on Harrison St approaches.	Location-specific	Location-specific	$20
O	Med	C	Harrison St and King Rd Connection	Enhance connection between King Rd and Harrison St	King Rd	Harrison St	~~$53~~ 60
Low Priority Projects							
B	~~Med~~Low	C	Intersection Improvements at 42nd Ave and Harrison St	Signalize intersection to facilitate dominant traffic flow.	Location-specific	Location-specific	~~$252~~ 280

Map ID[19]	Priority	Type	Project Name	Project Description	From	To	Cost~~(s)~~ ($1,000s)[20]
I	~~High~~Low	C	Railroad Ave Capacity Improvements	Widen to standard three lane cross section.	37th Ave	Linwood Ave	~~$12,990~~ 14,200
M	Low	C	Lake Rd Capacity Improvements	Widen to standard three lane cross section.	21st Ave	Oatfield Rd	~~$7,392~~ 8,100
N	Low	C	Johnson Creek Blvd and 42nd Ave Signalization	Replace 3-way stop with signal when warranted.	Location-specific	Location-specific	~~$250~~ 270
Q	Low	C	Hwy 224 Access Modifications at Freeman Way	Modify access at Freeman Way to improve intersection functioning.	Location-specific	Location-specific	~~$1,313~~ 1,400
~~U~~	~~Low~~	~~C~~	~~Harmony Road Grade Separation and Realignment at Linwood~~	~~Grade separate Harmony Road from Union Pacific Railroad and align as a through east-west movement. Outcome of alignment and geometry is dependant upon the Harmony Road Environmental Assessment project (scheduled for completion Fall 2008).~~	~~Location-specific~~	~~Location-specific~~	~~$28,000~~
W	Low	C	Intersection Improvements at 42nd Ave and King Rd	Realignment of intersection to improve traffic movements between 42nd Ave and King Rd east of 42nd Ave.	Location-specific	Location-specific	$200
X	Low	C	Local Street Connections in Tacoma Station Area	Connect local streets within Tacoma station area: 24th Ave between Ochoco St/Moores St & Clatsop St; Omark St between Mailwell Dr & Beta St (w/midblock connection from Main St); and Mailwell Dr to Harrison St via 26th Ave. (TSAP)	Location-specific	Location-specific	$8,120
Y	Low	C	Local Street Improvements in Tacoma Station Area	Construct street improvements on Stubb St, Beta St, Ochoco St, Hanna Harvester Dr, and Mailwell Dr. (TSAP)	Location-specific	Location-specific	$5,280

Notes:

C = Capital Project
O = Operational Project
P = Policy Project

High = High priority
Med = Medium priority
Low = Low priority

TSAP = Tacoma Station Area Plan

Action Plan

The ~~Auto~~ Street Network Action Plan (Table 8-11) identifies the highest priority projects that ~~can~~ are reasonably be expected to be funded with ~~City~~ local funds by ~~2030~~2035, which meets the ~~a~~ requirements of the ~~updated~~ State's Transportation Planning Rule.[21] The action plan project list ~~in Table 8-9 is the result of a multimodal~~ based upon a 2007 citywide project ranking process. In 2007, ~~A~~all of the modal master plan projects were ranked by the TSP Advisory Committee ~~with~~ after consideration of the Working Groups' priorities, other public support for the project, and ~~the~~ how well each project~~'s~~ implements~~ation of~~ the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added.

Table 8-~~9~~11 ~~Auto~~ Street Network Action Plan

Map ID	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
P	~~Hwy 224~~ Intersection Improvements at Hwy 224 Crossings (Oak St)	Add left-turn lanes and protected signal phasing on Oak St approaches.	Location-specific	Location-specific	$20	~~Direct~~ Match
V	Intersection Improvements at McLoughlin Blvd and 22nd Ave	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200	Match
C	Hwy 224 & Hwy 99E Refinement Plan	Conduct refinement study ~~that focuses on~~ to establish alternative mobility targets for Hwy 224 and McLoughlin Blvd for locations not meeting applicable State targets, and explore ways to minimize~~ing~~ barrier effect and improve~~ing~~ auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to ~~17th Ave~~ River Rd	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	$270	Match
	~~Railroad Avenue Capacity Improvements~~	~~Widen to standard three lane cross section.~~	~~37th Ave~~	~~Linwood Ave~~		~~Match~~
	~~Railroad Crossing Safety and Quiet Zone Project~~	~~Construct railroad crossing safety improvements at Oak St, Harrison St, and 37th Ave.~~	~~Location specific~~	~~Location specific~~		~~Direct~~

The completion of the action plan project list would improve transportation operations at several locations in Milwaukie. The study intersections would operate as listed in Table 8-12 with the inclusion of action plan projects during the year 2035 p.m. peak hour. Approximately one third of study intersections (8 of 24 locations) would not meet performance standards with the inclusion of the action plan projects. Six of these intersections would be located on ODOT facilities (McLoughlin Blvd or Hwy 224), while the remaining two locations would be on City of Milwaukie facilities (Linwood Ave). Additional refinement plans for McLoughlin Blvd and Hwy 224 are needed to identify appropriate improvements and/or alternate mobility targets for traffic mobility along the corridors.

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

Table 8-12 2035 Action Plan Intersection Level of Service (P.M. Peak Hour)

Intersection	Existing 2012			Future 2035 Action Plan Scenario		
	Level of Service (LOS)	Average Delay (Seconds)	Volume/ Capacity (V/C)	Level of Service (LOS)	Average Delay (Seconds)	Volume/ Capacity (V/C)
Two-Way Stop Controlled Intersections						
McLoughlin Blvd @ 22nd Ave	A/D	26.4	0.01	A/E	**38.7**	0.01
Harrison St @ 21st Ave	A/C	18.0	0.10	A/C	17.3	0.24
King Rd @ 42nd Ave	A/B	14.3	0.26	A/C	18.9	0.46
Monroe St @ Linwood Ave	A/D	31.2	0.51	B	11.6	0.66
All-Way Stop Controlled Intersections						
Harrison St @ Main St	B	13.2	0.39	C	19.4	0.78
42nd Ave @ Harrison St	B	12.8	0.22	C	24.4	0.86
Johnson Creek Blvd @ 32nd Ave[22]	F	**>50.0**	**0.77**	D	46.9	0.93
Signalized Intersections						
McLoughlin Blvd @ Ochoco St	B	10.1	0.85	C	32.8	1.08
McLoughlin Blvd @ Milport Rd	A	4.4	0.78	A	9.5	0.95
McLoughlin Blvd@ Harrison St	D	47.1	**0.99**	F	**83.8**	**1.20**
McLoughlin Blvd @ Washington St	C	20.0	0.88	E	**67.3**	**1.14**
Hwy 224 @ 17th Ave	C	20.7	0.59	C	24.2	0.77
Hwy 224 @ Harrison St	D	40.0	0.89	E	**79.6**	**1.17**
Hwy 224 @ Monroe St	B	19.0	0.75	C	31.8	0.97
Hwy 224 @ Oak St	D	44.1	0.88	E	**66.9**	1.06
Harrison St @ 32nd Ave	B	10.5	0.45	B	17.3	0.72
McLoughlin Blvd @ River Rd	D	35.5	0.99	F	**>80.0**	**1.14**
Lake Rd @ Oatfield Rd	D	36.0	0.62	D	42.7	0.80
Hwy 224 @ 37th Ave	C	25.5	0.82	F	**>80.0**	**1.30**
Hwy 224 @ Freeman Way	C	30.5	0.94	E	**58.4**	**1.08**
Hwy 224 @ Lake Rd	B	16.1	0.68	D	39.1	0.91
Johnson Creek Blvd @ Linwood Ave	D	53.6	0.97	F	**>80.0**	**1.23**
Linwood Ave @ King Rd	D	42.6	0.79	D	42.0	0.88
Linwood Ave @ Harmony Rd	E	**65.0**	0.94	F	**>80.0**	**1.55**

Notes: A/A=major street LOS/minor street LOS
Signalized and all-way stop delay = average vehicle delay in seconds for entire intersection
Unsignalized delay = highest minor street approach delay
Intersections shown in **bold type** exceed jurisdictional standards

[22] Intersection is assumed to have a traffic signal and westbound left-turn lane constructed by TriMet.

REGIONAL TRANSPORTATION PLAN (RTP) COMPLIANCE

The projects identified in the master plan list and further refined in the action plan list are ~~in coordination~~ consistent with the Metro 2035 Regional Transportation Plan (RTP) goals for regional mobility and non-SOV modal targets. It is expected that the City would continue coordination with Metro and Clackamas County as other plans are updated to maintain consistency and coordination on projects that are regionally implemented.

9 Freight Element

This chapter summarizes strategies to address the future needs of Milwaukie's freight system. The Freight Plan is intended to outline all freight needs over the next ~~20~~ 22 years, develop projects to address those needs and identify costs for those projects.

The quality of the local freight network, i.e., those transportation facilities necessary for the movement of bulk goods and materials, is essential to the economic health of the city. While all cities have some need for local delivery of goods, a majority of Milwaukie's employment is in the heavy manufacturing, warehousing, and distribution sectors. These employment sectors are dependent on the efficient movement of large quantities of both raw materials and products. A well-functioning and reliable system for the movement of freight into and out of Milwaukie contributes significantly to the City's ability to attract and retain industrial investment—and the jobs and tax proceeds that come with that investment.

TSP GOAL AND POLICY FRAMEWORK

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Several of these TSP Goals guide Milwaukie's policies on freight access and connectivity, specifically the following:

- **Goal 1 Livability** guides the City to protect residential neighborhoods from excessive noise and pollutants associated with freight transportation.
- **Goal 4 Quality Design** calls for street designs that to support the streets' intended uses, including truck turning movements, as applicable.
- **Goal 5 Reliability and Mobility** calls for maintaining traffic flow and mobility on arterial and collector roadways.
- **Goal 6 Compatibility** directs the City to coordinate with ODOT to address improvements to the commercial railroad system and the State highway system within Milwaukie.
- **Goal 9 Economic Vitality** calls for a safe and efficient freight system that facilitates the movement of goods.

NEEDS

This section outlines the basic needs for freight in Milwaukie, based on existing deficiencies and future forecasting.

Accessibility

In Milwaukie the land uses that are most associated with freight movement are located north of downtown along Hwy 99E (McLoughlin Blvd) and in southeast Milwaukie along Hwy 224. The function of these highways in these areas is critical to serving the movement of freight and goods. Both of these industrial areas are accessible by truck and rail. While rail access tends to function well (despite limitations due to Union Pacific's scheduling priorities), truck access is constrained and is projected to become more problematic as traffic volumes increase in the future (see Chapter 8). A third industrial area in the city along Johnson Creek Blvd, though smaller than the others, is also highly constrained by the transportation system.

The north Milwaukie industrial area (defined as the area south of city limits, west of the Union Pacific Railroad, east of 17th Ave and north of Hwy 224) has limited access to and from Hwy 99E. The eastern half of the area is particularly difficult to access: automobiles can only enter via the signalized intersections of Ochoco St/Hwy 99E and Milport Rd/Hwy 99E. Left turns from Hwy 99E at both of these locations are prohibited and right turns are allowed only at Ochoco St. Together these restrictions force trucks to use the frontage roads of Main St (on the east side of Hwy 99E) and Frontage Rd (to the west of Hwy 99E). Although restricted turn movements from Hwy 99E in this area improve through-vehicle performance and reduces delay on Hwy 99E, it forces freight vehicles to attempt difficult turning maneuvers and to travel out of their intended direction.

The intersection configurations at and near the Hwy 99E/Milport Rd intersection limit the utility of the intersection. The two frontage roads are very close to Hwy 99E. The stacking distance on Milport Rd between Hwy 99E and Frontage Rd is approximately 70 feet; the distance between Main St and Hwy 99E is just fifty feet, barely enough room to store one large trailer semi-truck. In addition, the alignment of the all-way stop control intersection of Main St/Milport Rd makes it particularly difficult for trucks to turn from Main St onto Hwy 99E.

The International Way industrial area is north of Hwy 224, between 37th Ave to the west, Lake Rd to the east, and Railroad Ave to the north. Access to and from the area is via three intersections: the signalized intersection of International Way, 37th Ave and Hwy 224; a signalized intersection at Freeman Way and Hwy 224; and a signalized intersection of International Way and Lake Rd, which is approximately 300 feet from the interchange of Lake Rd with Hwy 224. As discussed in Chapter 8, the intersection at 37th Ave and Hwy 224 is not well configured. The two intersections on 37th Ave are approximately 70 feet apart, making it difficult for trucks to access Hwy 224 because there is only space for one truck to wait for the signal to turn green and allow access to Hwy 224. A second concern is the curvature of the approach to Harmony Rd and Lake Rd at the eastern end of International Way, which is difficult for trucks to maneuver.

Ingress and egress to the third industrial area in Milwaukie, in the northeast corner of the city, is provided via Johnson Creek Blvd. Johnson Creek Blvd however, is limited to two axle-vehicles to the west of 45th Ave, effectively prohibiting heavy truck access to the west. The result is that trucks traveling to and from this area with origins or destinations in that direction must travel south via Linwood Ave, adding several miles of out-of-direction travel.

Connectivity

Several significant regional facilities that provide for regional movement of freight are located, in part, within Milwaukie. These are most notably the Union Pacific Railroad's (UPRR) Brooklyn Sub mainline and the Hwy 99E, and Hwy 224 mobility corridor. Access to these facilities allows Milwaukie businesses to connect to the national transportation network via Brooklyn Yard and I-205. Informal surveys of industrial businesses have confirmed that most out-bound and in-bound heavy truck trips use I-205. While these regional facilities do provide mobility for local users, they are operated by ODOT and UPRR primarily for the benefit of regional through-movements.

There is a need to minimize delay in accessing regional freight facilities. Milwaukie should acknowledge the need to serve those through-movements, while also striving to preserve and expand access for trips originating or terminating within the city. This is a primary concern for the north industrial area due to the out-of-direction travel required to access the area and the delays associated with leaving the area.

In addition, local and regional freight system users would benefit from improvements in the connections between these regional routes. Currently Hwy 99E and Hwy 224 connect with a partial interchange that facilitates direct access between southbound Hwy 99E to eastbound Hwy 224, and westbound Hwy 224 to northbound Hwy 99E. Other movements are not directly accommodated and require vehicles to utilize city streets such as 17th Ave (Hwy 224 westbound to Hwy 99E southbound) and Harrison St (Hwy 99E northbound to Hwy 224 eastbound).

Rail Crossings

The majority of the at-grade rail crossings in Milwaukie are constructed of asphalt. This surface material becomes uneven and deteriorates more quickly than concrete or rubberized materials that are more commonly used at railroad crossings. Elderly and disabled citizens, as well as adults with baby strollers, are experiencing difficulties walking across the asphalt railroad crossings. Bicyclists may also have difficulty crossing the railroad tracks at these locations. These are of primary concern on arterials and collectors, where vehicle traffic is the heaviest and the asphalt material deteriorates at a faster rate.

As discussed in Chapter 8, all at-grade rail crossings, regardless of materials, cause interruptions to the transportation network. These are particularly acute at crossings such as the UPRR crossing of Harrison St and the UPRR crossing of Harmony Rd, where frequent train crossings interrupt important auto circulation routes and impact emergency services.

Truck Maneuverability

Truck turning movements are difficult due to intersection alignments and/or geometries at several locations, including the Main St and Omark Dr intersections with Mailwell Dr.

Neighborhood Livability

Heavy vehicles and trains frequently create real and perceived neighborhood impacts. The impacts include noise, vibration, safety, aesthetics, and air quality. They are particularly noticeable when trains or trucks pass through or near residential neighborhoods.

RECOMMENDATIONS

Strategies

To address the needs described above, the City will pursue the following strategies.

Accessibility

Several alternatives for improving truck access and local circulation in the North Milwaukie industrial area were examined during the preparation of ~~this~~ the 2007 TSP update. The purpose of this detailed analysis was to develop and analyze various alternatives to improve access and circulation for freight to and from this area. The work was conducted with an awareness of the potential impacts that the Portland-Milwaukie Light Rail (PMLR) project could have on access to the area. To help develop alternatives that would meet the access and circulation needs of this area, a separate sub-group of the Freight Working Group was established to help develop a problem statement, goal statement, and evaluation criteria to help guide the development and analysis of the various alternatives.

The preferred alternative among the participants of the sub-group was the construction of an overpass of Hwy 99E at Ochoco St with alternative access to Hwy 99E via on/off lanes, and restricting access at Milport Rd to right-out movements, in concert with a "Tillamook" branch alignment of light rail. The detailed analysis for this process can be found in ~~the Technical~~ Appendix D ~~of this TSP~~. Because this access issue sits within the larger question of the best design of the Hwy 99E/Hwy 224 corridor, the Freight Working Group recommended forwarding these findings to a future Hwy 99E/Hwy 224 Corridor Refinement Plan, rather than including a specific improvement or set of improvements in the ~~TSP~~ Freight Master Plan

Rail Crossings

Improving the quality of the materials at at-grade crossings and pursuing the grade separation of key crossings, such as the UPRR and Harrison St, and the UPRR and Harmony Rd crossings, are included in the master plan. The City should not support the introduction of any new at-grade heavy rail crossings in the city.

Truck Maneuverability

Intersections that are part of the local freight network or provide access to regional facilities ought be designed to fully accommodate truck turning maneuvers. As part of new design guidelines, the City should adopt clear standards for adequate turning radii, lane widths and other geometric requirements of heavy vehicles for those streets that are local preferred freight routes or internal circulation routes within industrial areas. The master plan includes a project to correct two Mailwell Dr intersections that are currently problematic for truck maneuvers.

Neighborhood Livability

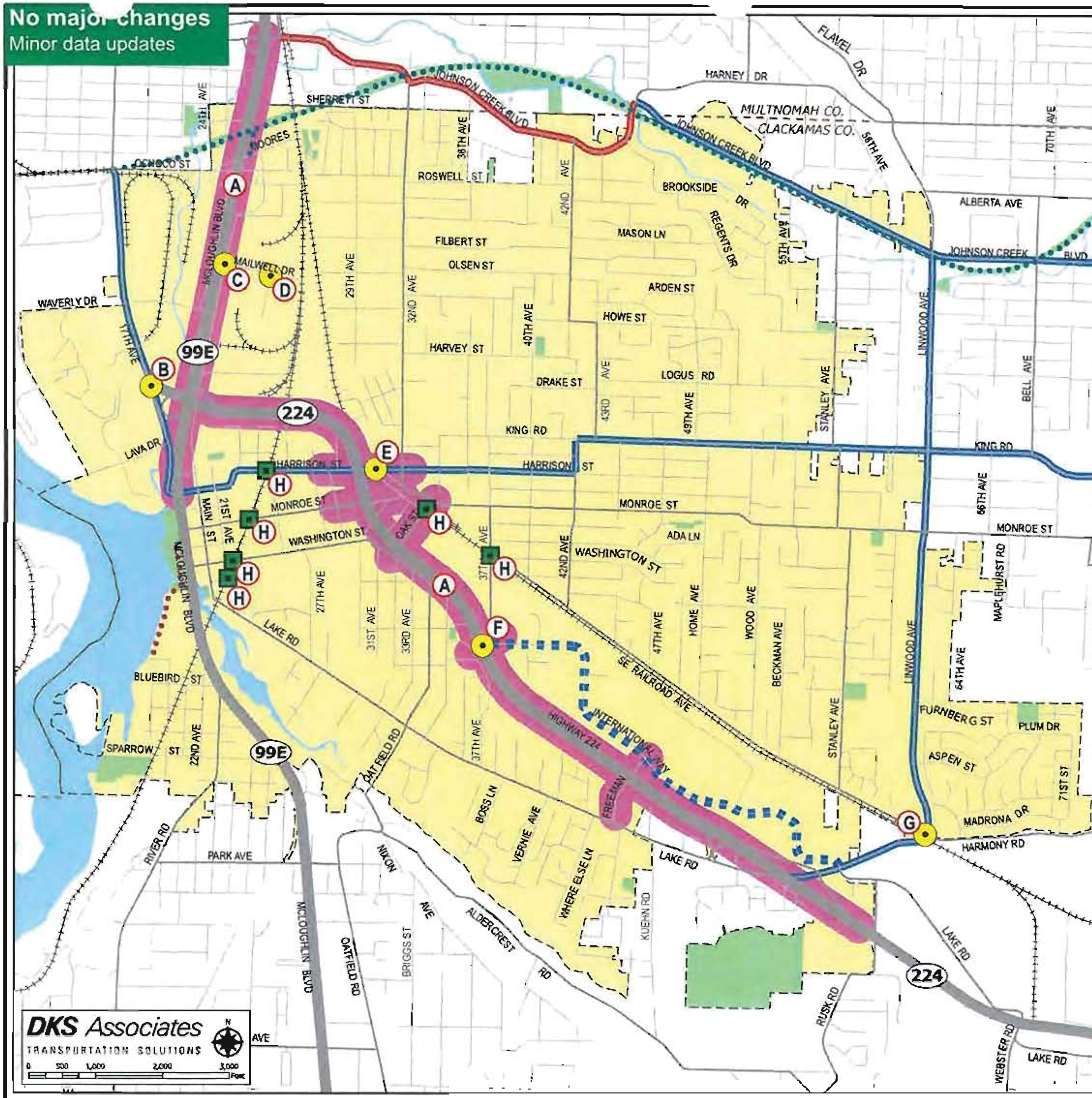
In support of minimizing residential impacts, the City actively encourages all heavy vehicles to use, to the extent practical, the identified local freight routes. Potential strategies to reduce freight traffic on local streets not identified as freight routes, such as traffic calming and diversion treatments, can be found in Chapter 11 Neighborhood Traffic Management. The rail crossing improvements described above also address livability issues. The rail crossing safety improvements, which could allow the creation of a "Quiet Zone," included in the ~~Auto~~ Street Network Master Plan would also reduce the negative impacts of freight facilities on residential areas.

Master Plan

A list of potential freight projects was developed to meet the identified needs for freight. These projects form the basis for the Freight Master Plan. The master plan shown in Figure 9-1 and summarized in Table 9-1 is an overall plan and summarizes the "wish list" of freight related projects in Milwaukie. The projects on the master plan were then used to create a Freight Action Plan. The action plan consists of projects that the community identified as higher priority projects and that the City could reasonably expect to fund. As development occurs, streets are rebuilt and as other opportunities (grant programs) arise, other projects on the master plan will be pursued.

The planning level cost estimates provided for each project are based on general unit costs for transportation improvements, but do not reflect the unique project elements that can significantly add to the estimated project costs. Each of these project costs will need further refinement to detail right-of-way requirements and costs associated with specific design details as projects are pursued.

No major changes
Minor data updates



CITY OF MILWAUKIE

Transportation System Plan

FIGURE 9-1

FREIGHT MASTER PLAN

December 2007

LEGEND

Existing Freight Routes

- Major Regional
- Minor Preferred (Local)
- Weight Restricted Minor Preferred (Local)

Proposed Improvements

- Intersection Improvement
- Intersection Material Upgrade
- Corridor Refinement Plan
- Minor Preferred Freight Route (Local)*

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- County Line
- Parks
- Water
- City Limits

Upon adoption of this document, the functional classification for SE International Way will be upgraded to Minor Preferred Freight Route (Local).

PROPOSED PROJECTS

Improve Corridor

(A) Conduct Refinement Plan for HWY 99E/HWY 224 focused on motor vehicle and freight mobility.
- HWY 99E Project Limits: Tacoma St to 17th Ave
- HWY 224 Project Limits: HWY 99E to Lake Rd Interchange

Improve Intersection

(B) ***17th Ave/HWY 224***
Upgrade intersection turning radii to better accommodate freight movements

(C) ***Main St/Mailwell Dr***
Upgrade intersection turning radii to better accommodate freight movements

(D) ***Mailwell Dr/Omark Dr***
Upgrade intersection turning radii to better accommodate freight movements

(E) ***Harrison St/Union Pacific Railroad Crossing***
Upgrade crossing to grade separated facility (outcome of crossing dependant upon 99E/224 Refinement Plan findings)

(F) ***HWY 224/37th Ave***
Consolidate two northern legs of 37th Ave and Industrial Way into one leg at HWY 224.

(G) ***Harmony Rd/Union Pacific Railroad Crossing***
Upgrade crossing to grade separated facility (outcome of crossing dependant upon Harmony Rd Project findings)

(H) ***At-grade Railroad Crossing Material Upgrades***
Upgrade crossing paving material to concrete or rubberized material for longevity of crossing at: Harrison St, Monroe St, Washington St, Adams St, Oak St, and 37th Ave

Table 9-1 Freight Master Plan Projects

Map ID[1]	Priority	Type	Project Name	Project Description	From	To	Cost(s) ($1,000s[2])
High Priority Projects							
A	High	C	Hwy 224 & Hwy 99E Refinement Plan	Conduct refinement study that focuses on minimizing barrier effect and improving auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to 17th Ave	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	~~$250~~ 270
E	High	C	Harrison St Railroad Crossing Separation	Upgrade Harrison crossing of Union Pacific Railroad tracks to grade-separated facility. Assess as part of Hwy 224 & Hwy 99E Refinement Plan.	Location-specific	Location-specific	~~$28,000~~ 30,700
F	High	C	Hwy 224 Intersection Improvements at 37th Ave	Consolidate the two northern legs of 37th Ave and International Way into one leg at Hwy 224.	Location-specific	Location-specific	~~$1,946~~ 2,100
I	High	C	Signage and Instersection Improvements at McLoughlin Blvd and Ochoco St	Establish signage for trucks and improve intersection. (TSAP)	Location-specific	Location-specific	$1,600
Medium Priority Projects							
C	Med	C	Intersection Improvements at Main St and Mailwell Dr	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	~~$50~~ 60
~~H~~	~~Med~~	~~C~~	~~Railroad Crossing Improvements at 21st and Adams~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location-specific~~	~~Location-specific~~	~~$50~~
~~H~~	~~Med~~	~~C~~	~~Railroad Crossing Improvements at Washington~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location-specific~~	~~Location-specific~~	~~$50~~
~~H~~	~~Med~~	~~C~~	~~Railroad Crossing Improvements at Monroe~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location-specific~~	~~Location-specific~~	~~$50~~
~~H~~	~~Med~~	~~C~~	~~Railroad Crossing Improvements at Harrison~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location-specific~~	~~Location-specific~~	~~$50~~

[1] See Figure 9-1.
[2] Project costs are order-of-magnitude estimates and are in ~~2007~~2012 dollars. Future costs may be more due to inflation. ~~Costing details can be found in the Technical Appendix.~~ In the case of operational projects, estimated costs are for the entire 22-year planning period.

Map ID[1]	Priority	Type	Project Name	Project Description	From	To	Cost(s) ($1,000s[2])
~~H~~	~~Med~~	~~C~~	~~Railroad Crossing Improvements at Oak~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location specific~~	~~Location specific~~	~~$50~~
~~H~~	~~Low~~	~~C~~	~~Railroad Crossing Improvements at 37th~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location specific~~	~~Location specific~~	~~$500~~
Low Priority Projects							
B	Low	C	~~Hwy 224~~ Intersection Improvements at Hwy 224 and 17th Ave	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	~~$50~~ 60
D	Low	C	Intersection Improvements at Mailwell Dr and Omark Dr	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	~~$50~~ 60
~~G~~	~~Low~~	~~C~~	~~Harmony Road Grade Separation and Realignment at Linwood Avenue~~	~~Grade separate Harmony Road from Union Pacific Railroad and align as a through east-west movement. Outcome of alignment and geometry is dependant upon the Harmony Road Environmental Assessment project (scheduled for completion Fall 2008).~~	~~Location specific~~	~~Location specific~~	~~$28,000~~

Notes:

C = Capital Project
O = Operational Project
P = Policy Project

High = High priority
Med = Medium priority
Low = Low priority

TSAP = Tacoma Station Area Plan

Action Plan

The Freight Action Plan (Table 9-2) identifies the highest priority projects that are reasonably expected to be funded with local funds by ~~2030~~2035, which meets the requirements of the ~~updated~~ State's Transportation Planning Rule.[3] The action plan project list is~~ the result of~~ based upon a 2007 citywide project ranking process. In 2007, ~~A~~all of the modal master plan projects were ranked by the TSP Advisory Committee after consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added.~~The highest ranking freight projects that are reasonably expected to be funded (see Chapter 13) with local funds are shown in Table 9-2.~~

Table 9-2 Freight Action Plan

Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Hwy 224 & Hwy 99E Refinement Plan	Conduct refinement study that focuses on minimizing barrier effect and improving auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to 17th Ave	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	$270	Match

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

10 Street Design ~~Element~~

This chapter describes the importance of street design, why it matters, and the street design options available in Milwaukie. This chapter also explores the benefits of a well-designed street and illustrates the relationship between street design, functional classification, and land use. Street design recommendations in this chapter are policy-based, not project-based. They direct the City to ~~develop~~ implement balanced and flexible street design standards that reflect the community's vision and include new and innovative design options.

GOALS AND POLICIES

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Listed below are the specific TSP Goals that guide the City's policies on street design:

- **Goal 1 Livability** guides the City to design and construct transportation facilities in a manner that enhances livability.
- **Goal 2 Safety** guides the City to design safe transportation facilities.
- **Goal 4 Quality Design** guides the City to design streets to support their intended users and calls for the ~~development~~ implementation of street design standards that promote context-sensitive transportation facilities that fit the physical context, respond to environmental resources, and maintain safety and mobility.
- **Goal 6 Sustainability** guides the City to take the natural environment into account when planning and designing transportation facilities.

STREET DESIGN

What is Street Design

A street's design determines how it will look and function. How a street looks and functions is ultimately dependent upon which street elements are included, their dimensions, and how they relate to each other. Street elements may include, but are not limited to: travel lanes, parking lanes, bicycle lanes, green zones,[1] pedestrian facilities, traffic-calming devices, and green street treatments. A street with two travel lanes and a gravel shoulder, for example, looks very different than one with four travel lanes and sidewalks. These two types of streets also function differently. The two-lane street likely has lower traffic volumes but, without pedestrian facilities, does not support safe pedestrian travel. The four-lane street likely has higher traffic volumes and, with sidewalks, supports safe pedestrian travel; however, without bike lanes, it probably does not support safe bicycle travel.

Since different streets serve different purposes, a functional classification system, which is a hierarchy of street designations, provides a framework for identifying which street elements to include in a street's design. A street's functional classification does not dictate which street elements to include. It does, however, provide a framework for determining the size and type of street elements to consider.

The City's functional classification system is used to balance the opposing needs for both mobility and access. These functions are opposing, since high speeds and continuous movement are desirable for mobility, while low speeds and traffic breaks are desirable for access to private property. Streets with a higher classification, such as arterial streets, emphasize a higher level of mobility for through-movement. They look and function very differently than streets with a lower classification, such as local streets, which emphasize the land access function. The different functional classifications are more fully discussed in Chapter 8.

Why Milwaukie ~~Needs~~ Has Street Design Options

The City's street design standards are contained in and/or referenced by the Milwaukie Municipal Code which is the City's main regulatory document. As required by the Code, street design standards are applied to new streets and to existing streets when development triggers the need for additional public street improvements. Since the majority of land in Milwaukie has already been developed, street design standards are most frequently applied to existing streets, many of which were only partially improved when constructed.[2] Many of the city's residential streets, for example, were constructed without bicycle, pedestrian, or stormwater facilities. Retrofitting an existing street with needed improvements is typically a much more complicated process, both in terms of design and construction, than constructing a new street.

The City has some flexibility when applying its existing design standards. ~~However, that flexibility is limited to reducing the size of individual elements by a foot or two, which is often insufficient when retrofitting an existing street with new improvements. Moreover,~~ ~~t~~The addition, alteration, or elimination of most street elements requires extensive review. When this type of review occurs, the City's existing design standards ~~fail to provide decision makers with any design guidance. They~~ identify the elements that should be included and their required and minimum allowed dimensions. ~~However, they fail to~~ They also identify which elements are most important to include when right-of-way is insufficient or which elements are most appropriate to alter or eliminate in certain situations.

[1] The green zone is the area between the curb and sidewalk and is commonly called a landscape strip.
[2] Partially improved streets are often referred to as incomplete streets.

~~In addition to the lack of flexibility and design guidance,~~ Tthe City's existing street design standards ~~don't~~ allow for more innovative types of designs, such as skinny streets, green streets, and alternative pedestrian facilities, all of which the community strongly supports. Green street development, in particular, has far reaching benefits for the region and the city. In addition to reducing stormwater runoff to streams and rivers, which improves water quality and wildlife habitat in general, green street development would help recharge the local aquifer, the city's main water supply.

For these reasons, the City ~~needs more~~ has flexibility when applying existing street design standards, more design guidance, and more street design options. Three of the main reasons are summarized below.

- When making improvements to existing streets, existing street design standards often need to be modified to "fit" the existing street conditions.
- Even when a typical street design would work, more environmentally friendly designs and alternative pedestrian facilities may be appropriate.
- More design flexibility and options ~~would~~ enable the City to allow street improvements that respond to the character of the surrounding natural and built environments.

The City recognizes the diversity of public opinion and development patterns that exist within Milwaukie and acknowledges that street design should not be a "one size fits all" approach. That is why the City ~~should have~~ has multiple street design options that support a street's intended users and its functional classification while also responding to adjacent land uses, neighborhood character, and environmental considerations.

Why Street Design Matters

Streets are the cornerstone of our transportation network. They are used by all modes of travel for a wide variety of commercial, recreational, and travel purposes. Since they traverse the entire city they also greatly influence neighborhood character. Street design matters because well-designed streets are a significant community asset. Poorly designed streets, on the other hand, can have a detrimental effect on commercial activities, recreational opportunities, personal mobility, emergency response, and property values. Since the design of a street is so closely tied to how it performs and how people experience the city, it is important for the City to carefully consider how it wants its streets to look and function and to design them accordingly.

Benefits of Good Street Design

The benefits of good street design occur on many levels. Benefits vary depending on the function of the street and the type of design implemented, but may include:

- Improved livability.
- Increased safety for pedestrians, bicyclists, drivers, and transit riders.
- Increased pedestrian and bicycle activity.
- Increased social and recreational opportunities.
- Decreased environmental impacts through localized stormwater management or reduced stormwater runoff.
- Enhanced air and water quality.
- Street beautification.
- Increased property values.

Many of these benefits come from enhancements to pedestrian and green zones, which are the areas between the curb (or edge of roadway where no curb exists) and the outer edge of the right-of-way (see Figure 10-1). The green zone acts as a buffer between motor vehicle traffic and pedestrian traffic. This buffer area increases pedestrian comfort and safety, reduces the affect of road spray on pedestrians, allows for more separation between pedestrians and vehicle exhaust fumes, and when combined with mature street trees, can reduce vehicle speeds by giving the appearance of a narrower street. Reduced vehicle speeds are a safety benefit for all modes of travel, and an environment that supports walking, creates opportunities for social contact, reduces motor vehicle reliance, and contributes to healthier and more active communities.

As its name implies, the green zone provides a space for street trees and other plantings that benefit the environment through improved air and water quality When appropriately designed, green zone plantings can also manage local stormwater runoff, which reduces the transportation system's impact on local streams and rivers. The green zone also provides a space for placement of utilities, fire hydrants, and other street furniture, so that the sidewalk can remain uncluttered, allowing for unimpeded pedestrian passage. Additionally, this area can be used for the placement of transit shelters and benches, which increases the safety and comfort of transit users.

STREET DESIGN ELEMENTS

The purpose of this chapter is to create ~~a street design~~ policy framework that will guide~~ the development of design standards that better~~ street design decisions to meet the needs and values of the community. The first step in this process is to describe the different street elements, which are listed below. This is followed by a discussion about which elements are optional and which are required (see the Street Design Cross Sections section) and what alternative design options are available and preferred by the community (see the Street Design Alternatives section).

All streets are composed of a number of different elements; however, not all elements are included on all streets. A street's functional classification, adjacent land uses, and available right-of-way width all influence which elements are included. When a specific element is included. it is generally located in the same location on the street relative to other elements. However, an element's design, dimension, and relationship to adjacent elements can and should vary depending upon neighborhood character, traffic management needs, and/or social, cultural, or environmental factors.

The following is a description of the different street elements or zones that comprise most streets.

Development Zone

The development zone is not in, but adjoins, the public right-of-way. In commercial or industrial zones, a building face may clearly define the edge of the right-of-way. In residential zones, the outer edge of the right-of-way is often not clearly or accurately marked. Access to the development zone is almost always through the public right-of-way in the form of a driveway or sidewalk.

Pedestrian Zone

The pedestrian zone is the public space between the development zone and the green zone. This area should support pedestrian activities by providing a comfortable space for walking, socializing, and accessing private property and buildings in the development zone. The needs for this space, its width and lighting, for example, depend upon the functional classification of the street and adjacent land uses. In general, pedestrian zones should be wider in dense commercial zones and on streets with high traffic volumes and speeds and may be narrower on local streets with low traffic volumes.

A typical pedestrian zone is at least five feet wide when adjacent to a green zone and at least six feet wide when adjacent to a street zone.

Green Zone

The green zone is the public space that separates the pedestrian zone from the street zone. It functions as a buffer between pedestrians and motor vehicle, bicycle, and other street zone users. It also offers a place to locate street trees, bike racks, street furniture, transit amenities, utilities, and plantings designed to manage stormwater runoff. The green zone can provide visual appeal for all users by balancing the hard concrete and asphalt surfaces from which a street is constructed. A green zone with mature street trees has the added benefit of framing the street and shielding pedestrians from the elements.

A typical green zone is at least five feet wide.

Street Zone

The street zone may contain many or few elements, depending on its functional classification. Typical elements include parking lane(s), turning lane(s), travel lane(s), and bike lane(s) or mixed vehicle lane(s) that include bicycles. Skinny streets or one-way streets offer different street zone variations as well. In general, the street zone serves as a conduit for mobility and access to private property. Streets that serve an important mobility function (e.g., arterials and collectors) are typically wider than streets that primarily exist to provide access to property (e.g., local).

Typical lane widths:

- Parking lane, 6-8 ft.
- Bicycle lane, 5-6 ft.
- Travel lane, 9-12 ft.[3]
- Shared travel lane, 14-16 ft.

In addition to vehicle and bicycle traffic, the street zone also contains pedestrian traffic at street intersections and midblock pedestrian crossings. To enhance pedestrian safety at intersection crosswalks and midblock locations, crossing locations should be visible and clearly understood by both drivers and pedestrians. The street zone may also contain green street treatments or traffic management devices to slow traffic or deter cut-through traffic. (See Chapter 11 for additional discussion of neighborhood traffic management.)

[3] A typical travel lane is between 10 and 11 feet wide. Narrower lane widths are appropriate on lower-volume streets, wider lane widths are appropriate on higher-volume streets and on freight and transit routes.

STREET DESIGN CROSS SECTIONS

Figure 10-1 contains cross sections for four of the City's street functional classifications.~~ Since this TSP update has identified a need for a more flexible approach to street design,~~ ~~t~~This figure lays the foundation for more flexible design standards. Street design elements marked with asterisks are optional when right-of-way width is insufficient to include all elements. Elements not marked with asterisks are required under all circumstances. The local and neighborhood street cross section, for example, indicates that, at a minimum, one travel lane and one pedestrian facility is required if there is truly insufficient right-of-way width to accommodate any other elements.

The local and neighborhood cross section also includes a skinny street option since a skinny street can contain all of the same elements as a local or neighborhood street. The difference between a skinny street and a local or neighborhood street is that a skinny street typically has narrower elements and/or overlapping parking and mixed travel zones.

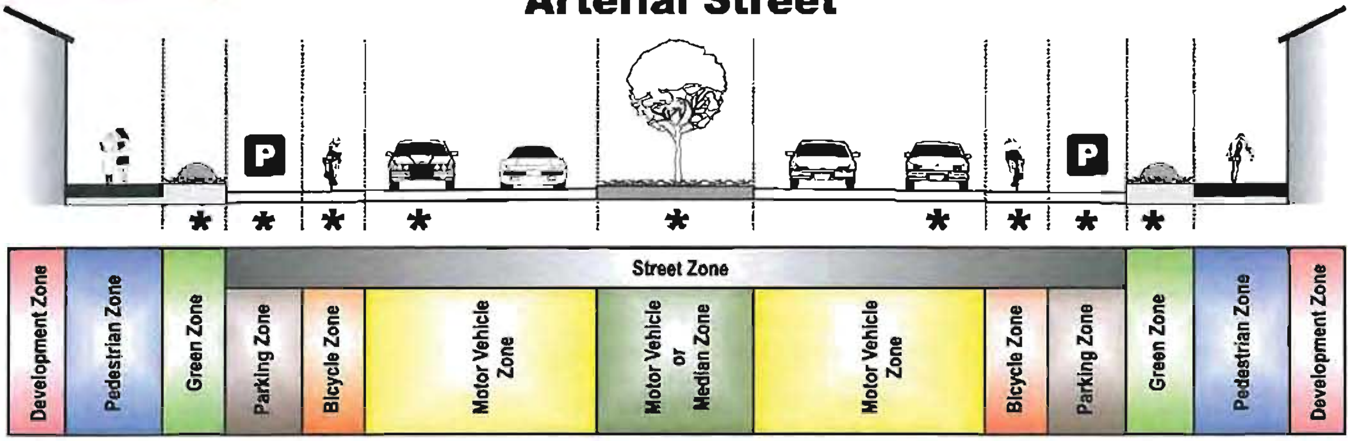
Variations to these cross sections may also be welcomed and/or required by the City when:

- Environmentally beneficial or green street treatments are proposed or needed.
- A street is an identified bikeway or pedestrian walkway in the TSP master plan.
- Existing structures are unusually close to the right-of-way.

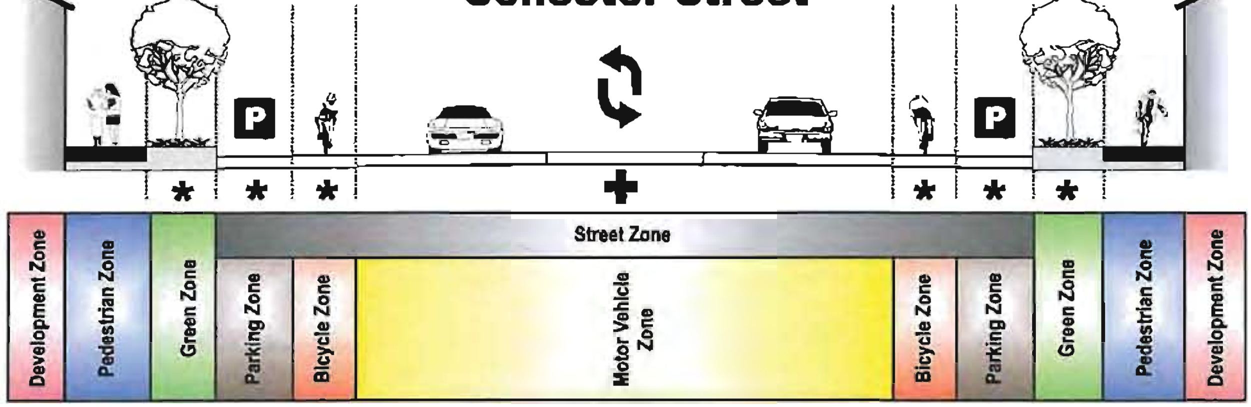
The cross sections in Figure 10-1 are shown without dimensions, as the intent is to provide a policy framework—not specific design details—for ~~the development of~~ more flexible street design standards.~~ that will be adopted as a separate regulatory document at a later date. At that time the City will need to identify preferred and minimum dimensions for each street element. It will also be necessary for the City to develop a design prioritization approach that identifies which elements to reduce and/or eliminate when sufficient right-of-way width is not available.~~

No changes

Arterial Street

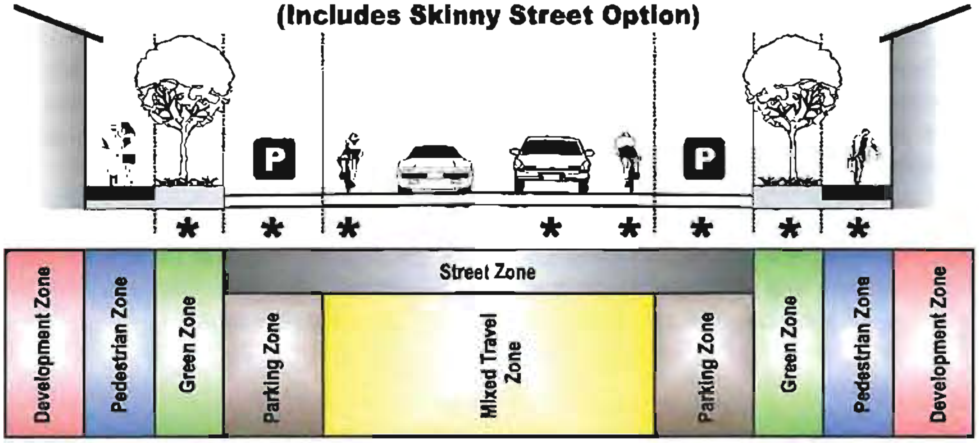


Collector Street



Local and Neighborhood Streets

(Includes Skinny Street Option)



DKS Associates

LEGEND

* -*Constrained Right-of-Way Optional Element*

✚ -*Where Warranted*

Information Sources: DKS Associates

STREET DESIGN CROSS SECTIONS BY FUNCTIONAL CLASSIFICATION

FIGURE 10-1

STREET DESIGN ALTERNATIVES

Pedestrian Facilities

Three pedestrian facility design alternatives are shown in Table 10-1.

Table 10-1 Pedestrian Facility Design Alternatives

Design Alternative	Description	
Vertical and Horizontal Separation	Separation from the street zone both vertically by a curb and horizontally by a green zone. This design alternative can incorporate green street treatments as outlined in the following section on green street design.	
Horizontal Separation	Separation from the street zone horizontally by a green zone or other horizontal element or barrier. The pedestrian zone is at the same grade as the street zone. This design alternative can incorporate green street treatments as outlined in the following section on green street design.	
Vertical Separation	Separation from the street zone vertically by a curb. The pedestrian zone is located "curb tight" against the street zone with no horizontal separation. Pedestrians could still be buffered from vehicular traffic in the street zone by on-street parking and/or bicycle lanes. If wide enough, this design alternative could incorporate tree wells for street trees.	

Source: DKS Associates

Vertical and horizontal separation is the community preferred pedestrian facility design in most situations and especially on streets with higher traffic volumes and speeds. Where traffic volumes and speeds are low, horizontal separation is preferred by the community over vertical separation, especially in neighborhoods that desire a less traditional sidewalk design. Two-sided pedestrian facilities are preferred, but one-sided pedestrian facilities are acceptable and even desirable under certain circumstances. When ~~developing~~ utilizing pedestrian facility design standards, it will be essential that the City identify the circumstances and the process by which one design alternative is chosen or required over another.

It is worth noting that the two preferred pedestrian facility designs include a green zone. In addition to horizontally separating pedestrians from the street zone, the pedestrian facilities that include a green zone are preferred because of the additional aesthetic and environmental benefits the green zone provides pedestrians and the street as a whole.

Green Streets

A traditional stormwater management system for a street uses a curb and gutter to capture and convey stormwater runoff to a catch basin and then a pipe. Piped runoff is then discharged offsite into a stream or river. A green street uses a different stormwater management approach. Instead of discharging stormwater offsite, a green street incorporates a stormwater management system into the right-of-way that allows most stormwater runoff to remain onsite.

where it is absorbed and cleansed through natural biological processes. Green street treatments capture and treat stormwater runoff locally, thereby protecting streams, groundwater, and wildlife habitat. Additionally, since Milwaukie's water supply comes from local wells, it is in the city's best interest to incorporate green zones and green street treatments into its streets as much as possible to protect and maintain the local groundwater supply—a vital city resource.

Most green street treatments have all of the benefits associated with the green zone but require regular maintenance to maintain their functionality and appearance. However, unlike traditional piped stormwater systems, maintenance usually does not require specialized equipment or training. Since some treatments can easily be incorporated into green zones, center medians, or the area usually occupied by parking lanes, streets can often be retrofitted with green street treatments without having to substantially alter any existing street elements or the right-of-way width.

Green street treatments are not dependent upon functional classification and can be incorporated into all street types. Table 10-2 below shows the different green street treatments and the zones in which they may be applicable.

***Table 10-2 Green Street Design Treatments*[4]**

Treatment	Application	How it Works	Application Zone		
			Pedestrian	Green	Street
			■ Recommended ⊡ Optional □ Not Recommended		
Rainwater Harvesting	Aboveground or subgrade containers that capture and reuse stormwater runoff for landscape irrigation.	Stormwater is conveyed to storage facilities during the wet season for use during the dry season.	■	■	⊡
Permeable Paving	Replacement of impermeable surfaces with permeable materials, such as permeable pavement, concrete, or paving blocks.	Permeable materials allow water infiltration through the surface to the subgrade.	■	■	■
Bio-retention (Raingardens)	Aboveground or subgrade containers that promote infiltration and evapotranspiration of stormwater.	Engineered or amended soils and vegetation are used to promote these processes.	□	■	□
Bio-swales	Subgrade channels with vegetation that convey and treat stormwater.	Vegetation is used to control flow velocities and settle pollutants.	□	■	□[5]

When ~~developing~~ utilizing green street design standards, it will be essential that the City identify the circumstances under which green street treatments would be required or recommended.

[4] The soils within an area where green street treatments could be implemented need to be tested to determine the rate of infiltration they can sustain. In addition to green street treatments, traditional stormwater management facilities need to be designed to control overflow if the capacities of the green street treatments are exceeded.
[5] With the exception of medians.

Additionally, the City should ensure that green street treatments receive ongoing maintenance to preserve their functionality and appearance.

Skinny Streets

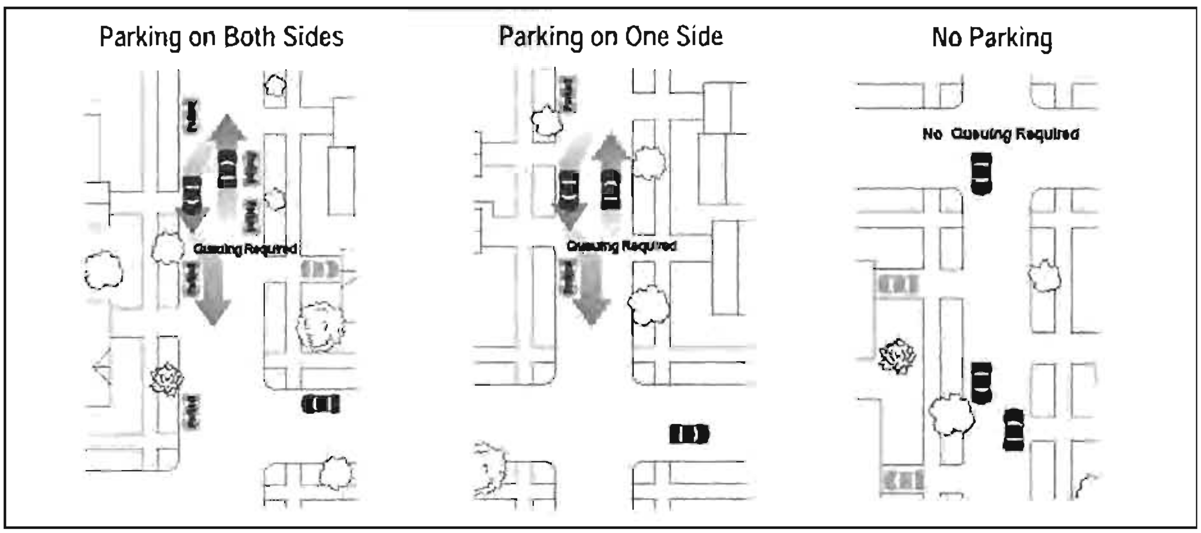
A skinny street is narrower than a normal street and is typically constructed when less paved surface area is desired or in areas with limited rights-of-way or physical constraints. Skinny street designs are typically only considered for streets that have lower traffic volumes and speeds, such as local or neighborhood streets, or in one-way couplet situations. Skinny streets function like regular streets and often have the following additional benefits:

- Slower vehicle speeds.
- Enhanced bicycle and pedestrian safety due to slower vehicle speeds.
- Reduced right-of-way impacts on adjacent properties.
- Reduced stormwater runoff and other environmental impacts due to reduced impervious surface area.

For emergency service personnel to be able to respond to emergencies in a timely manner, the Fire Code recommends that street zones have a minimum width of 20 feet to allow for passage and equipment set up.[6] Solid waste collectors and delivery trucks have similar needs.

Figure 10-2 illustrates three possible skinny street design options. These design options include parking on both sides of the street, parking on one side of the street, or parking on neither side of the street. The design option with parking on both sides of the street requires the widest paved street zone, and the design option with no parking requires the narrowest paved street zone. The design options with parking have overlapping travel and parking lanes. As a result, queuing may be required, which is where one vehicle waits in an open parking area or driveway for the other vehicle to pass.

Figure 10-2 Skinny Street Design Options



When ~~developing~~ utilizing skinny street design standards, it will be essential that the City identify under what circumstances skinny street designs would be required or recommended.

[6] *Neighborhood Street Design Guidelines, An Oregon Guide for Reducing Street Widths.* State of Oregon. November 2000.

RECOMMENDATIONS

In summary, the recommended actions and policy directions listed below call for the City to ~~develop~~ utilize balanced and flexible street design standards that reflect the community's vision and that include new and innovative design options, including green streets, skinny streets, and alternative pedestrian facility designs.

Design Standards

Recommended Action

~~Develop~~ Maintain a baseline cross section for each street functional classification (with preferred dimensions for all street elements) and a street design prioritization approach when the baseline elements do not fit. ~~Develop~~ Maintain street design standards for green streets, skinny streets, and alternative pedestrian facilities and identify under what circumstances alternative designs would be required or recommended. ~~Develop~~ Maintain a list of alternative materials, such as permeable pavers, and identify situations in which alternative materials would be suitable and desirable.

Policy Direction

- ~~Build more~~ Maintain flexibility in~~to~~ street design standards to allow for local design preferences and to avoid costly and time-consuming variance process requirements.
- Balance citywide needs, local design preferences, and best practices when ~~developing~~ utilizing street design standards.
- Provide for public involvement in the ~~development~~ utilization of street design standards and during the design phase of street-related Capital Improvement Projects.
- Consider maintenance costs and issues when ~~developing~~ utilizing design standards.
- ~~Develop~~ Utilize design standards, including alternative designs, which accommodate emergency response routes and needs.
- Require a minimum of one-sided pedestrian facilities on all streets.
- Require green zones and green street treatments where appropriate and practical.
- Maintain design consistency along a street's length where appropriate.

Green Zone and Green Street Plantings

Recommended Action

Develop a list of appropriate, low-maintenance plant species for use in green zones and green street treatments. Develop street tree replacement policies and regulations.

Policy Direction

- Ensure green zones and green street treatments are planted with appropriate, low-maintenance species.
- Preserve and expand the city's tree canopy

Maintenance

Policy Direction

- Ensure that green street treatments receive ongoing maintenance to preserve their functionality and appearance.
- Ensure that landscaping in green zones and medians is properly maintained.
- Ensure that street design elements and treatments function as intended.

11 Neighborhood Traffic Management ~~Element~~

Neighborhood traffic management is a term used to describe the many and varied traffic management approaches used to reduce the impacts of traffic volumes and speeds on residential neighborhoods and improve safety for pedestrians and bicyclists. This chapter describes the need for neighborhood traffic management, identifies tools that the City can use to slow and/or divert traffic, and outlines a process for implementing neighborhood traffic management measures. It is not the purpose of this chapter to identify streets in need of traffic management or to propose projects at specific locations.

GOALS AND POLICIES

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Listed below are the specific TSP Goals that guide the City's policies on neighborhood traffic management:

- **Goal 1 Livability** guides the City to protect residential neighborhoods from excessive through traffic and travel speeds while providing reasonable access to and from residential areas.
- **Goal 2 Safety** guides the City to maintain a safe transportation system.
- **Goal 4 Quality Design** guides the City to design streets to support their intended users and respond to the surrounding natural and built environments.

The main benefits of effective neighborhood traffic management are improved livability and safety. Reduced vehicle speeds are a safety benefit for all modes of travel. Reduced cut-through traffic improves livability through the reduction of vehicular noise, pollutants, and traffic volumes. Additionally, streets that are used in ways for which they weren't designed lead to congestion and safety hazards.

NEEDS

Most of the land within Milwaukie consists of residential neighborhoods. The city, with just over 20,000 citizens, has a relatively small population compared to the surrounding Portland metropolitan area. Because of Milwaukie's proximity to the city of Portland, its employment centers, and the two major regional routes through the city (Hwys 99E and 224), cut-through traffic and speeding is an ongoing concern for citizens. Cut-through traffic most often occurs when congestion occurs on regional routes and major streets and nonlocal traffic goes in search of less congested or more direct routes. Speeding can occur under many different circumstances; however, the city has a number of streets that are relatively straight with few intersections or traffic control devices. These types of streets often invite speeding violations.

Neighborhood traffic management is a means to address the negative impacts of unchecked traffic speed and volume on neighborhood streets. Effective use of neighborhood traffic management can address neighborhood needs and concerns, including, but not limited to, the following:

- Speeding.
- Cut-through traffic, especially by heavy freight trucks.
- Bicycle and pedestrian safety.
- Student safety around school zones.

Student safety around school zones has been and continues to be a concern in Milwaukie neighborhoods. In 1995, the Milwaukie Traffic Safety Commission was charged with identifying and implementing school trip safety improvements in collaboration with schools, parent teacher organizations, neighborhood district associations, residents, and staff. The now defunct commission enacted many safety improvements, but not all recommended projects were pursued or implemented. This chapter does not recommend specific traffic management measures at specific locations, such as schools, however, Chapter 5 Pedestrian Element and Chapter 6 Bicycle Element recommend projects that directly address student safety. In addition, the various Neighborhood District Associations can choose to develop neighborhood traffic management plans that identify more specific issues to be addressed.

TOOLS

There are many different measures available in the neighborhood traffic management "tool box," but not all of these measures are appropriate for all streets or in all situations. As with street design, traffic management measures need to take street functional classification, surrounding land uses, existing street design, emergency service provider access needs, and neighborhood preferences into account.

Table 11-1 groups neighborhood traffic management measures into four categories and shows the recommended application based on street functional classification. The four categories are as follows:

- Horizontal deflection (reduces traffic speeds).
- Vertical deflection (reduces traffic speeds).
- Volume control measures (reduces or diverts traffic volumes).
- Other measures.

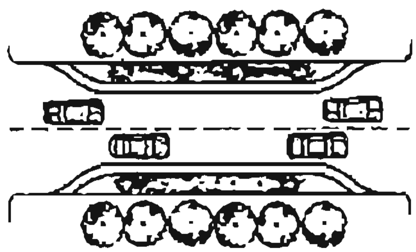
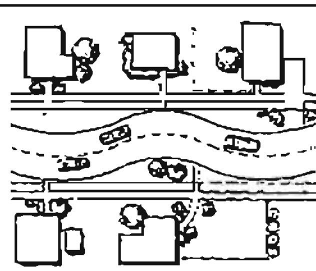
Most of the measures in the first three categories require physical changes to the street; whereas, most of the measures in the last category involve nonphysical changes such as signage, education, enforcement, speed monitoring trailers, and signal timing.

Additionally, State law provides the City with the authority to lower the speed limit of a residential street to 5 miles per hour below the the statutory speed required by the Oregon Department of Transportation.[1] The statutory speed for local streets is 25 miles per hour; therefore, the City can lower the speed limit on local streets to 20 miles per hour. Three criteria must be met to establish the ordinance, in addition to posting new speed limit signs:

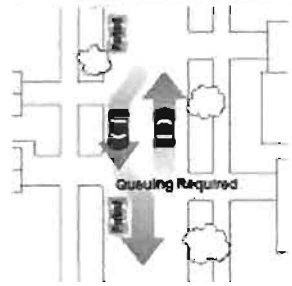
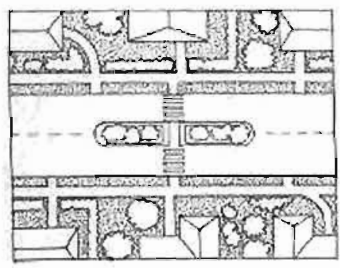
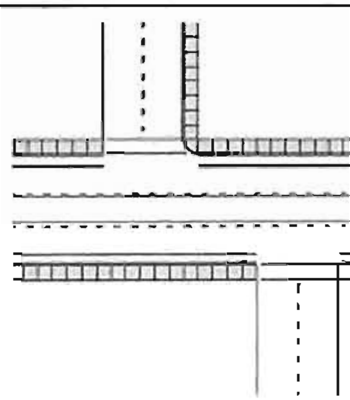
[1] ORS 810.180(10)

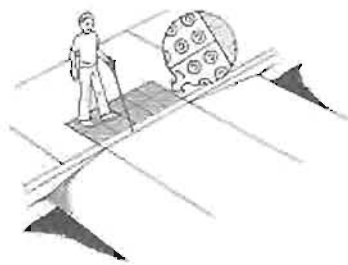
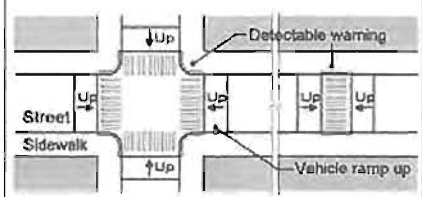
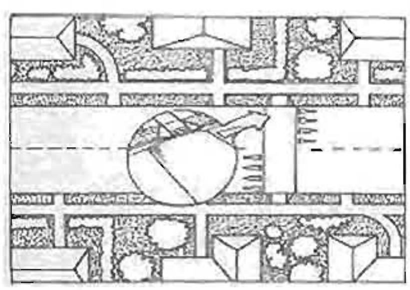
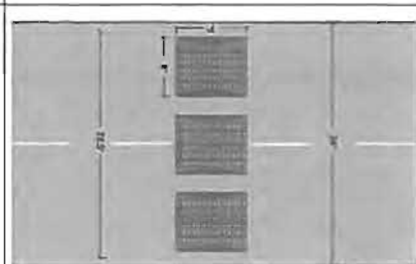
1. The street is located in a residential district.
2. The street has an average volume of fewer than 2,000 motor vehicles per day, more than 85% of which are traveling less than 30 miles per hour.
3. A traffic control device is used to indicate the presence of pedestrians and bicyclists.

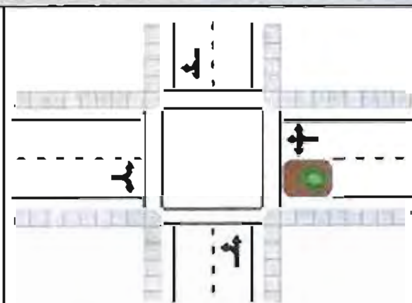
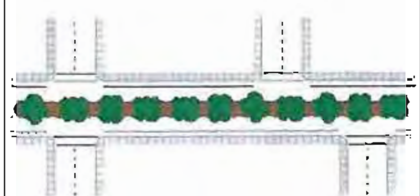
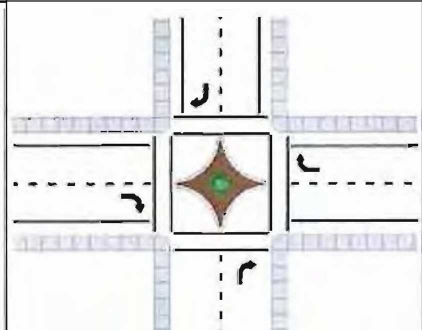
Table 11-1 Neighborhood Traffic Management (NTM) "Tool Box"

NTM Measure	Description	Example	■ Recommended ⊡ Optional □ Not Recommended Functional Classification: Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
Horizontal Deflection							
Bulbout	Curb extension at an intersection that reduces the pedestrian crossing distance by bringing the curb out into the parking lane. Reduces speeds and increases pedestrian safety by reducing crossing distance.		□	⊡	■	■	□
Choker	Midblock pedestrian or landscaped curb extension that narrows the roadway. Reduces speeds and, if designed for pedestrians, increases pedestrian safety by reducing crossing distance.		□	□	■	■	□
Chicane	Curb extensions or offsets along a portion of a roadway. Prevents drivers from taking a "straight shot" down the street, thereby reducing speeds.		□	⊡	■	■	□
Curvilinear Street	Similar to a chicane. A street with a series of 25 MPH reverse curves along its length. Prevents drivers from taking a "straight shot" down the street, thereby reducing speeds.		□	⊡	■	■	■

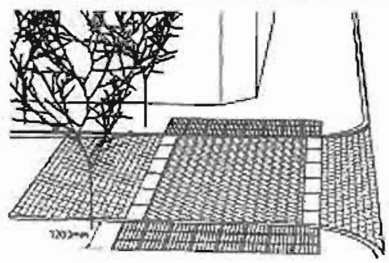
■ Recommended
⊡ Optional
□ Not Recommended

NTM Measure	Description	Example	Functional Classification: Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
Skinny Street	Street with narrower than normal travel lane widths. May involve overlap of parking and travel lanes. Reduces speeds and increases pedestrian safety by reducing crossing distance.		⊡	⊡	■	■	□
Center Median	Median in the middle of the roadway that narrows the adjacent travel lanes. Reduces speeds and increases pedestrian safety by providing a pedestrian refuge.		□	⊡	■	⊡	□
Traffic Circle	A round island in the middle of an intersection. Reduces vehicle speeds and collisions at intersections.		□	⊡	■	■	■
Offset Intersection Alignment	Intersection alignment that requires through traffic to jog left or right. Reduces speeds and cut-through traffic by providing a less direct path.		□	□	⊡	■	■

NTM Measure	Description	Example	Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
			■ Recommended ⊡ Optional □ Not Recommended Functional Classification				
Vertical Deflection							
Raised Crosswalk	Raised pavement surface at a crosswalk location. Reduces speeds and increases pedestrian safety by emphasizing the pedestrian crossing and eliminating the need for pedestrians to step down into the roadway.		□	□	■	■	■
Raised Intersection	Raised pavement surface throughout entire intersection area. Reduces speeds and increases pedestrian safety by emphasizing pedestrian crossings and eliminating the need for pedestrians to step down into the roadway.		□	□	■	■	■
Speed Hump/Table	Raised pavement surface across the entire width of a roadway. Humps are designed so that a vehicle's front and rear wheels travel over the hump at different times. Tables are longer than humps and accommodate a vehicle's front and rear wheels at the same time. Reduces vehicle speeds.		□	□	■	■	■
Speed Cushion	Similar to speed humps but not raised across the entire width of the roadway. Reduces vehicle speeds while allowing emergency vehicles to travel unimpeded due to their wider axles		□	⊡	■	■	■

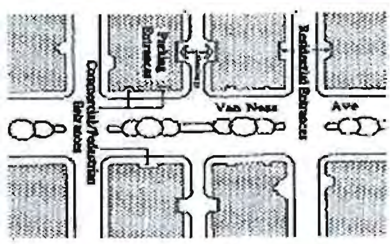
NTM Measure	Description	Example	■ Recommended ⊡ Optional □ Not Recommended Functional Classification Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
Volume Control Measures							
Full/Partial Closure	The complete or partial closure of a roadway to all through traffic by means of a physical barrier. Pedestrian and emergency access usually allowed. Reduces cut-through traffic.		□	□	⊡	■	■
Center Median Barrier	Median in the middle of the roadway that separates vehicles traveling in opposite directions and restricts left-turn movements. Median may extend through an intersection so as to block through movements on cross streets. Prevents cut-through traffic and increases vehicular safety by reducing turning conflicts.		■	■	■	⊡	□
Diverter	A median or other barrier, such as a curb extension, that forces traffic to turn in a particular direction. Reduces cut-through traffic and decreases vehicular conflicts.		□	□	⊡	■	■

■ Recommended
⊡ Optional
☐ Not Recommended

NTM Measure	Description	Example	Functional Classification: Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
One-way Street	A street that accommodates vehicular travel in only one direction. Reduces the number of available travel routes.		☐	☐	⊡	■	■
Other Elements							
Pavement Alternatives	Use of bricks or colored pavement to emphasize pedestrian crossing locations.		⊡	⊡	■	■	■
Entry Treatments	Use of landscaping to delineate and enhance a neighborhood entrance.		☐	☐	⊡	■	■
On-Street Parking	Use of parked cars to buffer pedestrians from moving vehicles and to reduce speeds, particularly on skinny streets where travel lanes and parking lanes overlap and must be shared by moving and parked vehicles.		☐	☐	⊡	■	■

NTM Measure	Description	Example	■ Recommended ⊡ Optional □ Not Recommended Functional Classification: Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
Informational Sign	Use of signs to alert drivers to various hazards.		□	⊡	■	■	■
Stop Sign	Use of stop signs to increase safety and interrupt traffic flow making routes less desirable for cut-through traffic. Typically placed at intersections. Warrants determined by the Manual on Uniform Traffic Control Devices (MUTCD). Not a speed control measure per MUTCD.		□	□	⊡	■	■
Truck Restrictions	Use of "No Truck" signs at key intersections to restrict through truck trips but not local truck trips.		□	□	⊡	■	■
Part Time Restrictions	Use of signs to limit through and/or turn movements during key times, typically during peak hours. Reduces cut-through traffic and facilitates traffic flow during peak hours.		■	■	■	⊡	⊡

NTM Measure	Description	Example	■ Recommended ⊡ Optional □ Not Recommended Functional Classification Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
Signal Timing	Coordination of signals to reduce stops along corridors and delays at intersections. Reduced green time on side streets discourages cut-through travel.		■	■	□	□	□
Police Enforcement	Use of regulatory authority to cite violators for speeding and other traffic infractions, such as illegal turning movements, to reduce such violations in the future.		■	■	■	■	■
Education	Education of the public regarding the hazards of speeding and the impacts of cut-through traffic through public service announcements, direct mailings, and driver education courses.		■	■	■	■	■
Speed ~~Radar Trailer~~ Reader Board	Use of ~~radar trailer~~ speed reader board to measure and display a driver's speed.		■	■	■	■	■
Photo Radar Van	Use of photo radar van to measure a driver's speed and issue speeding tickets for violations.		■	■	■	■	■

NTM Measure	Description	Example	Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
			■ Recommended ⊡ Optional □ Not Recommended Functional Classification				
Neighborhood Speed Watch	Citizen-based traffic management program that allows citizens to identify speeders with speed measuring devices and send them a standardized letter regarding the hazards of speeding.		□	□	■	■	■
Shared Street	A street without curbs where bollards, chokers, and/or landscape elements define vehicle and pedestrian areas. Reduces speeds through shared use of roadway by all travel modes. Originated in Europe.		□	□	⊡	■	■
Short Blocks	Use of shorter blocks to create more intersections and more streets to distribute traffic. Closely spaced intersections reduce speeds and provide more potential locations for stop signs and signals.		□	□	⊡	■	■
Enhanced Major Street Performance	Provision of adequate capacity and connectivity on arterials and collectors to encourage longer trips on these facilities and to discourage cut-through trips on local streets and neighborhood routes.		■	■	□	□	□

IMPLEMENTATION

Successful neighborhood traffic management requires the following:

- A process that identifies, evaluates, and prioritizes traffic management needs.
- Citizen involvement in traffic management measure selection.
- Professional design that considers the safety of all users.
- Funding and implementation of prioritized needs.

The Milwaukie Public Safety Advisory ~~Board~~ Committee is responsible for administering the City's neighborhood traffic management program. This ~~board~~ committee meets once a month and has ~~focused almost exclusively on~~ addressed the enforcement and education aspects of neighborhood traffic management through both the Traffic Safety Program and the Walk Safely Milwaukie Program. Engineering staff ~~will join~~ assist this ~~board~~ committee to improve neighborhood traffic management program coordination and to provide the technical expertise needed for evaluation and implementation of deflection and volume control traffic management measures.

The neighborhood traffic management program relies on citizens to identify neighborhood traffic concerns. This identification process, by its very nature, is reactive. However, the funding level and evaluation process will be deliberate and methodical to allow for equitable and efficient use of limited funds. Any Neighborhood District Association can develop a traffic management plan that identifies more specific issues or needs. The City will endeavor to allocate money each year to undertake selected neighborhood traffic management measures (see Table 11-2). ~~with the expectation that neighborhood district associations will provide matching funding for projects in their district.~~

RECOMMENDATIONS

Figure 11-1 outlines the proposed neighborhood traffic management process for the City of Milwaukie. As shown in this figure, there are multiple points in the process for public input and involvement and a feedback loop at the end to monitor the success of neighborhood traffic management measures that have been implemented.

It is recommended that the City annually fund the neighborhood traffic management program so that prioritized needs are implemented over time. The Neighborhood Traffic Management Action Plan (see Table 11-2) does not identify specific projects, but it does show the level of funding the City ~~proposes~~ aspires to commit to the neighborhood traffic management program for the duration of this plan. With regard to this funding, it is recommended that the City develop a process that ensures neighborhood traffic management funding is equitably distributed throughout the city.

Many of the policy recommendations contained in the Street Design chapter are applicable to neighborhood traffic management as well, the most relevant of which are summarized below.

- **Variety**: Allow for a wide variety of traffic management measures, as identified in this chapter's neighborhood traffic management "tool box."
- **Effectiveness**: Ensure that the chosen measure addresses the identified problem.
- **Landscaping**: Provide for landscaping wherever feasible and practicable.
- **Maintenance**: Consider maintenance needs and issues when designing traffic management measures and ensure long-term maintenance needs can be met.

- **Neighborhood Input**: Provide for neighborhood input when designing traffic management measures.

Figure 11-1 Neighborhood Traffic Management Process

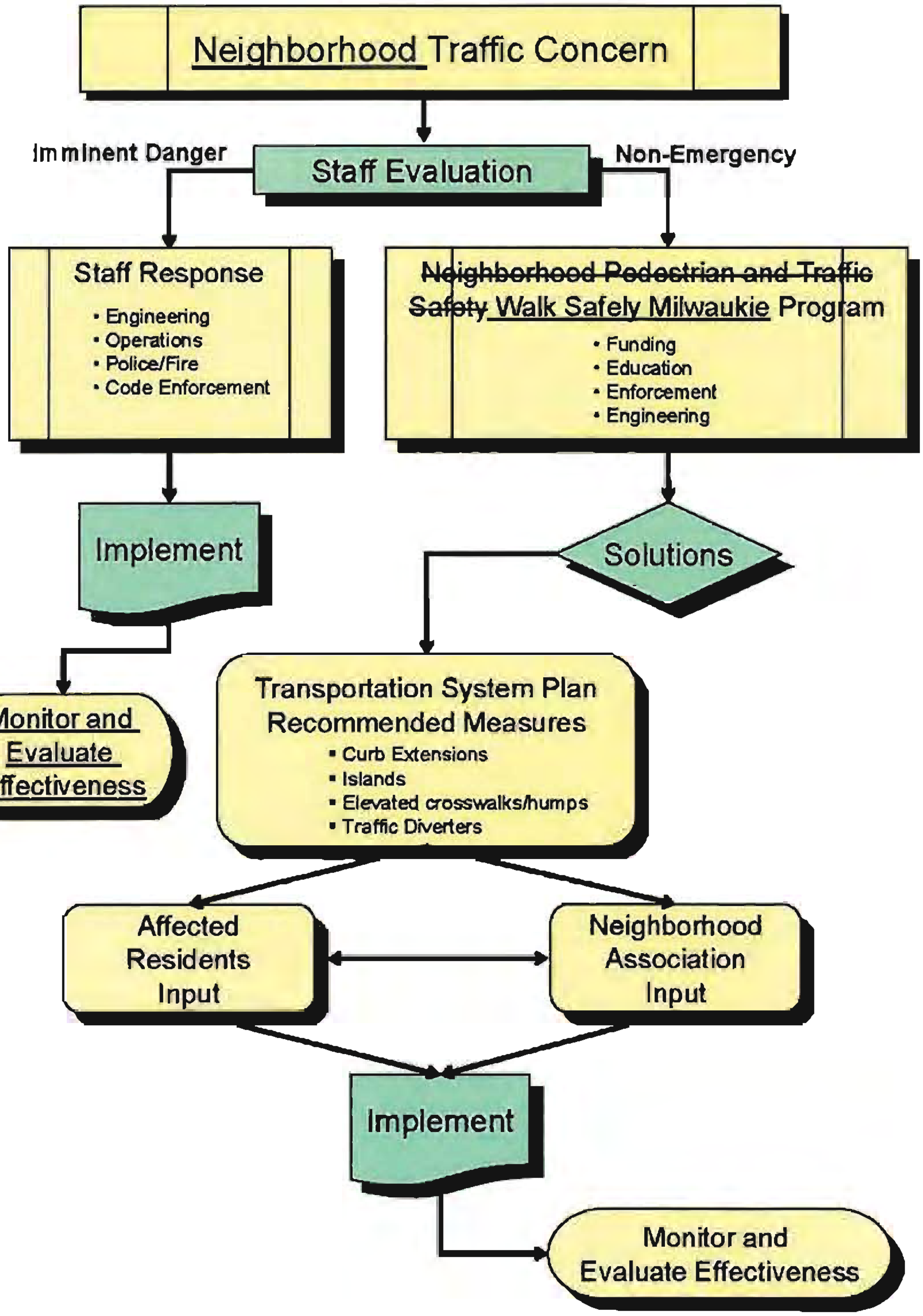


Table 11-2 Neighborhood Traffic Management Action Plan

Project Name	Project Description	From	To	Project Cost~~(s)~~ ($1,000s[2])	Direct Funding or Grant Match
~~Neighborhood Pedestrian and Traffic Safety Program~~ Walk Safely Milwaukie Program	Complete a few small traffic-calming and pedestrian safety projects throughout the city each year.	Citywide	Citywide	$300 ($13 annually)[3]	Direct ~~(with NDA match)~~

[2] Project costs are order-of-magnitude estimates and are in ~~2007~~2012 dollars. Future costs may be more due to inflation. ~~Costing details can be found in the Technical Appendix.~~

[3] Historically, the Neighborhood Pedestrian and Traffic Safety Program received $13,000 annually. In more recent years, the program name changed to Walk Safely Milwaukie and funding was raised to $100,000 annually. Future funding for the program will be evaluated on a biennial basis with the budget.

12 Downtown Parking

The purpose of this chapter is to describe the unique parking needs in ~~downtown~~ Milwaukie, outline some strategies for improving how the City manages and regulates parking, and the policies by which the City will manage and develop parking. It also recommends specific actions the City and downtown businesses can take to both manage parking demand and transition downtown to a less auto-dependent environment. The focus of this chapter is downtown Milwaukie, which is defined as the area covered by the Downtown Zones, and is a subset of the regionally-designated Town Center. But the guiding principles and policies are also directly applicable to the Tacoma St and Park Ave areas, where stations for the new Portland-Milwaukie Light Rail (PMLR) will be constructed. Commuter parking at those station areas could impact the adjacent neighborhoods.

The role of parking in downtown is to support the realization of the *Downtown and Riverfront Land Use Framework Plan*, which envisions a lively downtown area that is a cultural and commercial center for the community, comprised of an exciting and attractive mix of uses and amenities. Additionally, downtown is projected to be the location of significant employment growth (see Chapter 4). People will come downtown to work and to experience an environment that is unique, active and diverse. As a general principle, people do not come downtown to park.

This chapter addresses the needs and strategies associated with several distinct types of parking users:

- Employees
- Commuters (or park-and-riders)
- Downtown residents
- Visitors/customers

TSP GOAL AND POLICY FRAMEWORK

As part of this TSP update, the community developed a set of goals to guide the development of the transportation system in Milwaukie (see Chapter 2). Several of these TSP Goals guide the City's policies on parking in downtown Milwaukie:

- **Goal 1 Livability** guides the City to address spillover parking into residential neighborhoods.

- **Goal 9 Economic Vitality** speaks to the importance of downtown as a hub of commerce and employment.
- **Goal 3 Travel Choices** directs the City to support travel options that allow individuals to reduce single-occupant vehicle trips.
- **Goal 6 Sustainability** calls for the City to decrease reliance on automobile transportation and increase~~ing~~ the use of other modes to minimize transportation system impacts on the environment.
- **Goal 7 Efficient and Innovative Funding** directs the City to identify and develop diverse and stable funding sources to implement recommended projects in a timely fashion.

NEEDS

Parking needs in downtown Milwaukie can be divided into four categories: (1) improving enforcement and permitting practices, (2) managing parking supply as downtown surface lots redevelop and in light of the on-street spaces displaced by the new PMLR, (3) modifying code requirements for parking associated with new development, (4) and improving the parking facilities themselves.

Enforcement and Permitting Practices

Though the City has managed parking in downtown for many years, the~~ relatively recent~~ projected growth of residential~~ units and jobs in~~ and mixed use redevelopment along the PMLR extension through downtown has revealed some distinct needs related to how the City allocates, permits, and enforces public parking~~ areas~~.

~~Though for many years the City's parking permit program has reserved approximately 140-180 parking stalls for permit holders, the system does not work as effectively as it could. Many of the permits are sold to Portland-bound commuters who occupy spaces that would otherwise be used by downtown Milwaukie employees. Many employees have expressed frustration that the permit system is hard to use, and the City has not aggressively marketed the permits to downtown businesses.~~

~~The City has not had clear policy direction on how to manage parking as it relates to residents of downtown and just outside of downtown. Though the 2003 *Downtown Parking and Traffic Management Plan* included many policies, it did not include guidance on how to address the parking needs of downtown residents, nor what mechanisms need to be in place to address parking overflow into the neighborhoods surrounding downtown.~~

It is common practice for many downtown employees to park in short-term on-street spaces and move their car from space to space throughout the day to avoid getting a parking ticket.~~ Though~~ The City's policy (in the Milwaukie Municipal Code) is to enforce against this type of activity (known as "moving-to-evade"), and, in 2009, revisions were made to the "Move-to-Evade" or "Block Rule" ordinance (Milwaukie Municipal Code Section 10.20.080) that allow the City's Code Compliance staff more latitude to cite people who move their cars between short-term spaces during the day~~ staff has not had the tools required to enforce this policy~~.

In 2006, the City mapped all of the parking~~ stalls~~ spaces in downtown Milwaukie and began a regular practice of monitoring parking inventory and permit use. Prior to 2006, without such data, the staff could not identify problems; therefore, for a long time there was no adjusting of time-limit~~ stalls~~ spaces to meet adjacent purposes.

In 2008, the City created information for the public and downtown employees about location, cost, availability, and the purpose of downtown parking lot locations, as well means for utilizing the permit program. This information has been distributed through targeted outreach and direct mailings to downtown businesses, brochures, maps, and website development. In February 2013, the City's Finance Department took over administration of the parking permit program. This shift brings enhancements to the permit program, including selling permits in more than one location (e.g., at City Hall, by mail, on-line), offering flexible payment options (e.g. credit card, automatic deduction), and offering customized permit packages (e.g. monthly, semiannually, annual renewals).

The City has a Residential Parking Permit program, primarily designed for neighborhoods adjacent to the downtown core. An existing traffic regulation (No. 237, adopted in May 1993) provides a straightforward blueprint for defining area eligibility and the process to establish a residential parking permit area. Within Traffic Regulation No. 237, Section 2 (Area Eligibility) sets forth the criteria to initiate the process of establishing a residential parking permit area.

To implement the Residential Parking Permit program, there are three areas that need further clarification from City Council: (1) establishing a fee structure, (2) determining which City department or division will enforce the residential parking permit area (e.g., police or code enforcement), and (3) establishing a penalty structure for violations within the permit area. Further policy development is needed to address the potential parking impacts of mixed use redevelopment in the downtown core. This includes guidance on how to address the parking needs of downtown residents and businesses, as well as what mechanisms need to be in place to address parking spillover.

Management of Future Parking Supply

~~In 2003, the City's *Downtown Parking and Traffic Management Plan* included a forecast of the anticipated impact of future development on the supply of parking. Using land use growth estimates derived from the Downtown Plan, the study anticipated net growth of 68,930 gross square feet over a 10-year period. Using both 2003 and 2006 parking demand estimates, it is forecasted that new growth in downtown will generate demand for 121 to 167 new parking stalls by 2013.~~[4] ~~Table 12-1 summarizes demand projections.~~

~~Table 12-1 Future Parking Demand/Supply Growth~~

~~Year~~	~~Developed Area~~	~~Net Peak Parking Demand~~	~~Rate of Demand~~
~~2006~~	~~341,670 GSF~~	~~660-831 stalls~~	~~1.9-2.43 stalls/1,000 SF~~
~~2013 Estimated~~	~~410,600 GSF*~~	~~781-998 stalls~~	~~1.9-2.43 stalls/1,000 SF~~
~~**Growth**~~	~~**68,930 GSF**~~	~~**121-167 stalls**~~	

~~* Represents future land use scenario established by City of Milwaukie in accordance with the Downtown Milwaukie Land Use Framework Plan. System peak hour is from 11:00 a.m. to 12:00 p.m. Demand numbers reflect demand during this peak hour.~~

With most of downtown's ~~unbuilt~~ buildable land already in use as surface parking, future development will inevitably impact net parking resources. PMLR construction will result in the loss of approximately 50 on-street parking spaces near the new light rail station downtown.

[4] ~~Projections are for new demand for parking stalls. It does not include demand created due to parking stalls lost (and therefore in need of replacement) as new projects are built on existing surface parking lots.~~

While the overall amount of public and private parking is generally abundant today, it will become less so over time.[2]

One of the first needs addressed in this TSP update is the sorting out of who is responsible for providing future parking in downtown Milwaukie. The answer depends on several factors: whether the parking is public or private; is replacing existing parking or serving new uses; is intended for downtown employees, residents, or visitors; and is part of a structure or surface lot. This chapter attempts to clarify how these factors should be considered as the City determines its parking-related responsibilities associated with Downtown Plan implementation.

As evidenced by the North Main Village project, which was built on a former Safeway site near the corner of Main St and Harrison St, new development and infill in downtown Milwaukie will cause existing surface parking facilities to transition to new and denser land uses. The City should take a role as a developer or facilitator of new parking supply if it hopes to accomplish the urban vision outlined in the Downtown Plan. The private sector must also participate in the provision of new parking, and the City should understand how and when it could support businesses in this regard.

Development Code Modifications

The City Zoning ~~Code~~ Ordinance regulates not only building form and use, but also the amount of parking that can and should be built on a site. With the exception of the Downtown Storefront Zone, the City's parking requirements for downtown development ~~is~~ are currently the same as for other sites outside of downtown that are zoned for commercial or office development. The City's current parking standards for new development within the downtown zones are exceedingly variant and in many cases, overly burdensome. The parking requirements can be summarized as follows:

- In the Downtown Storefront Zone (and in the part of the Downtown Office Zone that is north of Washington St and east of McLoughlin Blvd), no off-street parking is required. Parking is allowed, but the applicant determines how much to provide.
- In the other Downtown zones, off-street parking is required. The type of use determines the amount required.[3] Applicants are required to provide between 1 and ~~15~~4 ~~stalls~~ spaces per 1000 sq ft of retail, restaurant, or office area; and between 1 and 1.25 ~~stalls~~ spaces per unit of multifamily residential development.

Currently, the actual demand for downtown parking is fairly evenly distributed between different land uses (e.g. retail, office, and restaurants).[4] This pattern of parking demand does reflect the multiple parking standards currently in place in the City Zoning ~~Code~~ Ordinance, which suggests that specific uses demand specific allocations of parking. A parking utilization study~~ies~~ conducted in ~~2003 and 2006~~2012 indicated that the demand for parking in downtown Milwaukie ~~ranges from 2.0 to 2.43~~ averaged 2.3 ~~stalls~~ spaces per 1,000 gross sq ft.

The ~~development~~ parking requirements that are currently in place may in fact require that a new development provide more parking than is needed by the development. On the relatively small building sites in downtown, such excessive requirements may preclude development altogether due to the high cost of building structured parking.

[2] As described in Chapter 3, the City's ~~October 2006~~December 2012 downtown parking inventory found ~~1,687~~1,828 ~~public~~ parking spaces (~~377~~385 on-street and ~~1,299~~1,443 off-street). Of these, ~~1,029~~1,221 are private parking spaces. During the peak hour (11:00 a.m.-12:00 p.m.), the public spaces are generally 50~~-60~~% full and the private spaces are ~~30 to 40~~42% full. See Figure 3-18 in Chapter 3~~, Figure 3-16~~ for a map of parking in downtown.

[3] The parking requirements vary across approximately 59 use categories. See Milwaukie Municipal Code 19.5600.

[4] See Table 3-11 in Chapter 3~~, Table 3-11~~.

Parking Facility Improvements

Most of the downtown parking supply is located on private surface lots outside of the downtown core (Main St between Scott St and Washington St). In many cases, the lots have inadequate signage, lighting, landscaping, and surface treatments. This is equally true for many of the public lots as well. The poor quality of the existing parking lots limits the ability of the City and the private sector to maximize the use of the existing inventory. Without high quality lighting, attractive physical appearance (i.e., paving, signage, landscaping), and pedestrian connectivity, the underutilization of existing ~~stalls~~ spaces will continue to fuel the perception that there is a shortage of downtown parking.[5]

The issue of pedestrian connectivity should be emphasized. The decision to park in a lot is comprised both of the assessment of the lot condition and the experience of walking to and from that lot. Without a safe, attractive, and convenient sidewalk system that connects all lots to all downtown destinations, the City will miss serving a certain percentage of would-be permit parkers who elect not to participate because of perceived safety issues. In Milwaukie, which has a complete sidewalk system downtown (see Figure 3-2 in Chapter 3), the need leans more toward safety than convenience. For example, many downtown sidewalks are not well lit, and many lack pedestrian amenities like street trees, benches, and trash cans.

STRATEGIES

There are two strategies for addressing the needs described above. The first is to adopt and implement a set of Downtown Parking Guiding Principles or Parking Management Principles, which establish a policy framework for the City's decision-making on downtown parking-related issues. The second strategy is to adopt and implement a set of Parking Operating Principles, which will direct City staff or its representatives in the day-to-day operation of the parking system.

As the City is not yet prepared to abide by these principles, a set of recommendations is included in the next section of this chapter. These recommendations will enable the City to effectively transition from its current practices to those described in the two sets of principles.

Downtown Parking Guiding Principles (Parking Management Principles)

"Guiding Principles for Managing Downtown Parking" were initially developed in 2003 as part of the *Downtown Milwaukie Downtown Parking and Traffic Management Plan*, and were confirmed and updated during the 2007 TSP update process. Although the 2003 set of Guiding Principles provides a relatively comprehensive framework for managing downtown parking, the 2007 TSP update refined the Principles and filled in a few gaps. For example, the 2003 version did not address downtown residential parking, nor were the principles regarding downtown park-and-rides sufficiently refined. The following 23 principles describe a complete and state-of-the-industry set of principles for managing parking in downtown Milwaukie:

Customer/Client/Vendor/Visitor Parking

1. The most convenient parking spaces should be reserved to support customer/client/ vendor/visitor access to downtown. Management of the on-street parking system should promote customer/visitor accessibility by prioritizing the parking of short-term patrons in downtown Milwaukie.

[5] Private lots are not currently utilized for public parking, but shared use arrangements are recommended and the physical state of the private lot will affect its marketability to potential users.

2. The City of Milwaukie should take the lead role in providing sufficient short-term parking to support the retail environment described in the *Downtown Plan*. The on-street system is therefore not intended for employee, resident, or commuter parking during normal business hours.

3. On-street parking in the downtown core should support street level activities. The provision of on-street parking on Main St should not be sacrificed for street capacity enhancement or vehicular through-put.

4. The City should enforce against long-term parkers (typically employees) who move their vehicles during the day to evade being cited for parking in short-term ~~stalls~~ spaces.

Multimodal Access

5. The City should strive to implement downtown travel options to provide a balanced system that includes public transit, automobile, bicycle, and pedestrian facilities and services for all downtown users.

6. Parking management strategies and programs should support, complement, and consider the availability and use of all access modes.

Employee Parking

7. City-controlled off-street lots should be managed to meet use demand using the 85 Percent Full Standard (85 PFS).[6] All parking lot management strategies should be coordinated with transportation demand management objectives to ensure that employees and customers have reasonable options for access.

8. Whether in on-street subareas or in off-street lots, wherever parking exceeds the 85 PFS, employee parking should be eliminated/phased out first. This is so the City can accommodate visitors and customers at all times. Businesses that have designated private employee parking lots should be encouraged to do the same, wherever possible. The City should help businesses understand and utilize demand management strategies to help employees transition to alternative modes of travel over time.

9 The City should provide clear and consistent information about downtown parking to optimize utility and convenience for all users.

10. The City should support downtown business efforts in transitioning more downtown employees into alternative modes (i.e., transit, bike, walk, ride-share) through business-based programs and incentives.

Park-and-Ride/Public Transit

11. Providing parking for downtown customers, visitors, and employees is a higher priority than providing parking for commuters destined for other cities.

12. Park-and-ride lots should be located outside the downtown core.

13. Bus staging in the downtown should have minimal impact to on-street visitor parking. Buses should serve downtown, but should not stage on downtown streets. The purpose and priority for transit stops in the downtown area is to provide safe, convenient, business-friendly access for downtown users, customers, and employees.

[6] Refer to page 12-8 for an explanation of the 85 Percent Full Standard.

14. While transit park-and-ride structures are discouraged downtown, the City may allow for the provision of such a structure should it dedicate some ~~stalls~~ spaces for downtown parking and lead to future control/ownership of the facility by the City for public parking exclusively or predominantly.

Quality of Parking

15. All downtown parking, whether public or private, should be safe, secure, well lit, and maintained to enhance the users' sense of safety and security.

Residential Parking

16. The downtown parking supply should be managed to minimize parking impacts on adjacent residential neighborhoods.

17. Downtown residential development should be responsible for providing on-site parking, or negotiating parking availability in off-street lots, for new residential units.

Publicly Managed Parking

18. Over time, the City anticipates that its off-street lots will redevelop and City-owned or -leased surface parking lots will gradually disappear. The City will attempt to continue to accommodate the commercial and residential buildings whose tenants are, as of ~~December 2007~~ November 2013, making use of City off-street lots. The City will continue this practice as long as public off-street spaces are available.[7]

19. Downtown Milwaukie employees are the highest priority customers in the City's parking permit program. As the permit system approaches capacity (i.e., spaces become unavailable for new applicants), the City should revoke parking permits issued to commuters as necessary, and refrain from issuing new permits to commuters.

20. The City supports the provision of a structured public parking facility for visitor and employee parking. Due to the expense of structured parking and the benefit structured parking would provide to downtown businesses, the City should commence planning for structured parking only in collaboration with the downtown business community and only after a viable funding strategy is identified.

21. The City supports shared use of parking areas, including public lots, when there is no conflict in operating hours.

Parking Requirements for New Development

22. Parking requirements for new development should contain needed parking on-site or through shared parking agreements.

23. New parking supply should be located within structures that contribute to the design and activity of downtown whenever possible.

Parking Operating Principles

Parking Operating Principles define the day-to-day operating priorities for managing parking in the Downtown Zones. The Operating Principles provide specific direction for addressing issues that will occur in the system, which should assist the City in following the Guiding Principles.

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[7] The term "City lots" in this recommendation excludes the lots adjacent to the Ledding Library and City Hall.

85 Percent Full Standard (85 PFS)

The first and most important piece of the Operating Principles is the 85 Percent Full Standard (85 PFS), and is therefore discussed separately here. The 85 PFS is an industry-based management standard for understanding the sufficiency of parking supply in a specified and limited area. The standard establishes a rule for when to make on-the-ground adjustments: when parking ~~stalls~~ spaces in specified and limited areas are routinely 85% full during the peak hour, the City should implement a more aggressive strategy to assist priority users in finding parking.[8]

Because downtown Milwaukie is relatively small, the 85 PFS should be applied beyond a "hot-spot" basis. That is, as small areas of downtown redevelop or become more popular, consideration should be given to parking utilization beyond the immediate parking impact area Nearby parking utilization should also be considered, due to the compactness of downtown and the Downtown Plan's emphasis on high quality pedestrian amenities and walkability.

However, when the 85 PFS is reached, there are many Operating Principles the City can apply in electing how to respond. These are described below, and are followed by the rest of the Operating Principles.

- **At 85 PFS:** Work with downtown employers to advertise and inform employees about how to use the City permit system and where parking is available.~~; and/or~~
- **At 85 PFS:** Enforce against employees or TriMet patrons who use spaces intended for visitors to downtown businesses.~~; and/or~~
- **At 85 PFS:** Modify the availability of on-street parking for short-term visitors or long-term permit holders, depending on the need of the adjacent building occupants.~~; and/or~~
- **At 85 PFS:** Increase permit prices.~~; and/or~~
- **At 85 PFS:** Invest in lighting, landscaping, and other amenities to make other parking areas, and the walk to them, more attractive.~~; and/or~~
- **At 85 PFS:** Acquire or construct new parking supply.~~; and/or~~
- **At 85 PFS:** Work with employers and TriMet to decrease the need for downtown employees' and patrons' need to drive to and park in downtown (implement Transportation Demand Management measures).

Additional Operating Principles are as follows.

- Short-term parking is defined as parking with time-stays less than or equal to four hours.
- Parking management may include strategies for modified pricing levels for short- and long-term parking, user types, or lot locations.
- The City will manage on-street parking spaces to primarily serve the ground-floor use of adjacent properties.
- There will be no unregulated on-street parking in downtown zones.

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[8] One possible consequence could be that no strategies need to be implemented if the utilization level is deemed acceptable. However, the trigger provides a proactive system of review and provides time to implement parking management strategies before overly constrained conditions occur.

- As long as spaces are available, off-street parking in downtown will be operated for the benefit of visitors, employees, and residents of downtown Milwaukie.

- Residential use of public off-street parking lots will be limited to nonbusiness hours (nights and weekends in some locations).

- Over time, public off-street parking will be transitioned to serve a higher mix of short-term visitor parking demand. Alternative mode options will be developed to support this transition.

- Except where residential parking permit zones are established, ~~O~~on-street parking outside of the downtown zones (i.e., in adjacent residential areas) will be unregulated but enforced by complaint only.

- If parking spillover from the downtown zones, or from the future light rail station areas (at Tacoma St and Park Ave), results in inadequate parking availability ~~outside of the downtown zones~~ in the neighborhoods adjacent to these areas, the City will facilitate the establishment of residential parking permit zone programs upon the request and support of the affected neighborhood(s).[9]

The application of both the Guiding Principles (Management Principles) and the Operating Principles will result in a parking distribution pattern that places each parking user in the location that best supports the goals of the Downtown Plan. As illustrated in Figure 12-1, visitor parking is provided in the retail core, employees are directed to public lots, park-and-ride commuters are moved to the downtown fringe, and residential neighborhoods are protected from spillover effects.

The goal is a clear and predictable downtown parking system, as summarized in Table 12-~~2~~1. The Guiding Principles account for each of the different types of parking users and the three types of parking ~~stalls~~ spaces potentially available to them. Additionally, Transportation Demand Management Tools are diligently designed into the parking management system, varying slightly depending on the user type.

[9] See recommendation on page 12-14~~3~~3 for detail.

Figure redesigned for clarity and simplicity

Figure 12-1 Diagram of Parking Type Locations

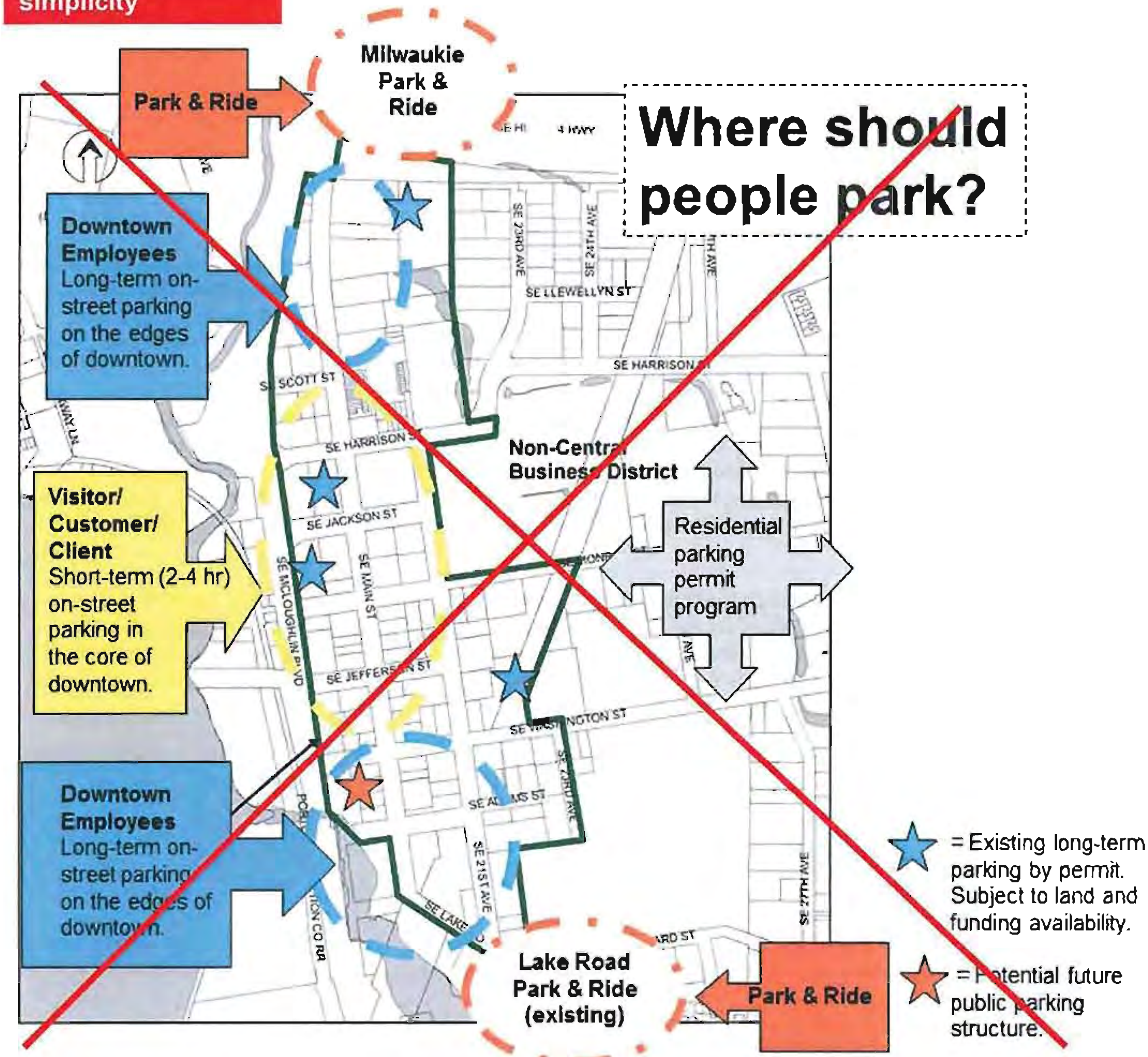

Table 12-~~2~~1 Parking Facility Priorities by Parking User Type

Parking User Types	Parking Facility Type			Transportation Demand Management Tools
	On-Street Parking	Off-Street Public Parking	Off-Street Private Parking	
Visitor/Customer/ Client	**Priority** 2-hr and 4-hr parking	**Allowed** Subject to land and funding availability	**Allowed** On-site parking controlled by property owner	• Transit • Bike parking • Pedestrian access and amenities
Downtown Employees	**Limited** • When not needed for adjacent retail/ restaurant • By permit only • Subject to 85% rule	**Priority** • Subject to land and funding availability • Priority to occupants of buildings existing in 2007 • Locations may shift over time as downtown develops • Subject to 85% rule	**Allowed** • On-site parking controlled by property owner • Shared parking arrangements encouraged • Private paid parking lots are allowed • New office/ commercial devel-opment required to supply 0-2.5 ~~stalls~~ spaces/1,000 sf[10]	• Transit passes • Bike parking • Encourage carpooling • Flexible parking permit options
Downtown Residents	**Limited** • After hours only	**Limited** • After hours only	**Allowed** • On-site parking controlled by property owner • Shared parking arrangements encouraged • Private paid parking lots are allowed • New residential development required to supply parking	• Transit passes • Bike parking • ~~Flexcar~~ Car-sharing • More services in downtown, requir-ing fewer trips to destinations outside downtown
Park-and-Ride (to Portland)	**Not Allowed**	**Limited** • Restricted in the core downtown area • Conditionally allowed in a parking structure • Must support downtown activity over the long term	**Allowed** • On-site parking controlled by property owner	• ~~Milwaukie~~ Southgate park-and-ride (opened 2010)[11] ~~to open 2008~~ • ~~Existing park-and-ride on~~ Lake Rd park-and-ride (existing) • Improve E-W bus connections to downtown Milwaukie

[10] Downtown parking required for new development will be analyzed and potentially revised during the 2013-14 "Moving Forward Milwaukie" project.
[11] The future of the Southgate park-and-ride is unclear once the PMLR opens in 2015. The City prefers that the Southgate site transition into operation as a parking lot for local employees.

RECOMMENDATIONS

The City should move to apply the Guiding Principles and Operating Principles. This will be easier to do with the implementation of certain policy recommendations, operational improvements, and capital projects.

Policy Recommendations

Adopt new parking development standards for commercial development in the downtown zones.

Amendments should create a unified parking standard for downtown commercial and office uses that does not require more parking ~~stalls~~ spaces than are needed. The revised code should encourage shared parking agreements and acknowledge on-street parking as a resource for downtown businesses.[12]

- Amend the Code to eliminate minimum parking ratios for commercial/retail uses in Downtown zones. This will enable the market to determine minimum parking levels for new commercial development, meaning that the City will allow new office and retail to be built in downtown Milwaukie without attendant parking (which supports the Downtown Plan's emphasis on the use of precious urban space for people and activity and not parking lots).
- Amend the Code to establish maximum surface lot parking ratios of 2.5 ~~stalls~~ spaces per 1,000 sq ft for all commercial uses within the downtown zones (which would cover office, retail, personal service, restaurant, auto, government, bowling, church, fraternal organization, gym, and funeral home uses, which are each listed separately in the current code). This will prohibit development that requires large surface parking lots, supporting the Downtown Plan's emphasis on a compact and interesting urban environment.

  Maximum parking ratios for parking provided in structured ~~stalls~~ spaces are not recommended if they meet the City's development standards and design guidelines.

Adopt new parking development standards for residential development in the downtown zones.[12]

Given that the on-street system in downtown is prioritized for customer/visitor use, the vision to bring greater levels of new residential development (over retail) to downtown will create potential conflicts for access to on-street parking. To mitigate this and assure that residential parking is available in downtown and on-street parking remains available to customers and visitors, the City should amend the Code as follows:

- ~~Establish a minimum surface parking lot requirement of 1 space per unit.~~
- ~~Establish a maximum surface parking lot requirement of 2 spaces per unit.~~
- Require no maximum parking allotment within structured parking facilities.
- To accommodate residential development that cannot incorporate parking into development sites (i.e., for reasons of site size, geometries, etc.), allow for requirement exceptions through approval of a transportation management and trip reduction plan.

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[12] Downtown parking required for new development will be analyzed and potentially revised during the 2013-14 Moving Forward Milwaukie: Enhancing Our Commercial Districts project.

- Prohibit the creation of residential on-street parking permit programs within the Downtown Zones.

Adopt ~~a framework for Residential Permit Zone(s) in neighborhoods adjacent to the Downtown Zones~~ an action plan to fully implement the Residential Parking Permit program by 2015.

As ~~the downtown grows~~ the new PMLR begins to affect the City's core and the neighborhoods near PMLR station areas at Tacoma St and Park Ave, and as land uses intensify, conflicts for parking in adjacent residential neighborhoods ~~adjacent to downtown~~ will likely occur as downtown users begin to spill over in the residential areas. In response, it is recommended that the City develop and enact an action plan to fully implement a Residential Parking Permit Zone program. ~~facilitate Residential Parking Zones (RPZs) at the request of affected neighborhoods. The City should adopt an approval framework for establishing an RPZ. The following elements of such a framework are provided as a basis to begin discussions with neighborhoods:~~

- ~~Affected neighborhoods, coordinated through Neighborhood District Associations, petition the City for creation of a RPZ by formally polling affected residents within a boundary.~~
- ~~If 51 percent of affected residents within a boundary poll in favor of a RPZ, the City could then move to implement a permit program.~~
- ~~At that time, a formal RPZ boundary would be established and any parking between the hours of 8:00 a.m. and 5:00 p.m. (Monday - Friday) would be limited to two hours unless by displayed permit.~~
- ~~Permits would only be available to residents with addresses in the RPZ zone and only to vehicle license numbers with addresses in the RPZ zone.~~
- ~~A "guest pass" program would be established to accommodate visitors to residential properties within the zone.~~
- ~~A system for determining cost to the City and the neighborhoods would be established prior to implementing the program. Costs will include creation and replacement of signage, permit creation and processing, and enforcement.~~

~~Strengthen the Move-to-Evade Enforcement Policy~~

~~The City should revise the "Move to Evade" ordinance (10.20.080) to allow the City's Parking Manager more latitude to cite people who move their cars between short-term stalls during the day.~~

Operational Projects

Public Information and Marketing

- ~~Create and~~ Continue to distribute information to the public and downtown employees about location, cost, availability, and the purpose of downtown parking lot locations, as well means for utilizing the permit program. This can be accomplished through such efforts as targeted outreach to downtown businesses, mailings, brochures, maps, and website development.
- Create a transportation information package for downtown employees, to include public parking, transit, and biking information.

- Promote Metro's online tool, "Drive less. *Connect*," (through the Regional Travel Options program) that promotes a ride-matching service connecting carpoolers and bike buddies. Since its launch in 2011, commuters have avoided using approximately 50,000 gallons of gasoline and saved roughly $308,000 collectively by joining carpools, biking, and riding transit.

Active Parking Management

The City should dedicate appropriate resources for actively managing downtown and station-area parking and the ripple effects into adjacent neighborhoods. This will include tools and staffing to enforce on-street parking time limits, maintain the downtown parking inventory map, and continue coordination between City departments. Active management further entails working with constituent groups (e.g. business owners, residents, and employees) to educate them about City policies and build their capacity to utilize alternative delivery models and modes, such as the formation of a Transportation Management Association and use of regional ride-share modalities.

Improve Parking Permit Program

Improvements to the City's Parking Permit Program can increase the use of off-street spaces that are currently underutilized. By moving employees who currently park on-street into off-street lots, valuable on-street ~~stalls~~ spaces can be freed up for customer or visitor use.

~~Improve/Streamline the Process for Purchasing Permits~~

~~Make purchasing parking permits easier and more convenient. Enhancements to the permit program could include selling permits in more than one location (e.g. at City Hall, by mail, on-line), offering flexible payment options (e.g. credit card, automatic deduction) and offering customized permit packages (e.g. monthly, biannually, annual renewals).~~

Implement "Tiered Pricing"

Currently the City charges the same amount for all parking lots. As such, parking is not priced according to demand or proximity to "premier" destinations. Tiered pricing would set rates based on lot popularity. For example, a lot with occupancies over 85% would be priced higher than lots with significantly lower rates of utilization. Lots on the fringe of the downtown would be priced lower than more popular lots located in the core retail area.

Parking Utilization Monitoring Program

No less than every two years, City staff should count the parking supply and peak-hour parking utilization. With the results of this information, the Parking Manager or designated staff should convene a meeting of stakeholders to review the results, check areas against the 85 PFS, and evaluate the need for any actions (e.g., redesignating short-term or long-term parking, modifying short-term parking durations, or adjusting the allotment of permits for Portland-bound commuters).

Identify Locations for Future Public Supply

As City-owned parking lots transition to more dense land uses, the City should continually consider the prospects for new parking supply for downtown employees.

Engage Owners of Private Parking Facilities to Provide Shared Parking

City staff should initiate a program to develop shared use agreements with owners of off-street private parking. The agreements should be developed for both employee parking and special event parking. The City or a downtown business association can take the lead in contacting property owners or developing incentives such as facility upgrades (e.g., lighting, striping, pavement, landscaping), leasing arrangements, revenue sharing, or public purchasing. Shared parking arrangements could be arranged between two private parties, or between private parties and the City.

Evaluate Funding Strategies for New Supply

The City should begin to discuss and evaluate potential funding sources for future public parking supply. These discussions with downtown stakeholders should assure that the final recommendations have broad support within the downtown community. Most public parking facilities developed in other jurisdictions are funded with multiple sources that include urban renewal/tax increment financing, parking fees and charges, meter districts, local improvement districts, capital fund allocations, and bonding.

Capital Implementation Projects

Signage Changes

Over time, distinctive, friendly, and clear customer/visitor parking signs should be designed and installed at all short-term public parking lots. The signs should be "blade" signs with information on both sides so that downtown patrons can read the signs from either direction.

Upgrade Public Parking Lots

The City should maintain the pavement, lighting, and landscaping of its off-street public parking facilities to ensure a safe and attractive appearance.

Implement the Public Area Requirements

Implementing the Public Area Requirements of the Downtown Plan will result in wider, continuous sidewalks with appropriate lighting. These improvements will help address concerns about walking several blocks between a parking lot and a destination

Master Plan

Table 12-~~3~~2, the Downtown Parking Master Plan Projects~~ List~~, summarizes the key projects needed to implement the recommendations in this chapter. Many of the projects related to the operation and maintenance of the City's parking program may be self-funding through parking permit fees and parking fines.[13]

Table 12-~~3~~2 Downtown Parking Master Plan Projects~~ List~~

Priority	Type	Project Name	Project Description	Cost(s) $1,000s[14]
High	O	Downtown Parking ~~Enforcement~~ Management	Implement a downtown parking management system, including a dedicated parking manager.	$40
~~Med~~ High	C	Public Parking Structure	Construct 3- to 4-story public parking structure with retail at ground floor for visitor/employee parking.	~~$10,000~~11,000

[13] This source of funding is not included in the TSP transportation funding forecast (Chapter 13).

[14] Project costs are order-of-magnitude estimates and are in ~~2007~~2012 dollars. Future costs may be more due to inflation. ~~Costing details can be found in the Technical Appendix.~~ In the case of operational projects, estimated costs are for the entire 22-year planning period.

~~Med~~ High	C	Downtown Parking Signage	Install wayfinding and identification signage at McLoughlin Blvd intersections and around public parking lots.	$10
~~High~~Med	C	Downtown Streetscape Improvements	Install sidewalk bulbouts, lighting, and pedestrian amenities.	~~$6,700~~7,300
Med	C	Downtown Public Parking Lot Improvements	Upgrade and maintain off-street public parking facilities with improved landscaping and lighting.	$~~50~~60

Notes:
C = Capital Project High = High priority
O = Operational Project Med = Medium priority
P = Policy Project Low = Low priority

Action Plan

The Downtown Parking Action Plan (Table 12-3) identifies the highest priority projects that are reasonably expected to be funded with local funds by ~~2030~~2035, which meets the requirements of the State's Transportation Planning Rule.[15] The action plan project list is ~~the result of~~ based upon a 2007 citywide project ranking process. In 2007, ~~A~~all of the modal master plan projects were ranked by the TSP Advisory Committee after consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added. ~~The highest-ranking downtown parking projects that are reasonably expected to be funded (see Chapter 13) with local funds are shown in Table 12-4.~~

Table 12-~~4~~3 Downtown Parking Action Plan

Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Downtown Parking Management	Implement a downtown parking management system, including a dedicated parking manager.	Downtown	Downtown	$40	Direct
Downtown Parking Signage	Install wayfinding and identification signage at McLoughlin Blvd intersections and around public parking lots.	Downtown	Downtown	$10	Direct
~~Downtown Streetscape Improvements~~	~~Install sidewalk bulbouts, lighting, and pedestrian amenities.~~	~~TBD~~	~~TBD~~		~~Match~~

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

13 Funding and Implementation Plan

The purpose of this chapter is to describe the funding framework for considering City of Milwaukie transportation improvements between ~~2008 and 2030~~2013 and 2035. This chapter outlines the foreseeable funding sources—and their restrictions—for both capital improvements and transportation maintenance projects. This chapter also provides a brief overview of additional funding sources.

CURRENT FUNDING SOURCES

The City of Milwaukie relies on a variety of funding sources for maintaining and improving its transportation infrastructure. Most of these sources are constrained, meaning that they can only be used for a specific function like expanding the system's capacity, paving the streets, or building bicycle facilities. The funds also flow into Milwaukie from a variety of sources, most of which are tax-based and administered through different levels of government and through different mechanisms.

Types of Transportation Funding Sources

The City has identified ~~11~~10 transportation funding sources that are currently ~~and potentially~~ available:[1]

Grant/Competitive Programs

- **Metropolitan Transportation Improvement Program (MTIP)** identifies how all federal transportation money is to be spent in the region in two-year increments. Each time the MTIP is developed, Milwaukie competes with other jurisdictions in the region for federal "regional flexible funds" that can be used for most aspects of the local transportation system.
- ~~**Congressional Appropriations** make federal funds available to Milwaukie through the sponsorship of a U.S. congressperson. Such appropriations are highly sought after and are not easily secured. However, Milwaukie has had some success in receiving appropriations.~~
- **Statewide Transportation Improvement Program (STIP)** is ODOT's project funding and scheduling document. The STIP makes funds available to cities, through a highly competitive process, for expansion, preservation, safety, and other system enhancements.

[1] This list includes federal funds that are not part of the City's regular revenue stream for transportation improvements.

The STIP ~~programs~~ makes expenditures from both State revenues and some federal programs.

City Share of State Highway Trust Fund

A portion of the taxes and fees assessed on Oregon motorists and freight haulers is paid to the City annually on a per capita basis. The primary sources are the State motor vehicle fuel tax, a weight-mile charge on heavy trucks, and vehicle registration fees. ODOT requires that cities set aside 1.0% of ~~of~~ the local share of Highway Trust Fund proceeds for the construction and maintenance of bicycle facilities.

Local Funds—Fees and Taxes

- **Franchise Fees** are paid by each of the City-owned facilities—water, wastewater, and stormwater—to the City's Street Fund for their use of the public right-of-way. The utilities are able to pay the franchise fee with some of the revenue they collect from Milwaukie utility rate-payers.
- **PGE Privilege Tax** is similar to the franchise fees, in that Portland General Electric pays the City for its use of the public right-of-way. As part of the City's Street Surface Maintenance Program, a portion of this fee is dedicated to surface maintenance for the city's most important streets.
- **Local Gas Tax** is separate and apart from the State gasoline tax. Milwaukie gas stations pay a tax on fuel sold in Milwaukie, which is sent to the City for street maintenance use only.
- **Street Surface Maintenance Fee** is similar to a utility bill, in that all Milwaukie properties are charged a monthly fee for use of the street system. These fees are dedicated for street maintenance use only.
- **Local Improvement Districts (LIDs)** are special assessment districts in which property owners benefiting from a transportation improvement pay for that improvement. These have not been frequently used by the City, but are available to interested property owners.

Local Funds—Development Contributions

- **System Development Charges** are collected from developers when new construction is expected to place heightened demand on the transportation system. The vast majority of these monies can only be used by the City for adding capacity to the system.
- **Fee In Lieu of Construction** is collected when required street frontage improvements, typically associated with residential construction, are impractical to build. These funds are limited in both how and where they can be spent.

Details About Specific Funding Sources

The following section provides additional detail about most of these sources, particularly those that the City can rely on regularly. The regular revenue stream projection provides the baseline for the Funding and Implementation Plan in this TSP.

Most of these funding sources can be (and have been) used by the City to leverage one another and additional sources. As transportation improvements are expensive and the competition for transportation dollars is fierce, the City must utilize the funds it regularly receives as "match" for larger awards, which are typically available through federal grant programs. The complete transportation funding picture for the City therefore requires that regular revenues cover maintenance, operations, small projects, and matches for larger capital projects that the City cannot accomplish without an infusion of funds for the specified project. The Funding and Implementation Plan follows this premise throughout.

~~Table 13-1 summarizes the current, anticipated, and approved funding sources and the estimated revenue available to the City of Milwaukie for transportation-related projects over the next 22 years. Total projected revenues over the next 22 years are approximately $3.75 million for capital projects, $22.9 million for maintenance projects, and $33.4 million for either capital or maintenance projects.~~

System Development Charges and Fee In Lieu of Construction

A transportation System Development Charge (SDC) is collected from developers when new construction or redevelopment is expected to place new demands on the transportation system. The SDC charge is based on a study-based rate and the number of new vehicle trips the development is expected to generate. The City's current SDC rate is $~~1,596.52~~1,676 per new p.m.-peak-hour trip. The transportation SDC consists of a reimbursement charge and an improvement charge. The improvement charge portion is roughly 95% of the total SDC and can only be used to construct transportation projects that add capacity.

Fee in Lieu of Construction (FILOC) is collected from developers in lieu of construction when required frontage improvements would not be practical, efficient, or beneficial to construct. For example, constructing an isolated sidewalk in the middle of a residential block where no sidewalks currently exist has minimal impact. However, pooling fees collected in lieu of required frontage construction enables the City to build improvements where they are most needed in the neighborhood in which they were collected, such as along identified bikeways, walkways, or school routes.

SDC and FILOC revenue varies based on the level of new development, so it is difficult to accurately forecast the amount of money that will be available from these sources. For example, ~~O~~over the past ~~five~~three fiscal years, SDC and FILOC revenue has been lower than in previous periods, averag~~ed~~ing only approximately $~~170,000~~11,100 per year (in ~~2007~~2012 dollars). Based on an assumption that the easing of the recent national recession and the opening of the new light rail line in 2015 will result in at least a slight increase in development activity in the future, ~~T~~the projected revenue from ~~these sources~~ SDCs and FILOC over the next 22 years is estimated to be $~~3.75 million~~745,600, with $444,500 already in hand from past FILOC collections, for a total of nearly $1.2 million.

Franchise Fees

Each of the three City-owned public utilities—water, wastewater, and stormwater—pays 8% of its net revenue to the Street Fund for the use of the public right-of-way. For the fiscal year ~~2006/2007~~2011/2012, the Street Fund received $~~546,650~~448,000 from such franchise fees. Franchise Fee projected revenue is expected to provide $~~12~~23.7 million over the next 22 years and is not restricted to either capital or maintenance projects.

State Gas Tax and Vehicle License Fees

The State of Oregon collects taxes and fees on motor vehicle fuel, licenses, and permits and then deposits the proceeds into the Highway Trust Fund. A portion of this fund is paid to cities annually on a per capita basis. By statute, the money may be used only for road-related purposes. Like most Oregon cities, Milwaukie uses its share primarily for street department operations and associated maintenance activities. Road maintenance includes a variety of activities such as striping, signage, sweeping, and shoulder maintenance.

Oregon motor vehicle fuel taxes are collected as a fixed amount per gallon of gasoline sold. The Oregon gas tax is currently 30 cents per gallon, increased from 24 cents per gallon on January 1, 2011~~and has not increased since 1993~~. Because it is levied on a per gallon basis, the revenue does not vary with changes in gasoline prices. Since ~~there has been no~~ increases do not keep up with inflation ~~since 1993~~, the value of this revenue has eroded over time as maintenance materials and repair costs have increased. Additionally, increased fuel efficiency in new vehicles has further reduced the total dollars collected relative to total miles driven.

Oregon vehicle registration fees are collected as a fixed amount at the time a vehicle is registered with the Department of Motor Vehicles. Vehicle registration fees in Oregon have recently increased to about $43 per year per vehicle~~from $15 per vehicle per year to $27 per vehicle per year for passenger cars, with similar increases for other vehicle types~~. Vehicle registration fees are not adjusted for inflation

In fiscal year ~~2006/2007~~2011/2012, the City received roughly $~~961,000~~1,110,000 from the Oregon Highway Trust Fund. The City's projected share of this fund is approximately $~~21~~27.1 million over the next 22 years.

These funds are flexible and are available for either capital or maintenance projects.

Bike Path Fund

One percent (1.0%) of the payments from the Highway Trust Fund must be reserved for the maintenance and construction of bicycle facilities. In fiscal year ~~2006/2007~~2011/2012, the City received $~~9,711~~11,110 from this revenue source and expects to receive $~~215,000~~271,600 over the next 22 years. Although these monies may only be spent on bicycle facilities, they are classified as unrestricted because they can contribute to capital or maintenance projects.

Street Surface Maintenance Fee

The street maintenance fee is paid by all City of Milwaukie utility customers (residents, businesses, government units, etc.) through their utility bill and is based on an estimate of daily trips generated by each customer. In fiscal year 2011/2012, revenues were approximately $609,000, and the fee is expected to generate $13.4 million over the next 22 years. Monies collected from this fee are dedicated to the Street Surface Maintenance Program (SSMP) for roadway surface preservation, including maintenance, rehabilitation, and reconstruction. They cannot be used to construct capital projects.

Portland General Electric (PGE) Privilege Tax

Similar to franchise fees, the PGE Privilege Tax is paid by a utility (in this case PGE) in exchange for the use of the public right-of-way. The rate approved by the Milwaukie City Council is 1.5% of Milwaukie customers' bills. ~~Because PGE payments to the City are based on a calendar year, the City will receive one-half of~~In fiscal year 2011/2012, the~~estimated annual~~ City received revenue of $~~300,000~~324,400 from this source~~in the first program year~~. Revenues for the next 22 years are projected to total nearly $~~6.8~~7.7 million. Monies collected from this tax are dedicated to the Street Surface Maintenance Program (SSMP) for roadway surface preservation, including maintenance, rehabilitation, and reconstruction. They cannot be used to construct capital projects.

~~Street Surface Maintenance Fee~~

~~The street maintenance fee is paid by all City of Milwaukie utility customers (residents, businesses, government units, etc.) through their utility bill and is based on an estimate of daily trips generated by each customer. Fiscal year 2007/2008 revenues are expected to be~~

~~$600,000, and the fee is expected to generate $13.4 million over the next 22 years. Monies collected from this fee are dedicated to roadway surface preservation, including maintenance, rehabilitation, and reconstruction. They cannot be used to construct capital projects.~~

Local ~~Motor Vehicle Fuel~~ Gas Tax

The City of Milwaukie local gas tax of two cents per gallon went into effect in April 2007. Revenue generated in fiscal year ~~2007/2008~~2011/2012 was ~~is expected to be~~ approximately $~~125,000~~179,000. Over the next 22 years, the total revenue from this source ~~will~~ is expected to be approximately $~~2.8~~4.4 million. Monies collected from this tax are dedicated to the Street Surface Maintenance Program (SSMP) for roadway surface preservation, including maintenance, rehabilitation, and reconstruction. They cannot be used to construct capital projects.

Projected Transportation Revenue

Table 13-1 summarizes the current, anticipated, and approved funding sources and the estimated revenue available to the City of Milwaukie for transportation-related projects over the next 22 years. Total projected revenues over the next 22 years are approximately $1.2 million restricted for capital projects, $25.5 million restricted for maintenance projects, and $50.9 million for either capital or maintenance projects (unrestricted).

Table 13-1 Projected Transportation Revenue for the 22-Year Planning Period (in ~~2007~~2012 dollars)

Funding Source	Capital	Unrestricted	Maintenance	TOTAL
SDC and FILOC[2]	~~$3,756,273~~ 1,190,100			$ ~~3,756,273~~ 1,190,100
Franchise Fees		$ ~~12,026,300~~ 23,716,000		~~12,026,300~~ 23,716,000
State Gas Tax		~~21,151,174~~ 26,887,000		~~21,151,174~~ 26,887,000
Bike Path Fund		~~213,642~~ 271,600		~~213,642~~ 271,600
Street Maintenance Fee			~~$13,412,781~~ 13,420,000	~~13,412,781~~ 13,420,000
PGE Privilege Tax			~~6,765,000~~ 7,744,000	~~6,765,000~~ 7,744,000
Local Gas Tax			~~2,750,000~~ 4,356,000	~~2,750,000~~ 4,356,000
Other Revenue		$60,000		$60,000
Projected Revenue (~~2008~~2014 to ~~2030~~2035)[3]	**~~$3,756,273~~** 1,190,100	**~~$33,391,116~~** 50,934,600	**~~$22,927,781~~** 25,520,000	**~~$60,075,170~~** 77,644,700

The three line items in Table 13-1 that are specifically restricted to funding maintenance projects (street maintenance fee, PGE privilege tax, and local gas tax) have been designated by City Council as the exclusive funding sources for the City's Street Surface Maintenance Program (SSMP). Projects eligible for SSMP funding include major rehabilitation and reconstruction of roadways. Routine street maintenance (e.g., filling potholes or patching asphalt) must be funded from the "unrestricted" sources in Table 13-1.

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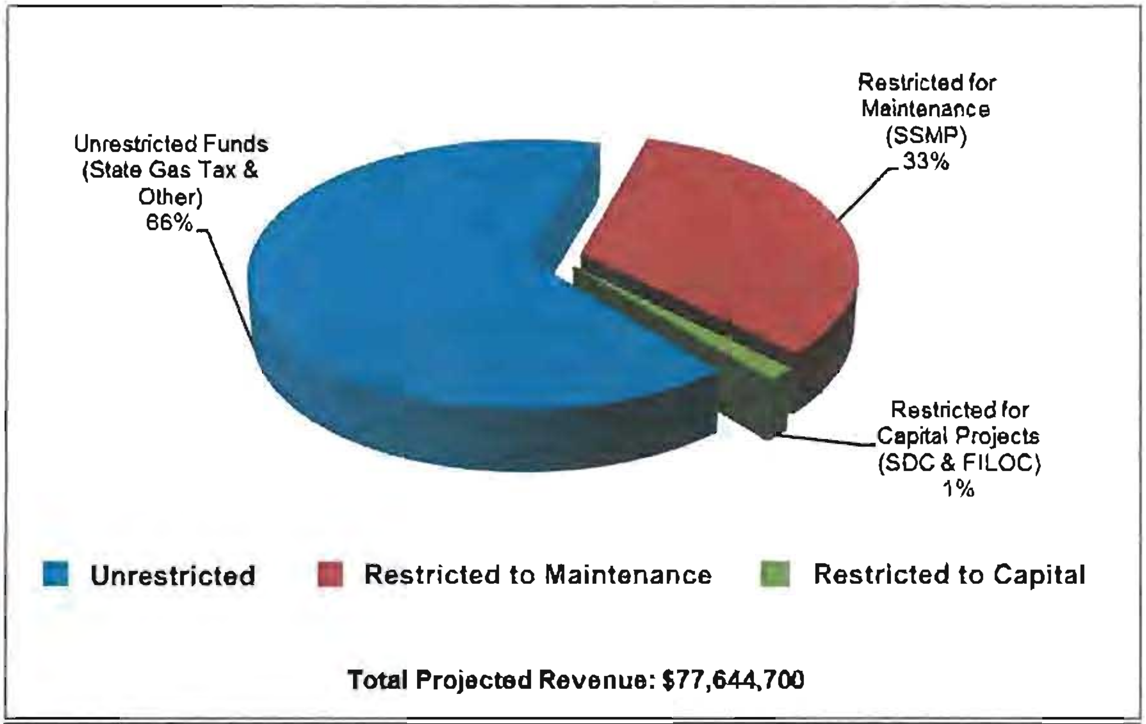
[2] Figure includes $444,500 of FILOC money currently in City coffers (unspent to date) in addition to $280,000 of projected FILOC revenue as estimated over the 22-year planning period.

[3] Projections for these funding sources were made based on the most recent year, with the exception of FILOC and SDC revenue. Because FILOC and SDC revenue is more variable, the projection is based on an average involving three years of actual revenues with an estimated small annual increase.

Figure 13-1 provides a graphic depiction of the information presented in Table 13-1, showing the makeup of anticipated revenue for the 22-year planning period.

Figure 13-1 Projected Transportation Revenue for the 22-Year Planning Period (in 2012 dollars)



CAPITAL AND MAINTENANCE PROJECTS

Based on current figures, projected costs for operations and maintenance over the 22-year planning period total approximately $77.2 million. Table 13-2 provides a detailed breakdown of these costs. As noted in Table 13-1, estimated revenues for the same time frame are approximately $77.6 million. However, some of those funds (approximately $1.2 million) are specifically restricted to capital projects, so there is some projected shortfall for operations and maintenance over the 22-year planning period. Not only does this mean that additional funds will be necessary simply to cover projected operational and maintenance costs, but also that the unrestricted revenues will be effectively unavailable for capital projects.

A minimum of approximately $272,000 must be spent on bicycle projects (capital or maintenance), or the City must forego expending the 1% of Highway Trust Fund revenues that must be devoted to bicycle facilities. But given that the regular sweeping of streets with bike lanes accounts for an annual Operations and Maintenance expenditure of approximately $50,000 (or $1.2 million over the 22-year planning period), this requirement is met 4 times over by that one operational project.

Table 13-2 Operations, Maintenance, and ~~Action Plan~~ Capital Costs for the 22-Year Planning Period (in ~~2007~~2012 dollars)

~~Projects~~	~~Capital Cost*~~	~~Operations Cost*~~	~~TOTAL Cost*~~
~~**Operations & Maintenance Projects**~~			
~~Traditional Maintenance Activities (sweeping, striping, signage, etc.)~~		~~$ 8,456,250~~	~~**$ 8,456,250**~~
~~Street Lighting~~		~~7,225,000~~	~~**7,225,000**~~
~~Overhead~~		~~4,510,000~~	~~**4,510,000**~~
~~Contributions to Support or Administration~~		~~9,809,250~~	~~**9,809,250**~~
~~Street Surface Maintenance Program~~		~~22,927,781~~	~~**22,927,781**~~
~~**Subtotal**~~		~~**$52,928,281**~~	~~**$52,928,281**~~
~~**Action Plan Projects**~~			
~~Motor Vehicle[4]/Freight~~	~~$2,668,000~~	~~$ 375,000~~	~~**$ 3,043,000**~~
~~Bicycle~~	~~640,000~~	~~1,100,000~~	~~**1,740,000**~~
~~Pedestrian~~	~~2,239,400~~		~~**2,239,400**~~
~~Transit~~	~~75,000~~		~~**75,000**~~
~~**Subtotal**~~	~~**$5,622,400**~~	~~**$ 1,475,000**~~	~~**$ 7,097,400**~~
~~**Total Approximate Costs (2008 to 2030)**~~	~~**$5,622,400**~~	~~**$54,403,281**~~	~~**$60,025,681**~~

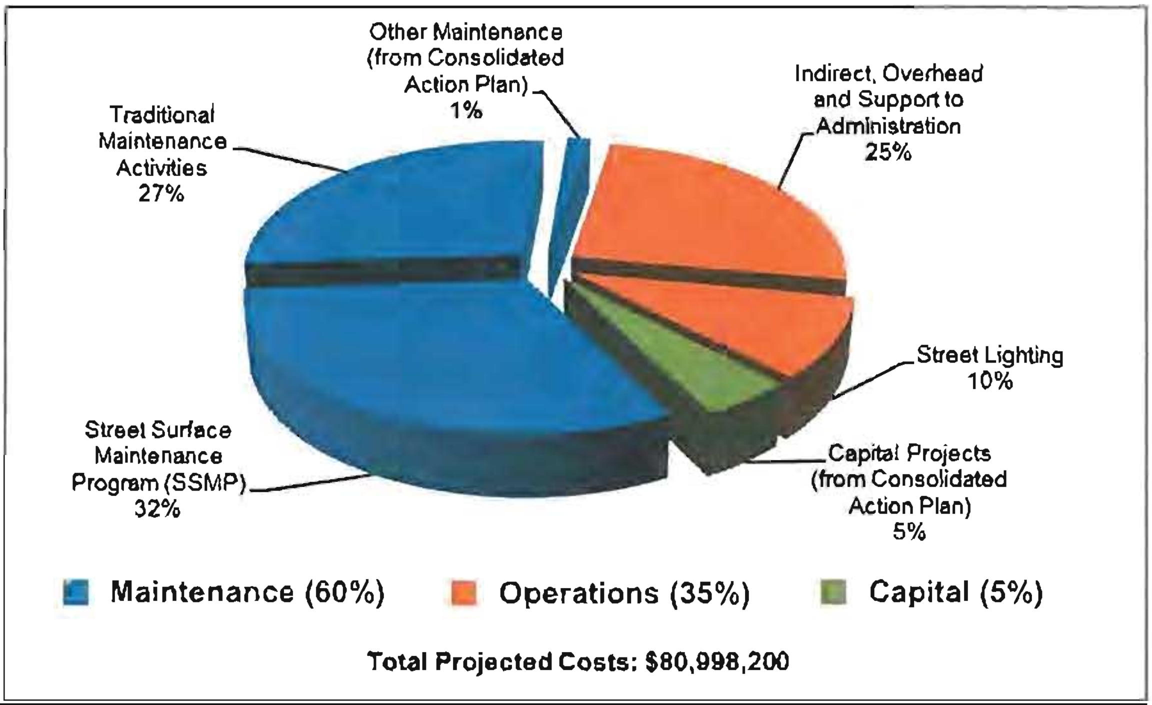
Projects	**Cost***
Operations	
Indirect, Overhead, and Administrative Support Costs	$ 20,307,000
Street Lighting	7,956,000
Subtotal	**$ 28,263,000**
Maintenance	
Street Surface Maintenance Program	$ 25,520,000
Traditional Maintenance Activities (sweeping, striping, signage, etc.)	22,170,000
Other Maintenance (from Consolidated Action Plan)[5]	1,206,000
Subtotal	**$ 48,896,000**
Capital	
Capital Projects (from Consolidated Action Plan)[6]	$ 3,839,200
Subtotal	**$ 3,839,200**
Total Approximate Costs (2014 to 2035)	**$ 80,998,200**

*Approximate Costs

[4] ~~Includes funding for Neighborhood Traffic Management Action Plan.~~
[5] Represents that portion of the cost of regular street sweeping that is spent on designated bike routes.
[6] Costs include all projects on the Consolidated Action Plan (Table 13-3). An 11% local match share was used for estimation purposes, except for directly funded projects

Table 13-2 demonstrates how the City can allocate available funds given their restrictions. Figure 13-2 provides a graphic depiction of the information presented in Table 13-2, showing the breakdown of anticipated costs for the 22-year planning period.

Figure 13-2 Projected Transportation Costs for the 22-Year Planning Period (in 2012 dollars)[7]



With limited local funding and many needs, the City will continually strive to allocate investments for projects that best meet the goals as outlined in Chapter 2. The action plans—in Chapters 5, 6, 7, 8, 9, 11, and 12—contain those projects that the City has prioritized most highly and intends to find funding for within the 22-year planning period.

~~Additionally~~ In the past 7 to 8 years, the City ~~will pursue a strategy that~~ has allocated transportation expenditures ~~those funds not earmarked for maintenance (as shown in Table 13-2)~~ in the following manner.

- ~~Approximately 20% to local system maintenance~~
- ~~Approximately 20% to capital and maintenance projects that can be completed with limited City funds~~
- ~~Approximately 60% to leverage receipt of regional, State, and federal grants~~

Maintenance-related expenses account for about 55% of spending and include:

- Approximately 35% to traditional maintenance (personnel, materials, and services for general operations and maintenance).
- Approximately 20% to the Street Surface Maintenance Program.

Operations-related expenses account for about 40% of spending and include:

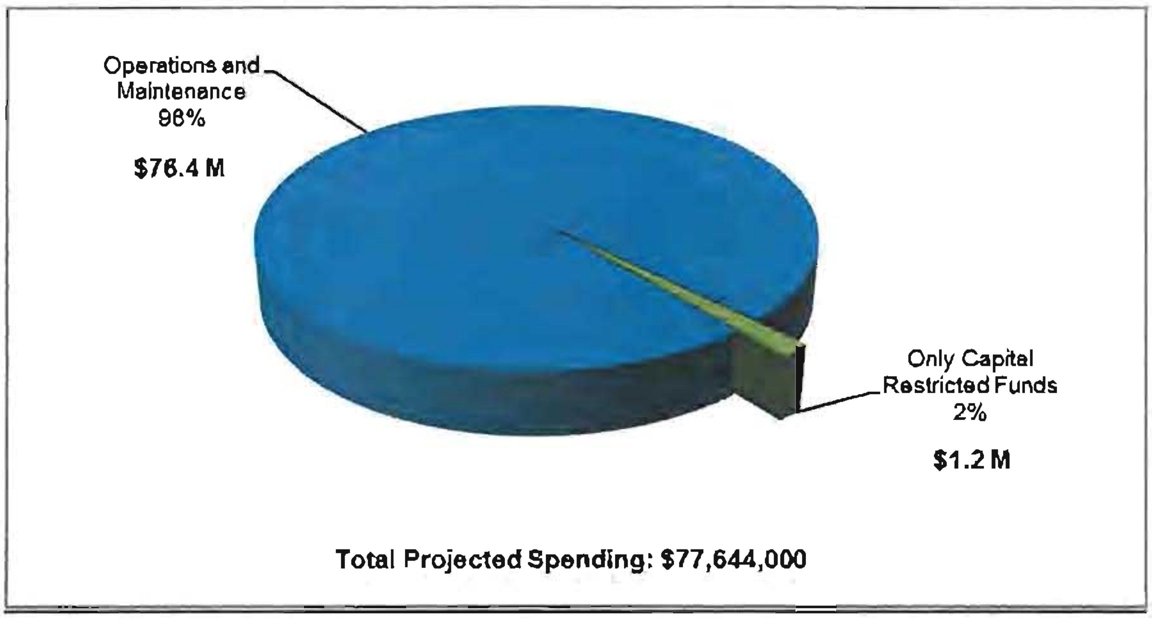
[7] Costs include all projects on the Consolidated Action Plan (Table 13-3). An 11% local match share was used for estimation purposes, except for directly funded projects

- Approximately 25% for indirect, overhead, and administrative support costs.
- Approximately 15% for street lighting.

Approximately 5% of annual spending has been directed to capital projects to improve the transportation system.

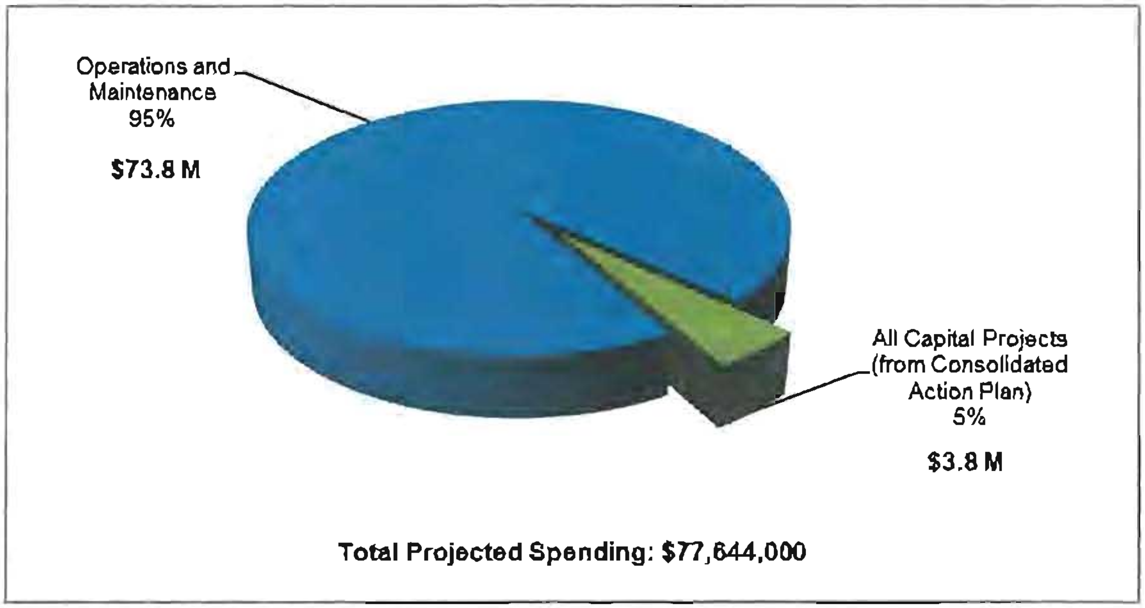
Projected costs over the 22-year planning period are greater than projected revenues by $3.5 million, or about 4%. If the City chooses not to reduce operations and maintenance expenses, and if no additional revenue sources are identified, the only revenues available for capital projects will be the SDC and FILOC funds. Over the 22-year planning period, these revenues are projected to be about $1.2 million and will cover only 31% of the approximately $3.8 million needed to fund all projects on the Consolidated Action Plan. This scenario represents spending approximately 2% of transportation revenues on capital projects and is depicted in Figure 13-3.

Figure 13-3 Spending Scenario 1: Funding Limited to Capital-Restricted Revenue over the 22-Year Planning Period (in 2012 dollars)



Alternately, in order to implement all the capital projects listed in the Consolidated Action Plan (Table 13-3), the City will need to reduce operations and maintenance expenses by about 6%, assuming no additional revenue sources are identified. This scenario represents spending approximately 5% of transportation revenues on capital projects and is depicted in Figure 13-4.

__Figure 13-4 Spending Scenario 2: Funding All Capital Projects on Consolidated Action Plan over the 22-Year Planning Period (in 2012 dollars)__



~~Leveraging limited local funds will allow the City to implement more projects sooner and to undertake larger projects than the City could otherwise afford.~~

~~The Prioritized Master Plan project list in Table 13-3 (at the end of this chapter) lists all of the proposed TSP projects that were generated through the TSP planning process. Additionally, it shows how well each project meets City goals and how the citizen working groups ranked them. The mode-specific Action Plans—in Chapters 5, 6, 7, 8, 9, 11, and 12 respectively—contain those projects that the City reasonably expects to fund that ranked high in the Prioritized Master Plan project list. The Action Plans include both capital projects and enhanced or new maintenance programs, such as increased bike lane sweeping.~~

~~Given current revenue sources and projections, the remaining projects identified in the mode-specific Master Plan project lists are not expected to be funded with local funds within this plan's 22-year planning horizon.~~

~~Existing operational and maintenance costs total approximately $53 million. See Table 13-2 for a detailed breakdown of these costs. The second half of this table summarizes how the City plans to spend the remaining $7 million of the projected $60 million of total revenue, broken down by mode. More detailed project descriptions and costs can be found in the mode-specific Action Plans.~~

[Table 13-2 originally appeared here. Moved up as shown on page 6 above.]

~~Table 13-2 demonstrates how the City can allocate available funds given their restrictions. The combined Action Plan project lists must include a minimum of $3.75 million in capital projects because SDC and FILOC revenue cannot be used to fund maintenance projects. Table 13-2 shows that approximately $5.6 million is earmarked for capital projects, which is almost $2 million more than the minimum requirement. Additionally, the Bicycle Action Plan must either include a minimum of $215,000 in bicycle projects (capital or maintenance), or forego expending the 1% of Highway Trust Fund revenues devoted to bicycle facilities. Nearly $1.75 million is~~

~~earmarked for bicycle facility improvements, which is over eight times the required minimum amount.~~

Project Cost Estimates

Order-of-magnitude cost estimates were developed for all projects identified in the modal master plans using general unit costs for transportation improvements. However, these estimates do not reflect unique project elements that can significantly add to project costs. More detailed project cost estimates will be developed as projects move closer to implementation, including detailed right-of-way requirements and costs associated with special designs. Because multiple modal improvements may occur on the same facility, costs were developed at a project level incorporating all modes, as appropriate. It may be desirable to break project mode elements out separately. However, in most cases, there are greater cost efficiencies in undertaking multiple modal improvements at the same time.

The Consolidated Action Plan project list (Table 13-3) presents the projects from all of the mode-specific action plans in a single table. The Prioritized Master Plan project list in Table 13-4 (at the end of this chapter) lists all of the proposed TSP projects that have been generated through the TSP planning process, grouping them by priority (High, Medium, Low).

Table 13-3 Consolidated Action Plan

On Action Plan List from TSP Chapter(s)	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Pedestrian & Bicycle	17th Ave Improvements	Fill in sidewalk gaps on both sides of street, fill in gaps in existing bicycle network with bike lanes, and/or provide multiuse path. Improve intersection safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.	Ochoco St	McLoughlin Blvd	$1,000	Match
Pedestrian, Bicycle, Public Transit	Railroad Ave Capacity Improvements	Pedestrian aspect: Fill in sidewalk gaps on both sides of street or construct multiuse path on one side.	37th Ave	Harmony Rd	$1,800	Match
		Bicycle aspect: Fill in gaps in existing bicycle network with bike lanes, cycle track, multiuse path, or other facilities.	37th Ave	Linwood Ave	$4,800	Match
		Public transit aspect: Provide bus service to extend to Clackamas Town Center and points east.	Harrison St	Eastern city limits	TBD	Direct (TriMet)
Pedestrian & Bicycle	Monroe St Neighborhood Greenway	Pedestrian aspect: Fill in sidewalk gaps on both sides of street.	42nd Ave	City limits	$1,800	Match
		Bicycle aspect (downtown): Designate as a "neighborhood greenway" and install traffic-calming improvements.	21st Ave	Hwy 224	$85	Match
		Bicycle aspect (central): Designate as a "neighborhood greenway" and install traffic-calming improvements.	Hwy 224	42nd Ave	$80	Match
		Bicycle aspect (east): Designate as a "neighborhood greenway" and install traffic-calming improvements.	42nd Ave	Linwood Ave	$165	Match
Pedestrian & Bicycle	Kellogg Creek Dam Removal and Hwy 99E Underpass	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/ped undercrossing between downtown Milwaukie and Riverfront Park.	Location-specific	Location-specific	$9,900	Match
Pedestrian & Street	Intersection Improvements at McLoughlin Blvd and 22nd Ave	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200	Match

On Action Plan List from TSP Chapter(s)	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Pedestrian & Bicycle	Stanley Ave Neighborhood Greenway (north)	Pedestrian aspect: Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	King Rd	$1,900	Match
		Bicycle aspect: Designate as a "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	King Rd	$135	Match
Pedestrian & Bicycle	Stanley Ave Neighborhood Greenway (south)	Pedestrian aspect: Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,800	Match
		Bicycle aspect: Designate as a "neighborhood greenway" and install traffic-calming improvements.	King Rd	Railroad Ave	$195	Match
Pedestrian & Bicycle	Kronberg Park Trail	Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E	Kellogg Creek Bridge	River Rd at Hwy 99E	$300	Match
Pedestrian & Bicycle	Kellogg Creek Bike/Ped Bridge	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500	Match
Pedestrian & Street	Intersection Improvements at Hwy 224 Crossings	Pedestrian aspect: Improve pedestrian crossings at Freeman Way, 37th Ave, Oak St, Monroe St, and Harrison St	Location-specific	Location-specific	$100 ($20 each)	Match
		Street aspect: Add left-turn lanes and protected signal phasing on Oak St approaches.	Location-specific	Location-specific	$20	Match
Pedestrian	Study of Pedestrian Crossings on Hwy 224	Examine alternatives for improving pedestrian crossings at five intersections along Hwy 224 (Harrison St, Monroe St, Oak St, 37th Ave, Freeman Way)	Harrison St	Freeman Way	$50	Match
Pedestrian	Adams St Connector	Construct pedestrian- and bicycle-only facility on Adams St between 21st Ave and Main St	21st Ave	Main St	$450	Match
Pedestrian	Linwood Ave Sidewalks (south)	Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,150	Match
Bicycle	29th/Harvey/40th Neighborhood Greenway	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	Monroe St	$220	Match
Public Transit	Downtown Transit Center Improvements	Construct new bus layover facility outside of the downtown core.	Location-specific	Location-specific	$1,250	Match
Public Transit	Downtown Loop Bus	Establish bus service from downtown to Tacoma and Park Ave stations.	Downtown	Tacoma station, Park Ave station	TBD	Direct (TriMet)
Public Transit	Neighborhood Loop Bus	Establish bus service between eastern neighborhoods and downtown.	Eastern city limits	Downtown	TBD	Direct (TriMet)

On Action Plan List from TSP Chapter(s)	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Parking	Downtown Parking Management	Implement a downtown parking management system, including a dedicated parking manager.	Downtown	Downtown	$40	Direct
Parking	Downtown Parking Signage	Install wayfinding and identification signage at McLoughlin Blvd intersections and around public parking lots.	Downtown	Downtown	$10	Direct
Nhbrhd Traffic Mgmnt	Walk Safely Milwaukie Program	Complete a few small traffic-calming and pedestrian safety projects throughout the city each year.	Citywide	Citywide	$300 ($13 annually)[6]	Direct
Street & Freight	Hwy 224 & Hwy 99E Refinement Plan	Conduct refinement study to establish alternative mobility targets for Hwy 224 and McLoughlin Blvd for locations not meeting applicable state targets, and explore ways to minimize barrier effect and improve auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to River Rd	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	$270	Match
Bicycle	Bike Lane Maintenance	Sweep bike lanes to remove debris.	Citywide	Citywide	$1,200	Direct

POTENTIAL NEW FUNDING SOURCES

The master plan project lists in Chapters 5-9, 11, and 12 include a large number of unfunded, but nonetheless high-priority, projects and programs. Absent an increase in funding, the City will be unable to address operational deficiencies identified in Chapter 4. The City may wish to consider new revenue sources to ensure that funding is available for proposed capital projects and other transportation programs.

In addition, the City ~~expects to contribute~~is contributing $5 million in match to the regional share of the Portland-Milwaukie Light Rail (PMLR) project. ~~While the exact allocation of the regional share is still to be determined, the City of Milwaukie's contribution is likely to be around $5 million.~~ The vast majority of the City's transportation revenues are restricted in ways that ~~would~~ do not allow the City to expend them on a light rail "match." SDC revenues, the only significant transportation revenue stream that could contribute to the project, are not projected to be adequate to cover the local match over the next 22 years~~, let alone in the next 5-8 years, the expected time frame in which the City would contribute to the light rail project~~.

The ~~City's approach to planning for any local financial contribution to light rail parallels the region's: the draft financing plan of the Regional Transportation Plan (which is being updated simultaneously with this TSP) includes the sources of local match for upcoming major transit projects separately from the traditional revenue streams. These major capital projects are not included within the baseline funding commitments and are included as conditional upon the identification of additional revenues. Similarly, the~~ Milwaukie share of the PMLR project is not included on the Public Transit Action Plan list because it will require revenues above and beyond those included in the baseline revenue projection.

[6] Historically, the Neighborhood Pedestrian and Traffic Safety Program received $13,000 annually. In more recent years, the program name changed to Walk Safely Milwaukie and funding was raised to $100,000 annually. Future funding for the program will be evaluated on a biennial basis with the budget.

Many cities use some combination of the following funding sources to supplement their capital and/or maintenance budgets.

General Fund Revenues

At the discretion of the City Council, the City can contribute General Fund revenues to transportation projects and programs. ~~(~~General Fund revenues primarily include property taxes, use taxes, and other miscellaneous taxes and fees imposed by the City.~~)~~ Competing community priorities set by the City Council limit the funding potential of this approach. General Fund resources can fund any aspect of the system, from capital improvements to operations, maintenance, and administration. Additional revenues available from this source are only available to the extent that either General Fund revenues are increased or City Council diverts funding from other City programs.

Expanded SDC Rate for Transportation

The City's transportation SDC rate is $~~1,596.52~~1,676 per p.m.-peak-hour trip generated. A more typical transportation SDC in the Portland metro area is approximately $2,000 per single-family residence (or p.m.-peak-hour trip generated). A regional examination of combined SDC and development fee costs conducted by the City of Portland found that the City of Milwaukie charges less than the majority of other jurisdictions (17th out of 21 overall) and has particularly low rates for residential uses.

Given that a large number of needs have been identified, a higher transportation SDC rate is warranted. The projects identified in this TSP will help the City maintain quality of life for its residents and businesses as the City experiences continued growth. It is appropriate to ensure that growth pays a fair and commensurate share of the costs of these new facilities.

In addition to reevaluating the SDC rate, the City may wish to consider tightening its policy on SDC credits. The City currently allows a credit against SDCs due for any privately funded transportation development that increases capacity. However, the City may wish to change this policy to allow SDC credits for only those privately funded projects that are identified in the City's adopted TSP, i.e., those improvements which have been identified as most important to the overall system. A modification of the City's municipal code would be required to implement this change.

Urban Renewal District

An Urban Renewal District (URD) is a mechanism by which the growth of tax revenues for a specific period of time is "captured" to pay for projects within the district. Typically, the sponsoring agency seeks bond financing of such projects and then repays those bonds with the "tax increment" generated in the area. The "tax increment" is the growth in tax revenue; the "frozen base," i.e., the property tax revenue already being generated, continues to flow to the appropriate taxing jurisdictions. All of the "tax increment" (the amount above the frozen base) goes towards retiring the urban renewal debt. This type of "tax increment" financing has been used in Oregon since 1960 to fund a wide variety of projects including transportation improvements. Recent public discussions about this funding mechanism have demonstrated some opposition to the concept; however, it remains in the TSP as an option to be revisited over the 22-year planning period.

Local Improvement District Assessment Revenue

The City may set up Local Improvement Districts (LIDs) to fund specific capital improvement projects within defined geographic areas, or zones of benefit. LIDs impose assessments on properties within its boundaries. LIDs cannot fund ongoing maintenance costs. They require separate accounting processes, and the assessments collected can only be spent on capital projects within the geographic area. Citizens representing 67% of the assessment can terminate an LID and overturn the planned projects, except in cases of emergency or sidewalk projects.

Direct Appropriations

The City can seek direct appropriations from the State Legislature and/or U.S. Congress for transportation capital improvements. In 2006, ~~T~~the City ~~has~~ received this kind of funding for ~~SE~~ Lake Rd improvements ~~in 2006~~ and will likely continue to pursue these special, one-time appropriations for major City projects.

Special Assessments

Special assessments allow local jurisdictions, with the agreement of property owners, to put into place additional property taxes to pay for specific capital projects or ongoing costs. A variety of special assessments are available in Oregon to fund a ~~variety~~ range of improvements, including sidewalks, curbs, gutters, street lighting, parking structures, and downtown or commercial zone transportation improvements. For example, the local share of funding for TriMet's Westside light rail project was paid for by a special assessment with voter approval. These assessments are commonly counted as revenue towards the limitations established by Measure 50.

Debt Financing

While not a direct funding source, debt financing can be used to 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 can also be a more 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 be identified to fulfill annual repayment obligations.

Voter-Approved General Obligation Bonds ~~Proceeds~~

Subject to voter approval, the City can issue General Obligation (GO) bonds to debt finance capital improvement projects. GO bonds are backed by the "full faith and credit" of the jurisdiction and provide increased taxing authority with which the City can generate revenues to make principal and interest repayments. For critical projects, the electorate may be willing to accept increased taxation. Proceeds may not be used for ongoing maintenance.

Revenue Bonds

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

Oregon Transportation Infrastructure Bank Loans

The Oregon Transportation Infrastructure Bank Loan program is a statewide revolving loan fund designed to promote innovative transportation funding solutions. The Financial Services Branch of ODOT provides State support for the program. In general, eligible projects include highway, transit, bikeway, and pedestrian access projects. Projects are rated on established criteria and recommended based on the rankings. Repayment of loans must begin within 5 years of project completion and must be complete within 30 years or at the end of the useful life of the project.

TSP IMPLEMENTATION AND UPDATE STEPS

The primary function of the TSP is to provide guidance for long-range policy and investment decisions about needed improvements to the transportation system over the next 22 years. The Consolidated Action Plan in Table 13-3 provides a list of the highest-priority projects for the community. This list is utilized to build the "Transportation Priority Project—Unfunded" section of the City's Capital Improvement Plan (CIP). The CIP is a list of projects for the City's water, wastewater, stormwater, and transportation systems that are scheduled to be funded in the short term. As funding becomes available, projects are moved from the unfunded section of the CIP to the section recommended for funding. Projects in the CIP section recommended for funding are reviewed for funding every 2 years through the City's budgeting process. In essence, the CIP is the primary implementation mechanism for TSP projects.

This document requires a series of implementing and on-going update steps to retain its usefulness over the next 22 years. Such steps include refining and updating the affected design standards for streets and trails, implementing the suggested development code and Comprehensive Plan text changes, and periodically updating and reviewing traffic forecasts and project priorities. The State suggests that cities should update local TSPs every 5 years to keep current on the latest land development trends, capital project funding conditions, and priorities of the community. These activities would typically be funded through a combination of grants, engineering funds, and planning funds, and are not, therefore, included in the financial projections for the modal action plans.

Table 13-~~3~~4 Prioritized Master Plan Project List

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[9]	Priority Ranking[10]	Is Project ~~Funded~~ in Action Plan?[11]	Project Type
HIGH PRIORITY PROJECTS								
17th Ave ~~Sidewalks~~ Improvements	Pedestrian & Bicycle	Fill in sidewalk gaps on both sides of street, fill in gaps in existing bicycle network with bike lanes, and/or provide multiuse path. ~~and i~~Improve intersections safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.	Ochoco St	McLoughlin Blvd	~~$920~~ 1,000	High	Yes	Capital
~~17th Avenue Bikeway and Intersection Safety Improvements~~	~~Bicycle~~	~~Fill in gaps in existing bicycle network with bike lanes or multiuse path. Improve intersection safety and eastbound connection at 17th Ave/Hwy 99E. Improve intersection safety at 17th Ave/Hwy 224.~~	~~Waverly Dr~~	~~Harrison St~~	~~$135~~	~~High~~	~~Yes~~	~~Capital~~
Railroad Ave Capacity Improvements ~~Sidewalks~~	Pedestrian ~~& Transit~~	Pedestrian aspect: Fill in sidewalk gaps on both sides of street or construct multiuse path on one side	37th Ave	Harmony Rd	~~$1,625~~ 1,800	High	Yes	Capital
~~Railroad Avenue Bike Lanes~~	Bicycle	Bicycle aspect: Fill in gaps in existing bicycle network with bike lanes, cycle track, multiuse path, or other facilities.	37th Ave	Linwood Ave	~~$4,364~~ 4,800	High	~~No~~Yes	Capital
	Transit	Transit aspect: Provide bus service to extend to Clackamas Town Center and points east.	Harrison St	Eastern city limits	TBD	High	Yes	Service Enhancements
Monroe St ~~Bicycle Boulevard~~Neighborhood Greenway (downtown)	Bicycle	Designate as a ~~Bicycle Boulevard~~ "neighborhood greenway" and install ~~bicycle boulevard~~ traffic-calming improvements.	21st Ave	~~Linwood Ave~~ Hwy 224	~~$300~~ $85	High	Yes	Capital
Monroe St Neighborhood Greenway (central)	Bicycle	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Hwy 224	42nd Ave	$80	High	Yes	Capital
Monroe St Neighborhood Greenway (east)	Bicycle	Designate as a "neighborhood greenway" and install traffic-calming improvements.	42nd Ave	Linwood Ave	$165	High	Yes	Capital
~~Monroe Street Sidewalks~~	Pedestrian	Fill in sidewalk gaps on both sides of street.	42nd Ave	City limits	~~$1,631~~ 1,800	High	Yes	Capital
Stanley Ave ~~Bicycle Boulevard~~ Neighborhood Greenway (north)	Bicycle & Pedestrian	Bicycle aspect: Designate as ~~a Bicycle Boulevard~~ "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	~~Railroad Ave~~ King Rd	~~$300~~ $135	~~Medium~~High	~~No~~Yes	Capital
		Pedestrian aspect: Fill in sidewalk gaps on both sides of street	Johnson Creek Blvd	King Rd	$1,900	High	Yes	Capital
Stanley Ave Neighborhood Greenway (south)	Bicycle & Pedestrian	Bicycle aspect: Designate as a "neighborhood greenway" and install traffic-calming improvements.	King Rd	Railroad Ave	$195	High	Yes	Capital
		Pedestrian aspect: Fill in sidewalk gaps on both sides of street	King Rd	Railroad Ave	$2,800	High	Yes	Capital
~~Stanley Avenue Sidewalks~~	Pedestrian	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	Railroad Ave	~~$4,304~~ 4,700	High	~~No~~Yes	Capital

[9] Project costs are order-of-magnitude estimates and are in 2012 dollars. Future costs may be more due to inflation. In the case of operational projects, estimated costs are for the entire 22-year planning period.

[10] Projects are ranked as either high, medium, or low. They are in no particular order within their ranking.

[11] ~~Funded projects are listed on one of the mode-specific Action Plans in the TSP and are expected to be funded within the 22-year planning period through either direct or leveraged City funding.~~

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[9]	Priority Ranking [10]	Is Project ~~Funded~~ in Action Plan?[11]	Project Type
Downtown Transit Center Improvements	Transit	Construct new bus layover facility outside of the downtown core. ~~Improve downtown bus stops and shelters consistent with level 3 features and including ample bike parking.~~	Location-specific	Location-specific	$1,250	High	Yes	Capital
Kellogg Creek Dam Removal and Hwy 99E Underpass	Pedestrian & Bicycle	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/pedestrian undercrossing between downtown Milwaukie and Riverfront Park.	~~Site~~ Location-Specific	~~Site~~ Location-Specific	~~$9,000~~ 9,900	High	Yes	Capital
29th/Harvey/40th ~~Bicycle Boulevard~~ Neighborhood Greenway	Bicycle	Designate as ~~a Bicycle Boulevard~~ "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	Monroe St	~~$200~~ 220	High	Yes	Capital
Bike Lane Maintenance	Bicycle	Sweep bike lanes to remove debris.	Citywide	Citywide	~~$1,100~~ 1,200	High	Yes	Operational
~~Bike Route Signage~~	~~Bicycle~~	~~Install neighborhood bike route signage.~~	~~Citywide~~	~~Citywide~~	~~$150~~	~~High~~	~~Yes~~	~~Operational~~
Study of Pedestrian Crossings on Hwy 224	Pedestrian	Examine alternatives for improving pedestrian crossings at five intersections along Hwy 224 (Harrison St, Monroe St, Oak St, 37th Ave, Freeman Way)	Harrison St	Freeman Way	$50	High	Yes	Policy
~~Hwy 224~~ Intersection Improvements at Hwy 224 and Oak St	~~Automobile~~ Street	Add left-turn lanes and protected signal phasing on Oak St approaches.	Location-specific	Location-specific	$20	High	Yes	Capital
~~Neighborhood Pedestrian and Traffic Safety Program~~ Walk Safely Milwaukie Program	Nbrhd Traffic Management	Complete a few small traffic-calming and pedestrian safety projects throughout the city each year.	Citywide	Citywide	$300 ($13 annually)	High	Yes	Capital
Hwy 224 & Hwy 99E Refinement Plan	~~Automobile~~ Street & Freight	Conduct refinement study ~~that focuses on~~ to establish alternative mobility targets for Hwy 224 and McLoughlin Blvd for locations not meeting applicable state targets, and explore ways to minimize~~ing~~ barrier effect and improve~~ing~~ auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to ~~17th Ave~~ River Rd	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	~~$250~~ 270	High	Yes	Capital
~~Railroad Crossing Safety and Quiet Zone Project~~	~~Automobile & Pedestrian~~	~~Construct railroad crossing safety improvements at Oak Street, Harrison Street, and 37th Avenue.~~	~~Location specific~~	~~Location specific~~	~~$285~~	~~High~~	~~Yes~~	~~Capital~~
Harrison St Railroad Crossing Separation	Freight	Upgrade Harrison crossing of Union Pacific Railroad tracks to grade-separated facility. Assess as part of Hwy 224 & Hwy 99E Refinement Plan.	Location-specific	Location-specific	~~$28,000~~ 30,700	High	No	Capital
~~Hwy 224~~ Intersection Improvements at Hwy 224 and 37th Ave	~~Automobile~~ Street & Freight	Consolidate the two northern legs of 37th Ave and International Way into one leg at Hwy 224.	Location-specific	Location-specific	~~$1,946~~ 2,100	High	No	Capital
Linwood Ave Capacity Improvements (north)	~~Automobile~~ Street	Widen to standard three lane cross section. Widen bridge over Johnson Creek.	Johnson Creek Blvd	King Rd	~~$8,500~~ 9,300	High	No	Capital
Linwood Ave Capacity Improvements (south)	~~Automobile~~ Street	Widen to standard three lane cross section.	King Rd	Harmony Rd	~~$11,400~~ 12,500	High	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[9]	Priority Ranking [10]	Is Project ~~Funded~~ in Action Plan?[11]	Project Type
Hwy 224 Crossing Improvements at Oak and Washington Sts	Bicycle	Improve intersection crossing safety for bicyclists at Washington St and Oak St.	Location-specific	Location-specific	$10	High	No	Capital
Downtown Parking ~~Enforcement~~ Management	Parking	Implement a downtown parking management system, including a dedicated parking manager.	Downtown	Downtown	$40	High	~~No~~Yes	Operational
Kellogg Creek Bike/Ped Bridge	Pedestrian & Bicycle	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500	High	Yes	Capital
Kronberg Park Trail	Pedestrian & Bicycle	~~Construct multimodal trail along Kellogg Creek connecting Kronberg Park to downtown Milwaukie.~~ Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E.	~~McLoughlin Blvd~~ Kellogg Creek Bridge	~~Downtown~~ River Rd	~~$1,200~~ 300	~~Low~~High	~~No~~Yes	Capital
Adams St Connector	Pedestrian	Construct pedestrian- and bicycle-only facility on Adams St between 21st Ave and Main St	21st Ave	Main St	$450	High	Yes	Capital
43rd Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Howe St/ 42nd Ave	King Rd/ 43rd Ave	~~$550~~ 600	~~Low~~High	No	Capital
Harmony Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Linwood Ave	City limits	~~$38~~ 40	~~Low~~High	No	Capital
International Way Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street	Criterion Ct	Lake Rd	~~$767~~ 840	~~Low~~High	No	Capital
River Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	McLoughlin Blvd	City limits	~~$626~~ 690	~~Low~~High	No	Capital
Intersection Curb Ramp Improvements	Pedestrian	Install curb ramps at all intersections with sidewalks (approximately 700 intersections).	Citywide	Citywide	~~$5~~ 3,500	~~Low~~High	No	Capital
~~Hwy 224~~ Intersection Improvements at Hwy 224 and 37th Ave	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	~~Low~~High	~~No~~Yes	Capital
~~Hwy 224~~ Intersection Improvements at Hwy 224 and Freeman Way	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	~~Low~~High	~~No~~Yes	Capital
~~Hwy 224~~ Intersection Improvements at Hwy 224 and Harrison St	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	~~Low~~High	~~No~~Yes	Capital
~~Hwy 224~~ Intersection Improvements at Hwy 224 and Monroe St	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	~~$15~~ 20	~~Low~~High	~~No~~Yes	Capital
~~Hwy 224~~ Intersection Improvements at Hwy 224 and Oak St	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	~~Low~~High	~~No~~Yes	Capital
Linwood Ave Sidewalks (south)	Pedestrian	Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,150	High	Yes	Capital
Bicycle-friendly Street Grates	Bicycle	Install bicycle-friendly street grates.	Citywide	Citywide	~~$50~~ 60	~~Low~~High	No	Operational

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[ii]	Priority Ranking [iii]	Is Project ~~Funded~~ in Action Plan?[iv]	Project Type
Intersection Improvements at Linwood Ave and Monroe St	Bicycle	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10	~~Low~~High	No	Capital
Lake Rd Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Main St	Guilford Dr	~~$3,142~~ 3,400	~~Low~~High	No	Capital
Stanley Ave Connectivity at King Rd	~~Automobile~~ Street	Enhance connection along Stanley Ave at King Rd.	Location-specific	Location-specific	~~$53~~ 60	~~Low~~High	No	Capital
Stanley Ave Connectivity at Monroe St	~~Automobile~~ Street	Enhance connection along Stanley Ave at Monroe St.	Location-specific	Location-specific	~~$53~~ 60	~~Low~~High	No	Capital
Intersection Improvements at McLoughlin Blvd and 22nd Ave	Pedestrian, Bicycle, & Street	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200	High	Yes	Capital
Improved Connection to Springwater Trail at 29th Ave and Sherrett St	Pedestrian & Bicycle	Pave the connection to Springwater Trail at 29th Ave and Sherrett St. (TSAP)	Location-specific	Location-specific	$20	High	No	Capital
Downtown Loop Bus	Transit	Establish bus service from downtown to Tacoma and Park Ave stations.	Downtown	Tacoma station, Park Ave station	TBD	High	Yes	Service Enhancement
Neighborhood Loop Bus	Transit	Establish bus service between eastern neighborhoods and downtown.	Eastern city limits	Downtown	TBD	High	Yes	Service Enhancement
Milwaukie Transportation Management Association Program	Transit	Implement a transportation management association for downtown employers.	Milwaukie Town Center	Milwaukie Town Center	$200	~~Low~~High	No	Operational
Improved Connection from Springwater Trail to Pendleton Site (Ramps)	Pedestrian & Bicycle	Construct ramps to improve existing connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$630	High	No	Capital
Improved Connection from Springwater Trail to Pendleton Site (Widened Undercrossing)	Pedestrian & Bicycle	Widen existing undercrossing to improve connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$100	High	No	Capital
Improved Connection from Springwater Trail to Tacoma Station	Pedestrian	Construct stairs to connect Springwater Trail to Tacoma station. (TSAP)	Location-specific	Location-specific	$80	High	No	Capital
Signage and Intersection Improvements at McLoughlin Blvd and Ochoco St	Freight	Establish signage for trucks and improve intersection. (TSAP)	Location-specific	Location-specific	$1,600	High	No	Capital
Downtown Parking Signage	Parking	Install wayfinding and identification signage at McLoughlin Blvd intersections and around public parking lots.	Downtown	Downtown	$10	~~Medium~~ High	~~No~~ Yes	Capital
Public Parking Structure	Parking	Construct 3- to 4-story public parking structure with retail at ground floor for visitor/employee parking.	Location-specific	Location-specific	~~$10,000~~ 11,000	~~Medium~~ High	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[9]	Priority Ranking[10]	Is Project ~~Funded~~ in Action Plan?[11]	Project Type
MEDIUM PRIORITY PROJECTS								
Lake Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	~~Kuehn Rd~~ Where Else Ln	Hwy 224	~~$2,049~~ 2,200	Medium	No	Capital
19th Ave and Sparrow St ~~Bicycle Boulevard~~ Neighborhood Greenway	Bicycle	Designate as a ~~Bicycle Boulevard~~"neighborhood greenway" and install ~~bicycle boulevard~~ traffic-calming improvements. This would connect the south end of Kellogg Creek Trail to River Rd.	Eagle St	River Rd	~~$737~~ 800	Medium	No	Capital
Intersection Improvements at Main St and Mailwell Dr	Freight	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	~~$50~~ 60	Medium	No	Capital
McLoughlin Blvd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Washington St	Southern city limits	~~$596~~ 650	Medium	No	Capital
~~Railroad Crossing Improvements at Harrison~~	~~Freight~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location specific~~	~~Location specific~~	~~$50~~	~~Medium~~	~~No~~	~~Capital~~
~~Railroad Crossing Improvements at 21st and Adams~~	~~Freight~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location specific~~	~~Location specific~~	~~$50~~	~~Medium~~	~~No~~	~~Capital~~
~~Railroad Crossing Improvements at Monroe~~	~~Freight~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location specific~~	~~Location specific~~	~~$50~~	~~Medium~~	~~No~~	~~Capital~~
~~Railroad Crossing Improvements at Washington~~	Freight	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	Location specific	Location specific	~~$50~~	~~Medium~~	~~No~~	~~Capital~~
~~Railroad Crossing Improvements at Oak~~	~~Freight~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location specific~~	~~Location specific~~	~~$50~~	~~Medium~~	~~No~~	~~Capital~~
~~Railroad Crossing Improvements at 37th~~	~~Freight~~	~~Upgrade paving materials to concrete or rubberized material to improve longevity and enhance for alternative modes.~~	~~Location specific~~	~~Location specific~~	~~$50~~	~~Medium~~	~~No~~	~~Capital~~
Pedestrian Walkway Amenities	Pedestrian	Install amenities, such as benches, along key walking routes.	Citywide	Citywide	~~$50~~ 60	Medium	No	Capital
~~Main Street Bike Lanes~~	~~Bicycle~~	~~Fill in gaps in existing bicycle network with bike lanes.~~	~~Harrison St~~	~~Moores St~~	~~$2,131~~	~~Medium~~	~~No~~	~~Capital~~
~~McLoughlin Blvd~~ Intersection Improvements at McLoughlin Blvd and 17th Ave	~~Automobile~~ Street	Prohibit left-turn movement from 17th Ave to northbound McLoughlin Blvd and Include in Hwy 224 & Hwy 99E Refinement Plan.	Location-specific	Location-specific	~~$15~~ 20	Medium	No	Capital
~~McLoughlin Blvd~~ Intersection Improvements at McLoughlin Blvd and River Rd	~~Automobile~~ Street	Consolidate a single access point for the area at Bluebird St with full intersection treatment and signalization or add second northbound left-turn lane at River Rd.	Location-specific	Location-specific	~~$898~~ 980	Medium	No	Capital
Harrison St and King Rd Connection	~~Automobile~~ Street	Enhance connection between King Rd and Harrison St at 42nd Ave.	Location-specific	Location-specific	~~$53~~ 60	Medium	No	Capital
37th Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Lake Rd	Harrison St	~~$794~~ 870	Medium	No	Capital
Intersection Improvements at 42nd Ave and King Rd	Pedestrian	Enhance intersection function.	Location-specific	Location-specific	~~$15~~ 20	Medium	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[9]	Priority Ranking[10]	Is Project Funded in Action Plan?[11]	Project Type
Downtown Public Parking Lot Improvements	Parking	Upgrade and maintain off-street public parking facilities with improved landscaping and lighting.	Downtown	Downtown	~~$50~~ 60	Medium	No	Capital
Community Bicycle Rides	Bicycle	~~Coordinate~~ Support community bike rides to encourage bike use.	Citywide	Citywide	$5	Medium	No	Operational
Intersection Improvements at Harrison St and Hwy 224	~~Automobile~~ Street	Add left-turn lanes and protected signal phasing on Harrison St approaches.	Location-specific	Location-specific	$20	Medium	No	Capital
Cyclist Education	Bicycle	Promote bicycling through bike use and route selection education.	Citywide	Citywide	$10	Medium	No	Operational
~~Railroad Crossing Pedestrian Improvements at Oak~~	~~Pedestrian~~	~~Improve intersection for pedestrians.~~	~~Location specific~~	~~Location specific~~	~~$15~~	~~Medium~~	~~No~~	~~Capital~~
Harrison St Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes (cost included with Harrison St road widening project).	Hwy 99E	21st Ave	~~$273~~ 300	Medium	No	Capital
Intersection Improvements at Linwood Ave and King Rd	~~Automobile~~ Street	Implement protected/permissive left-turn phasing for northbound and southbound approaches.	Location-specific	Location-specific	~~$16~~ 20	Medium	No	Capital
Brookside Dr Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	Regents Dr	~~$15~~ 20	Medium	No	Capital
~~Springwater Trail Paving Project~~	~~Bicycle~~	~~Improve corridor through repaving existing trail.~~	~~29th Ave~~	~~Linwood Ave~~	~~$500~~	~~Medium~~	~~No~~	~~Capital~~
Harrison St Capacity Improvements	~~Automobile~~ Street	Widen to standard three lane cross section.	32nd ~~St~~Ave	42nd ~~St~~Ave	~~$2,565~~ 2,800	Medium	No	Capital
~~Johnson Creek Blvd~~ Intersection Improvements at Johnson Creek Blvd and Linwood Ave	~~Automobile~~ Street	Add eastbound right-turn lanes and westbound right-turn lanes.	Location-specific	Location-specific	~~$803~~ 880	Medium	No	Capital
~~Harrison Street Intersection Improvements at Main~~	~~Automobile~~	~~Add westbound shared through/right-turn lane or eastbound right-turn lane.~~	~~Location specific~~	~~Location specific~~	~~$34~~	~~Medium~~	~~No~~	~~Capital~~
Logus Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	43rd Ave	49th Ave	~~$771~~ 850	~~High~~Medium	~~Yes~~No	Capital
Springwater Trail Completion	~~Bicycle &~~ Pedestrian & Bicycle	Contribute to regional project to complete Springwater Trail ("Sellwood Gap") along Ochoco St.	17th Ave	19th Ave	~~$80~~ 90	~~High~~Medium	~~Yes~~No	Capital
Downtown Streetscape Improvements	Parking & Pedestrian	Install sidewalk bulbouts, lighting, and pedestrian amenities.	Downtown	Downtown	~~$6,700~~ 7,300	~~High~~Medium	~~Yes~~No	Capital
King Rd Boulevard Treatments	Pedestrian	Install street boulevard treatments: widen sidewalks and improve crossings.	43rd Ave	Linwood	~~$500~~ 550	~~High~~Medium	~~Yes~~No	Capital
Bicycle and Pedestrian Overpass over Railroad Ave	Pedestrian & Bicycle	Establish a dedicated bicycle and pedestrian connection across Railroad Ave and the railroad tracks.	Railroad Ave	International Way	~~$2,025~~ 2,200	~~Low~~Medium	No	Capital
Oatfield Rd Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Guilford Ct	Lake Rd	~~$348~~ 380	~~Low~~Medium	No	Capital
International Way Bicycle Facilities	Bicycle	Construct bike lanes or other bike facilities.	37th Ave	Lake Rd	$400	Medium	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[9]	Priority Ranking [10]	Is Project Funded in Action Plan?[11]	Project Type
Traffic-Calming Improvements on River Rd at Lark St	Nbrhd Traffic Management	Install traffic-calming measures such as a permanent speed-warning sign and/or roundabout.	Location-specific	Location-specific	$310	Medium	No	Capital
Bicycle/ Pedestrian Improvements to Main St	Pedestrian & Bicycle	Construct multiuse path or other improved bike/ped facilities on Main St to provide safer connection between downtown and Tacoma station. (TSAP)	Hanna Harvester Dr	Tacoma station	$2,900	Medium	No	Capital
Bicycle/ Pedestrian Connection from Eastern Neighborhoods to Tacoma Station Area	Pedestrian & Bicycle	Establish bike/ped connection over existing railroad tracks and light rail to Tacoma station area. (TSAP)	Olsen St & Kelvin St	Mailwell Dr	$4,000	Medium	No	Capital
Improved Connection from Springwater Trail to McLoughlin Blvd	Pedestrian & Bicycle	Construct stairs or other facility to connect Springwater Trail to west side of McLoughlin Blvd. (TSAP)	Location-specific	Location-specific	$500	Medium	No	Capital
Bicycle/ Pedestrian Connection over Johnson Creek	Pedestrian & Bicycle	Construct bike/ped bridge over Johnson Creek along Clatsop St at 23rd Ave to connect Tacoma station area with adjacent neighborhood. (TSAP)	Location-specific	Location-specific	$400	Medium	No	Capital
Improved Bicycle/ Pedestrian Connections on West Side of Tacoma Station Area	Pedestrian & Bicycle	Improve bike/ped connections to adjacent neighborhood to west of Tacoma station area at Ochoco St and Milport Rd. (TSAP)	Location-specific	Location-specific	$500	Medium	No	Capital
LOW PRIORITY PROJECTS								
Railroad Ave Capacity Improvements	~~Automobile~~ Street ~~& Transit~~	Widen ~~SE~~ Railroad Ave to standard three lane cross section. ~~Accommodate future bus service.~~	37th Ave	Linwood Ave	~~$12,990~~ 14,200	~~High~~Low	~~Yes~~No	Capital
Ochoco St Sidewalks	Pedestrian	Construct sidewalks on Ochoco St to connect bus stops to Goodwill.	19th Ave	McLoughlin Blvd	~~$$$~~ $1,300	Low	No	Capital
Springwater ~~Corridor~~ Trail Intersection Improvements at 45th Ave	Bicycle	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10	Low	No	Capital
Johnson Creek Blvd and 42nd Ave Signalization	~~Automobile~~ Street	Replace 3-way stop with signal when warranted.	Location-specific	Location-specific	~~$250~~ 270	Low	No	Capital
~~Springwater Trail Ramp Improvement~~	~~Bicycle & Pedestrian~~	~~Improve ramp at Springwater Trail and McLoughlin Blvd.~~	~~Location specific~~	~~Location specific~~	~~$15~~	~~Low~~	~~Yes~~	~~Capital~~
~~Springwater Trail Ramp Improvement at McLoughlin~~	~~Pedestrian~~	~~Improve ramp at Springwater Trail and McLoughlin Blvd.~~	~~Location specific~~	~~Location specific~~	~~$15~~	~~Low~~	~~No~~	~~Capital~~
19th Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Kellogg Creek Trail	Sparrow St	~~$305~~ 330	Low	No	Capital
22nd Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	McLoughlin Blvd	Sparrow St	~~$325~~ 360	Low	No	Capital
Edison St Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	35th Ave	37th Ave	~~$116~~ 130	Low	No	Capital
Harvey St Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	32nd Ave	42nd Ave	~~$534~~ 590	Low	No	Capital
Home Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Railroad Ave	King Rd	~~$756~~ 830	Low	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[9]	Priority Ranking [10]	Is Project ~~Funded~~ in Action Plan?[11]	Project Type
Johnson Creek Blvd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Harney ~~Dr~~St	City limits	~~$378~~ 410	Low	No	Capital
Linwood Ave Sidewalks (north)	Pedestrian	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	~~Railroad Ave~~ King Rd	~~$2,960~~ 1,050	Low	No	Capital
Mason Lane Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	42nd Ave	Regents Dr	~~$674~~ 740	Low	No	Capital
Oatfield Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Guilford Ct	City limits	~~$132~~ 150	Low	No	Capital
Regents Dr Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Brookside Dr	Winsor Dr	~~$494~~ 540	Low	No	Capital
Roswell St Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	32nd Ave	36th Ave	~~$192~~ 210	Low	No	Capital
Rusk Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Lake Rd	North Clackamas Park	~~$652~~ 730	Low	No	Capital
Olsen St Sidewalks	Pedestrian	Fill in sidewalk gaps on north side of street.	32nd Ave	~~43rd~~42nd Ave	~~$432~~ 470	Low	No	Capital
49th Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Logus Rd	King Rd	~~$250~~ 270	Low	No	Capital
Hwy 224 Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Oak St	37th Ave	~~$420~~ 460	Low	No	Capital
Intersection Improvements at Olsen St and 42nd Ave	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	Low	No	Capital
~~Intersection Improvements at Harmony and Lake~~	~~Pedestrian~~	~~Improve pedestrian crossing.~~	~~Location specific~~	~~Location specific~~	~~$15~~	~~Low~~	~~No~~	~~Capital~~
Intersection Improvements at Railroad and 37th Aves	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$10	Low	No	Capital
Intersection Improvements at Stanley Ave and Logus Rd	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	~~$15~~ 20	Low	No	Capital
Pedestrian Connection to North Clackamas Park	Pedestrian	Create pedestrian connection between the school and the park.	Rowe Middle School	North Clackamas Park	~~$1,284~~ 1,400	Low	No	Capital
~~Hwy 224~~ Intersection Improvements at Hwy 224 and 17th Ave	Freight	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	~~$50~~ 60	Low	No	Capital
Intersection Improvements at Mailwell and Omark Drs	Freight	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	~~$50~~ 60	Low	No	Capital
Milwaukie Bike Map	Bicycle	Produce a Milwaukie Bike Map.	Citywide	Citywide	~~$50~~ 60	Low	No	Operational
~~Trolley Trail Signage~~	~~Bicycle~~	~~Design and install Trolley Trail signage.~~	~~Milwaukie Riverfront~~	~~Southern city limits~~	~~$54~~	~~Low~~	~~No~~	~~Capital~~
Springwater Trail Signage	Bicycle	Install wayfinding signage for Springwater Trail.	Citywide	Citywide	~~$15~~ 20	Low	No	~~Operational~~ Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[9]	Priority Ranking [10]	Is Project ~~Funded~~ in Action Plan?[11]	Project Type
Intersection Improvements at Johnson Creek Blvd and Linwood Ave	Bicycle	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10	Low	No	Capital
Intersection Improvements at Linwood Ave and King Rd	Bicycle	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10	Low	No	Capital
~~Intersection Improvements at Linwood and Harmony~~	~~Bicycle~~	~~Improve safety of crossing at intersection.~~	~~Location specific~~	~~Location specific~~	~~$10~~	~~Low~~	~~No~~	~~Capital~~
Intersection Improvements at International Way and Lake Rd	Bicycle	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10	Low	No	Capital
~~Intersection Improvements at Adams and 21st~~	~~Bicycle~~	~~Improve safety of crossing at intersection.~~	~~Location specific~~	~~Location specific~~	~~$10~~	~~Low~~	~~No~~	~~Capital~~
Harrison St Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Hwy 224	42nd Ave	~~$13~~ 10	Low	No	Capital
37th Ave Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Harrison St	Hwy 224	~~$2,900~~ 3,200	Low	No	Capital
43rd Ave Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	King Rd	Filbert St	~~$1,014~~ 1,100	Low	No	Capital
Linwood Ave Bike Lanes (north)	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Queen Rd	Johnson Creek Blvd	~~$1,692~~ 1,900	Low	No	Capital
Linwood Ave Bike Lanes (south)	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Juniper St	Harmony Rd	~~$296~~ 320	Low	No	Capital
Rusk Rd Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Lake Rd	North Clackamas Park	~~$936~~ 1,000	Low	No	Capital
~~21st Avenue Bike Lanes~~	~~Bicycle~~	~~Fill in gaps in existing bicycle network with bike lanes.~~	~~Harrison St~~	~~Lake Rd~~	~~$50~~	~~Low~~	~~No~~	~~Capital~~
Police Enforcement on Drivers	Bicycle	Enforce laws related to bike lanes and bicycle safety.	Citywide	Citywide	$10	Low	No	Operational
Bike Lane Striping	Bicycle & Transit	Restripe existing bike lanes and stripe bike lanes on streets where buses and bicyclists share the road.	Citywide	Citywide	$20	Low	No	Operational
Kellogg Creek Trail Improvements	Bicycle	Resurface trail and provide wayfinding signage to/from trail.	Milwaukie Riverfront	Treatment Plant	~~$623~~ 680	Low	No	Capital
Hwy 224 Access Modifications at Freeman Way	~~Automobile~~ Street	Modify access at Freeman Way to improve intersection functioning.	Location-specific	Location-specific	~~$1,313~~ 1,400	Low	No	Capital
~~Harmony Road Grade Separation and Realignment at Linwood~~	~~Freight & Automobile~~	~~Grade separate Harmony Road from Union Pacific Railroad and align as a through east-west movement. Outcome of alignment and geometry is dependant upon the Harmony Road Environmental Assessment project (scheduled for completion Fall 2008).~~	~~Location specific~~	~~Location specific~~	~~$28,000~~	~~Low~~	~~No~~	~~Capital~~
Washington St Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	~~35th~~32nd Ave	~~37th~~35th Ave	$130	Low	No	Capital
Franklin St Sidewalks	Pedestrian	Install sidewalks on both sides of street to connect to ~~Hector~~ Campbell Elementary School.	42nd Ave	45th Ave	~~$200~~ 220	~~Medium~~ Low	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[9]	Priority Ranking [10]	Is Project ~~Funded~~ in Action Plan?[11]	Project Type
Intersection Improvements at 42nd Ave and Harrison St	~~Automobile~~ Street	Signalize intersection to facilitate dominant traffic flow.	Location-specific	Location-specific	~~$252~~280	~~Medium~~ Low	No	Capital
Pedestrian Walkway Signage	Pedestrian	Provide maps and wayfinding signage on streets that identify ways to get around the city.	Citywide	Citywide	$10	~~Medium~~ Low	No	Operational
Lake Rd Capacity Improvements	~~Automobile~~ Street	Widen to standard three lane cross section.	21st Ave	Oatfield Rd	~~$7,392~~ 8,100	~~Medium~~ Low	No	Capital
Intersection Improvements at all Crossings of McLoughlin Blvd	Pedestrian	Improve all existing crossings of McLoughlin Blvd (e.g., extended time for crossing, signage). (ODOT to do.)	Location-specific	Location-specific	--	Low	No	Capital
Bike/Ped Path on Sparrow St	Pedestrian & Bicycle	Establish a dedicated bicycle and pedestrian connection on Sparrow St, connecting River Rd to Trolley Trail	River Rd	Trolley Trail	$350	Low	No	Capital
Bike/Ped Overpass over McLoughlin Blvd at River Rd	Pedestrian & Bicycle	Establish a dedicated bicycle and pedestrian connection across McLoughlin Blvd.	Kronberg Park	River Rd	$2,500	Low	No	Capital
Intersection Improvements at 42nd Ave and King Rd	Street	Realignment of intersection to improve traffic movements between 42nd Ave and King Rd east of 42nd Ave.	Location-specific	Location-specific	$200	Low	No	Capital
Traffic-Calming on lower King Rd	Nbrhd Traffic Manage-ment	Install traffic-calming measures on King Rd.	36th Ave	42nd Ave	$300	Low	No	Capital
Improved Connection from Springwater Trail to Pendleton Site (Tunnel)	Pedestrian & Bicycle	Construct tunnel under Springwater Trail to improve connection to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$1,200	Low	No	Capital
Crossing Improvements for McLoughlin Blvd at Ochoco St and Milport Rd	Pedestrian & Bicycle	Construct improvements at Ochoco St and Milport Rd to improve bike/ped crossing of McLoughlin Blvd (per ODOT, this will require full intersection improvements). (TSAP)	Location-specific	Location-specific	$8,320	Low	No	Capital
Local Street Connections in Tacoma Station Area	Street	Connect local streets within Tacoma station area: 24th Ave between Ochoco St/Moores St & Clatsop St; Omark St between Mailwell Dr & Beta St (w/ midblock connection from Main St); and Mailwell Dr to Harrison St via 26th Ave. (TSAP)	Location-specific	Location-specific	$8,120	Low	No	Capital
Local Street Improvements in Tacoma Station Area	Street	Construct street improvements on Stubb St, Beta St, Ochoco St, Hanna Harvester Dr, and Mailwell Dr. (TSAP)	Location-specific	Location-specific	$5,280	Low	No	Capital
Bicycle/ Pedestrian Connection between McLoughlin Blvd and Stubb St	Pedestrian & Bicycle	Establish bike/ped connection to McLoughlin Blvd sidewalk at west end of Stubb St. (TSAP)	Location-specific	Location-specific	$20	Low	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[5]	Priority Ranking[10]	Is Project ~~Funded~~ in Action Plan?[11]	Project Type
REGIONAL PROJECTS WITHIN OR THROUGHT THE CITY OF MILWAUKIE[12]								
~~Milwaukie Light Rail Extension or High Capacity Transit Improvements~~	~~Transit~~	~~Construct light rail or high capacity transit improvements between Milwaukie and Portland.~~	~~Rose Quarter MAX Station~~	~~Milwaukie Town Center~~	~~$515,000~~	—	~~No~~	~~Capital~~
Oregon City Light Rail Extension or High Capacity Transit Improvements	—	Construct light rail or high capacity transit improvements between Milwaukie and Oregon City.	Milwaukie Town Center	Oregon City	$577,500	—	No	Capital
~~Milwaukie Transportation Management Association Program~~	~~Transit~~	~~Implement a transportation management association for employers.~~	~~Milwaukie Town Center~~	~~Milwaukie Town Center~~	~~$200~~	—	~~No~~	~~Operational~~
~~Portland Traction Company Multiuse Trail~~	—	~~Plan, engineer, and construct multiuse trail along Portland Traction Company right-of-way.~~	~~Milwaukie~~	~~Gladstone~~	~~$1,386~~	—	~~No~~	~~Capital~~
North Clackamas Greenway Corridor Study	—	Study feasibility of corridor for multiuse path construction (possibly along Kellogg Creek).	Milwaukie	Clackamas Regional Center	—	—	No	Capital
Linwood/Harmony /Lake Rd Intersection Improvements	—Freight & Street	Add northbound right-turn lane and eastbound right-turn lane AND/OR Grade separate Harmony Rd from Union Pacific Railroad and align as a through east-west movement.	Location-specific	Location-specific	~~$28,000~~ 30,700	—	No	Capital
McLoughlin Blvd Improvements	—	Complete boulevard design improvements.	Scott St	Harrison St	$3,300	—	No	Capital
Tillamook Branch Trestle Trail Study	—	Study feasibility of east-west multiuse trail construction.	Milwaukie Town Center	Lake Oswego Town Center	—	—	No	Capital
Railroad Junction Improvements	—	Implement track and signal improvements to allow for increased track speeds between UP Willsburg Junction and UP Albina Yards.	Milwaukie	UP Railroad Albina Yards	$8,800	—	No	Capital
Railroad Track Extension	—	Extend two tracks from Willsburg Junction to Clackamas.	Milwaukie	I-205	$19,000	—	No	Capital
Tualatin-Portland Commuter Rail Extension Study	—	Study feasibility of adding peak-hour-only service on existing tracks.	Tualatin	Union Station via Lake Oswebo & Milwaukie	TBD	—	No	Operational
Pedestrian Overcrossing of McLoughlin Blvd at Umatilla St	—	Construct bike/ped overcrossing of McLoughlin Blvd at Umatilla St. (TSAP)	Location Specific	Location Specific	$2,200	—	No	Capital
Portland Bike-Share Station and Car Share Spaces at Tacoma Station	—	Establish a Portland Bike-Share station and car-share spaces at Tacoma station. (TSAP)	Location Specific	Location Specific	$70	—	No	Capital

Key:
NDA = Neighborhood District Association
NTMP = Neighborhood Traffic Management Program
CIP = Capital Improvement Program

[12] 2004 Regional Transportation Plan (RTP) projects in the Milwaukie area that may or may not be shown on mode-specific master plans or project lists.

STSP = Safe Trips to School Program
RTP = Regional Transportation Plan
TSAP = Tacoma Station Area Plan

14 Transportation Planning Rule Implementation

The purpose of this chapter is to provide an overview of recommended changes to the Milwaukie Municipal Code with the objective of complying with Oregon's Transportation Planning Rule (TPR) and Metro's Regional Transportation Plan (RTP).

OREGON TRANSPORTATION PLANNING RULE OVERVIEW

The Oregon Transportation Planning Rule ("TPR", or Oregon Administrative Rule Chapter 660, Division 12) requires local governments to implement a transportation system plan that is supported by local land use regulations. The rule sets requirements to protect transportation facilities and enhance pedestrian and bicycle travel.

TPR requirements are fairly broad and allow local governments flexibility in how they comply with the rule. For example, OAR 660-012-0045(2)(b) requires local governments to "protect transportation facilities . . . for their identified functions." The TPR does not define a standard to protect a facility or restrict local governments from self-identifying the function of their facilities.

TPR rules for ODOT-regulated facilities, such as Oregon State Highways 99E and 224, are more restrictive and are regulated by the State in coordination with the City. State, regional, and County facilities within the city are regulated by the respective owner of the facility but are also subject to City regulations.

The Milwaukie Municipal Code has been periodically updated to comply with the TPR, with the most recent updates occurring in 1994, ~~and~~ 2002, and 2007. ~~To remain TPR compliant, one~~ No comprehensive plan ~~amendment and three~~ or Zoning ~~code~~ Ordinance amendments are recommended as part of the ~~2007~~2013 TSP update. ~~Adoption of these amendments is expected to occur concurrently with TSP adoption, unless otherwise noted.~~

~~RECOMMENDED CHANGES~~

~~The four recommended amendments are summarized below. Proposed language is shown in boldface in the grey shaded boxes.~~

~~1. Transportation projects exempt from design standards and procedures.~~

~~The TPR requires that local codes separate transportation projects into three categories for review purposes. The categories are: those that are exempt from design standards~~

~~and procedures, those that are subject to limited review (e.g., Type I) under objective standards, and those that are subject to more extensive review (e.g., Type II) because they are significant or require discretionary decision making.~~

~~The Milwaukie zoning code clearly identifies which projects are in the second and third categories in Milwaukie Municipal Code (MMC) sections 19.1405.1 and 19.405.2. However, no projects are explicitly categorized as exempt. The City has interpreted its current code as exempting activities such as public agency maintenance of, repair to, or operational changes to an existing transportation facility from land use regulations. Since this is not explicit in the code, some of these activities could qualify as "development" per MMC section 19.103, and would therefore be subject to all the transportation planning, design standards, and procedures of MMC Chapter 19.1400, per the catch-all category "other," listed in MMC section 19.1403.A. The City would like to explicitly exempt these types of projects.~~

> **~~Proposed change/addition:~~**
>
> ~~MMC Section 19.1403.1 Limitations~~
>
> **~~D. The following activities and uses are exempt from the requirements of this section:~~**
>
> **~~1. Operation, maintenance, and repair of existing transportation facilities.~~**
>
> **~~2. Public capital improvement projects.~~**

~~2. Carpool/vanpool spaces.~~

~~According to the TPR, employee parking in new developments must provide "preferential parking for carpools and vanpools." The Milwaukie code has a provision that quantifies the number of carpool/vanpool spaces that must be provided (10 percent) but it does not require that the carpool spaces have preferential status. Other jurisdictions typically satisfy this provision through a spatial directive. That is, carpool/vanpool spaces must be closer to the main entrance to the building than general purpose spaces.~~

> **~~Proposed change/addition:~~**
>
> ~~MMC Section 19.506 Carpool and Vanpool Parking~~
>
> ~~**1. Applicability.** New industrial, institutional, and commercial development with fifty (50) or more employees shall provide carpool/vanpool parking.~~
>
> ~~**2. Number of Spaces.** Carpool/vanpool parking shall be provided for at least ten percent (10%) of the required parking.~~
>
> **~~3. Location. Parking for carpools/vanpools shall be closer to the main entrances of the building than other employee or student parking, except parking spaces designated for use by the disabled.~~**
>
> **~~4. Standards. Carpool/vanpool spaces shall be regular-sized, per requirements in Section 19.503.10, and shall be clearly designated with signs or pavement markings for use only by carpools/vanpools.~~**

~~3. Redevelop parking for transit uses.~~

~~The TPR states that a portion of parking areas in existing development "shall be allowed" to redevelop for transit-oriented uses, such as bus stops, shelters, and stations. While Milwaukie's code does not appear to prohibit the redevelopment of parking areas to support transit-oriented uses, neither does it provide an explicit allowance for this.~~

~~The following change/addition is an example of how the City could meet this TPR requirement. The City should incorporate such a change in its next regular code update when it reviews all of MMC Section 19.503.8 to ensure that the new proposed change is compatible with this section's existing requirements.~~

> **~~Proposed change/addition:~~**
>
> ~~MMC Section Modification of Minimum and Maximum Parking~~
>
> ~~E.~~ **~~The planning director is authorized to reduce up to 10 percent of existing required parking spaces at a conversion ratio of one parking space for each 100 square feet of transit facility for developments which incorporate transit-related facilities such as bus stops and pull-outs, bus shelters, or other transit-related facilities. The procedure for planning director review shall be in accordance with subsection 19.1011.1, Type I Administrative Review.~~**
>
> ~~F. Maximum parking allowed may be increased~~ **~~up to fifteen percent of the applicable standard, subject to subsection A above, and further subject to compliance with all zoning standards and management of related stormwater runoff.~~**

~~4. Transit-supportive land uses.~~

~~The TPR requires that "types and densities of land uses" along existing or planned transit routes be supportive of transit. The rule does not specify which land uses are required or what level of density could be considered supportive of transit. The City's zoning map shows generally higher densities and commercial development along the designated transit corridors. Explicit policy direction supporting higher densities along transit corridors would ensure compliance. The following change/addition is an example of how the City could provide this policy direction. Such a change could be implemented in a number of places in the Comprehensive Plan and should be discussed during the City's Periodic Review process.~~

> **~~Proposed change/addition:~~**
>
> ~~Milwaukie Comprehensive Plan~~
>
> ~~Chapter 5 Transportation, Public Facilities, and Energy Conservation~~
>
> ~~Transportation Element~~
>
> ~~Transportation Planning Rule~~
>
> ~~Land uses and transportation improvements along all corridors should be designed to promote transit, bicycling and walking.~~ **~~Specifically, land uses and densities along existing or planned transit routes should be planned to support transit.~~**

Appendix A

Neighborhood Information

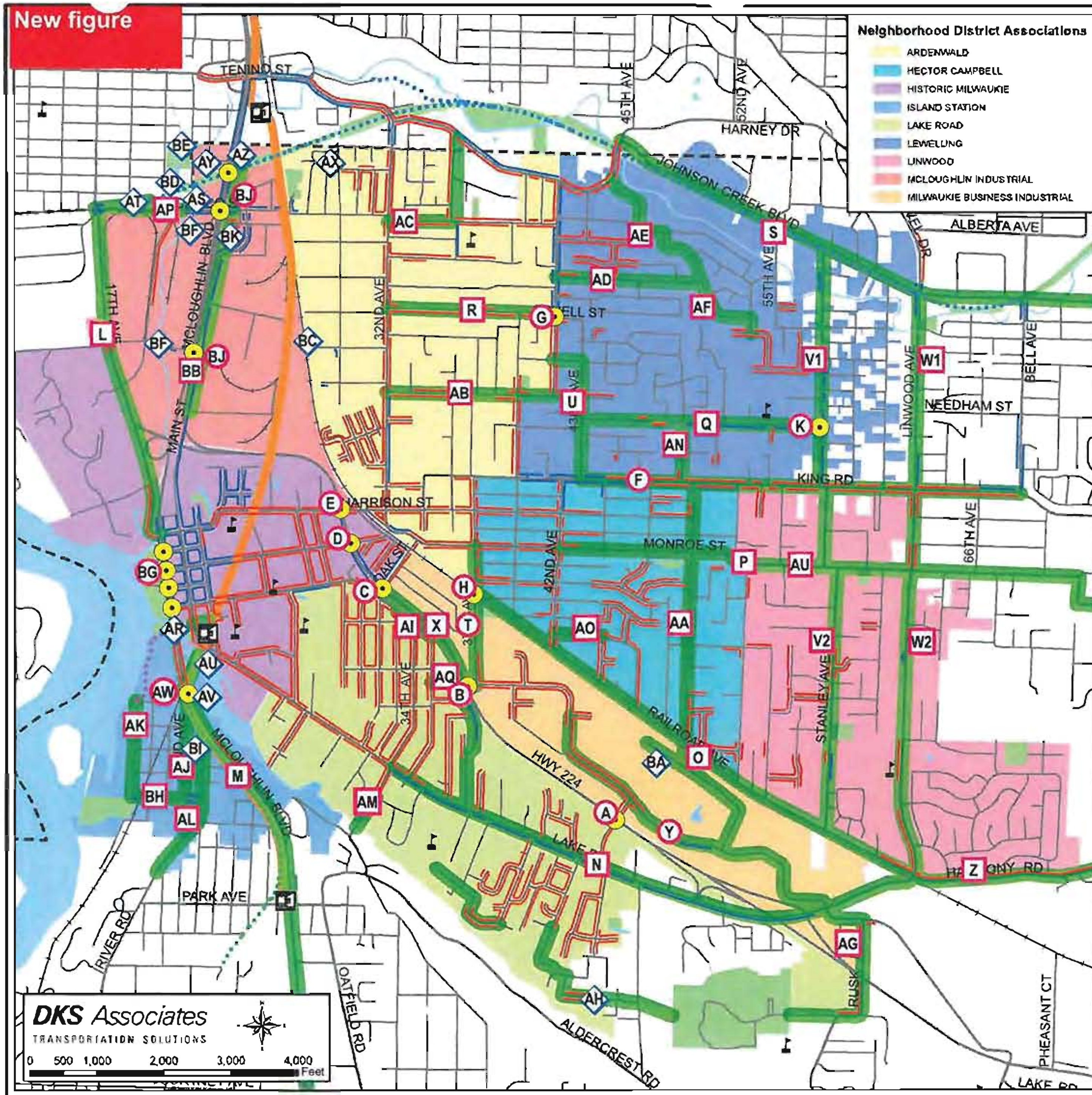
PURPOSE

Per public request for transportation information tailored to each Neighborhood District Association (NDA), all of the master plan figures were modified to include NDA boundaries in addition to the transportation conditions and proposed improvements.

The following maps are included in this appendix:

- Figure A-1: Pedestrian Master Plan with Neighborhood Boundaries
- Figure A-2: Bicycle Master Plan with Neighborhood Boundaries
- Figure A-3: Public Transit Master Plan with Neighborhood Boundaries
- Figure A-4: Street Network Master Plan with Neighborhood Boundaries
- Figure A-5: Freight Master Plan with Neighborhood Boundaries

These specific figures were selected because they depict both existing facilities and proposed improvements for each element, so they provide a comprehensive picture of the transportation environment of each neighborhood. These maps can be used to identify projects that impact a specific neighborhood and facilitate discussion about neighborhood transportation priorities.



Transportation System Plan

FIGURE A-1

PEDESTRIAN MASTER PLAN

November 2013

LEGEND

Existing Sidewalks

- < 5 ft width
- 5 ft - 10 ft width
- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail

Proposed Improvement

- Pedestrian Intersection Safety Improvement
- Pedestrian Facilities

- Schools
- Major Roads
- Streets
- Railroad
- County Line
- Water
- Parks
- Light Rail Transit
- Light Rail Station

PROPOSED PROJECTS

Improve Intersection to Increase Pedestrian Safety

- A Freeman Way/HWY 224
- B 37th Ave/HWY 224
- C Oak St/HWY 224
- D Monroe St/HWY 224
- E Harrison St/HWY 224
- F King Rd improvements
- G Olsen St/42nd Ave
- H Railroad Ave/37th Ave
- K Stanley Ave/Logus Rd
- AW McLoughlin Blvd and 22nd Ave
- BG All McLoughlin crossings
- BJ McLoughlin and Ochoco/Milport

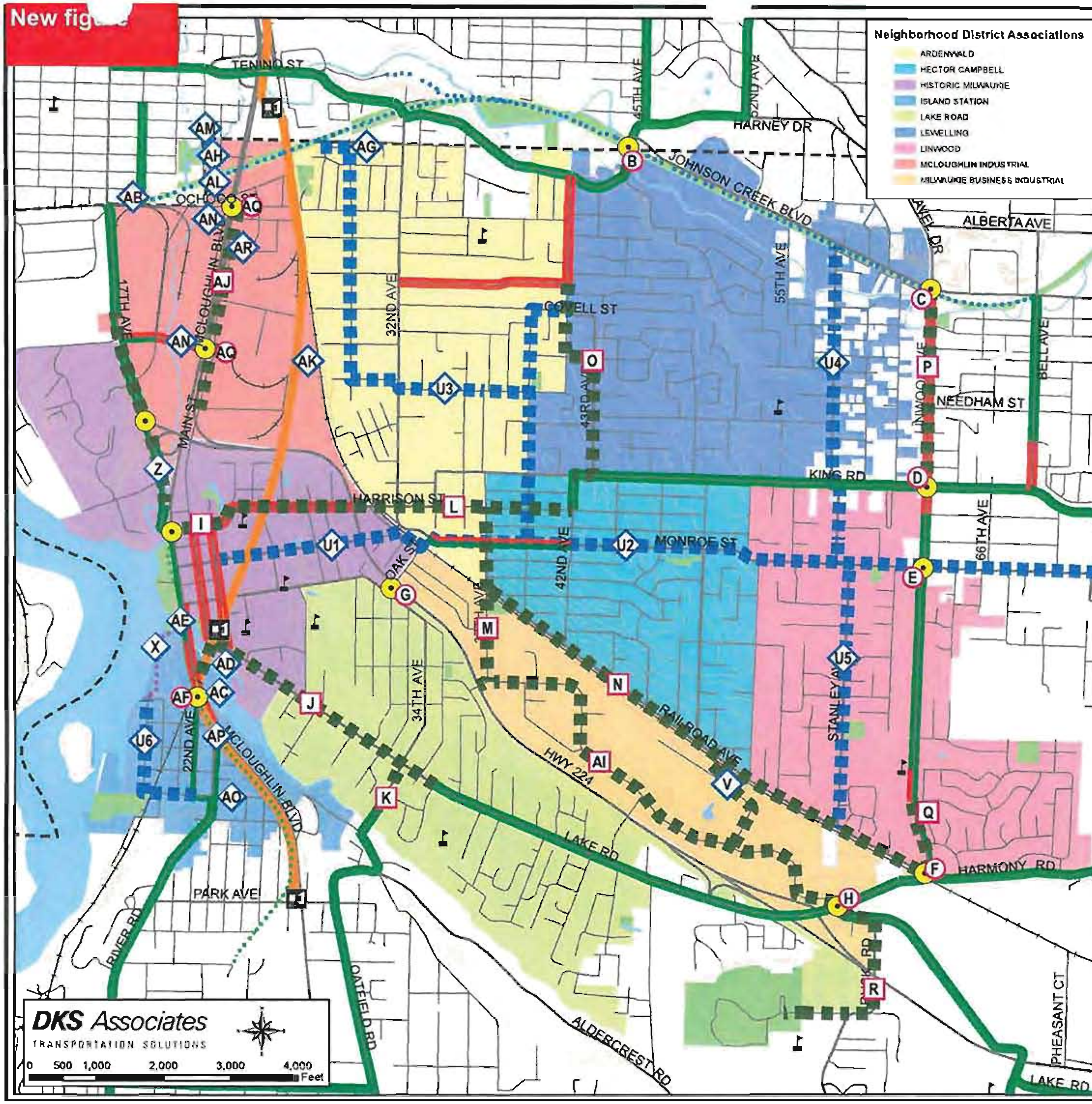
Provide Pedestrian Facilities Where Not Currently Present

See Table 5-1 for project descriptions L-AG, AI-AQ, BB, BH

Enhance Existing Pedestrian Connection

- AH Create ped connection from Rowe Middle School to North Clackamas Park
- AR Construct pedestrian underpass under HWY 99E at Kellogg Creek
- AS Improve ramp at Springwater Trail/HWY 99E
- AT Complete Springwater Trail along Ochoco St
- AU Construct bike-ped overpass over Kellogg Creek
- AV Construct Kronberg Park Trail
- AX Pave connection to Springwater Trail at 29th Ave and Sharrett
- AY Improve connection from Springwater Corridor to Pendleton Site
- AZ Construct stairs to connect Springwater Corridor to LRT Station
- BA Establish bike-ped connection across Railroad Ave and tracks
- BC Establish bike-ped connection over railroad tracks and LRT
- BD Construct stairs to connect Springwater Corridor to McLoughlin
- BE Construct bike-ped bridge over Johnson Creek along Clatsop at 23rd Ave to connect to LRT station
- BF Improve bike-ped connection to neighborhoods west of station
- BI Establish bike-ped connection over McLoughlin at River Rd
- BK Establish bike-ped connection to McLoughlin at Stubb St

New figure



Transportation System Plan

FIGURE A-2

BICYCLE MASTER PLAN

November 2013

LEGEND

Existing Bicycle Facilities
- Shared Lane
- Bicycle Lane
- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail

Proposed Improvements
- Bicycle Intersection Safety Improvement
- Bicycle Lanes
- Neighborhood Greenway

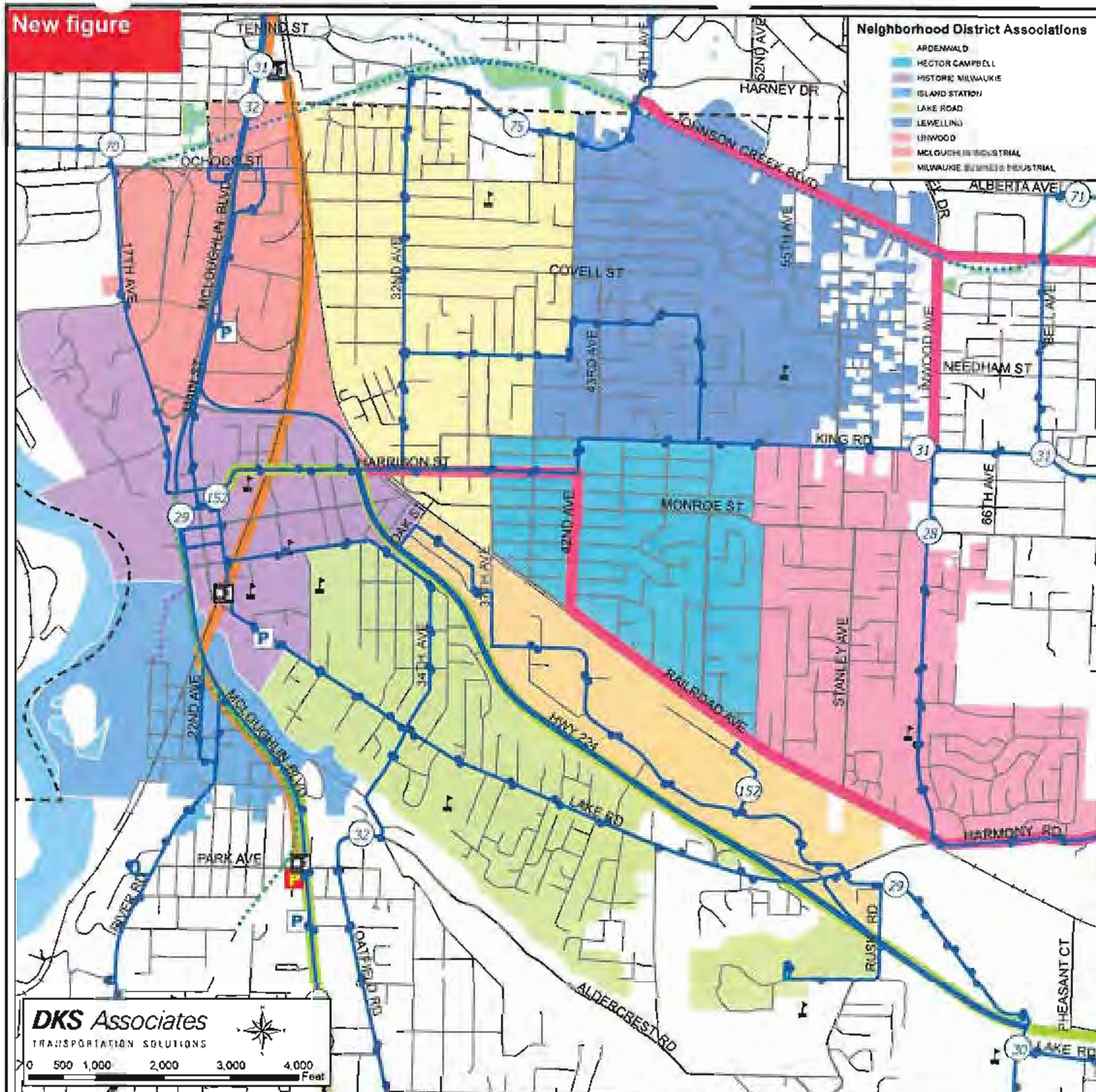
- Schools
- Major Roads
- Streets
- Railroad
- 10' Contours
- County Line
- Water
- Parks
- Light Rail Station
- Light Rail Transit

PROPOSED PROJECTS

Improve Intersection to Increase Bicycle Safety
- (A) Adams St/21st Ave/Railroad Crossing
- (B) Johnson Creek Blvd/Springwater Trail
- (C) Johnson Creek Blvd/Linwood Ave
- (D) Linwood Ave/King Rd
- (E) Linwood Ave/Monroe St
- (F) Linwood Ave/Harmony Rd
- (G) Washington St/Oak St/ HWY 224
- (H) International Way/Lake Rd
- (AF) McLoughlin and 22nd
- (AF) McLoughlin/Ochoco/Milport

Provide Bicycle Lanes Where not Currently Present
See Table 6-2 for project descriptions B-R, AL and AJ

Enhance Existing Bicycle Connection
- (U) Install Neighborhood Greenway treatments at various locations
- (V) Construct bicycle overpass from Railroad Ave to International Way
- (W) Improve Springwater Trail paving
- (X) Improve Kellogg Creek Trail
- (Y) Install Trolley Trail signage
- (Z) Fill in gaps in existing bike network with bike lanes or multiuse path. Improve intersection safety on 17th Ave at HWY 224 and at 99E.
- (AA) Improve ramp at Springwater Trail/HWY 99E
- (AB) Complete Springwater Trail along Ochoco St
- (AC) Construct Kronberg Park Trail
- (AD) Construct bike-ped overpass over Kellogg Creek
- (AE) Construct pedestrian underpass under HWY 99E at Kellogg Creek
- (AG) Pave connection to Springwater Trail at 29th Ave and Sherrett
- (AH) Improve connection from Springwater Corridor to Pendleton Site
- (AK) Establish bike-ped connection over railroad tracks and LRT
- (AL) Construct stairs to connect Springwater Corridor to McLoughlin
- (AM) Construct bike-ped bridge over Johnson Creek along Clatsop at 23rd Ave to connect to LRT station
- (AN) Improve bike-ped connection to neighborhoods west of station
- (AO) Establish bike-ped path on Sparrow to connect River Rd to Trolley Trail
- (AP) Establish bike-ped connection over McLoughlin at River Rd
- (AR) Establish bike-ped connection to McLoughlin at Stubb St



Transportation System Plan

FIGURE A-3

PUBLIC TRANSIT MASTER PLAN

November 2013

LEGEND

Existing Facilities

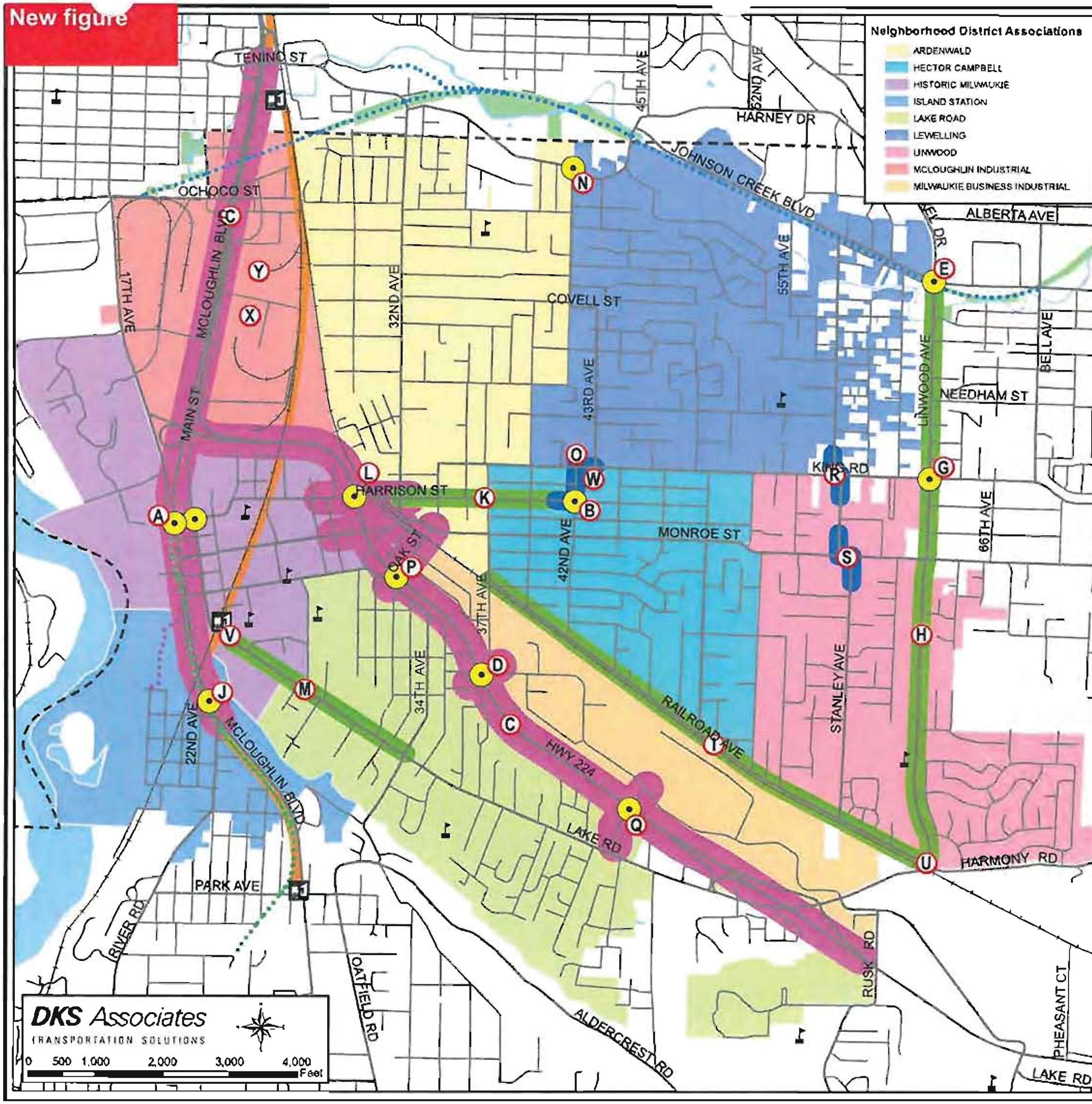
- Bus Route Number
- Bus Stop
- Park and Ride
- Light Rail Station
- Bus Route
- Light Rail Transit

Proposed Improvements

- Park and Ride
- New or Rerouted Bus Route
- Bus Rapid Transit Route

Other Map Features

- Schools
- Major Roads
- Streets
- Railroad
- Kellogg Creek Trail
- SpringwaterTrail
- Trolley Trail
- County Line
- Water
- Parks
- City Limits



Transportation System Plan

FIGURE A-4

STREET NETWORK MASTER PLAN

November 2013

LEGEND

Proposed Street Network Improvements

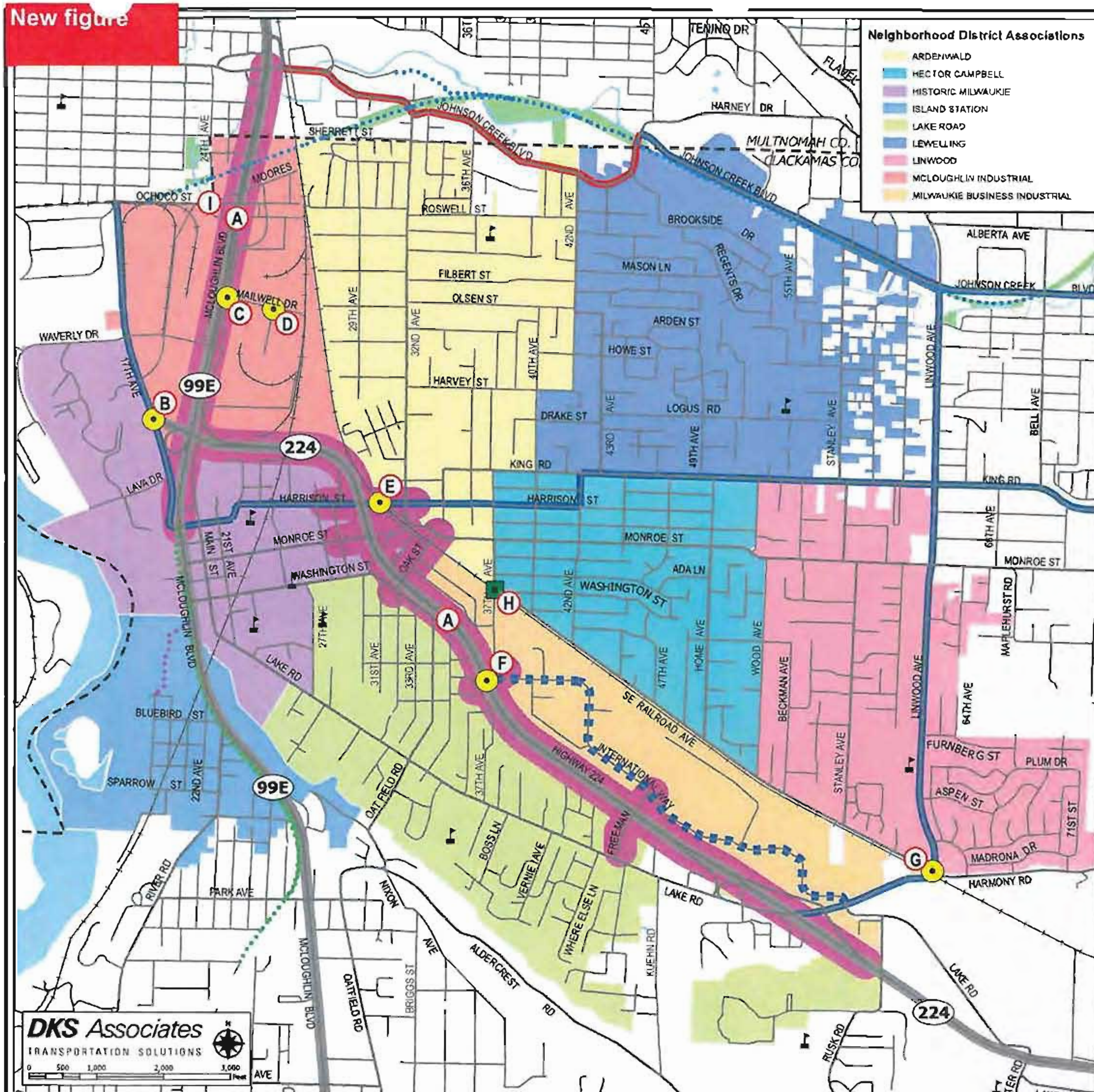
- Travel Route Improvement
- Roadway Widening Project
- Corridor Refinement Plan
- Intersection Improvement

- Schools
- Light Rail Station
- Light Rail Rapid Transit
- Kellogg Creek Trail
- SpringwaterTrail
- Trolley Trail
- Major Roads
- Streets
- Railroad
- County Line
- Water
- Parks

PROPOSED PROJECTS

- (A) Prohibit left turn movement at 17th Ave/McLoughlin Blvd and include in Refinement Plan
- (B) Signalize Harrison St/42nd Ave
- (C) Conduct Refinement Plan for HWY 99E/HWY 224 focused on motor vehicle and freight mobility.
  - HWY 99E Project Limits: Tacoma St to 17th Ave
  - HWY 224 Project Limits: HWY 99E to Lake Rd Interchange
- (D) Reconfigure intersection to consolidate 37th Ave/ Industrial Way
- (E) Add eastbound/westbound right turn lanes and integrate the trail crossing
- (F) Create westbound shared through/right lane; or Add eastbound right turn pocket
- (G) Implement protected/permitted phasing for northbound and southbound left turns
- (H) Widen Linwood Ave to standard three lane cross section
- (I) Widen Railroad Ave to standard three lane cross section
- (J) Redesign intersections of River Rd and 22nd Ave to consolidate intersections; or Add northbound left turn pocket on River Rd
- (K) Widen Harrison St to standard three-lane cross section
- (L) Add left turn-lanes and protected signal phasing on Harrison St approaches
- (M) Widen Lake Rd to standard three-lane cross section
- (N) Replace 3-way stop with signal when warranted and appropriate. (Coordinate with the City of Portland)
- (O) Enhance connection between King Rd and Harrison St
- (P) Add protected signal phasing on Oak St approaches
- (Q) Improve intersection/modify access at HWY 224 and Freeman Way
- (R) Enhance connection along Stanley Ave at King Rd
- (S) Enhance connection along Stanley Ave at Monroe St
- (V) Improve safety of Trolley Trail crossing at 22nd Ave
- (W) Realign intersection to improve traffic between 42nd Ave and King Rd east of 42nd Ave
- (X) Connect local streets within Tacoma Station Area (see Fig 8-4)
- (Y) Construct street improvements on Stubb St, Beta St, Ochoco St, Hanna Harvester Dr and Mailwell Dr (TSAP)

New figure



Transportation System Plan

FIGURE A-5

FREIGHT MASTER PLAN

November 2013

LEGEND

Existing Freight Routes

- Major Regional
- Minor Preferred (Local)
- Weight Restricted Minor Preferred (Local)

Proposed Improvements

- Intersection Improvement
- Intersection Material Upgrade
- Corridor Refinement Plan
- Minor Preferred Freight Route (Local)*

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- Trolley Trail
- County Line
- Parks
- Water

PROPOSED PROJECTS

Improve Corridor

(A) Conduct Refinement Plan for HWY 99E/HWY 224 focused on motor vehicle and freight mobility.
- HWY 99E Project Limits: Tacoma St to 17th Ave
- HWY 224 Project Limits: HWY 99E to Lake Rd Interchange

Improve Intersection

(B) ***17th Ave/HWY 224***
Upgrade intersection turning radii to better accommodate freight movements

(C) ***Main St/Mailwell Dr***
Upgrade intersection turning radii to better accommodate freight movements

(D) ***Mailwell Dr/Omark Dr***
Upgrade intersection turning radii to better accommodate freight movements

(E) ***Harrison St/Union Pacific Railroad Crossing***
Upgrade crossing to grade separated facility (outcome of crossing dependant upon 99E/224 Refinement Plan findings)

(F) ***HWY 224/37th Ave***
Consolidate two northern legs of 37th Ave and Industrial Way into one leg at HWY 224.

(G) ***Linwood/Harmony/Lake Road Intersection Improvements***
Add northbound right turn lane and eastbound right turn lane AND/OR grade separate Harmony Road from Union Pacific Railroad and align as a through east-west movement

(H) ***Railroad Crossing Improvements at 37th Ave***
Improve road transition to railroad crossing

(I) ***Signage and Intersection Improvements at McLoughlin Boulevard and Ochoco St.***
Establish signage for trucks and improve intersection (TSAP)

Appendix ~~A~~B

Public Involvement Summary

Archival Note: Appendix B was created as part of the 2007 TSP update—it does not reflect the update process that was conducted in 2013.

INTRODUCTION

Milwaukie has some of the most organized and active communities, neighborhoods and citizen activists in the Portland Metro area. Residents have a high expectation to be involved in City business. Recognizing this, the City developed a public involvement program that was likely the most extensive public outreach and involvement process-to-date in the State of Oregon for a Transportation System Plan (TSP). The program included opportunities for citizens to participate at both a mode-specific and broad policy level, resulting in a TSP that reflects the needs and priorities of the community.

POLICY REQUIREMENTS

State, regional, and City policies require that citizen input be part of the transportation system planning process. Oregon's Statewide Planning Goal #1 mandates the following:

- Provide widespread citizen involvement, including the establishment of a citizen advisory committee (CAC) broadly representative of geographic areas and interests.
- Assure effective two-way communication with citizens.
- Assure technical information is available in an understandable form.
- Assure that citizens receive a response from policymakers.
- Ensure adequate funding for citizen involvement in a planning budget.

As outlined in the Comprehensive Plan Chapter 1, City policy requires the following:

- **Objective #1:** "The City will promote citizen participation in the planning process primarily through the nine Milwaukie Neighborhood Areas..."
- **Objective #2:** "To encourage broadly based public participation involving a cross section of citizens from a variety of geographic and interest areas, solicited through an open, well-publicized process."
- **Objective #3:** "Promote informed public participation in planning decisions by providing readily available publications and printed materials regarding current issues and proposed policies and providing for two-way communication between policy-makers and citizens."

OUTREACH AND INVOLVEMENT PROGRAM

At the beginning of the TSP Update Project the City set the following goal:

> *The public involvement process for the Milwaukie TSP update will encourage and provide opportunities for citizens to participate in all phases of the planning process and keep*

Appendix ~~B~~C

Prioritized Master Plan Project List

Archival Note: Appendix C was created as part of the 2007 TSP update—it does not reflect the update process that was conducted in 2013.

The Prioritized Master Plan Project List contains all projects identified in the TSP update process. Projects came from many sources including, but not limited to, the following: 2007 TSP Working Groups, Milwaukie's Downtown Plan, Milwaukie's Capital Improvement Plan, 1997 TSP, and Metro's Regional Transportation Plan. All projects were vetted by staff, Working Group members, and Advisory Committee members.

The following process was used to prioritize the TSP projects.

- Working Group participants ranked projects as high, medium, or low.
- Staff evaluated each project against the TSP Goals using the Project Evaluation Questions. The idea behind the project evaluation questions is that, given the limited funds available, the City should prioritize funding of transportation projects that 1) effectively address identified problems, and 2) best meet the City's transportation goals. Projects that were ranked as low priority by the working groups were not evaluated unless other public involvement efforts (e.g. TSP Community Briefings or Open Houses), citizen groups (e.g. Neighborhood District Associations), or programs (e.g. Safe Trips to Schools Program or Capital Improvement Program) identified them as a priority.
- Staff also took other information into consideration before grouping the projects into high, medium, and low categories such as dependence on other projects or neighborhood support.
- Advisory Committee members reviewed staff's proposed project ranking and recommended some minor changes to the ranking of individual projects.

In addition to identifying the projects that are most important to the City, the Advisory Committee advised staff on which funding strategy to pursue in the development of the City's Action Plan. The Action Plan is the City's financially constrained project list that contains only those high priority projects that are likely to be funded with limited City funds within the 22-year planning period. The projects on the City's Action Plan are divided up by mode and appear in Chapters 5, 6, 7, 8, 9, 11, and 12 respectively. Action Plan projects are identified on the Prioritized Master Plan Project List by a "Yes" response in the column entitled "Is Project Funded?"

The Advisory Committee considered the following funding strategies.

- **Emphasis on direct City funding of projects.** This approach would encourage the City to fund projects itself and not use local funds to leverage outside funding. Taking this approach would require the City to save up for years to construct one or two projects (like widening Railroad Avenue) to the exclusion of many other projects.
- **Emphasis on leveraging City funds.** This approach would encourage the City to fund less expensive projects with local funds and to leverage state or federal funds with local match dollars for more expensive high priority projects. Taking this approach would theoretically enable the City to fund more projects than it could otherwise do on its own.

Appendix ~~C~~D

Conceptual Design Options

Archival Note: Appendix D was created as part of the 2007 TSP update—it does not reflect the update process that was conducted in 2013.

The Street Auto Network Working Group discussed the following design options during the TSP update process. These design options were developed to address current and/or future operational deficiencies at TSP study intersections.

Appendix ~~D~~E

Glossary of Technical Terms

Access Management: 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) to reduce impacts of approach traffic on the main facility.

Accessway: A facility that provides pedestrian and/or bicycle passage between streets, from a street to a building, or to other destinations such as schools, parks, or transit stops.

Average Daily Traffic (ADT): Measurement of the average number of vehicles passing a certain point each day on a highway, road, or street.

Alternative Modes: Transportation alternatives other than single-occupant automobiles. Alternative travel modes include travel by rail, transit, bicycle, and walking.

Arterial Street: High-volume, moderate-speed streets that carry vehicles within a city and between adjacent cities in surrounding metropolitan area. Arterials link major commercial, residential, industrial, and institutional areas. They are typically spaced about one mile apart to assure mobility and reduce the incidence of cut-through traffic on neighborhood routes and local streets.

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: A portion of the roadway that has been designated by striping and pavement markings for the preferential or exclusive use of bicyclists.

Capacity: The maximum number of vehicles or individuals that can traverse a given segment of a transportation facility with prevailing roadway and traffic conditions.

Central Business District (CBD): Traditional downtown area. Usually characterized by slow traffic speeds, on-street parking, and a compact street grid system.

Collector Street: Moderate-volume, moderate-speed streets that provide access and circulation within and between residential neighborhoods, commercial areas, and industrial areas. They serve a citywide function of connectivity and are typically spaced about one-half mile apart. They distribute trips between a neighborhood street system and an arterial street system, linking a wide range of land uses.

Congestion Mitigation/Air Quality (CMAQ) Program: Jointly administered by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA), was reauthorized in 2005 under the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The SAFETEA-LU CMAQ program provides over $8.6 billion in funds to state and transit agencies to invest in projects that reduce criteria air pollutants regulated from transportation-related sources.

Appendix ~~E~~F

Levels of Service (LOS) Descriptions

TRAFFIC LEVELS OF SERVICE

Analysis of traffic volumes is useful to understand the general nature of traffic in an area, but, by itself, does not indicate the ability of the street network to carry additional traffic or the quality of service afforded by specific facilities. To this end the concept of level of service (LOS) was developed to subjectively describe street and/or intersection performance. Bottlenecks are most often found at intersections, and the ability of the street network to carry traffic efficiently is generally diminished in their vicinities. As a result, LOS is most often evaluated at intersections, but key corridors can be evaluated as well.

LOS categories are similar to report card ratings. Levels of Service A, B, and C indicate conditions where traffic moves without significant delays over periods of peak travel demand. Levels of service D, E, and F represent progressively worse peak hour operating conditions. Most urban communities set level of service D as the minimum acceptable level of service for peak hour operation and plan for level of service C or better for all other times of the day. The Highway Capacity Manual provides LOS calculation methodologies for both intersections and arterials.[1]

[1] *Highway Capacity Manual 2000*, Transportation Research Board, Washington D.C., 2000, Chapters 16 and 17.

Appendix ~~F~~G

Traffic Data

CONTENTS

This appendix includes background and input data for the various traffic forecasting and analyses found throughout the TSP. See below for the location of the data for each type of analysis.

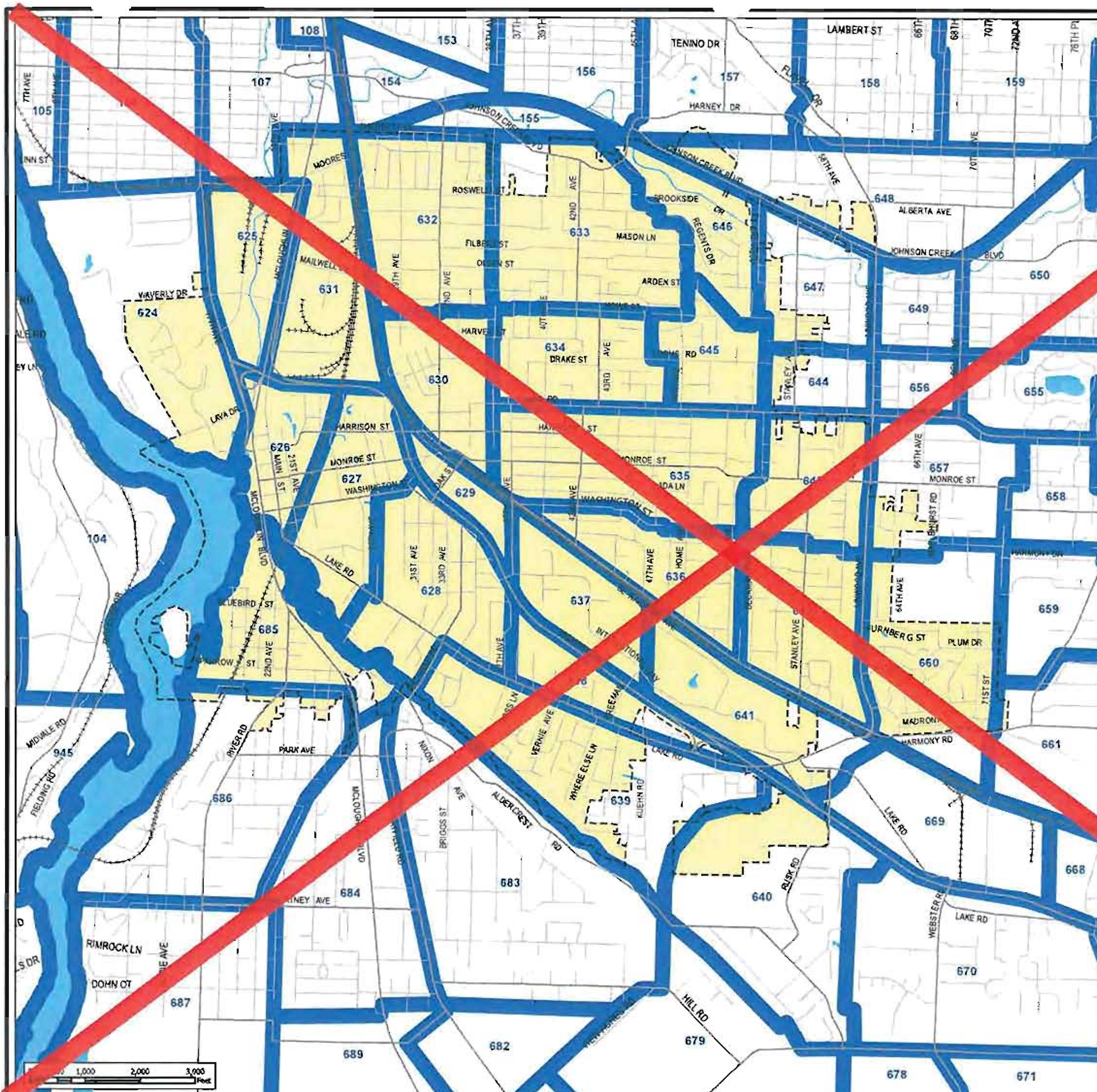
CITY OF MILWAUKIE

Transportation System Plan

Metro Model

TRANSPORTATION ANALYSIS ZONES

December 2007



LEGEND

- Original Metro Transportation Analysis Zones
- #### Transportation Analysis Zone Number

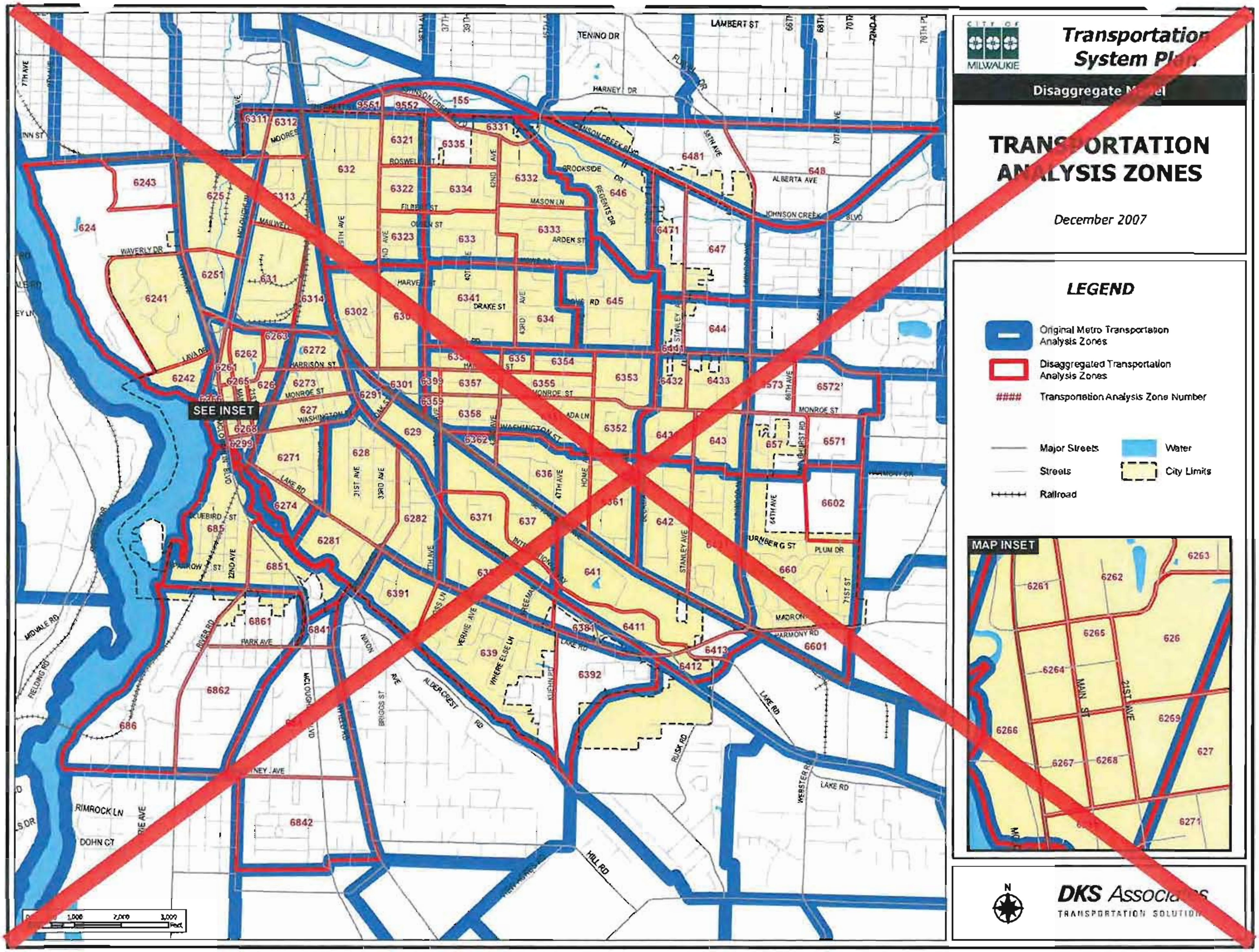
Other Map Features

- Major Streets
- Streets
- Railroad
- Water
- City Limits

N

DKS Associates

TRANSPORTATION SOLUTIONS



CITY OF MILWAUKIE
Transportation System Plan
Disaggregate Model
TRANSPORTATION ANALYSIS ZONES
December 2007
LEGEND
Original Metro Transportation Analysis Zones
Disaggregated Transportation Analysis Zones
Transportation Analysis Zone Number
Major Streets
Streets
Railroad
Water
City Limits
MAP INSET
SEE INSET
DKS Associates

2005 and 2030 Metro Land Use Data (Disaggregated)

Metro Taz	DKS TAZ		2005 HH	2005 RET	2005 OTH	2030 HH	2030 RET	2030 OTH	
155	155		1	0	13	2	0	38	
155	9551		2	0	0	4	0	5	
155	[illegible]		8	3	2	14	6	10	
		Total	11	3	15	20	6	53	
	[illegible]	Control	11	3	15	20	6	53	← Original Metro TAZ Total
624	624		0	0	50	0	0	50	
624	6241		350	0	0	375	0	0	
624	6242		160	0	103	173	0	191	
624	6243		75	0	0	80	0	0	
		Total	585	0	153	628	0	241	
	624	Control	585	0	153	628	0	241	← Original Metro TAZ Total
625	625		[illegible]	75	645	2	100	[illegible]	
625	6251		[illegible]	50	428	0	69	[illegible]	
		Total	0	125	1073	2	169	[illegible]	
	625	Control	0	125	1073	2	169	[illegible]	← Original Metro TAZ Total
626	626		0	0	50	0	0	60	
626	6261		0	20	90	0	27	115	
626	6262		60	[illegible]	90	291	24	115	
626	6263		72	[illegible]	0	291	[illegible]	0	
626	6264		0	40	0	90	[illegible]	0	
626	6265		0	0	90	0	0	115	
626	6266		0	0	10	0	0	55	
626	6267		0	40	90	0	54	115	
626	6268		0	40	90	0	53	115	
626	6269		0	40	[illegible]	90	53	115	
626	6299		0	18	[illegible]	[illegible]	25	115	
		Total	132	216	[illegible]	[illegible]	290	920	
	626	Control	132	216	689	[illegible]	290	920	← Original Metro TAZ Total
627	627		63	3	50	72	5	68	
627	6271		76	18	590	86	22	795	
627	6272		208	0	0	[illegible]	0	0	
627	6273		208	0	[illegible]	[illegible]	0	66	
627	6274		76	0	[illegible]	86	0	398	
		Total	631	21	[illegible]	716	27	1325	
	627	Control	631	21	985	716	27	1325	← Original Metro TAZ Total
628	628		200	133	47	215	[illegible]	400	
628	6281		300	15	0	310	[illegible]	44	
628	6282		200	[illegible]	0	210	[illegible]	100	
		Total	700	[illegible]	47	735	[illegible]	544	
	628	Control	700	[illegible]	47	735	194	544	← Original Metro TAZ Total
629	629		0	30	30	0	60	50	
902	6291		39	312	217	60	393	[illegible]	
		Total	39	342	247	60	453	[illegible]	
	629	Control	[illegible]	342	247	60	453	[illegible]	← Original Metro TAZ Total
630	630		[illegible]	0	50	280	0	80	
630	6301		80	5	100	100	11	346	
630	6302		182	0	350	261	0	380	
		Total	512	5	500	641	11	806	
	630	Control	512	5	500	641	11	806	← Original Metro TAZ Total
631	631		0	0	410	0	0	445	
631	6311		8	20	110	27	35	119	
631	[illegible]		0	10	175	0	16	190	
631	[illegible]		0	0	297	0	0	322	
631	[illegible]		0	0	175	0	0	190	
		Total	8	30	1167	27	51	1266	
	631	Control	8	30	1167	27	51	1266	← Original Metro TAZ Total
[illegible]	632		364	8	100	386	13	149	
[illegible]	6321		121	0	24	129	0	42	
[illegible]	6322		121	0	24	128	0	42	

2[illegible]5 and 2030 Metro Land Use Data (Disaggregated)

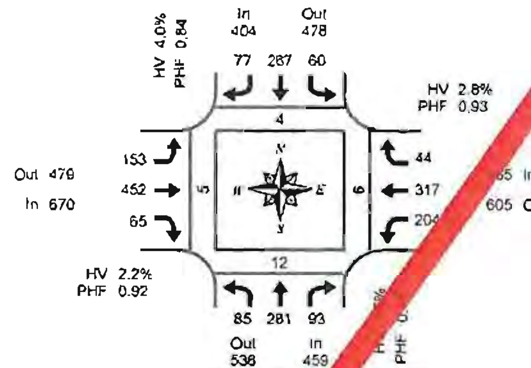
Metro [illegible]	DKS TAZ		2005 HH	2005 RET	2005 OTH	2030 HH	2030 RET	2030 OTH	
632	6323		121	0	24	129	0	42	
		Total	727	8	172	772	13	275	
	[illegible]32	Control	727	8	172	772	13	275	Original Metro T[illegible]otal
633	6[illegible]		162	0	0	165	0	0	
633	633[illegible]		40	0	40	53	0	55	
633	6332		145	0	0	160	0	0	
633	6333		202	0	0	210	0	0	
633	6334		145	0	69	160	0	75	
633	6335		115	0	0	125	0	0	
		Total	809	0	109	873	0	130	
	633	Control	809	0	109	873	0	130	[illegible]riginal Metro TAZ Total
634	634		[illegible]6	0	22	256	0	29	
634	6341		[illegible]	0	32	315	0	44	
		Total	52[illegible]	0	54	571	0	73	
	634	Control	526	0	54	571	0	73	Original Metro TAZ Total
635	635		0	180	24	0	230	[illegible]	
635	6351		171	0	0	193	0	0	
635	6352		150	[illegible]	0	160	0	0	
635	6353		150	[illegible]	20	170	0	35	
635	6354		50	0	0	60	0	0	
635	6355		83	30	40	95	58	60	
635	6356		58	0	0	66	[illegible]	0	
635	6357		50	0	10	57	[illegible]	25	
635	6358		100	0	0	115	0	0	
635	6359		0	0	[illegible]	20	0	0	
635	6399		17	0	[illegible]	20	0	0	
		Total	829	210	94	956	288	205	
	635	Control	829	210	94	956	288	205	Original Metro TAZ Total
636	636		190	0	299	[illegible]	0	306	
636	6361		144	0	0	[illegible]52	0	0	
636	6362		40	0	0	[illegible]	0	0	
		Total	374	0	299	[illegible]	0	306	
	636	Control	374	0	299	43[illegible]	0	306	Original Metro TAZ Total
637	637		1	20	9[illegible]	28	82	1185	
637	6371		0	280	[illegible]	0	330	641	
		Total	1	300	[illegible]459	28	412	1826	
	637	Control	1	300	1459	28	[illegible]	1826	Original Metro TAZ Total
638	638		25	0	67	20	1	72	
638	6381		167	0	0	152	0	0	
		Total	192	[illegible]	67	172	1	72	
	638	Control	192	[illegible]	67	172	1	72	Original Metro TAZ Total
639	639		271	0	29	262	0	[illegible]	
639	6391		120	0	90	116	0	[illegible]	
639	6392		151	0	0	148	0	[illegible]	
		Total	542	0	119	526	0	109	
	639	Control	5[illegible]	0	119	526	0	109	Original Metro TAZ Total
641	641		[illegible]	42	1700	0	60	1780	
641	6411		0	100	465	0	137	471	
641	6412		42	0	0	70	0	0	
641	6413		0	0	110	0	0	115	
		T[illegible]	42	142	2275	70	197	2366	
	641	C[illegible]trol	42	142	2275	70	197	2366	Origi[illegible]etro TAZ Total
642	642		230	0	75	245	0	100	
642	642[illegible]		210	0	146	233	0	209	
		Total	440	0	221	478	0	309	
	[illegible]2	Control	440	0	221	478	0	309	Original Metro T[illegible]Total
643	643		100	0	0	115	0	0	
643	6431		100	0	20	115	0	30	
64[illegible]	6432		85	0	0	100	0	0	

[illegible]05 and 2030 Metro Land Use Data (Disaggregated)

Met[illegible]az	DKS TAZ		2005 HH	2005 RET	2005 OTH	2030 HH	2030 RET	2030 OTH	
64[illegible]	6433		143	53	31	160	71	52	
		Total	428	53	51	490	71	82	
	643	Control	428	53	51	490	71	82	← Original Metro TA[illegible]otal
644	[illegible]		35	0	69	36	0	75	
644	64[illegible]		100	0	69	106	0	100	
		Total	135	0	138	142	0	175	
	644	[illegible]ontrol	135	0	138	142	0	175	← Origina[illegible]tro TAZ Total
645	645		278	0	89	304	0	104	
		To[illegible]	278	0	89	304	0	104	
	645	Contr[illegible]	278	0	89	304	0	104	← [illegible]iginal Metro TAZ Total
646	646		284	17	103	297	22	113	
		Total	[illegible]4	17	103	297	22	113	
	646	Control	[illegible]	17	103	297	22	113	← Original Metro TAZ Total
647	647		186	0	424	195	0	41[illegible]	
647	6471		62	0	424	68	0	[illegible]	
		Total	248	0	848	263	0	[illegible]9	
	647	Control	248	0	848	263	0	839	← Original Metro TAZ Total
648	648		360	[illegible]	680	380	35	870	
648	6481		120	80	226	130	120	295	
		Total	480	94	906	510	15[illegible]	1165	
	648	Control	480	94	906	510	[illegible]	1165	← Original Metro TAZ Total
657	657		80	0	0	82	0	0	
657	6571		78	0	[illegible]5	85	0	40	
657	6572		80	6	[illegible]	83	8	26	
657	6573		80	0	0	80	0	0	
		Total	318	6	56	33[illegible]	8	66	
	657	Control	318	6	56	[illegible]	8	66	← Original Metro TAZ Total
660	660		559	6	0	[illegible]74	7	5	
660	6601		0	0	0	[illegible]	0	0	
660	6602		15	0	32	[illegible]	0	34	
		Total	574	6	32	64[illegible]	7	39	
	660	Control	574	6	32	649	7	39	← Original Metro TAZ Total
684	684		565	185	[illegible]7	608	246	408	
684	6841		10	20	0	20	25	0	
684	6842		565	101	247	608	[illegible]0	408	
		Total	1140	306	494	1236	4[illegible]	816	
	684	Control	1140	306	494	1236	42[illegible]	816	← Original Metro TAZ Total
685	685		182	[illegible]	12	208	40	21	
685	6851		240	[illegible]	0	250	26	0	
		Total	422	50	12	458	66	21	
	685	Control	422	50	12	458	66	[illegible]	← Original Metro TAZ Total
686	686		545	13	600	550	28	66[illegible]	
686	6861		27[illegible]	0	75	274	0	125	
686	6862		5[illegible]	0	62	550	0	100	
		Total	[illegible]1	13	737	1374	28	889	
	686	Control	[illegible]361	13	737	1374	28	889	← Original Metro TAZ Total

Tot[illegible] Vehicle Summary

C[illegible] Carney
(503)[illegible]-2740



SE Linwood [illegible]e & SE King Rd

Tuesday, December 0[illegible] 2006
3:00 PM to 6:00 PM

Peak Hour Su[illegible]ary
3:45 PM to [illegible]45 PM

15-Minute Interval Summary
3:00 PM to 6:00 PM

Interval Start Time	Northbound SE Linwood Ave				[illegible]thbound SE [illegible]ood Ave				Eastbound SE King Rd				Westbound SE King Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	[illegible]es		North	South	East	West
3:00 PM	15	54	19	1	17	52	[illegible]	0	24	71	15	0	63	76	6	0	417	0	1	0	4
3:15 PM	16	53	25	1	9	58	[illegible]	0	28	94	15	0	59	77	[illegible]	0	459	0	0	1	0
3:30 PM	33	39	24	0	10	59	[illegible]	1	14	112	17	0	50	74	[illegible]	0	456	0	1	0	3
3:45 PM	29	73	22	0	11	64	[illegible]	0	41	117	24	0	57	80	[illegible]	0	550	0	4	2	2
4:00 PM	24	66	27	0	16	57	16	[illegible]	36	110	10	1	62	69	11	0	506	1	6	2	2
4:15 PM	15	67	18	0	19	64	20	[illegible]	37	114	13	0	50	[illegible]	8	0	502	1	1	0	0
4:30 PM	17	73	26	0	14	82	24	[illegible]	39	111	18	0	35	[illegible]	10	0	540	2	1	2	1
4:45 PM	29	69	34	0	19	66	22	[illegible]	41	108	14	0	34	[illegible]	19	0	536	0	0	0	5
5:00 PM	32	61	20	0	11	71	12	2	[illegible]	114	17	0	35	[illegible]	13	0	494	0	0	1	1
5:15 PM	27	68	29	1	15	60	24	0	[illegible]	116	10	0	[illegible]	81	12	0	496	3	4	3	1
5:30 PM	31	64	23	0	20	55	23	0	[illegible]	98	20	0	[illegible]	73	11	1	492	3	0	1	3
5:45 PM	19	41	10	0	6	55	21	0	[illegible]	94	16	0	[illegible]	68	16	0	394	0	1	0	1
Total Survey	287	730	277	3	167	743	222	4	375	[illegible]	189	1	[illegible]	921	142	1	5,842	10	19	12	23

Peak Hour Summary
3:45 PM to 4:45 PM

By Approach	Northbound SE Linwood Ave				Southbound SE Linwood Ave				Eastb[illegible] SE K[illegible]				Westbound SE King Rd				Total
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Ou[illegible]	[illegible]otal	[illegible]kes	In	Out	Total	Bikes	
Volume	459	536	995	0	404	478	882	1	670	[illegible]	1,149	[illegible]	565	605	1,170	0	2,098
%HV	3.5%				4.0%				[illegible]2.2%				2.8%				3.0%
PHF	0.93				0.84				0.92				0.93				0.95

Pedestrians Crosswalk			
North	South	East	West
4	12	6	5

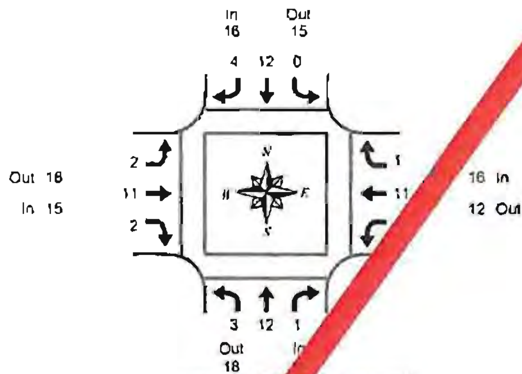
By Movement	Northbound SE Linwood Ave				Southbound SE Linwood Ave				Eastbound SE King Rd				Westbound SE King Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	85	281	93	459	60	267	77	404	153	452	65	670	204	[illegible]	44	565	2,098
%HV	3.5%	4.3%	1.1%	3.5%	0.0%	4.5%	5.2%	[illegible]	1.3%	2.4%	3.1%	2.2%	2.0%	[illegible]	2.3%	2.8%	3.0%
PHF	0.73	0.96	0.86	0.93	0.79	0.81	0.80	[illegible]	0.93	0.97	0.68	0.92	0.82	[illegible]	0.73	0.93	0.95

Rolling Hour Summary
3:00 PM to 6:00 PM

Interval Start Time	Northbound SE Linwood Ave				So[illegible]ound SE [illegible]ood Ave				Eastbound SE King Rd				Westbound SE King Rd				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	[illegible]	R	Bikes	L	T	R	Bikes	L	T	R	[illegible]		North	South	East	West
3:00 PM	93	219	90	2	47	[illegible]	60	1	107	394	71	0	219	307	42	[illegible]	1,882	0	5	3	9
3:15 PM	102	233	98	1	[illegible]	238	61	2	119	433	66	1	228	300	47	0	1,971	1	11	5	7
3:30 PM	101	247	91	0	[illegible]	244	68	2	128	453	64	1	219	300	43	0	2,014	2	12	4	7
3:45 PM	85	281	93	0	[illegible]	267	77	1	153	452	65	1	204	317	44	0	[illegible]	4	12	6	5
4:00 PM	85	277	105	0	58	269	82	1	153	443	55	1	181	318	48	0	[illegible]	4	8	4	8
4:15 PM	93	270	98	[illegible]	63	283	78	2	151	447	62	0	154	323	50	0	[illegible]	3	2	3	7
4:30 PM	105	271	109	[illegible]	59	279	82	2	140	449	59	0	132	327	54	0	[illegible]	5	5	6	8
4:45 PM	119	262	106	[illegible]	65	252	81	2	131	436	61	0	141	309	55	1	[illegible]	6	4	5	10
5:00 PM	109	234	82	[illegible]	52	241	80	2	115	422	63	0	130	296	52	1	1,876	6	5	5	6

Heavy Vehicle Summary

All Traffic Data
Services Inc
Clay Carney
[illegible]) 833-2740



Peak Hour Summary
3:45 PM [illegible] 4:45 PM

SE Linwood Ave & SE King Rd

Tuesday, December 05, 2006
3:00 PM to 6:00 PM

Heavy Vehicle 15-Minute Interval Summary
3:00 PM to 6:00 PM

Interval Start Time	Northbound SE Linwood Ave				Southbound SE Linwood Ave				Eastbound SE King Rd				Westbound SE King Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
3:00 PM	3	3	1	7	0	[illegible]	0	4	2	3	1	6	3	4	0	7	24
3:15 PM	1	3	0	4	1	[illegible]	0	4	2	5	0	7	1	4	0	5	20
3:30 PM	1	2	0	3	0	0	0	0	1	1	1	3	2	[illegible]	0	2	8
3:45 PM	0	4	1	5	0	3	[illegible]	4	1	4	0	5	2	[illegible]	0	5	19
4:00 PM	2	1	0	3	0	4	[illegible]	5	1	2	0	3	1	3	0	4	15
4:15 PM	0	6	0	6	0	1	[illegible]	2	0	4	2	6	[illegible]	4	1	6	20
4:30 PM	1	1	0	2	0	4	1	5	0	1	0	1	[illegible]	1	0	1	9
4:45 PM	0	1	2	3	0	1	1	[illegible]	0	2	1	3	[illegible]	1	0	4	12
5:00 PM	2	3	1	6	1	1	0	[illegible]	0	1	0	1	1	0	0	1	10
5:15 PM	0	1	1	2	1	1	0	[illegible]	0	4	0	4	0	2	0	2	10
5:30 PM	0	1	2	3	0	0	0	0	1	1	1	[illegible]	0	0	1	1	7
5:45 PM	0	1	1	2	0	2	1	3	[illegible]	1	2	[illegible]	0	0	0	0	9
Total Survey	10	27	9	46	3	24	6	33	[illegible]	29	8	46	14	22	2	38	163

Heavy Vehicle Peak Hour Summary
3:45 PM to 4:45 PM

By Approach	Northbound SE Linwood Ave			Southbound SE Linwood Ave			Eastbound SE King Rd			Westbound SE King Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	16	18	34	16	15	31	[illegible]	18	[illegible]	16	12	28	63
PHF	0.29			0.33			[illegible]			0.27			0.29

By Movement	Northbound SE Linwood Ave				Southbound SE Linwood Ave				Eastbound SE King Rd				Westbound SE King Rd				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	3	12	1	16	0	12	4	16	2	11	2	15	[illegible]	11	1	16	63
PHF	0.15	0.27	0.06	0.29	0.00	0.33	[illegible]	0.33	0.10	0.28	0.17	0.23	[illegible]	0.28	0.25	0.27	0.29

Heavy Vehicle Rolling Hour Summary
3:00 PM to 6:00 PM

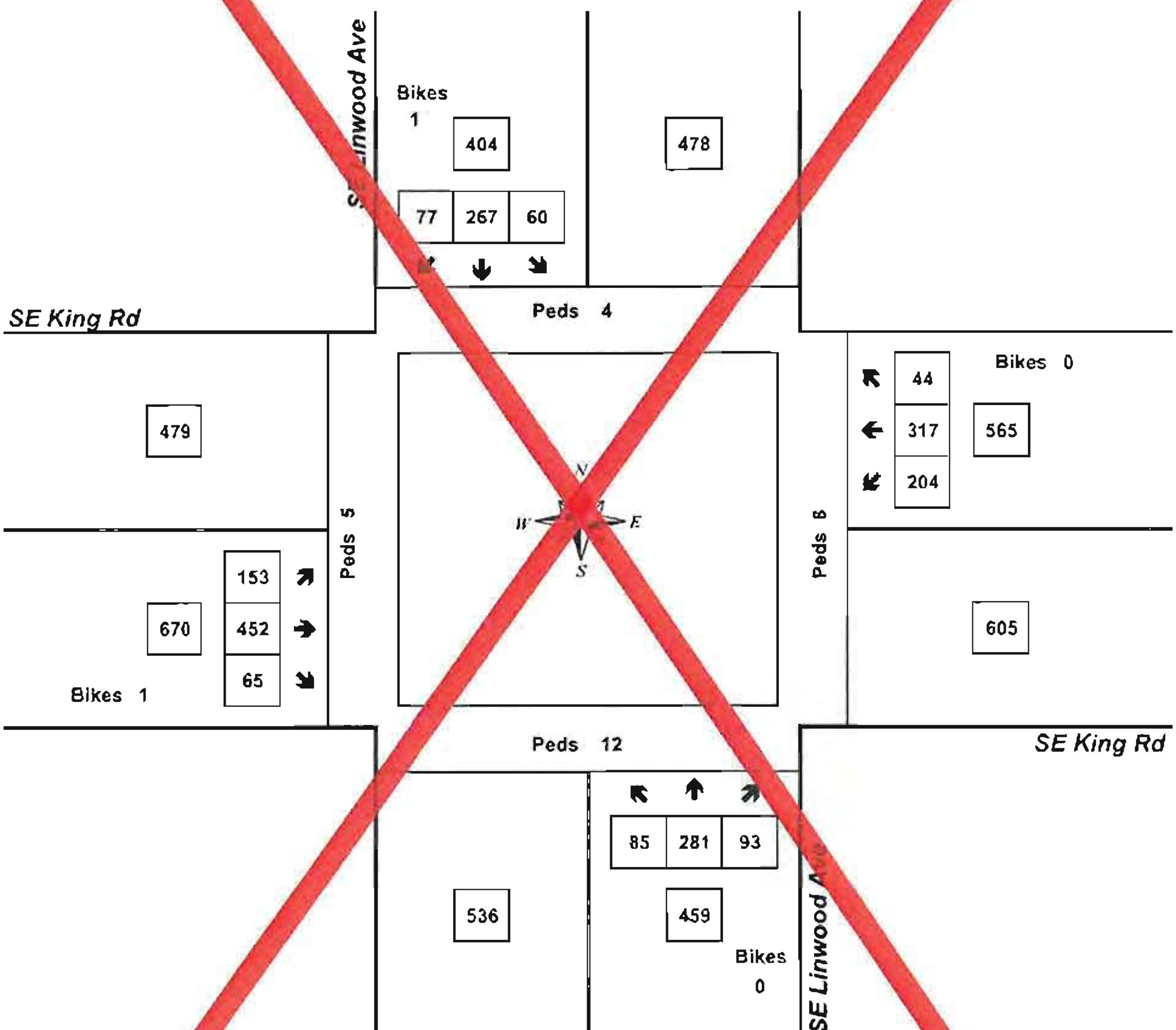
Interval Start Time	Northbound SE Linwood Ave				Southbound SE Linwood Ave				Eastbound SE King Rd				Westbound SE King Rd				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
3:00 PM	5	12	2	19	1	10	1	12	6	13	2	21	8	11	0	19	71
3:15 PM	4	10	1	[illegible]	1	10	2	13	5	12	1	18	6	10	0	[illegible]	62
3:30 PM	3	13	1	[illegible]	0	8	3	11	3	11	3	17	6	10	1	[illegible]	62
3:45 PM	3	12	1	[illegible]	0	12	4	16	2	11	2	15	4	11	1	[illegible]	63
4:00 PM	3	9	2	14	0	10	4	14	1	9	3	13	5	9	1	15	56
4:15 PM	3	11	3	17	1	7	3	11	0	8	3	11	5	6	1	12	51
4:30 PM	3	6	[illegible]	13	2	7	2	11	0	8	1	9	4	4	0	8	[illegible]
4:45 PM	2	6	[illegible]	14	2	3	1	6	1	8	2	11	4	3	1	8	[illegible]
5:00 PM	2	6	[illegible]	13	2	4	1	7	2	7	3	12	1	2	1	4	[illegible]

Peak Hour Summary

All Traffic Data Services Inc
Clay Carney
(503) 833-2740

SE Linwood Ave & SE King Rd

3:45 PM to 4:45 PM
Tuesday, December 05, 2006



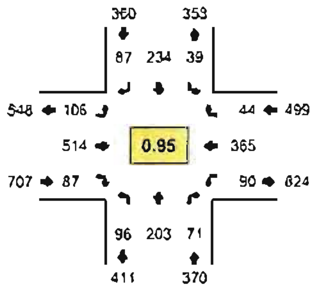
Approach	PHF	HV%	Volume
EB	0.92	2.2%	670
WB	0.93	2.8%	565
NB	0.93	3.5%	459
SB	0.84	4.0%	404
Intersection	0.95	3.0%	2,098

Count Period: 3:00 PM to 6:00 PM

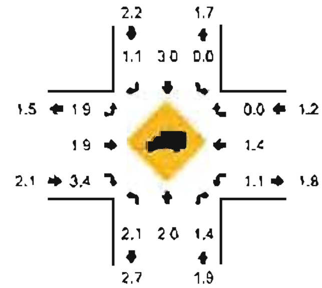
This new data sheet replaces the 2007 data sheet for this intersection.

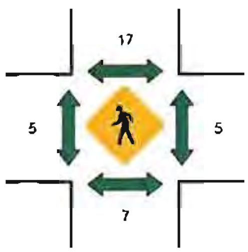
Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

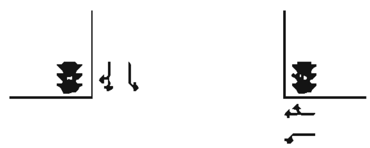
LOCATION: Linwood Ave – King Rd | **QC JOB #:** 10776902
CITY/STATE: Milwaukie, OR | **DATE:** Tue, Jun 12 2012

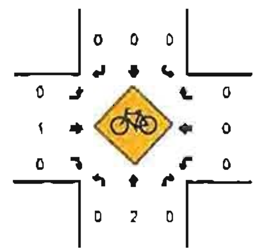


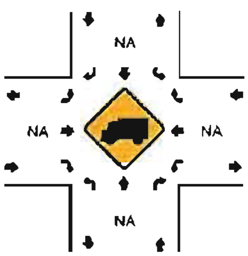
Peak-Hour: 5:00 PM – 6:00 PM
Peak 15-Min: 5:30 PM – 5:45 PM

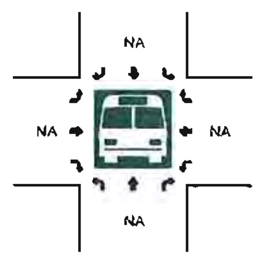












5-Min Count Period Beginning At	Linwood Ave (Northbound) Left	Thru	Right	U	Linwood Ave (Southbound) Left	Thru	Right	U	King Rd (Eastbound) Left	Thru	Right	U	King Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	6	27	10	0	4	13	4	0	4	37	8	0	6	21	5	0	145	
4:05 PM	8	12	6	0	5	14	3	0	8	35	7	0	12	19	3	0	132	
4:10 PM	5	19	5	0	7	7	6	0	3	53	11	0	4	29	3	0	152	
4:15 PM	10	18	5	0	1	18	4	0	16	34	6	0	9	24	3	0	148	
4:20 PM	5	14	10	0	3	21	6	0	11	42	6	0	2	23	7	0	150	
4:25 PM	4	7	8	0	4	7	3	0	9	43	9	0	5	34	1	0	134	
4:30 PM	13	24	8	0	3	19	3	0	7	36	6	0	5	16	4	0	144	
4:35 PM	8	19	5	0	4	23	14	0	11	32	6	0	16	23	3	0	164	
4:40 PM	6	15	9	0	4	29	8	0	13	28	7	0	10	24	3	0	156	
4:45 PM	3	17	10	0	5	17	8	0	8	47	3	0	11	32	2	0	163	
4:50 PM	13	11	3	0	2	18	7	0	2	38	4	0	6	24	4	0	132	
4:55 PM	3	9	7	0	6	13	6	0	10	37	10	0	8	24	1	0	134	1754
5:00 PM	12	18	5	0	6	15	3	0	6	37	7	0	12	38	3	0	162	1771
5:05 PM	6	21	4	0	3	24	11	0	13	43	8	0	7	28	1	0	169	1808
5:10 PM	5	16	6	0	2	9	7	0	11	43	8	0	6	31	4	0	148	1804
5:15 PM	11	23	9	0	3	25	7	0	9	41	8	0	7	31	3	0	177	1833
5:20 PM	5	19	4	0	5	19	7	0	5	42	9	0	5	42	3	0	165	1848
5:25 PM	10	19	7	0	1	20	11	0	10	41	7	0	8	19	2	0	155	1869
5:30 PM	8	20	10	0	3	14	9	0	14	44	5	0	10	22	2	0	161	1886
5:35 PM	8	13	3	0	7	26	6	0	5	46	10	0	10	36	5	0	175	1897
5:40 PM	7	19	6	0	3	25	4	0	8	41	7	0	12	35	4	0	171	1912
5:45 PM	10	8	12	0	2	27	6	0	5	42	6	0	6	29	6	0	159	1908
5:50 PM	8	15	1	0	4	18	12	0	8	40	7	0	5	33	6	0	157	1933
5:55 PM	6	12	4	0	0	12	4	0	12	54	5	0	2	21	5	0	137	1936

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	92	208	76	0	52	260	76	0	108	524	88	0	128	372	44	0	2028
Heavy Trucks	0	0	0		0	12	0		4	20	0		0	0	0		36
Pedestrians		4				32				8				8			52
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

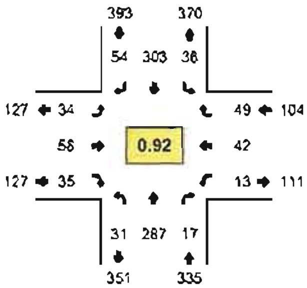
Comments:

Report generated on 6/18/2012 11:28 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

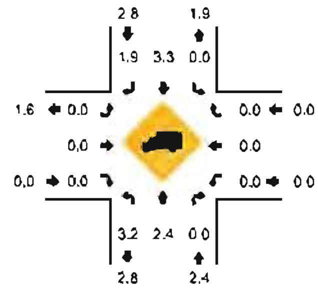
This is a new data sheet for a new intersection studied in the 2013 update.

Type of peak hour being reported: Intersection Peak | Method for determining peak hour: Total Entering Volume

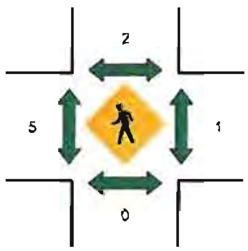
LOCATION: Linwood Ave -- Monroe St | **QC JOB #:** 10776903
CITY/STATE: Milwaukie, OR | **DATE:** Tue, Jun 12 2012

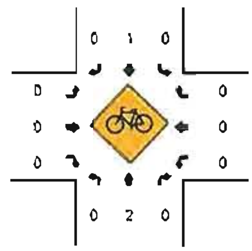


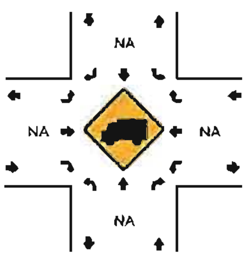
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

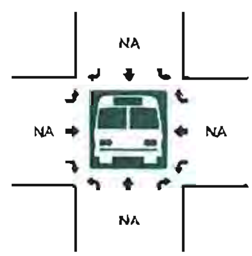


Quality Counts









5-Min Count Period Beginning At	Linwood Ave (Northbound) Left	Thru	Right	U	Linwood Ave (Southbound) Left	Thru	Right	U	Monroe St (Eastbound) Left	Thru	Right	U	Monroe St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	2	25	2	0	3	15	4	0	4	4	2	0	1	3	3	0	68	
4:05 PM	2	25	1	0	5	19	7	0	3	3	4	0	2	1	1	0	73	
4:10 PM	3	28	2	0	2	17	3	0	1	1	4	0	2	5	4	0	72	
4:15 PM	4	26	5	0	4	26	3	0	4	6	3	0	1	2	3	0	87	
4:20 PM	2	21	4	0	3	16	8	0	4	3	2	0	1	2	6	0	72	
4:25 PM	4	19	2	0	3	16	2	0	4	3	3	0	0	2	3	0	61	
4:30 PM	3	37	3	0	3	30	6	0	1	5	5	0	2	6	8	0	109	
4:35 PM	1	16	1	0	4	34	4	0	4	2	5	0	2	5	1	0	79	
4:40 PM	2	23	2	0	5	36	2	0	1	2	5	0	2	2	1	0	83	
4:45 PM	1	28	0	0	2	21	4	0	5	1	4	0	4	2	1	0	73	
4:50 PM	0	26	2	0	2	25	5	0	0	2	2	0	0	2	2	0	68	
4:55 PM	2	16	3	0	2	18	5	0	1	3	4	0	0	0	0	0	54	899
5:00 PM	1	27	1	0	5	20	5	0	4	5	2	0	0	1	6	0	77	908
5:05 PM	4	23	4	0	3	30	7	0	2	6	3	0	1	1	2	0	86	921
5:10 PM	1	27	1	0	0	17	2	0	1	3	6	0	2	5	2	0	67	916
5:15 PM	1	26	1	0	2	28	5	0	2	4	3	0	1	5	12	0	90	919
5:20 PM	3	37	1	0	4	25	2	0	1	3	2	0	1	4	4	0	87	934
5:25 PM	3	20	2	0	3	31	4	0	4	5	3	0	1	2	5	0	83	956
5:30 PM	4	25	3	0	5	17	7	0	4	9	2	0	0	4	3	0	83	930
5:35 PM	1	29	0	0	2	35	4	0	8	3	1	0	1	3	2	0	89	940
5:40 PM	2	12	2	0	4	33	5	0	2	3	3	0	0	2	4	0	72	929
5:45 PM	7	21	0	0	5	26	4	0	3	10	5	0	3	1	2	0	87	943
5:50 PM	1	17	2	0	2	27	5	0	1	3	0	0	2	5	3	0	68	943
5:55 PM	3	23	0	0	1	14	4	0	2	4	5	0	1	9	4	0	70	959

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	28	332	16	0	36	336	44	0	28	48	32	0	12	44	84	0	1040
Heavy Trucks	4	12	0		0	20	0		0	0	0		0	0	0		36
Pedestrians		0				8				4				0			12
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

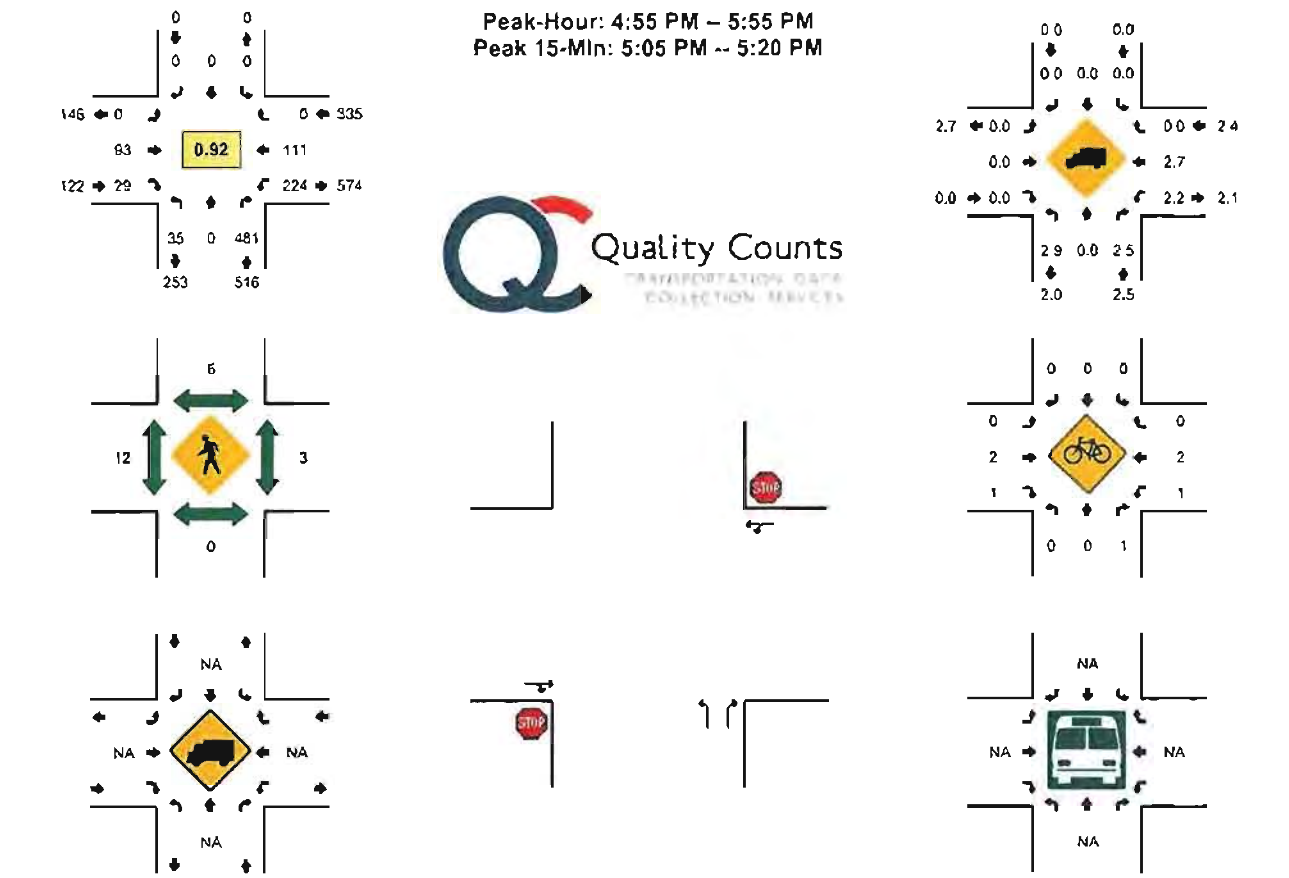
Report generated on 6/18/2012 11:28 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

This is a new data sheet for a new intersection studied in the 2013 update.

Type of peak hour being reported: Intersection Peak — Method for determining peak hour: Total Entering Volume

LOCATION: 42nd Ave -- King Rd — **QC JOB #:** 10776901
CITY/STATE: Milwaukie, OR — **DATE:** Tue, Jun 12 2012

Peak-Hour: 4:55 PM -- 5:55 PM
Peak 15-Min: 5:05 PM -- 5:20 PM



5-Min Count Period Beginning At	42nd Ave (Northbound) Left	Thru	Right	U	42nd Ave (Southbound) Left	Thru	Right	U	King Rd (Eastbound) Left	Thru	Right	U	King Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	3	0	31	0	0	0	0	0	0	6	0	0	20	4	0	0	64	
4:05 PM	1	0	33	0	0	0	0	0	0	15	4	0	18	3	0	0	74	
4:10 PM	2	0	40	0	0	0	0	0	0	8	2	0	20	6	0	0	78	
4:15 PM	0	0	39	0	0	0	0	0	0	3	0	0	14	1	0	0	57	
4:20 PM	4	0	35	0	0	0	0	0	0	5	1	0	23	3	0	0	71	
4:25 PM	6	0	39	0	0	0	0	0	0	4	1	0	23	4	0	0	77	
4:30 PM	2	0	41	0	0	0	0	0	0	9	7	0	15	2	0	0	76	
4:35 PM	2	0	36	0	0	0	0	0	0	8	0	0	14	4	0	0	64	
4:40 PM	1	0	45	0	0	0	0	0	0	9	2	0	19	6	0	0	82	
4:45 PM	2	0	34	0	0	0	0	0	0	7	3	0	21	8	0	0	75	
4:50 PM	1	0	32	0	0	0	0	0	0	11	1	0	20	8	0	0	73	
4:55 PM	1	0	38	0	0	0	0	0	0	11	6	0	10	7	0	0	73	864
5:00 PM	4	0	27	0	0	0	0	0	0	6	3	0	16	14	0	0	70	870
5:05 PM	5	0	44	0	0	0	0	0	0	10	1	0	14	13	0	0	87	883
5:10 PM	2	0	55	0	0	0	0	0	0	7	4	0	15	5	0	0	88	893
5:15 PM	0	0	45	0	0	0	0	0	0	5	3	0	20	16	0	0	89	925
5:20 PM	4	0	35	0	0	0	0	0	0	8	0	0	30	8	0	0	85	939
5:25 PM	4	0	36	0	0	0	0	0	0	8	3	0	13	7	0	0	71	933
5:30 PM	2	0	45	0	0	0	0	0	0	7	4	0	17	9	0	0	84	941
5:35 PM	5	0	34	0	0	0	0	0	0	6	2	0	23	7	0	0	77	954
5:40 PM	5	0	38	0	0	0	0	0	0	7	1	0	22	7	0	0	80	952
5:45 PM	2	0	40	0	0	0	0	0	0	7	2	0	21	5	0	0	77	954
5:50 PM	1	0	44	0	0	0	0	0	0	11	0	0	23	13	0	0	92	973
5:55 PM	1	0	37	0	0	0	0	0	0	6	1	0	8	6	0	0	59	959

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	28	0	576	0	0	0	0	0	0	88	32	0	196	136	0	0	1056
Heavy Trucks	0	0	8		0	0	0		0	0	0		0	4	0		12
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	2	0		1	1	0		4
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/18/2012 11:28 AM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		[illegible]	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		[illegible]	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		[illegible]	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.96		1.00	0.97	
Flt Protected	[illegible]	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	[illegible]	1718		1676	1711		1644	1663		1710	1656	
Flt Permitted	[illegible]	1.00		0.95	1.00		0.95	[illegible]		0.95	1.00	
Satd. Flow (perm)	1693	[illegible]		1676	1711		1644	[illegible]		1710	1656	
Volume (vph)	153	[illegible]	65	204	317	44	85	[illegible]	93	60	267	77
Peak-hour factor, PHF	0.95	[illegible]	0.95	0.95	0.95	0.95	0.95	[illegible]	0.95	0.95	0.95	0.95
Adj. Flow (vph)	161	476	68	215	334	46	[illegible]	296	98	63	281	81
RTOR Reduction (vph)	0	6	0	0	6	0	[illegible]	13	0	0	12	0
Lane Group Flow (vph)	161	538	[illegible]	215	374	0	[illegible]	381	0	63	350	0
Confl. Peds. (#/hr)	4		[illegible]	12		4	5		6	6		5
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	1%	2%	3%	[illegible]	3%	[illegible]	4%	4%	1%	0%	4%	5%
Turn Type	Prot			[illegible]			Prot			Prot		
Protected Phases	7	4		[illegible]	[illegible]		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	11.2	29.5		12.8	[illegible]		6.0	27.0		3.9	24.9	
Effective Green, g (s)	11.2	29.5		12.8	[illegible]		6.0	27.0		3.9	24.9	
Actuated g/C Ratio	0.13	0.33		[illegible]	0.35		0.07	0.30		0.04	0.28	
Clearance Time (s)	4.0	4.0		[illegible]	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		[illegible]	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	213	568		241	597		111	503		75	462	
v/s Ratio Prot	0.10	c0.31		c0.13	0.22		[illegible]	c0.23		0.04	0.21	
v/s Ratio Perm												
v/c Ratio	0.76	0.95		0.89	0.63		[illegible]	0.76		0.84	0.76	
Uniform Delay, d1	37.7	[illegible]		37.5	24.2		[illegible]	28.1		42.3	29.4	
Progression Factor	1.00	[illegible]		1.00	1.00		1.00	[illegible]		1.00	1.00	
Incremental Delay, d2	14.1	[illegible]		31.0	2.1		32.7	[illegible]		53.7	11.1	
Delay (s)	51.8	[illegible]		68.6	26.3		73.7	[illegible]		96.0	40.5	
Level of Service	[illegible]	D		E	C		E	D		F	D	
Approach Delay (s)		53.6			41.6			44.9			48.7	
Approach LOS		D			D			D			D	

Intersection Summary				
HCM Average Control Delay	47.5	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	89.2	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	79.9%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

This new data sheet replaces the 2007 data sheet for this intersection.

HCM Signalized Intersection Capacity Analysis
1112: SE Linwood Avenue & King Road

6/29/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	515	90	90	365	45	100	205	75	40	235	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.96		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1808		1787	1839		1770	1777		1805	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1808		1787	1839		1770	1777		1805	1760	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	542	95	95	384	47	105	216	79	42	247	95
RTOR Reduction (vph)	0	7	0	0	5	0	0	13	0	0	15	0
Lane Group Flow (vph)	116	630	0	95	426	0	105	282	0	42	327	0
Confl. Peds. (#/hr)	17		7	7		17	5		5	5		5
Confl. Bikes (#/hr)						1						2
Heavy Vehicles (%)	2%	2%	3%	1%	1%	0%	2%	2%	1%	0%	3%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	8.5	31.2		8.3	31.0		6.0	29.0		2.9	25.9	
Effective Green, g (s)	8.5	31.2		8.3	31.0		6.0	29.0		2.9	25.9	
Actuated g/C Ratio	0.10	0.36		0.09	0.35		0.07	0.33		0.03	0.30	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	172	645		170	652		122	590		60	522	
v/s Ratio Prot	c0.07	c0.35		0.05	0.23		c0.06	c0.16		0.02	c0.19	
v/s Ratio Perm												
v/c Ratio	0.67	0.98		0.56	0.65		0.86	0.48		0.70	0.63	
Uniform Delay, d1	38.1	27.7		37.8	23.7		40.3	23.2		41.8	26.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.0	29.3		3.9	2.4		42.2	2.8		30.0	5.6	
Delay (s)	48.1	57.1		41.7	26.0		82.5	25.9		71.8	32.2	
Level of Service	D	E		D	C		F	C		E	C	
Approach Delay (s)		55.7			28.9			40.8			36.5	
Approach LOS		E			C			D			D	

Intersection Summary			
HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	87.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

This is a new data sheet for a new intersection studied in the 2013 update.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	95	30	35	485	225	115
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	33	38	527	245	125
Pedestrians	12				3	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	925	319	382			
vC1, stage 1 conf vol	319					
vC2, stage 2 conf vol	606					
vCu, unblocked vol	925	319	382			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	78	95	97			
cM capacity (veh/h)	479	719	1160			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	136	38	527	370
Volume Left	103	38	0	0
Volume Right	33	0	0	125
cSH	521	1160	1700	1700
Volume to Capacity	0.26	0.03	0.31	0.22
Queue Length 95th (ft)	26	3	0	0
Control Delay (s)	14.3	8.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.3	0.6		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		

This is a new data sheet for a new intersection studied in the 2013 update.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Volume (veh/h)	35	60	35	15	45	55	35	290	20	40	315	60
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	65	38	16	49	60	38	315	22	43	342	65
Pedestrians		1			5						2	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		0			0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1218	
pX, platoon unblocked												
vC, conflicting volume	951	881	376	940	903	333	409			342		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	951	881	376	940	903	333	409			342		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	76	94	91	81	92	97			96		
cM capacity (veh/h)	178	267	674	178	259	709	1144			1223		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	141	125	375	451
Volume Left	38	16	38	43
Volume Right	38	60	22	65
cSH	275	343	1144	1223
Volume to Capacity	0.51	0.36	0.03	0.04
Queue Length 95th (ft)	68	41	3	3
Control Delay (s)	31.2	21.4	1.1	1.1
Lane LOS	D	C	A	A
Approach Delay (s)	31.2	21.4	1.1	1.1
Approach LOS	D	C		

Intersection Summary				
Average Delay		7.3		
Intersection Capacity Utilization		49.0%	ICU Level of Service	A
Analysis Period (min)		15		

New data sheet for the 2013 update

Milwaukie TSP Update

Future Volume Forecasts

Scenario: 2035 PM "Low Build" (Financially Committed)

Date 6/29/2012

N/S	E/W	#	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
McLoughlin Blvd	Ochoco St	1	0	2000	20	0	3290	220	120	40	200	10	270	160
McLoughlin Blvd	Milport Road	2	280	2020	100	0	3540	20	20	20	270	250	30	20
McLoughlin Blvd	Harrison St	3	20	1120	170	100	2290	20	20	20	20	190	20	10
42nd Avenue	Harrison St	4	20	20	20	10	20	50	240	10	20	10	20	10
McLoughlin Blvd	Washington St	5	10	1050	30	100	2200	10	0	10	10	20	10	140
Main Street	Harrison St	6	20	20	20	20	20	80	70	10	10	20	110	60
17th Avenue	Hwy 224	7	0	20	100	370	20	0	0	0	0	110	0	20
Hwy 224	Harrison St	8	60	1190	250	20	2250	180	90	200	20	310	210	20
Hwy 224	Monroae Street	9	60	1920	10	20	2770	10	20	20	160	20	30	20
Hwy 224	Oak Street	10	200	1470	20	260	2290	260	140	140	110	20	110	180
32nd Avenue	Harrison St	11	40	20	20	20	40	400	420	530	10	20	430	10
McLoughlin Blvd	22nd Ave	12	110	990	0	0	1400	780	0	0	10	0	0	0
McLoughlin Blvd	River Road	13	10	950	0	0	1680	0	310	0	130	0	0	0
Oatfield Rd	Lake Road	14	70	190	180	140	320	10	20	20	90	180	30	70
Hwy 224	37th Ave	15	70	1240	20	220	1870	50	50	90	440	290	270	380
Freeman Way	Hwy 224	16	20	30	10	510	30	140	30	2420	30	10	1450	240
Hwy 224 off/on ramp	Lake Road	17	170	0	160	110	820	10	100	240	100	0	70	120
21st Ave	Harrison St	18	20	10	30	20	10	10	10	140	20	20	150	20
32nd Avenue	Johnson Creek Blvd	19	20	130	30	540	250	0	0	70	90	40	20	360
Linwood Ave	Johnson Creek Blvd	20	140	220	50	180	310	120	140	860	230	10	820	230
Linwood Ave	King Road	21	50	420	150	20	520	20	20	100	50	230	20	20
Linwood Ave	Harmony Rd	22	50	450	1660	270	570	20	40	270	70	1460	310	280

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in	Percentile	SPIS
081	**PACIFIC HIGHWAY EAST**														
OR-99E	1	4.4[illegible]	4.54	53,600	1	1					Portland	MULTNOMAH			20.32
OR-99E	1	4.46	4.55	53,600	1	1					Portland	MULTNOMAH	LEG. FROM 081BP		20.32
OR-99E	1	4.47	[illegible].56	53,600	1	1					Portland	MULTNOMAH			20.32
OR-99E	1	4.48	[illegible]	53,600	1	1					Portland	MULTNOMAH			20.32
OR-99E	1	4.49	4.5[illegible]	53,600	1	1					Portland	MULTNOMAH	S.E. UMAT[illegible]A ST		20.32
OR-99E	1	4.50	4.59	53,600	1	1					Portland	MULTNOMAH			20.32
OR-99E	1	4.56	4.65	[illegible],600	3			1	1	1	Portland	MULTNOMAH			11.01
OR-99E	1	4.57	4.66	[illegible]00	3			1	1	1	Portland	MULTNOMAH			11.01
OR-99E	1	4.58	4.67	53,[illegible]	3			1	1	1	Portland	MULTNOMAH			11.01
OR-99E	1	4.59	4.68	53,600	3			1	1	1	Portland	MULTNOMAH			11.01
OR-99E	1	4.60	4.69	53,600	[illegible]			1	1	1	Milwaukie	CLACKAMAS			11.01
OR-99E	1	4.65	4.74	53,600	3				1	2	Milwaukie	CLACKAMAS			9.51
OR-99E	1	4.67	4.76	53,600	5				1	4	Milwaukie	CLACKAMAS			12.24
OR-99E	1	4.68	4.77	53,600	5				1	4	Milwaukie	CLACKAMAS			12.24
OR-99E	1	4.69	4.78	53,600	10			[illegible]	4	5	Milwaukie	CLACKAMAS			23.01
OR-99E	1	4.70	4.79	53,600	11			[illegible]	5	5	Milwaukie	CLACKAMAS			25.28
OR-99E	1	4.71	4.80	53,600	12			1	[illegible]	6	Milwaukie	CLACKAMAS			26.02
OR-99E	1	4.72	4.81	53,600	13			1	6	[illegible]	Milwaukie	CLACKAMAS			28.23
OR-99E	1	4.73	4.82	53,600	12			1	6	[illegible]	Milwaukie	CLACKAMAS			27.52
OR-99E	1	4.74	4.83	53,600	12			1	6	5	Milwaukie	CLACKAMAS			27.52
OR-99E	1	4.75	4.84	53,600	11			1	6	4	Milwaukie	CLACKAMAS			26.78
OR-99E	1	4.76	4.85	51,100	11			1	6	4	Milwaukie	CLACKAMAS			26.87
OR-99E	1	4.77	4.86	51,100	8			1	5	2	Milwaukie	CLACKAMAS			22.89
OR-99E	1	4.78	4.87	51,100	8			1	5	2	Milwaukie	CLACKAMAS	ACCESS. TO/FROM		22.89
OR-99E	1	4.79	4.88	51,100	4				3	[illegible]	Milwaukie	CLACKAMAS			14.02
OR-99E	1	4.80	4.89	51,100	3				[illegible]	1	Milwaukie	CLACKAMAS			11.04
OR-99E	1	4.81	4.90	51,100	3				[illegible]	1	Milwaukie	CLACKAMAS			11.04
OR-99E	1	5.09	5.18	51,100	3				1	2	Milwaukie	CLACKAMAS			9.54
OR-99E	1	5.10	5.19	51,100	4			1	1	2	Milwaukie	CLACKAMAS			12.52
OR-99E	1	5.11	5.20	51,100	17		1	3	2	11	Milwaukie	CLACKAMAS		85	44.42
OR-99E	1	5.12	5.21	51,100	21		1	4	3	13	Milwaukie	CLACKAMAS		90	49.73
OR-99E	1	5.13	5.22	51,100	22		1	4	4	13	Milwaukie	CLACKAMAS		90	51.78
OR-99E	1	5.14	5.23	51,100	[illegible]		1	4	4	13	Milwaukie	CLACKAMAS		90	51.78
OR-99E	1	5.15	5.24	51,100	22		1	4	4	13	Milwaukie	CLACKAMAS		90	51.78
OR-99E	1	5.16	5.25	51,[illegible]	22		1	4	4	13	Milwaukie	CLACKAMAS		90	51.78
OR-99E	1	5.17	5.26	[illegible]00	21		1	4	3	13	Milwaukie	CLACKAMAS		90	49.73
OR-99E	1	5.18	5.27	[illegible],100	21		1	4	3	13	Milwaukie	CLACKAMAS		90	49.73
OR-99E	1	5.19	5.28	51,100	19		1	4	3	11	Milwaukie	CLACKAMAS		90	48.61
OR-99E	1	5.20	5.29	51,100	18		1	3	3	11	Milwaukie	CLACKAMAS	ACCESS[illegible]/FROM	90	46.52
OR-99E	1	5.21	5.[illegible]	51,700	5			1	2	2	Milwaukie	CLACKAMAS			15.28
OR-99E	1	5.37	[illegible].46	51,700	3					3	Milwaukie	CLACKAMAS			8.03
OR-99E	1	5.38	5.47	51,700	3					3	Milwaukie	CLACKAMAS			8.03
OR-99E	1	5.3[illegible]	5.48	51,700	4				1	3	Milwaukie	CLACKAMAS			11.01
OR-99E	1	[illegible]	5.49	51,700	4				1	3	Milwaukie	CLACKAMAS			11.01
OR-99E	1	[illegible].41	5.50	51,700	4				1	3	Milwaukie	CLACKAMAS			11.01
OR-99E	1	5.42	5.51	51,700	4				1	3	Milwaukie	CLACKAMAS			11.01
OR-99E	1	5.43	5.52	51,700	4				1	3	Milwaukie	CLACKAMAS	081AJ CONN		11.01
OR-99E	[illegible]	5.44	5.53	51,700	4				1	3	Milwaukie	CLACKAMAS			11.01
[illegible]R-99E	[illegible]	5.45	5.54	51,700	3				1	2	Milwaukie	CLACKAMAS			9.53
OR-[illegible]E	1	5.61	5.70	27,400	3					3	Milwaukie	CLACKAMAS			8.56
[illegible]99E	1	5.62	5.71	27,400	3					3	Milwaukie	CLACKAMAS			[illegible]56

This data sheet replaces the 2007 data sheet for these road segments

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
081	**PACIFIC HIGHWAY EAST**														
OR-99E	1	4.41	4.50	42,300	14			1	6	7		MULTNOMAH		70	29.50
OR-99E	1	4.42	4.51	42,300	13			1	6	6		MULTNOMAH		70	28.79
OR-99E	1	4.43	4.52	42,300	11			1	6	4		MULTNOMAH		65	27.27
OR-99E	1	4.44	4.53	42,300	11			1	6	4		MULTNOMAH	081BP CONN (TACOMA !	65	27.27
OR-99E	1	4.45	4.54	42,300	3				1	2		MULTNOMAH			9.66
OR-99E	1	4.66	4.75	42,300	3		1		2			CLACKAMAS		70	27.66
OR-99E	1	4.67	4.76	42,300	4		1		2	1		CLACKAMAS		70	29.19
OR-99E	1	4.68	4.77	42,300	6		1		3	2		CLACKAMAS		80	33.16
OR-99E	1	4.69	4.78	42,300	14		1	1	5	7		CLACKAMAS		90	44.50
OR-99E	1	4.70	4.79	42,300	14		1	1	4	8		CLACKAMAS		90	43.00
OR-99E	1	4.71	4.80	42,300	14		1	1	3	9		CLACKAMAS		85	41.50
OR-99E	1	4.72	4.81	42,300	14		1	1	3	9		CLACKAMAS		85	41.50
OR-99E	1	4.73	4.82	42,300	14		1	1	3	9		CLACKAMAS		85	41.50
OR-99E	1	4.74	4.83	42,300	15		1	1	3	10		CLACKAMAS		85	42.19
OR-99E	1	4.75	4.84	42,300	15		1	1	3	10		CLACKAMAS		85	42.19
OR-99E	1	4.76	4.85	42,300	14			1	3	10		CLACKAMAS		60	25.00
OR-99E	1	4.77	4.86	42,300	13			1	3	9		CLACKAMAS		60	24.29
OR-99E	1	4.78	4.87	42,300	11			1	2	8		CLACKAMAS	ACCESS (DECREASING R	50	21.27
OR-99E	1	4.78	4.87	42,300	11			1	2	8		CLACKAMAS	OCHOCO ST.	50	21.27
OR-99E	1	4.79	4.88	51,100	4					4		CLACKAMAS			9.52
OR-99E	1	4.80	4.89	51,100	3					3		CLACKAMAS			8.04
OR-99E	1	4.91	5.00	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.92	5.01	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.93	5.02	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.94	5.03	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.95	5.04	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.96	5.05	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.97	5.06	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.98	5.07	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.99	5.08	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	5.08	5.17	51,100	3			1	2			CLACKAMAS		15	12.54
OR-99E	1	5.09	5.18	51,100	5			1	3	1		CLACKAMAS		35	16.79
OR-99E	1	5.10	5.19	51,100	7			1	5	1		CLACKAMAS		55	21.95
OR-99E	1	5.11	5.20	51,100	20	1		2	10	7		CLACKAMAS		95	56.67
OR-99E	1	5.12	5.21	51,100	20	1		2	10	7		CLACKAMAS		95	56.67
OR-99E	1	5.13	5.22	51,100	22	1		2	11	8		CLACKAMAS		95	59.28
OR-99E	1	5.14	5.23	51,100	23	1		2	12	8		CLACKAMAS		95	61.31
OR-99E	1	5.15	5.24	51,100	23	1		2	12	8		CLACKAMAS		95	61.31
OR-99E	1	5.16	5.25	51,100	23	1		2	12	8		CLACKAMAS		95	61.31
OR-99E	1	5.17	5.26	51,100	22	1		2	11	8		CLACKAMAS		95	59.28

Rte.	Rdwy	[illegible]MP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in	Pe[illegible]ile	SPIS
081	**PACIF[illegible] HIGHWAY EAST**														
OR-99E	1	5.6[illegible]	5.72	27,400	15			3	2	10	Milwaukie	CLACKAMAS			28.69
OR-99E	1	5.64	5.73	27,400	16			3	3	10	Milwaukie	CLACKAMAS			30.93
OR-99E	1	5.65	[illegible].74	27,400	22			3	4	15	Milwaukie	CLACKAMAS		80	36.40
OR-99E	1	5.66	[illegible]	27,400	22			3	4	15	Milwaukie	CLACKAMAS		80	36.40
OR-99E	1	5.67	5.7[illegible]	27,400	22			3	4	15	Milwaukie	CLACKAMAS		80	36.40
OR-99E	1	5.68	5.77	27,400	23			3	4	16	Milwaukie	CLACKAMAS		80	37.01
OR-99E	1	5.69	5.78	27,400	25			3	4	18	Milwaukie	CLACKAMAS		80	38.19
OR-99E	1	5.70	5.79	[illegible]400	26			3	4	19	Milwaukie	CLACKAMAS		85	38.75
OR-99E	1	5.71	5.80	2[illegible]0	23			3	4	16	Milwaukie	CLACKAMAS		80	37.01
OR-99E	1	5.72	5.81	27,4[illegible]	24			3	4	17	Milwaukie	CLACKAMAS	[illegible]I AVE.	80	37.61
OR-99E	1	5.73	5.82	41,800	[illegible]2				2	10	Milwaukie	CLACKAMAS			20.58
OR-99E	1	5.74	5.83	41,800	[illegible]				1	11	Milwaukie	CLACKAMAS			19.08
OR-99E	1	5.75	5.84	41,800	6					6	Milwaukie	CLACKAMAS			12.18
OR-99E	1	5.76	5.85	41,800	7					7	Milwaukie	CLACKAMA[illegible]			13.24
OR-99E	1	5.77	5.86	41,800	7					7	Milwaukie	CLACKA[illegible]S	JACKSON ST.		13.24
OR-99E	1	5.78	5.87	41,800	7					7	Milwaukie	CLAC[illegible]AS			13.24
OR-99E	1	5.79	5.88	41,800	12		1	[illegible]	2	7	Milwaukie	CLA[illegible]AMAS		85	40.08
OR-99E	1	5.80	5.89	41,800	14		1	[illegible]	3	8	Milwaukie	C[illegible]KAMAS		85	43.03
OR-99E	1	5.81	5.90	41,800	16		1	2	[illegible]	8	Milwaukie	[illegible]ACKAMAS		90	47.39
OR-99E	1	5.82	5.91	41,800	15		1	2	5	[illegible]	Milwaukie	CLACKAMAS		90	46.73
OR-99E	1	5.83	5.92	41,800	15		1	2	5	[illegible]	Milwaukie	CLACKAMAS	S.E. MONROE ST.	90	46.73
OR-99E	1	5.84	5.93	41,800	16		1	2	6	7	[illegible]waukie	CLACKAMAS		90	48.89
OR-99E	1	5.85	5.94	41,800	18		1	2	7	8	M[illegible]uki[illegible]	CLACKAMAS		90	51.66
[illegible]R-99E	1	5.86	5.95	41,800	17		1	2	7	7	Mil[illegible]	CLACKAMAS		90	51.03
[illegible]R-99E	1	5.87	5.96	41,800	17		1	2	7	7	Mil[illegible]	CLACKAMAS		90	51.03
OR-99E	1	5.88	5.97	41,800	16		1	2	7	6	[illegible]aukie	CLACKAMAS	ROAD. TO BOAT	90	50.39
OR-99E	1	5.89	5.98	41,800	10				6	4	[illegible]ilwaukie	CLACKAMAS			25.00
OR-99E	1	5.90	5.99	41,800	8				6	[illegible]	Milwaukie	CLACKAMAS			23.22
OR-99E	1	5.91	6.00	41,800	6				4	[illegible]	Milwaukie	CLACKAMAS			18.18
OR-99E	1	5.92	6.01	41,800	6				[illegible]	2	Milwaukie	[illegible]ACKAMAS			18.18
OR-99E	1	5.93	6.02	41,800	6				4	2	Milwaukie	C[illegible]KAMAS	WASHINGTON ST.		18.18
OR-99E	1	5.94	6.03	41,800	4				3	1	Milwaukie	CLA[illegible]MAS			14.20
OR-99E	1	6.15	6.24	41,800	3				2	1	Milwaukie	CLACKA[illegible]S			11.17
OR-99E	1	6.16	6.25	41,800	4			1	2	1	Milwaukie	CLACKAM[illegible]			14.20
OR-99E	1	6.17	6.26	41,800	5			1	2	2	Milwaukie	CLACKAMAS			15.51
OR-99E	1	6.18	6.27	41,800	[illegible]			2	2	2	Milwaukie	CLACKAMAS			18.18
OR-99E	1	6.19	6.28	41,800	[illegible]			2	2	3	Milwaukie	CLACKAMAS			19.24
OR-99E	1	6.20	6.29	41,8[illegible]	7			2	2	3	Milwaukie	CLACKAMAS			19.24
OR-99E	1	6.21	6.30	4[illegible]0	16			2	4	10	Milwaukie	CLACKAMAS	22[illegible]AVE.		29.39
OR-99E	1	6.22	6.31	[illegible]800	18			2	5	11	Milwaukie	CLACKAMAS		75	32.16
OR-99E	1	6.23	6.32	41,800	18			2	5	11	Milwaukie	CLACKAMAS		75	32.16
OR-99E	1	6.24	6.33	41,800	18			2	6	10	Milwaukie	CLACKAMAS		75	33.66
OR-99E	1	6.25	6.3[illegible]	41,800	18			3	5	10	Milwaukie	CLACKAMAS		75	33.66
OR-99E	1	6.26	[illegible]	41,800	17			2	5	10	Milwaukie	CLACKAMAS		75	31.53
OR-99E	1	6.27	[illegible].36	41,800	16			2	5	9	Milwaukie	CLACKAMAS			30.89
OR-99E	1	6.28	6.37	41,800	15			1	5	9	Milwaukie	CLACKAMAS			28.73
OR-99E	1	6.2[illegible]	6.38	41,800	15			1	6	8	Milwaukie	CLACKAMAS			30.23
OR-99E	1	[illegible]	6.39	41,800	15			1	6	8	Milwaukie	CLACKAMAS	ACCESS, FROM		30.23
OR-99E	1	[illegible].31	6.40	37,600	6			1	4	1	Milwaukie	CLACKAMAS	LEG, FROM RIVER		19.84
OR-99E	1	6.32	6.41	37,600	4			1	3		Milwaukie	CLACKAMAS			15.80
OR-99E	1	6.33	6.42	37,600	4			1	3		Milwaukie	CLACKAMAS			15.80
[illegible]R-99E	[illegible]	6.34	6.43	37,600	3			1	2		Milwaukie	CLACKAMAS			12.76
OR-9[illegible]	1	6.76	6.85	37,600	4			1	1	2		CLACKAMAS			[illegible]2.8[illegible]
O[illegible]E	1	6.77	6.86	37,600	6			1	1	4		CLACKAMAS			[illegible]

This data sheet replaces the 2007 data sheet for these road segments

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
081	**PACIFIC HIGHWAY EAST**														
OR-99E	1	5.18	5.27	51,100	21	1		2	10	8		CLACKAMAS		95	57.23
OR-99E	1	5.19	5.28	51,100	19	1		2	9	7		CLACKAMAS		95	54.61
OR-99E	1	5.20	5.29	51,100	17	1		2	7	7		CLACKAMAS	ACCESS (DECREASING R	90	50.42
OR-99E	1	5.20	5.29	51,100	17	1		2	7	7		CLACKAMAS	SE MILPORT RD	90	50.42
OR-99E	1	5.21	5.30	39,200	3				2	1		CLACKAMAS		5	11.22
OR-99E	1	5.22	5.31	39,200	3				2	1		CLACKAMAS		5	11.22
OR-99E	1	5.62	5.71	25,100	4			1	2	1		CLACKAMAS		25	14.82
OR-99E	1	5.63	5.72	25,100	23			2	13	8		CLACKAMAS		90	49.48
OR-99E	1	5.64	5.73	25,100	25			3	13	9		CLACKAMAS		90	52.18
OR-99E	1	5.65	5.74	25,100	25			3	13	9		CLACKAMAS		90	52.18
OR-99E	1	5.66	5.75	25,100	25			3	13	9		CLACKAMAS		90	52.18
OR-99E	1	5.67	5.76	25,100	26			4	13	9		CLACKAMAS		95	54.25
OR-99E	1	5.68	5.77	25,100	27			4	13	10		CLACKAMAS		95	54.83
OR-99E	1	5.69	5.78	25,100	28			4	13	11		CLACKAMAS		95	55.40
OR-99E	1	5.70	5.79	25,100	28			4	13	11		CLACKAMAS		95	55.40
OR-99E	1	5.71	5.80	25,100	29			3	13	13		CLACKAMAS		95	54.44
OR-99E	1	5.72	5.81	32,500	27			3	11	13		CLACKAMAS	HWY 081 M P (2)5.72	90	48.89
OR-99E	1	5.72	5.81	32,500	27			3	11	13		CLACKAMAS	17TH AVE	90	48.89
OR-99E	1	5.73	5.82	32,500	8			2		6		CLACKAMAS		40	17.72
OR-99E	1	5.74	5.83	32,500	7			1		6		CLACKAMAS		30	15.19
OR-99E	1	5.75	5.84	32,500	7			1		6		CLACKAMAS		30	15.19
OR-99E	1	5.76	5.85	32,500	8			1		7		CLACKAMAS		35	16.22
OR-99E	1	5.77	5.86	32,500	7					7		CLACKAMAS	JACKSON ST	20	13.69
OR-99E	1	5.78	5.87	32,500	5					5		CLACKAMAS		5	11.34
OR-99E	1	5.79	5.88	32,500	4					4		CLACKAMAS			9.97
OR-99E	1	5.80	5.89	32,500	4					4		CLACKAMAS			9.97
OR-99E	1	5.81	5.90	32,500	5				2	3		CLACKAMAS		25	14.34
OR-99E	1	5.82	5.91	32,500	6				2	4		CLACKAMAS		30	15.57
OR-99E	1	5.83	5.92	32,500	6				2	4		CLACKAMAS	SE MONROE ST	30	15.57
OR-99E	1	5.84	5.93	32,500	9		1		4	4		CLACKAMAS		85	38.18
OR-99E	1	5.85	5.94	32,500	10		1	1	4	4		CLACKAMAS		85	40.60
OR-99E	1	5.86	5.95	32,500	9		1	1	4	3		CLACKAMAS		85	39.68
OR-99E	1	5.87	5.96	32,500	10		1	1	4	4		CLACKAMAS		85	40.60
OR-99E	1	5.88	5.97	32,500	11		1	1	4	5		CLACKAMAS	SE JEFFERSON ST	85	41.45
OR-99E	1	5.88	5.97	32,500	11		1	1	4	5		CLACKAMAS	ROAD (BOAT LANDING)	85	41.45
OR-99E	1	5.89	5.98	32,500	11		1	1	4	5		CLACKAMAS		85	41.45
OR-99E	1	5.90	5.99	32,500	11		1	1	4	5		CLACKAMAS		85	41.45
OR-99E	1	5.91	6.00	32,500	9		1	1	3	4		CLACKAMAS		85	38.18
OR-99E	1	5.92	6.01	32,500	9		1	1	4	3		CLACKAMAS		85	39.68
OR-99E	1	5.93	6.02	32,500	9		1	1	4	3		CLACKAMAS	WASHINGTON ST	85	39.68

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in	Percentile	SPIS
161	**WOODBURN-ESTACADA**														
OR-211	1	[illegible]	23.87	2,400	1	1						CLACKAMAS			24.00
OR-211	1	23.79	23.88	2,400	1	1						CLACKAMAS			24.00
OR-211	1	23.80	[illegible]	2,400	1	1						CLACKAMAS			24.00
OR-211	1	23.81	[illegible]	2,400	1	1						CLACKAMAS			24.00
OR-211	1	23.82	[illegible]	2,400	1	1						CLACKAMAS			24.00
OR-211	1	28.71	28.80	2,300	3		1		2			CLACKAMAS		80	36.34
OR-211	1	28.72	28.81	2,300	3		1		2			CLACKAMAS		80	36.34
OR-211	1	28.73	28.82	[illegible]	3		1		2			CLACKAMAS		80	36.34
OR-211	1	28.74	28.83	[illegible]	3		1		2			CLACKAMAS		80	36.34
OR-211	1	28.75	28.84	2,300	3		1		2			CLACKAMAS		80	36.34
OR-211	1	28.76	28.85	2,300	[illegible]		1		2			CLACKAMAS		80	36.34
OR-211	1	28.77	28.86	2,300	3		1		2			CLACKAMAS	HILLOCKBURN RD.	80	36.34
OR-211	1	32.44	32.53	3,300	5			1		4		CLACKAMAS			21.70
OR-211	1	32.45	32.54	3,300	5			1		4		CLACKAMAS			21.70
OR-211	1	32.46	32.55	3,300	6			1		5		CLACKAMAS			23.96
OR-211	1	32.47	32.56	3,300	6			[illegible]		5		CLACKAMAS			23.96
OR-211	1	32.48	32.57	3,300	6			1		5		CLACKAMAS			23.96
OR-211	1	32.49	32.58	3,300	6			1		5		CLACKAMAS			23.96
OR-211	1	32.50	32.59	3,300	6			1		[illegible]		CLACKAMAS			23.96
OR-211	1	32.51	32.60	3,300	6			1		5		CLACKAMAS			23.96
OR-211	1	32.52	32.61	3,300	6			1		5		CLACKAMAS			23.96
OR-211	1	32.53	32.62	3,300	4			1		3		CLACKAMAS	S.HAYDEN RD		19.15
OR-211	1	32.66	32.75	5,700	4		1	1	1	1		CLACKAMAS		75	34.14
OR-211	1	32.67	32.76	5,700	4		1	1	1	1		CLACKAMAS		75	34.14
OR-211	1	32.68	32.77	5,700	4		1	1	1	1		CLACKAMAS		75	34.14
OR-211	1	32.69	32.78	5,700	4		1	1	1	[illegible]		CLACKAMAS		75	34.14
OR-211	1	32.70	32.79	5,700	4		1	1	1	[illegible]		CLACKAMAS		75	34.14
OR-211	1	32.71	32.80	5,700	4		1	1	[illegible]	1		CLACKAMAS		75	34.14
OR-211	1	32.72	32.81	5,700	4		1	[illegible]	1	1		CLACKAMAS		75	34.14
OR-211	1	32.73	32.82	5,700	4		1	1	1	1		CLACKAMAS		75	34.14
OR-211	1	32.74	32.83	5,700	4		[illegible]	1	1	1		CLACKAMAS	S. REID RD	75	34.14
OR-211	1	32.75	32.84	5,700	3			1	1	1		CLACKAMAS			15.13
OR-211	1	33.40	33.49	6,800	3				1	2		CLACKAMAS			12.98
171	**CLACKAMAS**														
	1	-0.01	0.08	[illegible]	9				3	6	Milwaukie	CLACKAMAS	[illegible]H AVE.		23.32
	1	0.00	0.09	[illegible]	9				3	6	Milwaukie	CLACKAMAS			23.32
	1	0.01	0.10	[illegible]	13			1	5	7	Milwaukie	CLACKAMAS		75	32.08
	1	0.02	0.11	13,100	12			1	5	6	Milwaukie	CLACKAMAS	LEG, FR[illegible] 17TH	75	31.09
	1	0.03	0.12	13,100	9			1	4	4	Milwaukie	CLACKAMAS			26.32
	1	0.04	[illegible]	13,100	9			1	4	4	Milwaukie	CLACKAMAS			26.32
	1	0.05	[illegible]	13,100	8			1	3	4	Milwaukie	CLACKAMAS			23.61
	1	0.06	0.15	13,100	7			1	2	4	Milwaukie	CLACKAMAS			20.81
	1	0.07	0.16	13,100	7			1	2	4	Milwaukie	CLACKAMAS			20.81
	1	[illegible]	0.17	13,100	7			1	2	4	Milwaukie	CLACKAMAS			20.81
OR-224	1	[illegible]	0.18	13,100	6			1	3	2	Milwaukie	CLACKAMAS			20.90
OR-224	1	[illegible]	0.19	13,100	6			1	3	2	Milwaukie	CLACKAMAS			20.90
OR-224	1	0.58	0.67	28,900	4				1	3	Milwaukie	CLACKAMAS			11.62
OR-224	[illegible]	0.59	0.68	28,900	17			2	5	10	Milwaukie	CLACKAMAS		75	32.90
[illegible]	[illegible]	0.60	0.69	28,900	19			2	5	12	Milwaukie	CLACKAMAS		80	34.25
[illegible]	1	0.61	0.70	28,900	20			2	5	13	Milwaukie	CLACKAMAS		80	[illegible]
[illegible]	1	0.62	0.71	28,900	20			2	5	13	Milwaukie	CLACKAMAS		80	[illegible]

This data sheet replaces the 2007 data sheet for these road segments

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
081	**PACIFIC HIGHWAY EAST**														
OR-99E	1	5.94	6.03	32,500	5			1	2	2		CLACKAMAS		30	15.84
OR-99E	1	5.95	6.04	32,500	4				2	2		CLACKAMAS		15	12.97
OR-99E	1	5.96	6.05	32,500	4				2	2		CLACKAMAS		15	12.97
OR-99E	1	5.97	6.06	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.12	6.21	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.13	6.22	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.14	6.23	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.15	6.24	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.16	6.25	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.17	6.26	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.18	6.27	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.21	6.30	32,500	4				3	1		CLACKAMAS	22ND AVE.	25	14.47
OR-99E	1	6.22	6.31	32,500	6				5	1		CLACKAMAS		45	20.07
OR-99E	1	6.23	6.32	32,500	7				6	1		CLACKAMAS		55	22.69
OR-99E	1	6.24	6.33	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.25	6.34	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.26	6.35	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.27	6.36	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.28	6.37	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.29	6.38	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.30	6.39	32,500	8				6	2		CLACKAMAS	BLUE BIRD ST.	60	23.72
OR-99E	1	6.30	6.39	32,500	8				6	2		CLACKAMAS	RIVER RD (2ND RT.)	60	23.72
OR-99E	1	6.31	6.40	27,100	5				4	1		CLACKAMAS	LEG (FROM RIVER RD.)	40	17.63
OR-99E	1	6.45	6.54	27,100	3				2	1		CLACKAMAS		10	11.57
OR-99E	1	6.46	6.55	27,100	3				2	1		CLACKAMAS		10	11.57
OR-99E	1	6.66	6.75	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.67	6.76	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.68	6.77	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.69	6.78	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.70	6.79	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.71	6.80	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.72	6.81	27,100	5				2	3		CLACKAMAS		25	14.63
OR-99E	1	6.73	6.82	27,100	5				3	2		CLACKAMAS		35	16.13
OR-99E	1	6.74	6.83	27,100	5				3	2		CLACKAMAS		35	16.13
OR-99E	1	6.75	6.84	27,100	5				3	2		CLACKAMAS		35	16.13
OR-99E	1	6.76	6.85	27,100	5				4	1		CLACKAMAS		40	17.63
OR-99E	1	6.77	6.86	27,100	5				4	1		CLACKAMAS		40	17.63
OR-99E	1	6.78	6.87	27,100	10				7	3		CLACKAMAS		70	27.61
OR-99E	1	6.79	6.88	27,100	12				8	4		CLACKAMAS		75	30.86

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in	Percentile	SPIS
171	**CLACKAMAS**														
OR-224	1	[illegible]	0.72	28,900	21			2	5	14	Milwaukie	CLACKAMAS		80	35.52
OR-224	1	0.64	0.73	28,900	21			2	5	14	Milwaukie	CLACKAMAS		80	35.52
OR-224	1	0.65	0.74	28,900	20			2	5	13	Milwaukie	CLACKAMAS		80	34.89
OR-224	1	0.66	[illegible]	28,900	21			3	5	13	Milwaukie	CLACKAMAS		80	37.02
OR-224	1	0.67	[illegible]	28,900	20			3	4	13	Milwaukie	CLACKAMAS		80	34.89
OR-224	1	0.68	0.77	28,900	18			3	4	11	Milwaukie	CLACKAMAS	171AB CON[illegible] S.E.	75	33.58
OR-224	1	0.69	0.78	32,300	11			2	1	8	Milwaukie	CLACKAMAS			21.97
OR-224	1	0.70	0.79	[illegible]	9			2	1	6	Milwaukie	CLACKAMAS			20.20
OR-224	1	0.71	0.80	[illegible]	8			2	1	5	Milwaukie	CLACKAMAS			19.23
OR-224	1	0.72	0.81	[illegible]	8			2	1	5	Milwaukie	CLACKAMAS			19.23
OR-224	1	0.73	0.82	32,300	[illegible]			2	1	4	Milwaukie	CLACKAMAS			18.20
OR-224	1	0.74	0.83	32,300	[illegible]			2	1	4	Milwaukie	CLACKAMAS			18.20
OR-224	1	0.75	0.84	32,300	8			2	1	5	Milwaukie	CLACKAMAS			19.23
OR-224	1	0.76	0.85	32,300	7			1	1	5	Milwaukie	CLACKAMAS			16.70
OR-224	1	0.77	0.86	32,300	7			1	1	5	Milwaukie	CLACKAMAS			16.70
OR-224	1	0.78	0.87	31,400	7			1	1	5	Milwaukie	CLACKAMAS	171AC CONN (S.E.		16.76
OR-224	1	0.83	0.92	31,400	3				1	2	Milwaukie	CLACKAMAS			9.92
OR-224	1	0.84	0.93	31,400	14		1	2	[illegible]	6	Milwaukie	CLACKAMAS		90	46.93
OR-224	1	0.85	0.94	31,400	14		1	2	6	5	Milwaukie	CLACKAMAS		90	48.43
OR-224	1	0.86	0.95	31,400	14		1	2	6	[illegible]	Milwaukie	CLACKAMAS		90	48.43
OR-224	1	0.87	0.96	31,400	14		1	2	6	5	Milwaukie	CLACKAMAS		90	48.43
OR-224	1	0.88	0.97	31,400	15		1	2	6	6	Milwaukie	CLACKAMAS		90	49.17
OR-224	1	0.89	0.98	31,400	15		1	2	6	6	Milwaukie	CLACKAMAS		90	49.17
R-224	1	0.90	0.99	31,400	15		1	2	6	6	Milwaukie	CLACKAMAS		90	49.17
OR-224	1	0.91	1.00	31,400	16		1	2	7	6	Milwaukie	CLACKAMAS		90	51.38
OR-224	1	0.92	1.01	31,400	17		1	2	7	7	Milwaukie	CLACKAMAS		90	52.06
OR-224	1	0.93	1.02	34,700	16		1	2	7	6	Milwaukie	CLACKAMAS	171AD CONN.	90	51.01
OR-224	1	0.94	1.03	34,700	5				3	[illegible]	Milwaukie	CLACKAMAS			15.75
OR-224	1	0.95	1.04	34,700	4				[illegible]	2	Milwaukie	CLACKAMAS			12.89
OR-224	1	0.96	1.05	34,700	4				[illegible]	2	Milwaukie	CLACKAMAS			12.89
OR-224	1	0.97	1.06	34,700	4				2	2	Milwaukie	CLACKAMAS			12.89
OR-224	1	0.98	1.07	34,700	3				2	1	Milwaukie	CLACKAMAS			11.32
OR-224	1	0.99	1.08	34,700	3				2	1	Milwaukie	CLACKAMAS			11.32
OR-224	1	1.00	1.09	34,700	3				2	1	Milwaukie	CLACKAMAS			11.32
OR-224	1	1.26	1.35	34,700	[illegible]		1	1		1	Milwaukie	CLACKAMAS			26.32
OR-224	1	1.27	1.36	34,700	[illegible]		1	1		2	Milwaukie	CLACKAMAS			27.89
OR-224	1	1.28	1.37	[illegible]	6		1	3		2	Milwaukie	CLACKAMAS	[illegible]G. FROM 171AE	75	33.46
OR-224	1	1.29	1.38	[illegible]	6		1	3		2	Milwaukie	CLACKAMAS		75	33.46
OR-224	1	1.30	1.39	[illegible]	6		1	3		2	Milwaukie	CLACKAMAS		75	33.46
OR-224	1	1.31	1.40	34,700	7		1	3		3	Milwaukie	CLACKAMAS		80	34.56
OR-224	1	1.32	1.41	34,700	7		1	3		3	Milwaukie	CLACKAMAS	171AE CO[illegible] (S.E.	80	34.56
OR-224	1	1.33	1.42	34,700	6		1	2		3	Milwaukie	CLACKAMAS		75	31.96
OR-224	1	1.34	[illegible]	34,700	6		1	2		3	Milwaukie	CLACKAMAS		75	31.96
OR-224	1	1.35	1.44	34,700	5		1	2		2	Milwaukie	CLACKAMAS			30.75
OR-224	1	1.36	1.45	34,700	4			2		2	Milwaukie	CLACKAMAS			12.89
OR-224	1	1.37	1.46	34,700	3			2		1	Milwaukie	CLACKAMAS	171AF CONN		11.32
OR-224	1	[illegible]	1.87	34,700	3			1	1	1	Milwaukie	CLACKAMAS			11.32
OR-224	1	1.79	1.88	34,700	3			1	1	1	Milwaukie	CLACKAMAS			11.32
OR-224	1	1.80	1.89	34,700	5			1	3	1	Milwaukie	CLACKAMAS			17.25
OR-224	1	1.81	1.90	34,700	7			2	4	1	Milwaukie	CLACKAMAS			22.56
R-224	1	1.82	1.91	34,700	7			2	4	1	Milwaukie	CLACKAMAS			22.56
OR-22[illegible]	1	1.83	1.92	34,700	7			2	4	1	Milwaukie	CLACKAMAS			22.56
OR[illegible]	1	1.84	1.93	34,700	7			2	4	1	Milwaukie	CLACKAMAS			[illegible]

This data sheet replaces the 2007 data sheet for these road segments

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
161	**WOODBURN-ESTACADA**														
OR-211	1	33.35	33.44	6,300	3				1	2		CLACKAMAS	S CADONAU RD	15	13.25
OR-211	1	33.36	33.45	6,300	3				1	2		CLACKAMAS		15	13.25
OR-211	1	33.37	33.46	6,300	3				1	2		CLACKAMAS		15	13.25
OR-211	1	33.39	33.48	6,300	3					3		CLACKAMAS		10	11.75
OR-211	1	33.40	33.49	6,300	9			2	3	4		CLACKAMAS		75	30.51
171	**CLACKAMAS**														
	1	0.02	0.11	7,800	3					3		CLACKAMAS	LEG (FROM 17TH AVE.)	5	11.03
	1	0.03	0.12	7,800	3					3		CLACKAMAS		5	11.03
	1	0.04	0.13	7,800	3					3		CLACKAMAS		5	11.03
	1	0.05	0.14	7,800	5				1	4		CLACKAMAS		35	16.80
	1	0.06	0.15	7,800	5				1	4		CLACKAMAS		35	16.80
	1	0.07	0.16	7,800	5				1	4		CLACKAMAS		35	16.80
	1	0.08	0.17	7,800	5				1	4		CLACKAMAS		35	16.80
OR-224	1	0.09	0.18	7,800	5				1	4		CLACKAMAS		35	16.80
OR-224	1	0.10	0.19	7,800	4				1	3		CLACKAMAS		25	14.81
OR-224	1	0.11	0.20	7,800	3				1	2		CLACKAMAS		15	12.53
OR-224	1	0.58	0.67	24,800	3				1	2		CLACKAMAS			10.17
OR-224	1	0.59	0.68	24,800	25			5	10	10		CLACKAMAS		90	50.75
OR-224	1	0.60	0.69	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.61	0.70	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.62	0.71	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.63	0.72	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.64	0.73	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.65	0.74	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.66	0.75	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.67	0.76	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.68	0.77	24,800	24			6	10	8		CLACKAMAS	171AB CONN. (SE HARRI:	90	51.65
OR-224	1	0.69	0.78	24,500	10			2	6	2		CLACKAMAS		70	29.43
OR-224	1	0.70	0.79	24,500	9			2	5	2		CLACKAMAS		65	26.95
OR-224	1	0.71	0.80	24,500	9			2	5	2		CLACKAMAS		65	26.95
OR-224	1	0.72	0.81	24,500	9			2	5	2		CLACKAMAS		65	26.95
OR-224	1	0.73	0.82	24,500	9			2	5	2		CLACKAMAS		65	26.95
OR-224	1	0.74	0.83	24,500	10			3	5	2		CLACKAMAS		70	29.43
OR-224	1	0.75	0.84	24,500	10			3	5	2		CLACKAMAS		70	29.43
OR-224	1	0.76	0.85	24,500	10			3	5	2		CLACKAMAS		70	29.43
OR-224	1	0.77	0.86	24,500	10			3	5	2		CLACKAMAS		70	29.43
OR-224	1	0.78	0.87	24,500	9			2	5	2		CLACKAMAS	171AC CONN. (SE MONR(	65	26.95
OR-224	1	0.82	0.91	25,100	3			1	1	1		CLACKAMAS		10	11.66
OR-224	1	0.83	0.92	25,100	6			1	3	2		CLACKAMAS		45	19.07
OR-224	1	0.84	0.93	25,100	19			2	5	12		CLACKAMAS		80	34.92

Rte.	Rdwy	[illegible]MP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection In	Per[illegible]ile	SPIS
171	**CLAC[illegible]MAS**														
OR-224	1	[illegible]	1.94	34,700	7			2	4	1	Milwaukie	CLACKAMAS			22.56
OR-224	1	1.86	1.95	34,700	6			1	4	1	Milwaukie	CLACKAMAS			19.96
OR-224	1	1.87	[illegible]	34,700	6			1	4	1	Milwaukie	CLACKAMAS			19.96
OR-224	1	1.88	[illegible]	34,700	5			1	4		Milwaukie	CLACKAMAS			18.75
OR-224	1	1.89	[illegible]	34,700	5			1	4		Milwaukie	CLACKAMAS	S E. FREEMAN[illegible]AY		18.75
OR-224	1	2.63	2.72	40,700	6			2	1	3	Milwaukie	CLACKAMAS	HWY. 171[illegible]		16.72
OR-224	1	2.64	2.73	[illegible]	8			2	2	4	Milwaukie	CLACKAMAS			20.26
OR-224	1	2.65	2.74	[illegible]	8			2	2	4	Milwaukie	CLACKAMAS			20.26
OR-224	1	2.66	2.75	[illegible]	8			2	2	4	Milwaukie	CLACKAMAS			20.26
OR-224	1	2.67	2.76	40,700	8			2	2	4	Milwaukie	CLACKAMAS			20.26
OR-224	1	2.68	2.77	40,700	[illegible]			2	2	4	Milwaukie	CLACKAMAS			20.26
OR-224	1	2.69	2.78	40,700	8			2	2	4	Milwaukie	CLACKAMAS	171A1 CONN.		20.26
OR-224	1	2.70	2.79	35,400	8			2	2	4	Milwaukie	CLACKAMAS			20.54
OR-224	1	2.71	2.80	35,400	8			2	2	4	Milwaukie	CLACKAM[illegible]			20.54
OR-224	1	2.72	2.81	35,400	9			3	2	4		CLACK[illegible]AS	RUSK RD.		22.98
OR-224	1	2.73	2.82	35,400	3			1	1	1		CLA[illegible]MAS			11.31
OR-224	1	3.10	3.19	35,400	4			[illegible]	[illegible]	3		[illegible]CKAMAS			11.37
OR-224	1	3.11	3.20	35,400	20	1		3	[illegible]	12		[illegible]LACKAMAS		90	50.50
OR-224	1	3.12	3.21	35,400	24	1		3	6	[illegible]		CLACKAMAS		90	55.83
OR-224	1	3.13	3.22	35,400	24	1		3	6	1[illegible]		CLACKAMAS		90	55.83
OR-224	1	3.14	3.23	35,400	25	1		3	6	15		CLACKAMAS		95	56.38
OR-224	1	3.15	3.24	35,400	24	1		3	6	14		CLACKAMAS		90	55.83
R-224	1	3.16	3.25	35,400	24	1		3	6	14		CLACKAMAS		90	55.83
R-224	1	3.17	3.26	35,400	23	1		3	5	14		CLACKAMAS		90	53.77
OR-224	1	3.18	3.27	35,400	23	1		3	5	14		CLACKAMAS		90	53.77
OR-224	1	3.19	3.28	35,400	23	1		3	5	14		CLACKAMAS		90	53.77
OR-224	1	3.20	3.29	35,400	21	1		3	5	[illegible]		CLACKAMAS	LAKE RD.	90	52.60
OR-224	1	3.21	3.30	37,800	6			[illegible]	[illegible]	3		[illegible]LACKAMAS			16.83
OR-224	1	3.24	3.33	37,800	8			[illegible]	3	2		C[illegible]KAMAS			23.40
OR-224	1	3.25	3.34	37,800	10			[illegible]	5	2		CLA[illegible]MAS			28.22
OR-224	1	3.26	3.35	37,800	11			4	5	2		CLACK[illegible]AS			30.54
OR-224	1	3.27	3.36	37,800	11			4	5	2		CLACKAM[illegible]			30.54
OR-224	1	3.28	3.37	37,800	11			4	5	2		CLACKAMA[illegible]			30.54
OR-224	1	3.29	3.38	37,800	11			4	5	2		CLACKAMAS			30.54
OR-224	1	3.30	3.39	37,800	[illegible]			4	5	2		CLACKAMAS			30.54
OR-224	1	3.31	3.40	37,800	10			4	4	2		CLACKAMAS			28.22
OR-224	1	3.32	3.41	[illegible]	10			4	4	2		CLACKAMAS			28.22
OR-224	1	3.33	3.42	[illegible]	10			4	4	2		CLACKAMAS	PH[illegible]ANT COURT		28.10
OR-224	1	3.34	3.43	[illegible]	3			1	2			CLACKAMAS			12.71
OR-224	1	3.56	3.65	39,800	3			2		1		CLACKAMAS			11.21
OR-224	1	3.57	[illegible]	39,800	3			2		1		CLACKAMAS			11.21
OR-224	1	3.58	[illegible]	39,800	3			2		1		CLACKAMAS			11.21
OR-224	1	3.59	[illegible]	39,800	4			2		2		CLACKAMAS			12.75
OR-224	1	3.60	3.69	39,800	4			2		2		CLACKAMAS			12.75
OR-224	1	[illegible]	3.70	39,800	6			2		4		CLACKAMAS			15.25
OR-224	1	[illegible]	3.71	39,800	9			2	1	6		CLACKAMAS			19.73
OR-224	1	[illegible]	3.72	39,800	13			3	2	8		CLACKAMAS			25.96
OR-224	1	3.64	3.73	39,800	31		1	4	11	15		CLACKAMAS		[illegible]	67.90
OR-224	1	3.65	3.74	39,800	32		1	3	11	17		CLACKAMAS		[illegible]	66.87
R-224	1	3.66	3.75	39,800	33		1	2	11	19		CLACKAMAS		95	65.85
R-22[illegible]	1	3.67	3.76	39,800	33		1	2	11	19		CLACKAMAS		95	65.85
OR-[illegible]	1	3.68	3.77	39,800	33		1	2	11	19		CLACKAMAS		95	[illegible]
[illegible]	1	3.69	3.78	39,800	32		1	2	11	18		CLACKAMAS		95	[illegible]

This data sheet replaces the 2007 data sheet for these road segments

171 CLACKAMAS

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
OR-224	1	0.85	0.94	25,100	20			2	5	13		CLACKAMAS		80	35.57
OR-224	1	0.86	0.95	25,100	21			2	5	14		CLACKAMAS		80	36.22
OR-224	1	0.87	0.96	25,100	21			2	5	14		CLACKAMAS		80	36.22
OR-224	1	0.88	0.97	25,100	21			2	5	14		CLACKAMAS		80	36.22
OR-224	1	0.89	0.98	25,100	21			2	4	15		CLACKAMAS		80	34.72
OR-224	1	0.90	0.99	25,100	21			2	4	15		CLACKAMAS		80	34.72
OR-224	1	0.91	1.00	25,100	21			2	4	15		CLACKAMAS		80	34.72
OR-224	1	0.92	1.01	25,100	21			2	4	15		CLACKAMAS		80	34.72
OR-224	1	0.93	1.02	25,100	18			2	2	14		CLACKAMAS	171AD CONN (OAK ST)	70	29.73
OR-224	1	0.94	1.03	25,700	4					4		CLACKAMAS			10.29
OR-224	1	0.95	1.04	25,700	3					3		CLACKAMAS			8.63
OR-224	1	1.23	1.32	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.24	1.33	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.25	1.34	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.26	1.35	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.27	1.36	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.28	1.37	25,700	8			2	2	4		CLACKAMAS	LEG (FROM 171AE CONN	50	21.29
OR-224	1	1.29	1.38	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.30	1.39	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.31	1.40	25,700	7			2	2	3		CLACKAMAS		45	20.20
OR-224	1	1.32	1.41	25,700	7			2	2	3		CLACKAMAS	171AE CONN (SE EDISO	45	20.20
OR-224	1	1.80	1.89	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.81	1.90	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.82	1.91	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.83	1.92	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.84	1.93	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.85	1.94	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.86	1.95	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.87	1.96	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.88	1.97	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.89	1.98	25,700	7			2	3	2		CLACKAMAS	SE FREEMAN WAY	55	21.70
OR-224	1	2.63	2.72	27,300	6				4	2		CLACKAMAS		45	18.90
OR-224	1	2.64	2.73	27,300	7				4	3		CLACKAMAS		45	20.06
OR-224	1	2.65	2.74	27,300	7				4	3		CLACKAMAS		45	20.06
OR-224	1	2.66	2.75	27,300	8		1		4	3		CLACKAMAS		85	37.63
OR-224	1	2.67	2.76	27,300	8		1		4	3		CLACKAMAS		85	37.63
OR-224	1	2.68	2.77	27,300	9		1		4	4		CLACKAMAS		85	38.63
OR-224	1	2.69	2.78	27,300	10		1		4	5		CLACKAMAS	171AI CONN M P 3C2 69	85	39.59
OR-224	1	2.70	2.79	26,900	9		1		4	4		CLACKAMAS		85	38.68
OR-224	1	2.71	2.80	26,900	9		1		4	4		CLACKAMAS		85	38.68

This data sheet replaces the 2007 data sheet for these road segments

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
171	**CLACKAMAS**														
OR-224	1	2.72	2.81	26,900	9		1		4	4		CLACKAMAS	RUSK RD	85	38.68
OR-224	1	2.73	2.82	26,900	5		1			4		CLACKAMAS		70	28.14
OR-224	1	2.74	2.83	26,900	4		1			3		CLACKAMAS		65	26.72
OR-224	1	2.75	2.84	26,900	4		1			3		CLACKAMAS		65	26.72
OR-224	1	2.76	2.85	26,900	3					3		CLACKAMAS			8.58
OR-224	1	2.77	2.86	26,900	3					3		CLACKAMAS			8.58
OR-224	1	3.06	3.15	26,900	3				3			CLACKAMAS		15	13.08
OR-224	1	3.07	3.16	26,900	4				3	1		CLACKAMAS		25	14.72
OR-224	1	3.08	3.17	26,900	4				3	1		CLACKAMAS		25	14.72
OR-224	1	3.09	3.18	26,900	4				3	1		CLACKAMAS		25	14.72
OR-224	1	3.10	3.19	26,900	9				6	3		CLACKAMAS		65	25.18
OR-224	1	3.11	3.20	26,900	25		1	2	9	13		CLACKAMAS		95	60.79
OR-224	1	3.12	3.21	26,900	31		2	2	10	17		CLACKAMAS		95	75.91
OR-224	1	3.13	3.22	26,900	32		2	2	11	17		CLACKAMAS		95	76.26
OR-224	1	3.14	3.23	26,900	34		2	2	12	18		CLACKAMAS		95	76.95
OR-224	1	3.15	3.24	26,900	34		2	2	12	18		CLACKAMAS		95	76.95
OR-224	1	3.16	3.25	26,900	33		2	2	11	18		CLACKAMAS		95	76.61
OR-224	1	3.17	3.26	26,900	32		2	2	11	17		CLACKAMAS		95	76.26
OR-224	1	3.18	3.27	26,900	32		2	2	11	17		CLACKAMAS		95	76.26
OR-224	1	3.19	3.28	26,900	32		2	2	11	17		CLACKAMAS		95	76.26
OR-224	1	3.20	3.29	26,900	28		2	2	9	15		CLACKAMAS	LAKE RD.	95	74.81
OR-224	1	3.21	3.30	29,200	11		1		5	5		CLACKAMAS		85	41.76
OR-224	1	3.22	3.31	29,200	5				4	1		CLACKAMAS		40	17.51
OR-224	1	3.23	3.32	29,200	6				4	2		CLACKAMAS		45	18.77
OR-224	1	3.24	3.33	29,200	9				7	2		CLACKAMAS		65	26.45
OR-224	1	3.25	3.34	29,200	9				7	2		CLACKAMAS		65	26.45
OR-224	1	3.26	3.35	29,200	10				7	3		CLACKAMAS		70	27.39
OR-224	1	3.27	3.36	29,200	10				7	3		CLACKAMAS		70	27.39
OR-224	1	3.28	3.37	29,200	10				7	3		CLACKAMAS		70	27.39
OR-224	1	3.29	3.38	29,200	10				7	3		CLACKAMAS		70	27.39
OR-224	1	3.30	3.39	29,200	8				5	3		CLACKAMAS		55	22.46
OR-224	1	3.31	3.40	29,200	8				5	3		CLACKAMAS		55	22.46
OR-224	1	3.32	3.41	29,200	8				5	3		CLACKAMAS		55	22.46
OR-224	1	3.33	3.42	29,200	6				4	2		CLACKAMAS	PHEASANT CT	45	18.77
OR-224	1	3.60	3.69	35,100	4		1		1	2		CLACKAMAS		70	27.88
OR-224	1	3.61	3.70	35,100	6		1		2	3		CLACKAMAS		75	31.94
OR-224	1	3.62	3.71	35,100	10		1	1	3	5		CLACKAMAS		85	38.90
OR-224	1	3.63	3.72	35,100	10		1	1	3	5		CLACKAMAS		85	38.90
OR-224	1	3.64	3.73	35,100	30		2	3	12	13		CLACKAMAS		95	74.05
OR-224	1	3.65	3.74	35,100	32		2	3	13	14		CLACKAMAS		95	74.70
OR-224	1	3.66	3.75	35,100	37		2	4	15	16		CLACKAMAS		95	76.24

Exhibit C

Milwaukie 2013 TSP
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Appendices

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1 Executive Summary

The Milwaukie Transportation System Plan (TSP) is the City's long-term plan for transportation improvements and includes policies and projects that could be implemented through the City Capital Improvement Plan, development review, or grant funding. The 2007 TSP planning process was a great opportunity for the community to fully define its transportation goals and discuss how the whole transportation system could be improved to support livability in Milwaukie. The 2013 TSP update process provided an opportunity to ensure that the plan reflected current conditions and took into account the latest forecasts and projections.

Milwaukie is a city of approximately 21,000 people and just under five square miles. Part of Milwaukie is designated as a Town Center in the 2040 Growth Concept. Though Milwaukie's population is expected to grow moderately (approximately one % per year), the city lies at the intersection of several regional transportation facilities and downstream from several areas slated for significant growth in Metro's 2040 Growth Concept.

THE PURPOSE OF A TRANSPORTATION SYSTEM PLAN (TSP)

A primary purpose of an up-to-date TSP is to fulfill the State of Oregon Transportation Planning Rule (TPR) requirements for comprehensive transportation planning in the cities of Oregon. The TSP is a guiding policy document for long-term transportation planning and presents the City's goals and policies while outlining and prioritizing proposed improvements for pedestrian, bicycle, public transit, motor vehicle, and freight systems; downtown parking; and neighborhood traffic management. In addition, the TSP outlines the financial forecast for potential funding and ties that back to potential prioritized improvements to determine any funding shortfalls for projects. When funding shortfalls exist, potential concepts for generating additional revenue are outlined to help guide City funding-related decisions.

The TSP strives to determine existing problem areas for all modes of transportation, looks into the future to identify the needs created by growth, and provide solutions to existing and future needs with guidelines to develop the desired multimodal transportation system. Identifying specific transportation system needs will help the City guide its future transportation system investments and determine how land use and transportation decisions can be brought together beneficially for the community.

After Chapter 4 Future Forecasting Process, each section of the TSP includes a long-range master plan and an action plan. The action plans address those transportation improvements that could be made using limited local funding sources. The final prioritization of transportation system improvements will be determined by the Milwaukie City Council as part of the annual capital improvements planning and budgeting process.

WHO WAS INVOLVED IN THE CITY'S TSP UPDATES?

During the 2007 TSP update process, the City of Milwaukie launched an extensive public outreach and involvement process (see Appendix B). Citizens, partner agencies, and business representatives were invited to join one or more mode-specific working groups and the TSP Advisory Committee. The working groups were created to focus on different subtasks of the TSP, including: Traffic and Street Network Solutions, Pedestrian and Bike Solutions, Street Design, Transit Solutions, Downtown Parking, and Freight Access. The Advisory Committee oversaw both technical and policy review of the TSP, and offered guidance on the final prioritization of projects and strategies.

In 2013, the City conducted a smaller-scale update to the TSP in order to maintain compliance with Metro's 2035 Regional Transportation Plan (RTP). The public engagement component of the 2013 TSP update was far less intensive than the one in 2007, as the proposed changes did not involve major policy decisions and instead focused on the following elements:

- Update existing figures, tables, and text to reflect current conditions.
- Adjust the TSP's planning horizon year from 2030 to 2035.
- Remove completed projects and update project descriptions as needed.
- Add the final Portland-Milwaukie Light Rail (PMLR) alignment to master plan maps.

The 2013 TSP update, driven by the RTP compliance requirement, allowed the City to confirm that the master plans for the various travel modes (e.g., pedestrian, bicycle, public transit, etc.) will help the region move toward meeting its performance targets for 2035, including reductions in congestion, percentage of single-occupancy vehicle trips, and vehicle miles traveled per capita.

TSP UPDATE PROCESS

In addition to data collection and public involvement, a TSP update consists of seven main elements. The following sections describe each of these elements in more detail.

Goals

Transportation goals and policies form the basis for how the local transportation system will be developed and maintained over the next 22 years. The City's transportation goals support a multimodal approach to transportation planning and reflect how citizens think about and experience Milwaukie's transportation system. The City's nine transportation goals are:

- **GOAL 1 Livability:** Design and construct transportation facilities in a manner that enhances the livability of Milwaukie's community.
- **GOAL 2 Safety:** Develop and maintain a safe and secure transportation system.
- **GOAL 3 Travel Choices:** Plan, develop, and maintain a transportation system that provides travel choices and allows people to reduce the number of trips made by single-occupant vehicles.
- **GOAL 4 Quality Design:** Establish and maintain a set of transportation design and development regulations that are sensitive to local conditions.

- **GOAL 5 Reliability and Mobility:** Develop and maintain a well-connected transportation system that reduces travel distance, improves reliability, and manages congestion.
- **GOAL 6 Sustainability:** Provide a sustainable transportation system that meets the needs of present and future generations.
- **GOAL 7 Efficient and Innovative Funding:** Efficiently allocate available funding for recommended transportation improvements, and pursue additional transportation funding that includes innovative funding methods and sources.
- **GOAL 8 Compatibility:** Develop a transportation system that is consistent with the City's Comprehensive Plan and coordinates with County, State, and regional plans.
- **GOAL 9 Economic Vitality:** Promote the development of Milwaukie's, the region's, and the state's economies through the efficient movement of people, goods, and services, and the distribution of information.

Existing Conditions

Project staff reviewed existing conditions to establish how the transportation systems within Milwaukie currently operate in terms of quality, effectiveness, accessibility, and safety. Sidewalk and pavement conditions, roadway and intersection traffic volumes, transit and freight operations, as well as parking, rail, environmental justice and natural resources were all reviewed with the goal of understanding the "bigger picture" of the City's transportation needs. Additional detail related to these topics can be found in Chapter 3.

Forecasting Future Traffic Conditions

The forecast year for this plan is 2035. The City used Metro's urban area transportation forecast model to forecast future p.m. peak-hour traffic volumes at study area intersections. This is a complex model that takes many anticipated trends in demographics, changes in land use, population, etc. into account when forecasting future traffic volumes. Some of the more important assumptions include the projected growth in population in Clackamas County and the rest of the Metro region, residential and employment growth in downtown Milwaukie, and an increase in transit use within the Metro region. See Chapter 4 for more detail.

Identification of Needs and Potential Improvements

The traffic volume projections forecasted from the Metro model formed the basis for identifying potential roadway deficiencies and evaluating alternative circulation improvements within Milwaukie. Needs for other modes were then identified, based on the future traffic forecasts and deficiencies in the existing infrastructure (sidewalks, bike lanes, transit stops, etc.).

Collectively, the master plans in Chapters 5 through 12 of the TSP describe the proposed capital and operational improvements to the transportation system between 2013 and 2035. While many of these potential improvements are presented as benefiting one mode, when possible, multiple modes are combined into one project. For instance, the Railroad Ave road-widening project listed in the Street Network Master Plan could include new bike lanes and sidewalks, as well as improvements for freight and transit.

Between the 2007 and 2013 TSP updates, the PMLR project became more defined, with construction starting in 2012. A thorough feasibility and impact study was conducted for the PMLR project, identifying and developing appropriate mitigation for the new light rail system's impacts to Milwaukie's transportation infrastructure. The warranted improvements are being constructed as the new light rail system is being built. Once completed, PMLR will become a part of the City's transportation system and will be further studied to identify and address needed improvements as part of future updates to the TSP.

In June 2013, the Tacoma Station Area Plan (TSAP) was adopted to address potential redevelopment opportunities near the new PMLR station at Tacoma St. The TSAP included a list of approximately 20 projects identified to meet new transportation needs. These projects were assigned order-of-magnitude costs and were added to the relevant project lists for the various modes.

Ranking and Prioritizing Improvements

The action plans in Chapters 5 through 12 focus on the highest priority projects that are most likely to be funded over the next 22 years with limited City funds. The action plans are built upon the premise that, given the limited funds available, the City should prioritize funding of transportation projects that 1) effectively address identified problems, and 2) best meet the City's Goals.

To prioritize the projects as part of the 2007 TSP update, project staff and the Advisory Committee used three sources: the project rankings from the working groups, evaluation of each project against the nine TSP Goals, and other information regarding dependence on other projects, neighborhood support, etc. Using this approach, project staff and the Advisory Committee developed a relative ranking of the projects, grouping them into three categories (high, medium, and low priority).

For the 2013 TSP update, project staff did not reevaluate projects against the nine TSP Goals but, instead, considered the input generated around a public meeting that was held to discuss transportation project priorities. For approximately 20% of the existing projects, the priority classification was adjusted to reflect changes in current conditions or a new awareness of community need. For new projects arising from the Tacoma Station Area Plan (TSAP), staff assigned a priority to each based on input from the TSAP Advisory Committee as well as staff knowledge of overall system needs.

Financing Transportation Projects

The financially constrained action plan lists in Chapters 5 through 12 identify which projects the City should prioritize for funding with limited City funds. While these action plans will set the priorities for use of local funds, they do not assume funding sources such as State or regional grants, or contributions from local development. Therefore, the "financially constrained" lists are very constrained.

Given the limited availability of funding, the City will have to make tradeoffs when deciding how to spend the limited funds each year. As part of the 2007 TSP update, the Advisory Committee determined that the City should use a strategic approach that funds a range of high priority "implementable" projects. This approach encourages the City to tackle smaller projects with local funds, but also use local funds as the required local match to leverage State and federal funds for larger high priority projects. The 2013 TSP update reaffirmed this strategic approach.

The primary function of the TSP is to provide guidance for long-range policy and investment decisions about needed improvements to the transportation system over the next 22 years. The Consolidated Action Plan in Table 13-3 (located in Chapter 13 Funding and Implementation Plan) provides a list of the highest priority projects for the community. This list is utilized to build the "Transportation Priority Project—Unfunded" section of the City's 5-year Capital Improvement Plan (CIP). The CIP is a list of projects for the City's water, wastewater, stormwater, and transportation systems that are scheduled to be funded in the short term. As funding becomes available, projects are moved from the unfunded section of the CIP to the section recommended for funding. Projects in the CIP section recommended for funding are reviewed by the City Council for funding every 2 years through the City's budgeting process. In essence, the CIP is the primary implementation mechanism for TSP projects.

Recommendations

The Milwaukie TSP focuses on Milwaukie's transportation needs and decisions. Therefore, participants in the 2007 planning process created a set of recommendations that implemented State and regional policies but were tailored to Milwaukie's current and future needs. From all of the input that citizens and businesses offered during the 2007 TSP process, there were some clear messages. The highest priorities established in 2007 for improving transportation in Milwaukie were:

- Improve pedestrian and bicycle facilities throughout the city.
- Enhance public transit service.
- Maintain existing facilities.
- Manage traffic in neighborhoods (address "cut-through" traffic) as regional traffic volumes increase.
- Improve safety and accessibility of crossings over major corridors.

Though it is common for people to be focused on their own street, neighborhood, or bus line, a broad number of people identified the following areas as a priority in 2007:

- Downtown
- Milwaukie Marketplace area
- Railroad Ave
- Railroad crossings throughout the city

The 2013 TSP Update process did not involve the same level or depth of public involvement and discussion, as it was intended as only a minor refresh of the 2007 document. However, public comments gathered at and around a public meeting held in June 2013 largely confirmed the above recommendations (with at least one exception, that there was no clear identification of the Milwaukie Marketplace as a priority area). In 2013, people appear to be generally more supportive of projects that serve to improve multiple modes of transportation than those that enhance only one aspect of the larger transportation system. In addition, there is a clear emphasis on improving east-west connections across the community, especially to mitigate the divisive effect that Hwy 224 has in separating downtown from the predominant population in the eastern neighborhoods.

The following section summarizes the specific recommendations that resulted from the analysis of each mode and aspect, including: pedestrian, bicycle, public transit, motor vehicle, freight, street design, neighborhood traffic management, and downtown parking. Figure 1-1, the Composite Master Plan Map, summarizes the recommended improvements on one map, showing the location of recommended master plan improvements for pedestrian, bicycle, public transit, motor vehicle, and freight modes.

Transportation System Plan

FIGURE 1-1

COMPOSITE MASTER PLAN

November 2013

Legend

- Schools
- Light Rail Station
- Light Rail Transit
- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail
- Railroad
- Streets
- Major Roads
- County Line
- Water
- Parks
- City Limits

Proposed Projects

- Bicycle Corridor Improvement
- Pedestrian Corridor Improvement
- Transit Corridor Improvement
- Freight Intersection Imrovement
- Bicycle Intersection Improvement
- Pedestrian Intersection Improvement
- Auto Intersection Improvement

PEDESTRIAN FACILITIES

Walking is the most affordable and accessible of all transportation modes. It is also clean, low-impact, and healthy for the individual. A safe and comfortable pedestrian environment allows people of all ages and abilities to travel independently.

Milwaukie's pedestrian system is challenged by an incomplete arterial/collector sidewalk system, a lack of local street connectivity, arterial crossings with potential safety and connectivity issues, and a lack of complete multiuse trails (see Chapter 3).

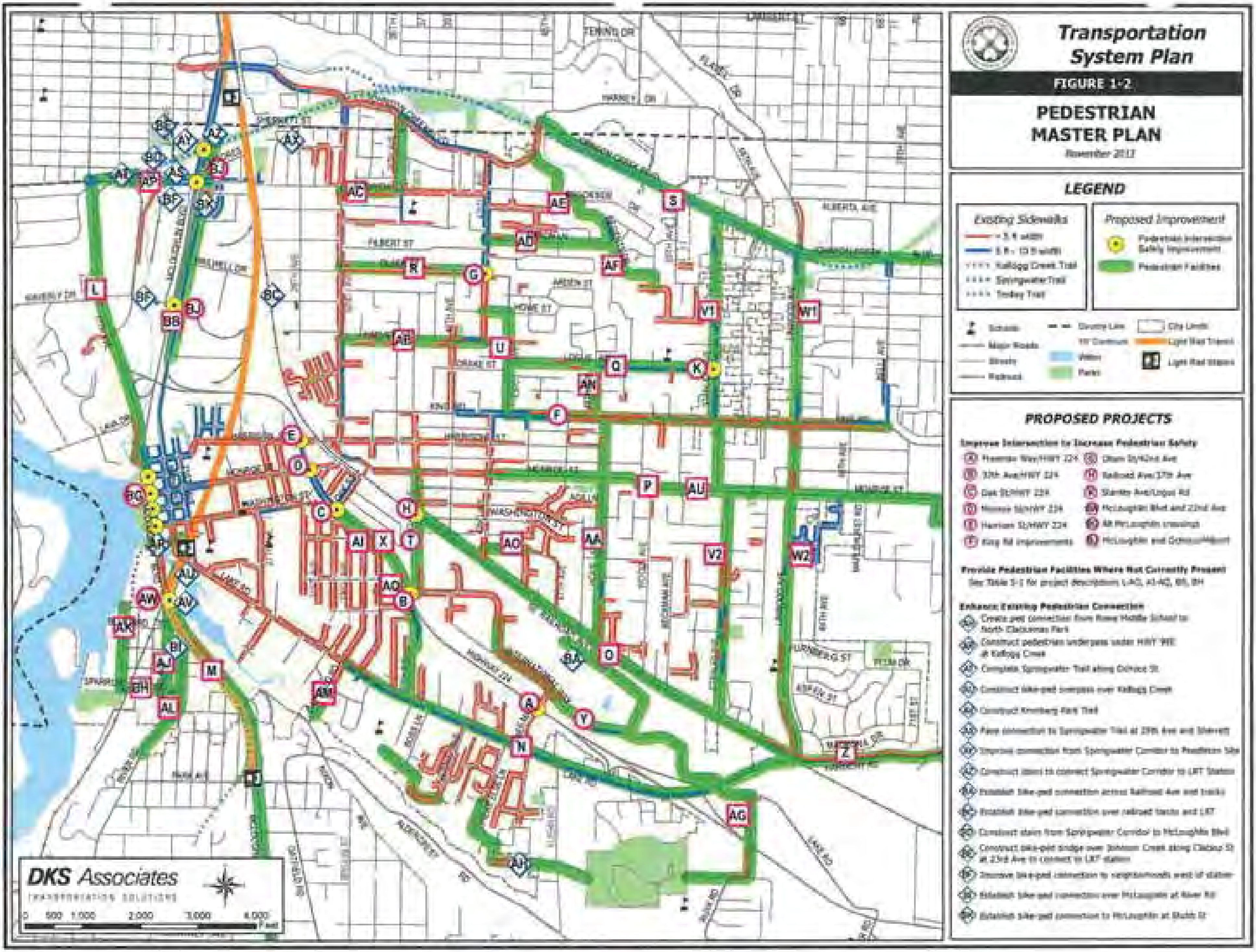
The City has several strategies for addressing pedestrian system needs and guiding project prioritization. The prioritization process helps to focus community investment on those projects that are most effective at addressing critical needs, while deferring other projects of lesser importance. The strategies for pedestrian facilities include:

- Key pedestrian corridors to connect neighborhoods with schools, parks, activity centers, and major transit stops.
- Arterial crossing and safety enhancements.
- Fill gaps in the network where some sidewalks exist.
- Pedestrian corridors that connect to major recreational uses.
- Enforcement of laws that protect pedestrians.
- Education about pedestrian safety and available walking routes.

These strategies would be implemented by projects that address needs and deficiencies.

Key Recommendations

- **Arterial and Collector Street Improvements:** Construct walkways along key collector and arterial streets, especially when project is publicly funded:
  - Monroe St from 42nd Ave to eastern city limit
  - Stanley Ave within the city limits
  - Linwood Ave within city limits
  - 17th Ave north of downtown
  - Railroad Ave within the city limits
- **Local Street Improvements:** Walkways on local streets will be mostly constructed by new/infill development.
- **Intersection Improvements:** Construct intersection improvements to improve pedestrian safety near Hwy 224 and the Milwaukie Marketplace:
  - Oak St by the railroad tracks
  - Harrison St and Hwy 224
  - Railroad Ave and 37th Ave
- **Develop and distribute walking maps** that show routes to major destinations such as parks, schools, commercial areas, and trails.
- **Enforce against motorists** who speed and run stop signs.


Transportation System Plan
FIGURE 1-2
PEDESTRIAN MASTER PLAN
November 2013
LEGEND
Existing Sidewalks
< 5 ft width
5 ft - 15 ft width
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Proposed Improvement
Pedestrian Intersection Safety Improvement
Pedestrian Facilities
Schools
Major Roads
Streets
Railroad
County Line
Water
Parks
City Limits
Light Rail Transit
Light Rail Station
PROPOSED PROJECTS
Improve Intersection to Increase Pedestrian Safety
Freeman Way/HWY 224
37th Ave/HWY 224
Oak St/HWY 224
Monroe St/HWY 224
Harrison St/HWY 224
King Rd improvements
Olsen St/42nd Ave
Railroad Ave/37th Ave
Stanley Ave/Logus Rd
McLoughlin Blvd and 22nd Ave
All McLoughlin crossings
McLoughlin and Ochoco/Milport
Provide Pedestrian Facilities Where Not Currently Present
See Table 5-1 for project descriptions: L-AG, AI-AQ, BB, BH
Enhance Existing Pedestrian Connection
Create ped connection from Rowe Middle School to North Clackamas Park
Construct pedestrian underpass under HWY 99E at Kellogg Creek
Complete Springwater Trail along Ochoco St
Construct bike-ped overpass over Kellogg Creek
Construct Kronberg Park Trail
Pave connection to Springwater Trail at 29th Ave and Sherrett
Improve connection from Springwater Corridor to Pendleton Site
Construct stairs to connect Springwater Corridor to LRT Station
Establish bike-ped connection across Railroad Ave and tracks
Establish bike-ped connection over railroad tracks and LRT
Construct stairs from Springwater Corridor to McLoughlin Blvd
Construct bike-ped bridge over Johnson Creek along Clatsop St at 23rd Ave to connect to LRT station
Improve bike-ped connection to neighborhoods west of station
Establish bike-ped connection over McLoughlin at River Rd
Establish bike-ped connection to McLoughlin at Bluff St
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet

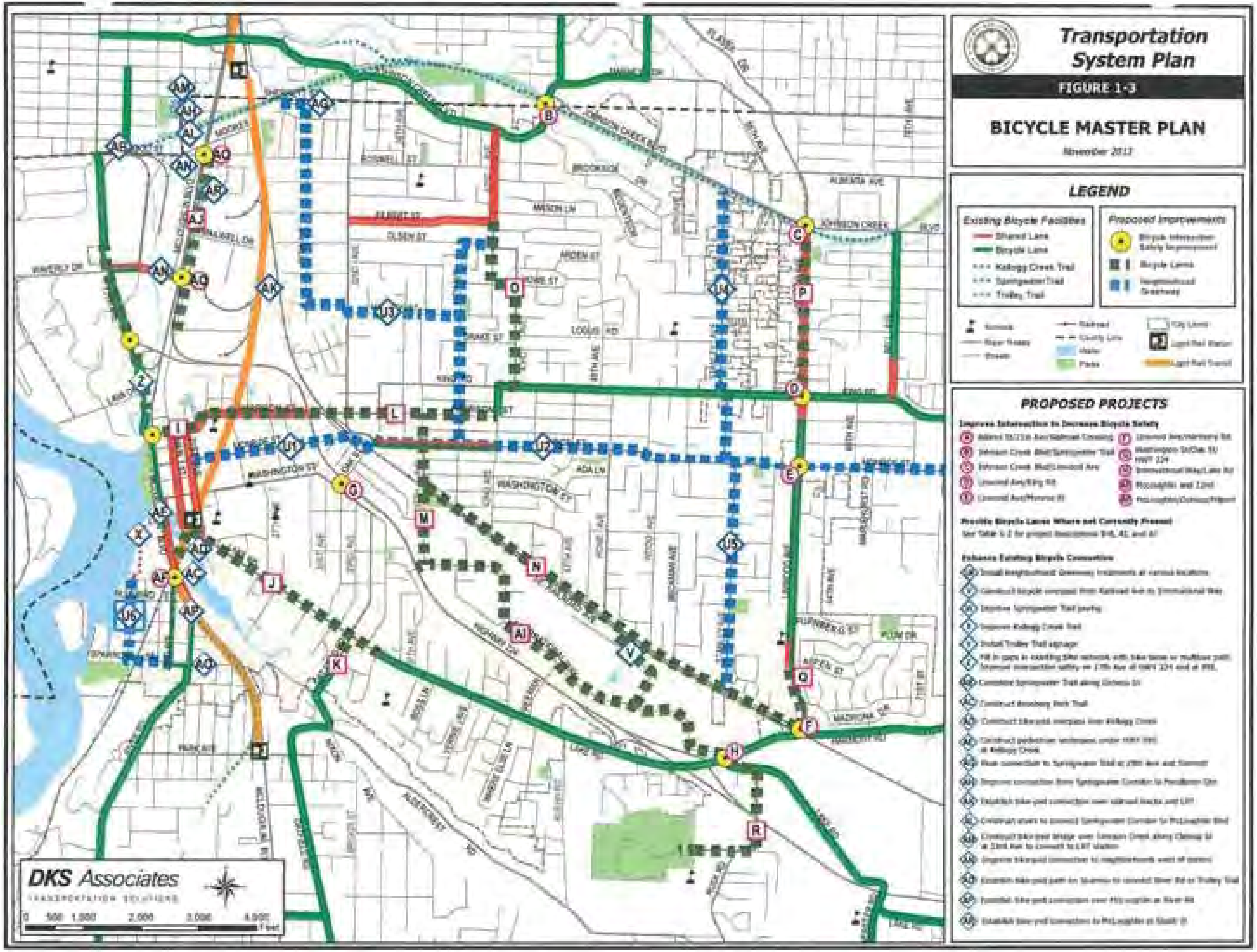
BICYCLE FACILITIES

The bicycle is a human-powered vehicle that allows people of all ages to move independently, at relatively low cost and with little impact to the environment. Bicycling promotes the well-being of people who live and work in Milwaukie, with the added benefit of reducing auto traffic on city streets.

Milwaukie's existing bicycle system is deficient in three primary ways: lack of connectivity, difficult crossings, and insufficient street designations. Recommended improvements should be aimed at closing the gaps in the bicycle network, improve crossing safety, maintaining the existing system, improving signage, and educating bicyclists and motorists.

Key Recommendations

- **Neighborhood Greenway Improvements:** Prioritize "neighborhood greenways" (also sometimes referred to as "bike boulevards") as a method for providing safe bikeway connections to other transportation modes and between parks, schools, activity centers, and regional destinations. Establish neighborhood greenways along the following routes:
  - Monroe St from downtown to Linwood Ave
  - Stanley Ave from Railroad Ave to Springwater Trail
  - 29th Ave from Springwater Trail to Monroe St (via Harvey St and 40th Ave)
  - 19th Ave and Sparrow St to Trolley Trail
- **Bikeway Improvements:** Improve existing bikeways by paving, striping, adding signage, establishing bike lanes where appropriate, etc.
- **Intersection Improvements:** Make key intersections safer and more functional for bicyclists with treatments such as improved striping, accessible signal buttons, and bicycle detection devices.
- **Education:** Improve education for bicyclists and drivers and encourage bicycling through planned bicycling events.
- **Maintenance:** Keep bike lanes clear of debris.
- **Coordination with Other Jurisdictions:**
  - Work with other jurisdictions on long-range projects such as route connectivity and trail system planning and construction.
  - Improve response on day-to-day issues such as sweeping out bike lanes and enforcing traffic and parking laws.


Transportation System Plan
FIGURE 1-3
BICYCLE MASTER PLAN
November 2013
LEGEND
Existing Bicycle Facilities
Shared Lane
Bicycle Lane
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Proposed Improvements
Bicycle Intersection Safety Improvement
Bicycle Lanes
Neighborhood Greenway
Light Rail Station
Light Rail Transit
PROPOSED PROJECTS
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet
WASHINGTON ST
MONROE ST
KING RD
JOHNSON CREEK BLVD
HARRISON ST
LAKE RD
WAVERLY DR
BROOKSIDE DR
ALBERTA AVE
OLSEN ST
ARDEN ST
LOGUS RD
ADA LN
MADRONA DR
ASPEN ST
PLUM DR

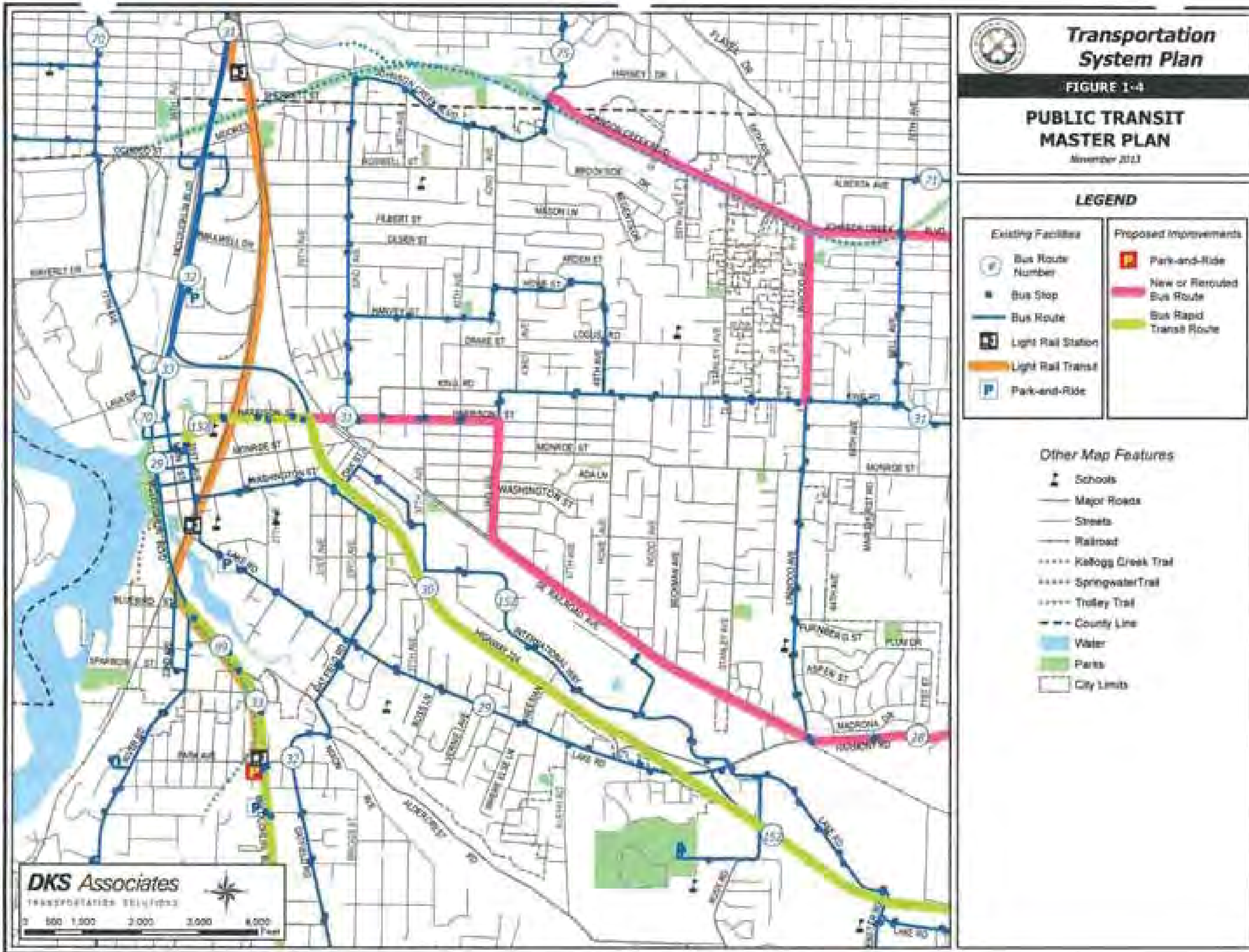
PUBLIC TRANSIT FACILITIES

The availability, convenience, and desirability of public transit are key aspects of a system that must support the movement of people to, from and through Milwaukie. Transit trips reduce single-occupant vehicle trips (which reduces traffic and energy consumption), serves community members who cannot drive (including the elderly, disabled, and youth), and minimizes transportation system impacts to the environment, such as vehicle emissions and soil and water pollution from impervious surface runoff.

Though transit service in Milwaukie needs to be improved in many ways, its greatest deficiencies are in the areas of service levels, safety, and convenience of service. There is a disparity between the City's goals for transit service and use, and the system's ability to meet those goals today. To close this gap, the City and TriMet should simultaneously pursue three types of improvements: service enhancements, capital improvements, and policy improvements.

Key Recommendations

- **Service Enhancements:**
  - Add a bus route on Railroad Ave (extending to Clackamas Town Center via Harmony Rd)
  - Add a bus route on Johnson Creek Blvd
  - Reduce headways to less than 30 minutes on all routes.
  - Enhance service on north-south routes.
  - Improve reliability of all routes.
- **Capital Improvements:**
  - Install shelters at bus stops that meet TriMet criteria.
  - Improve downtown bus stops and shelters, and include ample bike parking.
  - Construct a new bus layover facility at the Southgate park-and-ride.
- **Policy Recommendations:**
  - Eliminate the layover function of the downtown transit center.
  - Expand transit service. Provide service in "transit disadvantaged" areas. Fund local service enhancements through savings made from transit capacity improvements.
  - Provide appropriately located and sized park-and-ride facilities. Provide park-and-rides on Milwaukie's fringe for commuters and park-and-rides inside Milwaukie for Milwaukie residents.
  - Improve transit safety.
  - Reinvest transit "savings" within Milwaukie. Any savings derived from new capacity should be contained and reinvested within the Milwaukie service area.



Transportation System Plan

FIGURE 1-4

PUBLIC TRANSIT MASTER PLAN

November 2013

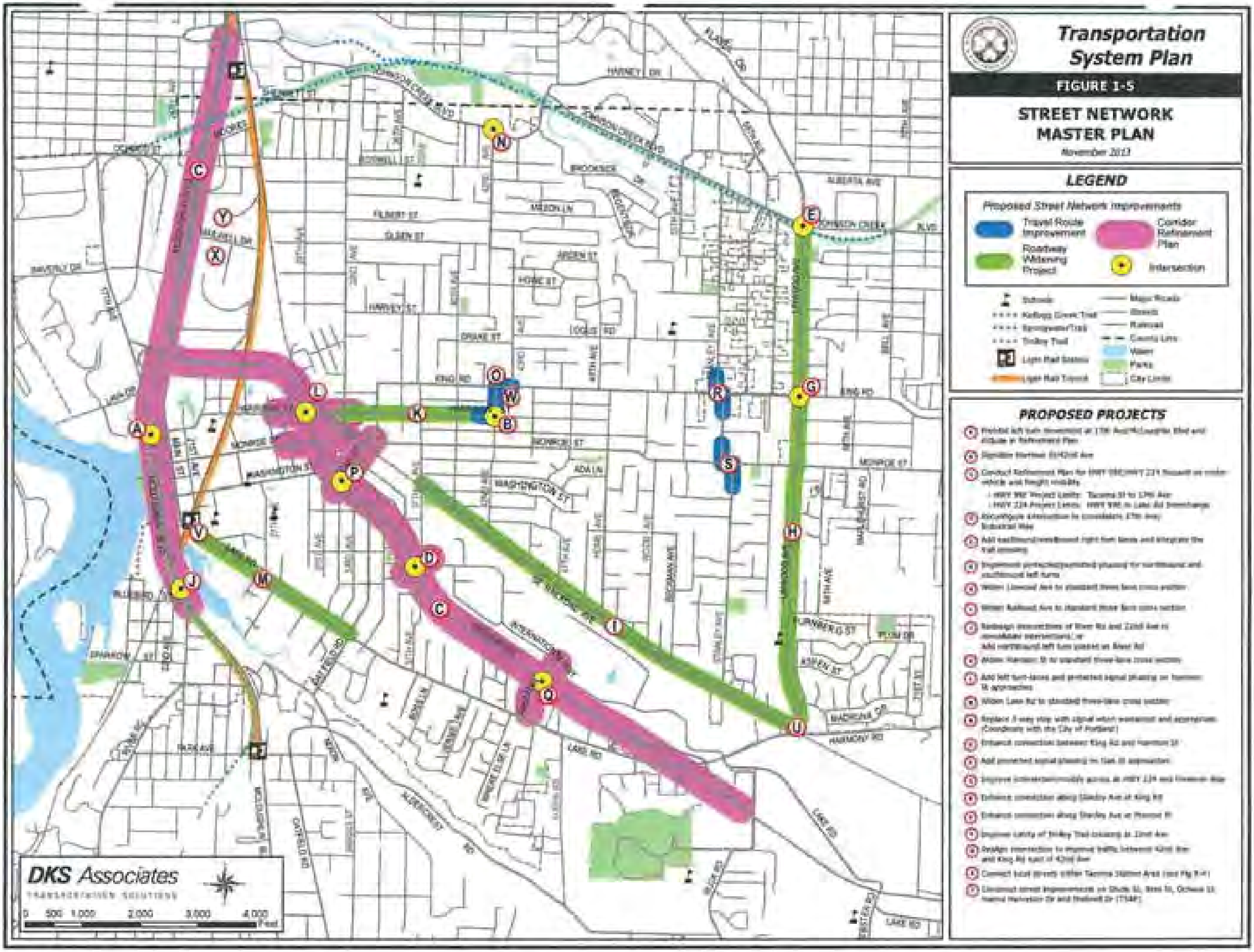
MOTOR VEHICLE FACILITIES

The Street Network element of the TSP focuses on maintaining motor vehicle traffic flow and mobility on arterial and collector roadways, protecting residential neighborhoods from excessive through traffic and travel speeds, providing reasonable access to and from residential areas, improving safety, and promoting efficient through-street movement.

Limited connectivity between Milwaukie neighborhoods often forces motorists to travel out of direction and increases traffic volumes and miles traveled on the few connecting streets. Regional and local traffic volumes are projected to increase on many city streets and cause many intersections to operate below jurisdictional standards.

Key Recommendations

- **Use Transportation System Management** to get the most out of the existing system.
- **Improve substandard streets and intersections** to accommodate traffic and improve safety.
- **Enhance neighborhood character and livability** through well-designed street improvements.
- **Leverage Street Surface Maintenance projects** to bring roads up to standards when possible.
- **Initiate a Hwy 99E/Hwy 224 Refinement Plan** with ODOT to define the future conditions of this corridor. Assumptions to include:
  - Primary crosstown connection is Harrison St.
  - Improve freight access to North Industrial area
  - Multiple grade-separated connections between Harrison St and Freeman Way.
  - Reduce the visual and physical "barrier" effect of the highway for nonmotorized modes of travel.
- **Implement capacity improvement projects on key corridors** as needed.
  - Harrison St/Main St
  - Harrison St/42nd Ave/King Rd
  - Johnson Creek Blvd/Linwood Ave
  - King Rd/Linwood Ave
  - Monroe St



Transportation System Plan
FIGURE 1-5
STREET NETWORK MASTER PLAN
November 2013
LEGEND
Proposed Street Network Improvements
Travel Route Improvement
Corridor Refinement Plan
Roadway Widening Project
Intersection
Schools
Major Roads
Streets
Railroad
County Line
Light Rail Station
Light Rail Transit
Water
Parks
City Limits
PROPOSED PROJECTS
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000
Feet
KING RD
MONROE ST
WASHINGTON ST
JOHNSON CREEK BLVD
HARMONY RD
LAKE RD
HARVEY ST
DRAKE ST
LOGUS RD
ARDEN ST
HOME ST
FILBERT ST
OLSEN ST
BOSWELL ST
BROOKSIDE DR
MEADOW LN
ALBERTA AVE
FLAVEL DR
MADRONA DR
FURNBERG ST
ASPEN ST
ADA LN
SPARROW ST
BLUEBIRD
PARK AVE

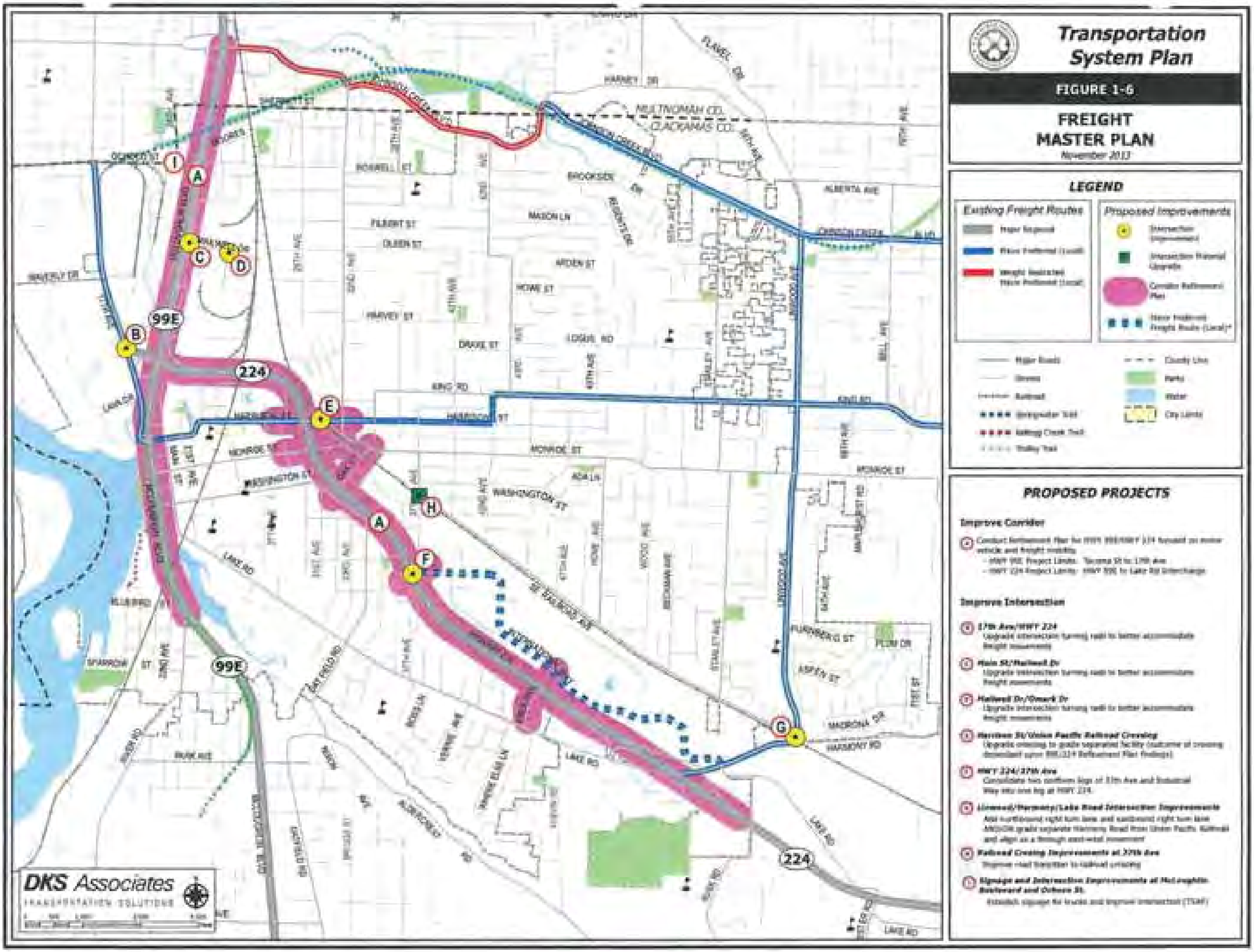
FREIGHT PLAN

A quality local freight network facilitates movement of bulk goods and materials, and is essential to the economic health of the city. While all cities have some need for local delivery of goods to retailers and similar activities, in Milwaukie a majority of employment is in the heavy manufacturing, warehousing, and distribution sectors, which are dependent on efficient movements of large quantities of both raw materials and finished products. A well-functioning and reliable system for the movement of freight into and out of the city contributes significantly to the City's ability to attract and retain industrial investment—and the jobs and tax proceeds that come with that investment.

The city's freight network faces a few specific challenges. Access to the North Industrial area from McLoughlin Blvd is limited due to turn restrictions at Milport Rd and Ochoco St. Most rail crossings exhibit deterioration due to wear and tear and frequent train crossings, resulting in increased delay for the general public and freight haulers. The number of routes available to trucks is limited by weight limitations on certain freight routes and narrow intersections.

Key Recommendations

- **North Industrial Access:** Improve access to the area, potentially with an overpass of Hwy 99E at Ochoco St. This and other solutions should be evaluated through a Hwy 99E/224 Refinement Plan (described in the previous section).
- **Rail Crossings:** Improve the quality of the materials at at-grade crossings and pursue the grade separation of key crossings.
- **Street Reclassification:** Designate International Way as a freight route.



Transportation System Plan
FIGURE 1-6
FREIGHT MASTER PLAN
November 2013
LEGEND
Existing Freight Routes
Proposed Improvements
County Line
Parks
Water
City Limits
PROPOSED PROJECTS
Improve Corridor
Improve Intersection
17th Ave/HWY 224
Main St/Hallwell Dr
Hallwell Dr/Omark Dr
HWY 224/37th Ave
DKS Associates
TRANSPORTATION SOLUTIONS
99E
224
MULTNOMAH CO.
CLACKAMAS CO.
HARNEY DR
FLAVEL DR
BROOKSIDE DR
ALBERTA AVE
MASON LN
FILBERT ST
QUEEN ST
ARDEN ST
HOWE ST
HARVEY ST
DRAKE ST
LOGUS RD
KING RD
HARRISON ST
MONROE ST
WASHINGTON ST
SE RAILROAD AVE
LAKE RD
HARMONY RD
MADRONA DR
BOWMAN ST
WAVERLY DR
LAVA DR
BLUEBIRD ST
SPARROW ST
RISK AVE

STREET DESIGN

A street's design determines how it will look and function. How a street looks and functions ultimately depends upon which elements are included, their dimensions, and how they relate to each other. Well-designed streets can contribute to the identity and character of a neighborhood and increase property values. They can also speed or slow traffic, reduce environmental impacts, and allow for safe multimodal use.

Problems

Milwaukie is a developed city with a largely incomplete street network. Though the community supports the completion of its streets through construction of safe pedestrian and bicycle facilities, most neighborhoods also want to maintain neighborhood character by saving existing trees and maintaining the slower traffic speeds that often accompany substandard roads. The City's current design standards limit the City's ability to sensitively improve existing streets by only allowing a few street design options. Allowing for more flexibility when determining the design of a street would allow for the City to respond to the character of the surrounding natural and built environments.

Possible Solutions

The City should update its standards and policies to allow for implementation of context-sensitive street design. The use of innovative designs, such as green streets, skinny streets, and flexible pedestrian designs are some examples of street design options that the City could incorporate into its street design standards.

Key Recommendations

- **Standards:** Develop a baseline cross section for each street functional classification and a street design prioritization approach for when the baseline design elements do not fit.
- **Flexibility:** Build more flexibility into street design standards to:
  - Allow for local design preferences.
  - Increase bicycle and pedestrian safety.
  - Avoid costly and time-consuming variance process requirements.
- **Alternative Designs:** Develop street design standards for green streets, skinny streets, and alternative pedestrian facilities.
- **Balance:** Balance the larger community's needs, local design preferences, and best practices when developing street design standards.
- **Landscaping:** Provide for landscaping (including street trees) wherever feasible.
- **Maintenance:** Consider maintenance costs and issues when developing design standards and design alternatives.

NEIGHBORHOOD TRAFFIC MANAGEMENT

The City recognizes that the vitality and feel of a neighborhood can be greatly influenced by the speed and volume of traffic traveling to and through it. Neighborhood traffic management is a way for the City and its citizens to create a dialogue about traffic concerns on a neighborhood level.

Problems

Milwaukie consists mostly of residential neighborhoods, and has a relatively small population compared to the surrounding Portland metropolitan area. Because of its proximity to the city of Portland, its many employment opportunities, and the two major regional routes that traverse the city (McLoughlin Blvd and Hwy 224), cut-through traffic is an ongoing concern for Milwaukie residents. As traffic volumes increase and congestion occurs on regional routes and major streets, there is potential for traffic to spill over onto neighborhood routes and local streets in search of less congested or more direct routes. Neighborhood traffic management is a means to address the negative impacts of unchecked speed and volume on neighborhood and local streets.

Possible Solutions

There are many different options available in the neighborhood traffic management 'tool box,' but not all of these options are appropriate for all streets. Traffic management options need to be based on the functional classification of the road, surrounding land uses, the design of the street, as well as input from emergency services and residents. Effective use of neighborhood traffic management in Milwaukie can address community needs and concerns, including, but not limited to, the following:

- Speeding
- Cut-through traffic
- Pedestrian safety
- Student safety around school zones

Key Recommendations

- **Funding:** It is recommended that the City annually fund the Walk Safely Milwaukie Program so that prioritized needs are implemented over time. The Neighborhood Traffic Management Action Plan (see Table 11-2) does not identify specific projects, but it does show the level of funding the City aspires to commit to the Walk Safely Milwaukie Program for the duration of this plan. With regard to this funding, it is recommended that the City develop a process that ensures neighborhood traffic management funding is equitably distributed throughout the city.
- **Investment:** Allocate a certain amount of money per year to install selected neighborhood traffic management projects. The number of projects would be limited but coordinated with citizen involvement. Encourage implementation of neighborhood traffic management projects by private development.
- **Variety:** Allow for a wide variety of traffic management measures.
- **Effectiveness:** Ensure that the chosen measure addresses the identified problem.
- **Neighborhood Input:** Involve affected neighborhoods when designing neighborhood traffic management measures.
- **Landscaping:** Neighborhood traffic management solutions need to provide for landscaping wherever feasible.
- **Maintenance:** Consider maintenance needs and issues (including landscaping) when designing traffic management measures and ensure that the long-term maintenance needs can be met.

DOWNTOWN PARKING

Properly managed downtown parking is vital for implementing and maintaining the City's 2001 *Downtown and Riverfront Land Use Framework Plan*. This plan envisions a lively downtown area with a clear sense of place and identity, comprised of an attractive mix of uses and amenities. The city's downtown area will grow as an important employment center and therefore parking must be built and managed to serve the retail core as downtown transitions to a multimodal environment.

Problems

Currently, downtown Milwaukie is vulnerable to serving as an impromptu park-and-ride for people traveling to downtown Portland. Downtown residents and employees are parking in spaces that should serve visitors, which causes parking to spill over into neighborhoods. The parking lots that are available, and some downtown streets, are not well lit and do not feel safe. Downtown employees are often not aware of their parking and transportation options and the current parking permit system does not work as well as it could. As the downtown area evolves, the existing parking lots will be developed and other parking options will need to be considered.

Possible Solutions

There are two viable solutions Milwaukie can use to improve the downtown parking situation: parking management and parking supply. Parking must be managed to assure that priority land uses are supported with an effective and efficient system of access that caters to the needs of priority users. The City and the private sector can also invest in new parking supply to support downtown development.

Key Recommendations

- **Manage parking to support downtown revitalization**, according to the vision in the Downtown and Riverfront Plan. Manage on-street parking to serve adjacent ground-floor uses.
- **Keep an updated parking inventory** and conduct periodic parking use studies to understand how parking areas are used.
- **When parking areas are over 85% full**, adjust parking management practices to make the best use of available parking (adjust parking zones, increase prices, install parking meters, etc.).
- **Require the private sector to identify sufficient parking** for residential and commercial uses, but do not ask developers to "over-build" parking. Encourage shared parking arrangements.
- **Provide public off-street parking for downtown employees** as funds and property availability allows. First priority will be given to buildings and businesses existing in 2007.
- **Work with property and business owners** to decrease employees' need for auto parking as downtown transitions to a multimodal environment.
- **Develop a plan to locate a public parking structure** to support downtown, but only in collaboration with the downtown business community and only after a viable funding strategy is identified.

OVERVIEW

Transportation goals and policies form the basis for how the local transportation system will be developed and maintained over the next 22 years. The City's transportation goals support a multimodal approach to transportation planning and reflect how citizens think about and experience Milwaukie's transportation system.

The policy framework of this plan is organized as follows:

- **Goal Statement:** A statement that describes an ideal condition that the City desires to attain over time for various aspects of the transportation system. For example: Provide access to safe, affordable, and reliable transportation choices for all Milwaukie residents and businesses.
- **Policy Statements:** Statements that are intended to outline specific measures that will be taken to achieve a goal.

The following section lists the goals and policies for the Milwaukie Transportation System Plan (TSP). They are not listed in order of importance or priority, but rather are all aspects that need to be considered when developing, funding, and managing the transportation system.

GOAL 1 LIVABILITY

Design and construct transportation facilities in a manner that enhances the livability of Milwaukie's community.

Policies

a. Provide convenient walking and bicycling facilities to promote the health and physical well being of Milwaukie citizens.

b. Protect residential neighborhoods from excessive through traffic and travel speeds while providing reasonable access to and from residential areas.

c. Protect residential neighborhoods from excessive noise and pollutants associated with higher functional class streets, industrial uses, and rail activities.

d. Minimize the "barrier" effect of large transportation facilities on nonmotorized modes of travel.

e. Construct a transportation system that is accessible to all members of the community.

f. Provide a seamless and coordinated transportation system that is barrier-free, provides affordable and equitable access to travel choices, and serves the needs of all people and businesses, including citizens of low income, people with disabilities, children, and seniors.

GOAL 2 SAFETY

Develop and maintain a safe and secure transportation system.

Policies

a. Design and maintain safe and secure walkways and bikeways between parks, schools, and other activity centers in Milwaukie.

b. Design and construct transportation-related improvements to meet City standards as outlined in the City's Transportation Design Manual and the Americans with Disabilities Act (ADA).

c. Adopt and implement access control and spacing standards for all streets under the City's jurisdiction to improve safety and promote efficient through-street movement. Access control measures should be generally consistent with Clackamas County access guidelines to ensure consistency on City and County roads.

d. Improve riders' sense of safety at transit stops through lighting, design, and enforcement.

GOAL 3 TRAVEL CHOICES

Plan, develop, and maintain a transportation system that provides travel choices and allows people to reduce the number of trips made by single-occupant vehicles.

Policies

a. Provide a citywide network of convenient walkways and bikeways that are integrated with other transportation modes and regional destinations.

b. Collaborate with TriMet and other transit providers to provide convenient and accessible public transit service to all Milwaukie neighborhoods.

c. Support travel options that allow individuals to reduce single-occupant vehicle trips.

d. Establish local non-single-occupancy-vehicle (non-SOV) modal targets, subject to new data and methodology made available to local governments, for all relevant design types identified in the Regional Transportation Plan. Targets must meet or exceed the regional modal targets for 2040 Growth Concept land use design types as illustrated in Table 2-1.

Table 2-1 2040 Regional Metro Targets for Non-Single-Occupant Vehicles (non-SOVs)

2040 Design Type	Modal Target
Regional centers, town centers, main streets, station communities, corridors, passenger intermodal facilities	45% to 55%
Industrial areas, freight intermodal facilities, employment areas, inner neighborhoods, outer neighborhoods	40% to 45 %

e. Encourage local employment and commercial job creation in order to reduce the number of locally generated regional work and shopping trips.

f. Ensure bike and bus routes are well separated, marked, mapped, and marketed.

g. Ensure that savings derived from adding capacity (LRT or other) is reinvested in local service enhancements for Milwaukie.

GOAL 4 QUALITY DESIGN

Establish and maintain a set of transportation design and development regulations that are sensitive to local conditions.

Policies

a. Design streets to support their intended users.

b. Integrate bicycle and pedestrian facilities into street planning, design, construction, and maintenance activities.

c. Require developers to include pedestrian-, bicycle-, and transit-supportive improvements within proposed developments and adjacent rights-of-way in accordance with adopted policies and standards.

d. Promote context-sensitive transportation facility design, which fits the physical context, responds to environmental resources, and maintains safety and mobility.

e. Consider maintenance costs and issues when developing and implementing design standards.

f. Promote landscaping and pervious surfaces wherever practical and feasible.

GOAL 5 RELIABILITY AND MOBILITY

Develop and maintain a well-connected transportation system that reduces travel distance, improves reliability, and manages congestion.

Policies

a. Enhance street system connectivity wherever practical and feasible. In particular, improve east-west connectivity across the community, especially to connect the eastern neighborhoods across Hwy 224 to downtown.

b. Maintain traffic flow and mobility on arterial and collector roadways.

GOAL 6 SUSTAINABILITY

Provide a sustainable transportation system that meets the needs of present and future generations.

Policies

a. Encourage an energy efficient transportation system.

b. Increase the use of walking and bicycling for all travel purposes.

c. Improve and enhance the livability of Milwaukie by decreasing reliance on automobile transportation and increasing the use of other modes to minimize transportation system impacts on the environment.

d. Practice stewardship of air, water, land, wildlife, and botanical resources. Take into account the natural environments in the planning, design, construction, and maintenance of the transportation system.

GOAL 7 EFFICIENT AND INNOVATIVE FUNDING

Efficiently allocate available funding for recommended transportation improvements, and pursue additional transportation funding that includes innovative funding methods and sources.

Policies

a. Plan for an economically viable and cost-effective transportation system.

b. Identify and develop diverse and stable funding sources to implement recommended projects in a timely fashion.

c. Prioritize maintenance of the transportation system.

d. Identify local street improvement projects that can be funded by the State of Oregon to improve the performance of the State highway system.

e. Provide funding for local match share of jointly funded capital projects with other public partners.

f. Prioritize funding of projects that are most effective at meeting the goals and policies of the TSP.

GOAL 8 COMPATIBILITY

Develop a transportation system that is consistent with the City's Comprehensive Plan and coordinates with County, State, and regional plans.

a. Coordinate and cooperate with adjacent jurisdictions and other transportation agencies to develop transportation projects that benefit the city of Milwaukie and the region as a whole.

b. Work collaboratively with other jurisdictions and agencies so the transportation system can function as one.

c. Coordinate with other jurisdictions and community organizations to develop and distribute transportation-related information.

d. Review City transportation standards periodically to ensure consistency with regional, State, and federal standards.

e. Coordinate with TriMet, the Milwaukie Center, and adjacent jurisdictions to identify existing and future transit-related needs, including placement of park-and-ride facilities.

f. With ODOT's assistance, coordinate with railroad companies to provide a viable commercial railroad system in and through Milwaukie.

g. Coordinate with ODOT to address improvements to State highways within Milwaukie to benefit all modes of transportation.

GOAL 9 ECONOMIC VITALITY

Promote the development of Milwaukie's, the region's, and the state's economies through the efficient movement of people, goods, and services, and the distribution of information.

Policies

a. Ensure a safe and efficient freight system that facilitates the movement of goods to, from, and through Milwaukie, the region, and the state while minimizing conflicts with other travel modes.

b. Consider constructing grade separation or gate control for all railroad crossings.

c. Provide transportation facilities that support land uses that are consistent with the Comprehensive Plan.

d. Evaluate land development projects to determine possible adverse traffic impacts.

e. Ensure that all new development contributes a fair share toward on-site and off-site transportation system improvements.

f. Manage parking in downtown to support revitalization, according to the vision in the *Milwaukie Downtown and Riverfront Plan*. The purpose of, and priority for, on-street parking in downtown is to support the vitality of the retail core.

3 Existing Conditions

The main objective of Milwaukie's Transportation System Plan (TSP) is to inventory, evaluate, and plan for all modes of travel. The purpose of this chapter is to document the existing transportation facilities in the TSP study area, and provide a basis of knowledge and benchmarks for assessing the physical and operational needs of the system.

OVERVIEW

Existing transportation conditions in Milwaukie were evaluated in late 2006. The existing traffic and transportation conditions for the following modes of travel and items that affect the transportation environment were inventoried and analyzed:

- Pedestrians
- Bicycles
- Public Transit
- Motor Vehicle
- Rail
- Parking
- Environmental Justice
- Environmental Resources

This list of areas covered includes two topics not previously included in the 1997 TSP: environmental justice and environmental resources. Environmental justice with respect to transportation is aimed at identifying underserved and vulnerable populations to help increase outreach efforts to adequately serve those areas within the city. The environmental resources evaluation within this document helps to identify and map environmentally sensitive areas with respect to flood plains, fish and wildlife habitat, wetlands, vegetation, and local historical resources.

The city of Milwaukie is located within Clackamas County just south of the city of Portland. Figure 3-1a shows the location of Milwaukie with respect to the Portland metropolitan region. The study area for this analysis is defined as approximately 1/4 mile beyond the city of Milwaukie boundary limits and includes twenty-two intersections that were selected to address major roadways and areas of concern. Figure 3-1b shows this study area and the study area intersections.

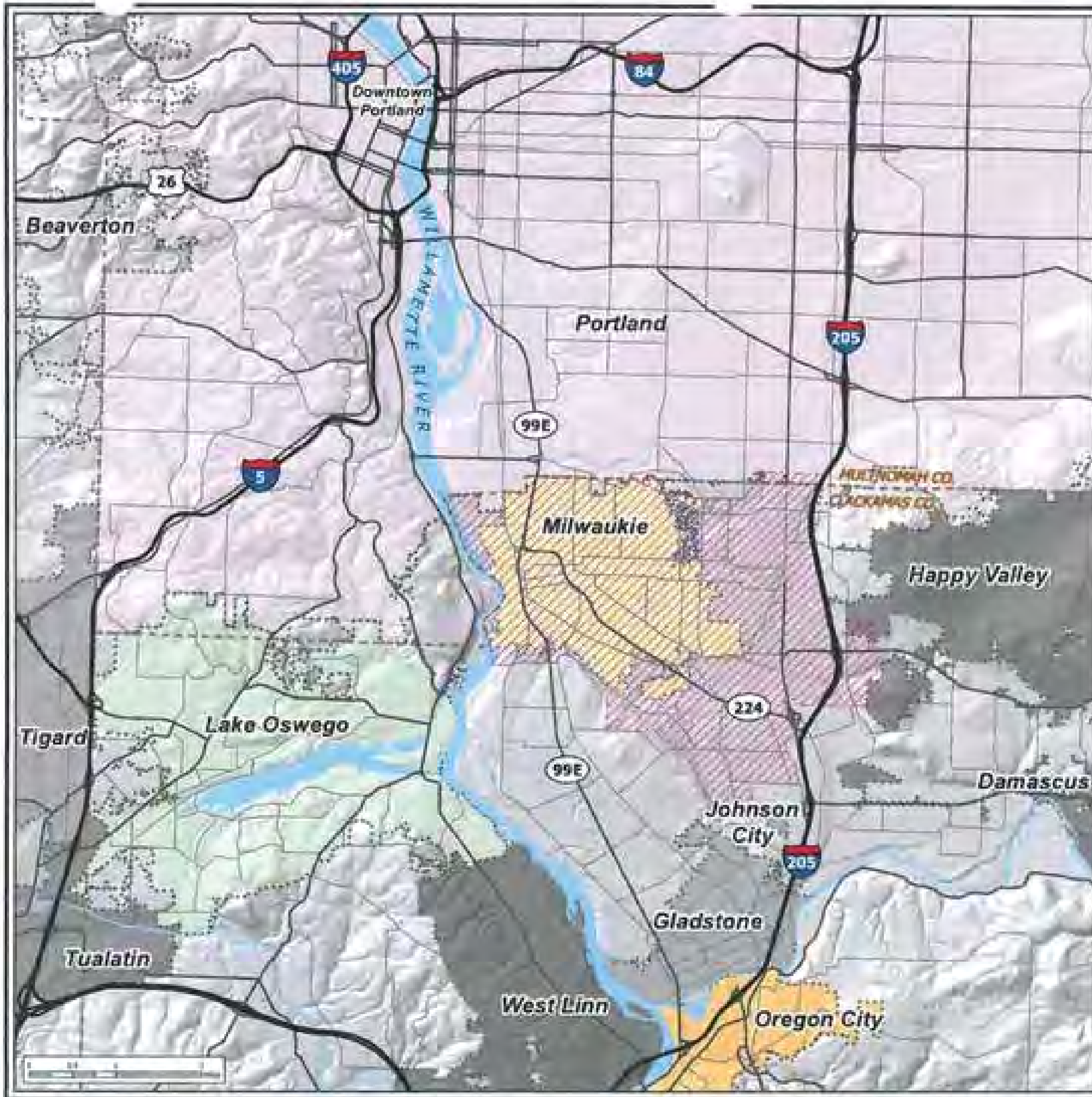
The following sections describe the City's existing transportation facilities and their usage and performance.

Transportation System Plan

FIGURE 3-1a

STUDY AREA CONTEXT

November 2013



LEGEND

- Milwaukie City Limits
- Urban Growth Management Agreement (UGMA) area
- Freeways
- Major Arterials
- Arterials
- County Line
- Water
- City Limits

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TRANSPORTATION SOLUTIONS

Transportation System Plan

FIGURE 3-1b

STUDY AREA

November 2013

LEGEND

- Study Intersections
- Major Highways
- Major Roads
- Streets
- Kellogg Creek Trail
- SpringwaterTrail
- Trolley Trail
- Light Rail Station
- Light Rail Transit
- Railroad
- Schools
- County Line
- Town Center
- Water
- Parks
- City Limits

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TRANSPORTATION SOLUTIONS

0 500 1,000 2,000 3,000 4,000 Feet

PEDESTRIANS

The Metro Regional Transportation Plan (RTP) identifies downtown Milwaukie as a Town Center; a local activity area that provides a range of local retail and service opportunities within close proximity to each other. Milwaukie's downtown is characterized by a variety of small specialty retail shops, storefront businesses, and a historic street grid network. There are three parks within downtown and five schools within the Town Center boundary. These features are important hubs of pedestrian activity.

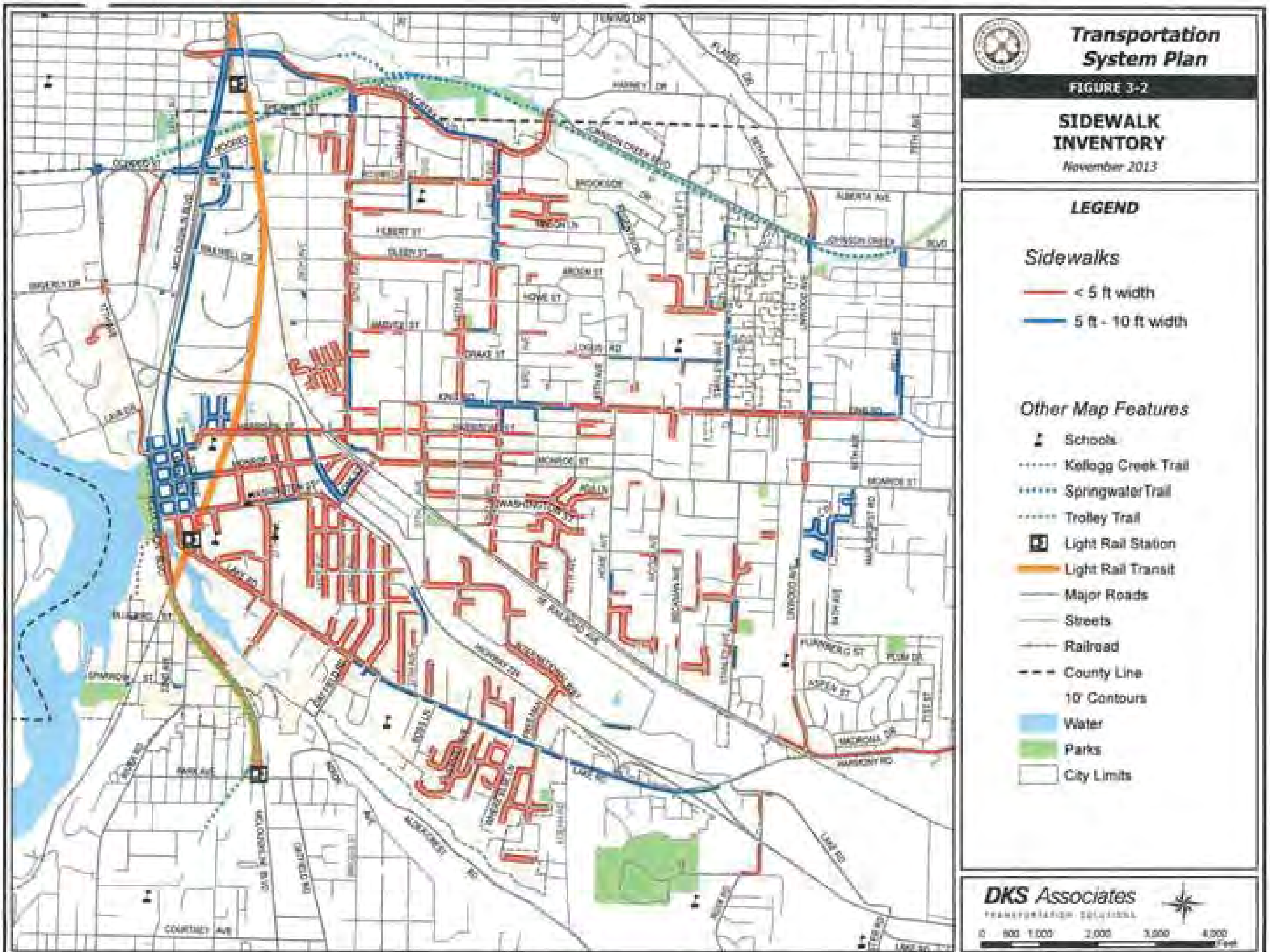
Existing Pedestrian Facilities

All of the sidewalks and trails within Milwaukie are displayed in Figure 3-2. Many sections of the City's arterial and collector streets, identified as Major Roads on Figure 3-2, have sidewalks on at least one side of the street. A typical sidewalk configuration is a "curb tight" design, where the sidewalk is constructed adjacent to the curb.

In general, neighborhoods to the northeast of Hwy 224 lack adequate pedestrian facilities. For example many older residential areas in this part of the city have no sidewalks whatsoever whereas most of the streets in downtown and residential areas to the southwest of Hwy 224 have sidewalks on both sides. This patchwork of sidewalks is well illustrated in Figure 3-2, which shows the existing sidewalks and areas lacking.

Based on a visual inspection, many of the sidewalks in Milwaukie are in good to excellent condition, with no major cracking or heaving. Examples of sidewalks in very good or excellent condition are 37th Ave near Milwaukie Marketplace and along McLoughlin Blvd near downtown. Almost all sidewalks are located in the public right-of-way, yet in Milwaukie it is the responsibility of the adjacent property owner to repair sidewalks in poor condition.

Sidewalks are rarely free of obstructions, and Milwaukie sidewalks are no exception. In addition to the occasional utility pole, many Milwaukie residents share their sidewalks with mailboxes. This is more of a concern where older, narrower sidewalks exist; for instance, the western portion of Lake Rd, where the sidewalk is narrow and made of asphalt.



Transportation System Plan
FIGURE 3-2
SIDEWALK INVENTORY
November 2013
LEGEND
Sidewalks
< 5 ft width
5 ft - 10 ft width
Other Map Features
Schools
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Light Rail Station
Light Rail Transit
Major Roads
Streets
Railroad
County Line
10' Contours
Water
Parks
City Limits
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet

In Milwaukie, wheelchair ramps are not provided at every intersection with sidewalks. However, since the Americans with Disabilities Act (ADA) was enacted in 1991, the City has required and installed wheelchair ramps in all sidewalk projects. Over the past few years, the City has retrofitted numerous intersections in the downtown area with wheelchair ramps. There are still a number of intersections that have partial or no ramps and need to be retrofitted.

Pedestrian crosswalks exist primarily at signalized intersections and crossings. Most of these intersections have crosswalks on all four legs, but there are a few where crosswalks are only partially provided.

The Springwater Trail, a regional multiuse path, extends east from Ochoco St, and continues along Johnson Creek Blvd to Linwood Ave, where it extends beyond the city limits to the east. East of 45th Ave, this trail serves as a pedestrian facility for Johnson Creek Blvd, as there are no sidewalks on this stretch of road. The Three Bridges Project, which constructed bridges across the Union Pacific Railroad, McLoughlin Blvd, and Johnson Creek, has extended the Springwater Trail westward to the intersection of 19th St/Ochoco St. This trail is nearly continuous and connects Portland to Milwaukie. However, there is limited access to the trail between 45th Ave and Ochoco St due to grade separation of the trail and the streets it crosses.

The Kellogg Creek Trail, a regional multiuse path, is recognized by Metro as being part of the North Clackamas Greenway. The trail is 7.5 feet wide and runs along the Willamette River from Adams St to Eagle St, connecting downtown Milwaukie with the Island Station neighborhood. This trail serves as an alternative multiuse path along McLoughlin Blvd and the riverfront.

Another trail that is partially constructed is the Trolley Trail. This multiuse trail starts in downtown Milwaukie and extends south to Gladstone. The Trolley Trail provides an aesthetically pleasing and safe connection between neighborhoods, parks, schools, retirement communities, businesses, and public transit. A segment of the trail along McLoughlin Ave between Park Ave and River Rd is closed until 2014 due to construction of the Portland-Milwaukie Light Rail (PMLR).

Pedestrian Volume

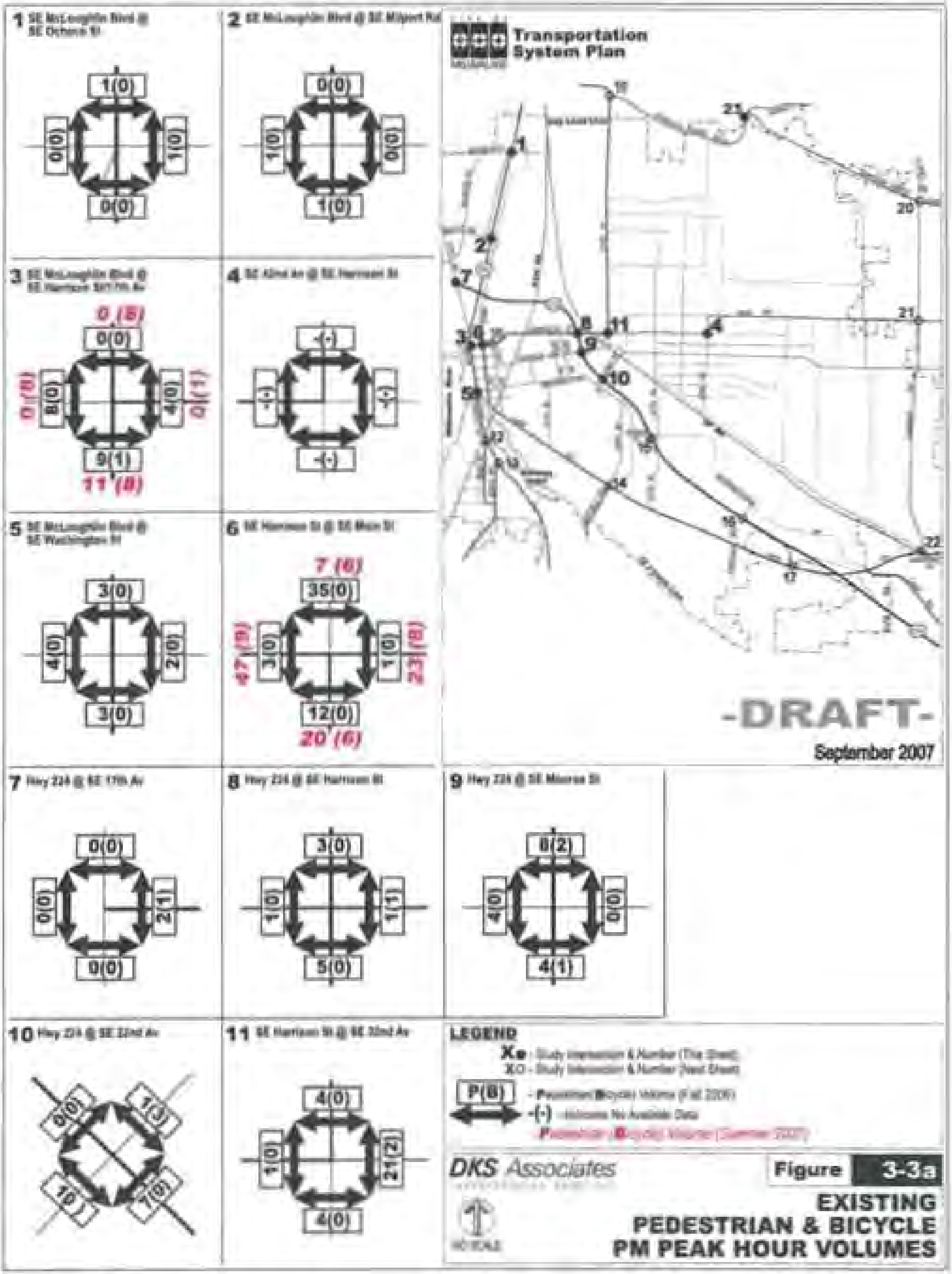
Pedestrian crossing volumes were counted at the study intersections during the summer of 2006, and are shown in Figure 3-3a and Figure 3-3b. The counts were taken during the evening peak period (4:00 to 6:00 p.m.) at the study intersections, and represent a snapshot in time of pedestrian travel.

The most significant pedestrian movements occur near retail and educational areas, including downtown Milwaukie, the intersection of Linwood Ave and King Rd, and the intersection of Johnson Creek Blvd and Linwood Ave. Along major roadways, such as McLoughlin Blvd and Hwy 224, pedestrian crossings are limited to locations with traffic signal controls, due to high motor vehicle volumes and speeds.

Summary of Pedestrian Findings

The following summarizes key pedestrian findings related to the level of activity documented as well as deficiencies for this mode of travel. These findings will be utilized to help guide future improvements to address the deficiencies for this mode of travel in the transportation network.

- The majority of study area intersections have pedestrian activity levels on individual legs of the intersections that are ten crossings or less during the p.m. peak hour. Locations with higher activity levels than this occur along the Springwater Trail and in downtown.
- There are a number of discontinuous sidewalks within Milwaukie that prohibit the ease of use for pedestrians to travel in and around the city. These occur primarily in the east and north areas of the city.
- The city contains numerous dead-end and curvilinear streets that hamper pedestrian connectivity.
- Travel between the eastern and western areas of the city is particularly problematic due to the location of Hwy 224 and the railroad line that parallels it to the north. Both of these transportation facilities act as barriers to pedestrian travel because there are few places where these facilities can be crossed. The roadway width and average vehicle speed on Hwy 224 also contribute to this barrier effect.
- The use of asphalt at the city's railroad crossings is also of concern to pedestrians because it is more prone to buckling than concrete. The city has numerous at-grade railroad crossings, and the condition at these crossings varies widely. Those crossings with uneven walking surfaces are of special concern to elderly and disabled individuals.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September 2007
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Figure 3-3a
EXISTING
PEDESTRIAN & BICYCLE
PM PEAK HOUR VOLUMES

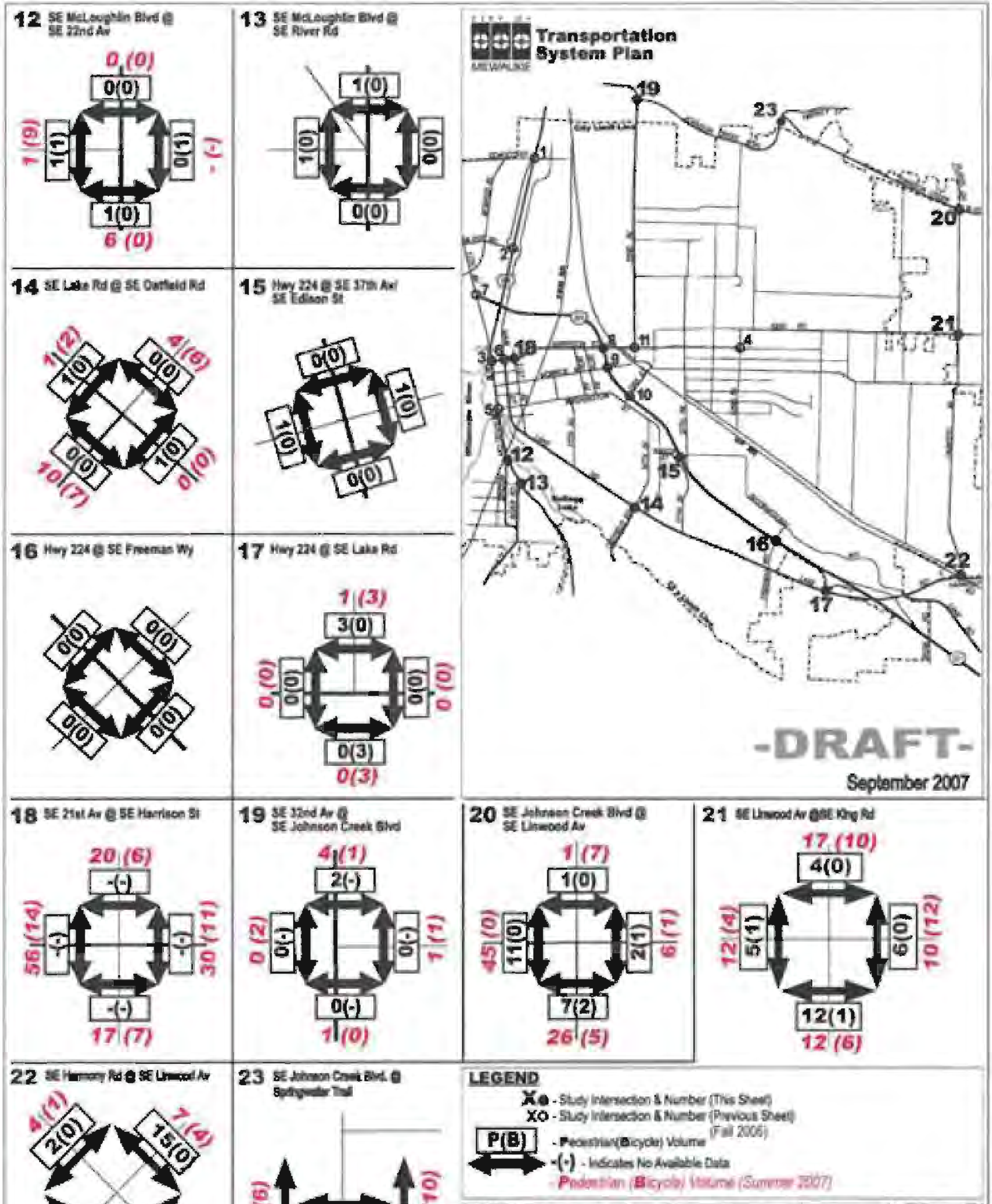

Figure 3-3b

EXISTING PEDESTRIAN & BICYCLE PM PEAK HOUR VOLUMES

BICYCLES

In general, designated bicycle facilities are limited in Milwaukie, making it difficult for bicyclists to safely and easily access activity centers and other local and regional destinations. The State Transportation Planning Rule requires cities to provide bikeways along roads classified as arterials and major collectors.[1] Figure 3-4 shows the existing designated bicycle facilities in Milwaukie.

Existing Bicycle Facilities

There are a limited number of designated bikeways and bicycle facilities in Milwaukie. A bikeway can include any road that is designed to accommodate bicycles.[2] Bikeways may have wider lanes or shoulders, and can be marked by pavement markings and signage. On-road bikeways generally exist on arterial and collector streets and can consist of a delineated bike lane or a wide shoulder (six feet or more). However, in Milwaukie, bikeways do not exist on all arterial or collector streets. Typically, north-south bikeways are discontinuous, except for Linwood Ave. In general, bikeways exist on the edges of the city lack connectivity. Metro's Regional Transportation Plan (RTP) identifies Hwy 224 and parts of McLoughlin Blvd as regional on-street bikeways, although the lack of marked bike lanes and higher traffic volumes and speeds along these corridors may discourage use by bicyclists. There are no bicycle detectors at signalized intersections or bikeway signage on the streets.

There are three off-road multiuse trails that enhance bicycle access in Milwaukie. First is the Springwater Trail, which parallels Johnson Creek Blvd in Milwaukie, and connects bicyclists to downtown Portland to the northwest and to the I-205 north-south multiuse trail to the east. Due to grade separation, there is limited access to the trail in some locations. Another off-street facility available in Milwaukie is the Kellogg Creek Trail in the downtown riverfront area, which is part of the North Clackamas Greenway. Bicyclists also have access to a portion of the Trolley Trail where construction was recently completed in downtown Milwaukie. The Trolley Trail runs along an old streetcar route that begins in Riverfront Park in downtown Milwaukie and ends in Gladstone to the south. A segment of the trail along McLoughlin Blvd between River Rd and Park Ave is closed until 2014 due to construction of PMLR.

[1] (OAR 660-012-0020) Department of Land Conservation and Development, Division 12, Transportation Planning Rule.

[2] Oregon Bicycle and Pedestrian Plan, Oregon Department of Transportation, June 14, 1995.

Transportation System Plan

FIGURE 3-4

BICYCLE FACILITY INVENTORY

November 2013

LEGEND

Bicycle Lanes

- Shared Lane
- Bicycle Lane

Trails

- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail

Other Map Features

- Schools
- Light Rail Station
- Light Rail Transit
- Major Roads
- Streets
- Railroad
- County Line
- Water
- Parks
- City Limits
- 10' Contours

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0 500 1,000 2,000 3,000 4,000 Feet

Based on a general visual survey, the surface conditions of bikeways are generally good to excellent with the exception of King Rd, where the bike and auto lanes suffer due to failing pavement conditions.

Bicycle Volume

Bicycle counts were conducted in Fall 2006 during the evening peak period (4:00 to 6:00 p.m.) at the study intersections shown in Figures 3-3a and 3-3b. At some locations, additional counts were taken in August 2007. These counts are shown in red on Figures 3-3a and 3-3b. The reported bicycle volumes are generally moderate, with the highest level of activity in the downtown area.

Summary of Bicycle Findings

The following summarizes key bicycle findings related to the level of activity documented as well as deficiencies for this mode of travel. These findings will be utilized to help guide future improvements to address the deficiencies for this mode of travel in the transportation network.

- In general, designated bikeways exist on the edges of the city and lack connectivity through the city.
- The Springwater Trail along the northern edge of the city is a valuable off-road bikeway; however, it is currently difficult to access west of 45th Ave.
- Bicyclists traveling between the eastern and western areas of the city are impeded by the location of Hwy 224 and the railroad line that parallels it to the north. Both of these transportation facilities act as barriers to bicycle travel because there are few places where these facilities can be crossed. The roadway width and average vehicle speed on Hwy 224 also contribute to this barrier effect.

PUBLIC TRANSIT

Fixed-route, dial-a-ride and paratransit services are available within Milwaukie for both local and regional trips. Two agencies, Clackamas County and the Tri-County Metropolitan District of Oregon Transit (TriMet), provide these services. TriMet provides transit service to and from Milwaukie, with fixed-route transit services including routes 28, 29, 31, 32, 33, 34, 70, 75, 99, and 152. These routes, their approximate headways, the locations of stops, shelters, the transit center, and park-and-rides are shown in Figure 3-5. This map also shows Neighborhood District Association boundaries to provide additional context for the location of existing transit facilities.

Table 3-1, below, shows each bus route's schedule, approximate headway, and main destinations.[3] Most of the bus lines serving the city operate with average headways of 30 minutes or less (three have 15 minute headways) during the peak weekday commute hours. Bus service is limited on the weekends. When in service, the bus routes listed above transport riders to several local and regional destinations, including downtown Milwaukie, Clackamas Town Center, downtown Portland, Oregon City, Clackamas Transit Center, Milwaukie Providence Hospital, Lloyd Center, Clackamas Community College, and the Milwaukie Center.

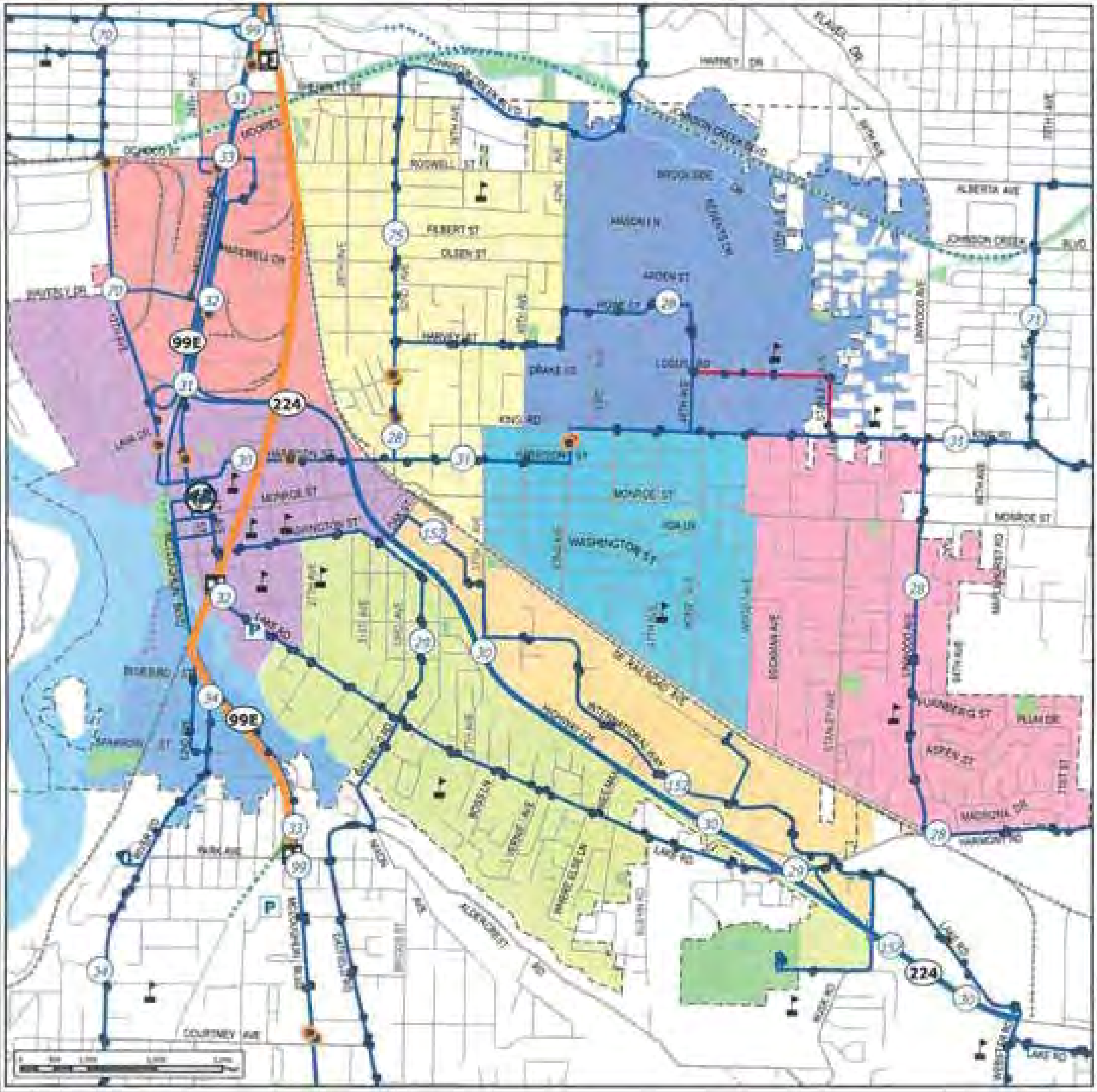
[3] A headway is the amount of time between bus arrivals.

Table 3-1 Service Route Schedules and Destinations

Existing Public Transit Service in Milwaukie					
Line # and Name	Weekday		Weekend		Destinations Served (partial list)
	Schedule	Approx. Headway (min.)	Schedule	Approx. Headway (min.)	
28 Linwood	6:00 a.m.-7:00 p.m. Peak and Off-peak	60	No Service	N/A	Milwaukie Transit Center Clackamas Town Center
29 Lake/ Webster	6:30 a.m.-8:00 p.m. Peak and Off-peak	60	No Service	N/A	Milwaukie Transit Center Clackamas Town Center
31 King Rd	6:00 a.m.-10:00 p.m. Peak Off-peak	30 60	**Sat:** 6:30 a.m.-10:00 p.m. Peak Off-peak	30 60	Milwaukie Transit Center Clack. Town Ctr. Transit Center Downtown Portland
32 Oatfield	7:00 a.m.-7:30 p.m. Peak Off-peak	30 60	**Sat:** 9:30a.m.-6:30 p.m. Peak and Off-peak	60	Milwaukie Transit Center Clackamas Comm. College Downtown Portland Oregon City Transit Center
33 McLoughlin	4:30 a.m.-2:00 a.m. Peak Off-peak	15 30	**Sat & Sun:** 5:30 a.m.-1:30 a.m. Peak Off-peak	15 30	Clackamas Comm. College Downtown Portland Oregon City Transit Center Milwaukie Transit Center
34 River Rd	5:30 a.m.-8:00 p.m. Peak and Off-peak	60	No Service	N/A	Oregon City Transit Center Milwaukie Transit Center
70 12th Ave	5:00 a.m.-11:00 p.m. Peak Off-peak	15 30	**Sat & Sun:** 8:30 a.m.-11:00 p.m. Peak Off-peak	15 60	Milwaukie Transit Center Lloyd Center Columbia River Correction Center
75 Cesar Chavez (39th Ave)/ Lombard	4:30 a.m.-1:30 a.m. Peak Off-peak	15 30	**Sat & Sun:** 5:30 a.m.-1:30 a.m. Peak Off-peak	15 30	Milwaukie Transit Center Milwaukie Providence Hospital St. Johns
99 McLoughlin Express	Peak only	20	No Service	N/A	Clackamas Comm. College Downtown Portland
152 Milwaukie Shuttle	6:30 a.m.-6:30 p.m. Peak Off-peak	30 60	No Service	N/A	Milwaukie Transit Center Clackamas Town Center Milwaukie Center

Milwaukie is divided into seven officially recognized Neighborhood District Associations (NDAs) and two business and industrial centers, each with varying levels of transit coverage. Table 3-2 summarizes the transit service and amenities available in the different neighborhoods. All of the neighborhoods in Milwaukie have access to transit, with some neighborhoods having more service than others. Research has shown that a transit rider will walk up to 1/4 mile to a transit stop.[4] Figure 3-5 illustrates existing transit facilities.

[4] Planning Commission TOD Committee, Walking Distance Research, http://www.fairfaxcounty.gov/planning/tod_docs/walking_distance_abstracts.pdf, Fairfax County, Virginia.



Transportation System Plan

FIGURE 3-5

TRANSIT ROUTES AND SHELTERS

November 2013

LEGEND

Transit Facilities

- Bus Routes < 30 Min. Frequency
- Bus Routes > 30 Min. Frequency
- Transit Center
- Stop
- Shelter
- Park-and-Ride
- Light Rail Station
- Light Rail Transit

Other Map Features

- Schools
- Kellogg Creek Trail
- SpringwaterTrail
- Trolley Trail
- Water
- Parks
- Major Roads
- Streets
- Railroad
- County Line
- City Limits

Neighborhood District Assocations

- ARDENWALD
- HECTOR CAMPBELL
- HISTORIC MILWAUKIE
- ISLAND STATION
- LAKE ROAD
- LEWELLING
- LINWOOD
- MCLOUGHLIN INDUSTRIAL
- MILWAUKIE BUSINESS INDUSTRIAL

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Table 3-2 Neighborhood Service Routes and Public Transit Amenities

Neighborhood	Transit Route #'s	Stops	Facilities
Ardenwald	31, 75, 28	39	2 Shelters
Hector Campbell	31	12	No Extra Facilities
Historic Milwaukie	29, 31, 32, 33, 34, 70, 75, 99, 28, 152	36	1 Transit Center with Shelters 1 park-and-ride
Island Station	33, 34, 99	13	No Extra Facilities
Lake Rd	29, 32	30	No Extra Facilities
Lewelling	28, 31, 75	30	No Extra Facilities
Linwood	28, 31	26	No Extra Facilities
McLoughlin Industrial	31, 32, 33, 99	17	3 Shelters
Milwaukie Business & Industrial	31, 152	22	No Extra Facilities

Milwaukie's bus transit center is located in downtown Milwaukie on the blocks surrounding City Hall. In addition to the transit center, a single shared-use park-and-ride is located along Lake Rd south of downtown. TriMet has plans to construct a second park-and-ride facility on Main St at the former Southgate Theater site. Currently there are only six shelters provided within Milwaukie. TriMet typically considers locating transit shelters at stops with 35 or more boardings per day.[5] One stop meets this minimum boarding threshold, but does not offer a shelter.[6] This stop is located near the intersection of Harrison St and 24th Ave.

Transit service quality, or its Level of Service (LOS), is measured as the headway between arriving buses. Headway is the average amount of time that a person could expect to wait to catch a bus. For instance, a transit service with a low headway (<10 min) provides a high LOS ("A"), because vehicles are arriving frequently (approximately 1 vehicle every 10 minutes). The average headways and corresponding LOS (based on the *Highway Capacity Manual* methodology[7]) for each of the routes serving Milwaukie are listed in Table 3-3.

[5] *Design Criteria*, TriMet, August 2002.
[6] Based on Fall 2006 weekday bus boarding information as provided by TriMet.
[7] *2000 Highway Capacity Manual*, Transportation Research Board, 2000, Chapter 27.

Table 3-3 TriMet Service Routes and Weekday Peak Period Level of Service

Line # and Name	Average Headway (minutes)			Level of Service (LOS) (based on headways)		
	a.m.	Midday	p.m.	a.m.	Midday	p.m.
28 Linwood	62	71	75	F	F	F
29 Lake/Webster Rd	62	71	76	F	F	F
31 King Rd	28	28	29	D	D	D
32 Oatfield	36	58	30	E	E	E
33 McLoughlin	18	20	18	C	D	C
34 River Rd	70	72	70	F	F	F
70 12th/NE 33rd Ave	18	19	17	C	C	C
75 Cesar Chavez/Lombard	14	17	13	B	C	B
99 McLoughlin Express	26	*	21	D	*	D
152 Milwaukie	36	69	27	E	F	D

Note: a.m. period = 06:00-08:30, Midday period = 08:30-16:00, p.m. period = 16:00-18:00
Level of Service (LOS) for transit service based on headway:

- **LOS A** = less than 10 minutes
- **LOS B** = 10-14 minutes
- **LOS C** = 14-19 minutes
- **LOS D** = 20-29 minutes
- **LOS E** = 30-60 minutes
- **LOS F** = greater than 60 minutes

*No service.

Special Transit Services

Special transit services are available to residents of Milwaukie through the Milwaukie Center Transportation Program, and TriMet Lift Program. The Milwaukie Center Transportation Program is part of the Clackamas County Transportation Consortium, which is dedicated to providing coordinated transportation services to seniors and ADA-eligible persons. Transit opportunities are also available to the residents of Hillside Manor and Hillside Park, a low-income housing area located near the corner of Hillside Court and 32nd Ave. The Milwaukie Center, located within North Clackamas Park, is a community center that offers different social services and a place for social gatherings. The different transit programs available through the Milwaukie Center include:

- **The Dial-a-Ride program**, which offers rides to service area residents who are over age 60 or disabled. The service offered is available within the city of Milwaukie and its urban growth boundary, and runs between locations, such as the Milwaukie Center, shopping locations, and the residents' homes.

- **The Transportation Reaching People (TRP) program**, which is a volunteer service available to seniors and people with disabilities, and consists of drivers from Clackamas County Volunteer Connection. It takes people to their appointments on a donation basis.

- **The Catch-a-Ride program**, which offers similar services to residents of Hillside Manor, Hillside Park, and other Milwaukie area residents. It serves a number of different locations within the city, including the Milwaukie Transit Center and Clackamas Town Center.

TriMet, the primary public transportation provider in the region, has a special transit program available to Milwaukie residents:

- **The TriMet Lift program**, which provides small bus transportation services that are equipped to handle persons with disabilities. Those eligible for program services have physical or mental disabilities that prevent their use of fixed-route transit service (as required by the Americans with Disabilities Act). This service is available seven days per week and the TriMet service area is a 0.75-mile radius around existing bus routes. Eligible users are to call in advance to schedule for Lift Program pick-up.

Summary of Public Transit Findings

The following summarizes key transit findings related to the level of activity and deficiencies documented for this mode of travel. These findings will be utilized to help guide how future improvements can address the deficiencies for this mode of travel.

- The majority of Milwaukie is served by some form of transit that is accessible within 1/4 mile of transit stops provided by TriMet, with the exception of an area to the east bounded by Railroad Ave to the south, 42nd Ave to the west, Monroe St to the north and Stanley Ave to the east. The existing railroad line that parallels Hwy 224 in this area restricts transit accessibility to the south for this area, and existing transit routes that run along Linwood Ave and King Rd are beyond the 1/4-mile radius that a pedestrian would typically travel to access transit. A second area in the northeast corner of Milwaukie, roughly centered on Johnson Creek Blvd and 55th Ave, lacks adequate transit service. This area includes many of the properties that recently annexed into the city.
- In total, approximately 15% of land coverage in Milwaukie does not have access to transit within 1/4 mile of existing transit stops, with approximately half of that lacking coverage occurring in the area identified above.
- Generally, Milwaukie is served with headways (time between buses) along existing transit routes of 30 minutes or better. However, some roadways have headways longer than 30 minutes. These facilities are: Lake Rd, Oatfield Rd, Linwood Ave, International Way, and Harvey St/Logus Rd.
- There are currently six transit stops that have shelters. Two additional stops have existing ridership that meet TriMet's standard for placing shelters:
  - Harrison St/24th Ave
  - 42nd Ave/Llewellyn St

MOTOR VEHICLES

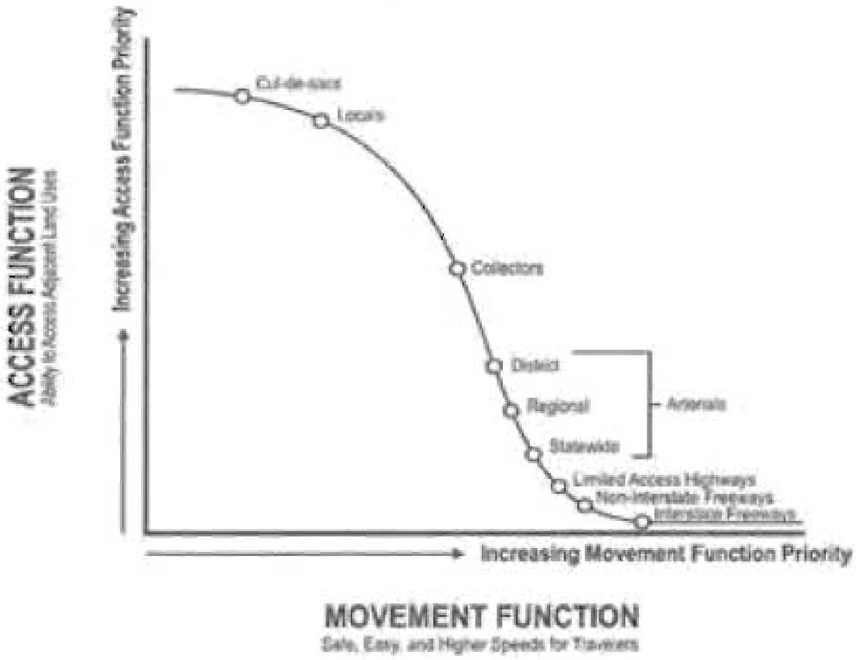
The following section addresses all aspects of the motor vehicle network throughout Milwaukie. The topics addressed include:

- Roadway functional classification
- Roadway characteristics
- Motor vehicle volume
- Measures of effectiveness
- Safety
- Heavy vehicles

Roadway Functional Classification

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

Figure 3-6: Functionality of Access versus Movement



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

- **Mobility Increases:** As the level of mobility increases, the distance between destinations as well as the proportions of freight and through traffic generally increases.
- **Integration of Pedestrian and Bicycle Facilities Decreases:** Provisions for adjoining sidewalks and bike facilities are required up through the arterial class; however, the frequency of intersection or midblock crossings for nonmotorized vehicles steadily decreases with higher functional classes. Expressway and freeway facilities typically do not allow pedestrian and bike facilities adjacent to the roadway, and any crossings are grade-separated to enhance mobility and safety.
- **Access Decreases:** As mobility increases, access to parking, loading, and land are reduced.
- **Facility Design Standards Increase:** Roadway design standards increase in technical complexity to accommodate wider and faster facilities for exclusive use by motor vehicles. The opposite end of the scale is the most basic two-lane roadway with unpaved shoulders that requires minimal technical design.

The existing Milwaukie functional class system for roadway facilities is shown in Figure 3-7. A street-by-street comparison to ODOT, Metro and the City of Milwaukie classifications for arterial and collector streets is shown in Table 3-4. Additionally, Table 3-4 compares the right-of-way (ROW) width to the actual pavement width for each facility.

Figure 3-8 illustrates roadway ownership and maintenance of the various roads in Milwaukie. McLoughlin Blvd and Hwy 224 are State facilities. Hwy 224 is classified as a Principal Arterial. McLoughlin Blvd is classified as a Principal Arterial north of Hwy 224 and a Major Arterial south of Hwy 224. As such, the preferred regional mobility route through Milwaukie from Portland is along McLoughlin Blvd to Hwy 224, and along Hwy 224 to I-205 and destinations outside of the city of Milwaukie. The majority of arterial and collector roadways outside the city limit but within the city's Urban Growth Management Area are owned and operated by Clackamas County or ODOT. The City is responsible for the majority of the roads inside the city limits.

Transportation System Plan

FIGURE 3-7

FUNCTIONAL CLASSIFICATION

November 2013

LEGEND

Functional Classification

- Regional Routes
- Arterials
- Collectors
- Neighborhood Routes
- Local

Other Map Features

- Schools
- Kellogg Creek Trail
- SpringwaterTrail
- Trolley Trail
- Railroad
- County Line
- Water
- City Limits

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0 500 1,000 2,000 3,000 4,000 Feet

Transportation System Plan

FIGURE 3-8

ROADWAY JURISDICTION

November 2013

LEGEND

Jurisdiction

- State of Oregon
- Clackamas County
- City of Portland
- Joint Milwaukie/Portland
- Private

NOTE: All other roads within Milwaukie are under authority of the City.

Other Map Features

- Schools
- Major Roads
- Streets
- Railroad
- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail
- County Line
- Water
- Parks
- City Limits
- Light Rail Station
- Light Rail Transit

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Table 3-4 Functional Classification Comparison Arterial and Collector Streets

Roadway	ODOT	Metro	Clackamas County	City of Milwaukie	ROW/ Pavement Width (ft)
McLoughlin Blvd	Urban Principal Arterial—Other	Principal Arterial (Highway)/ Major Arterial	Major Arterial	Freeway/ Regional Route	110-120/ 65-140
Hwy 224	Urban Principal Arterial—Other Fwy or Expy	Principal Arterial (Highway)	Freeway/ Expressway	Freeway/ Regional Route	165/80-100
17th Ave	—	—	Minor Arterial	Arterial	35-60/60
21st Ave	—	Minor Arterial	Minor Arterial	Arterial	60/45
22nd Ave	—	—	Minor Arterial	Arterial	60/25-40
Harrison St	—	Minor Arterial	Minor Arterial	Arterial	60/20-50
Harmony Rd	—	Major Arterial	Major Arterial	Arterial	60/35-60
Johnson Creek Blvd	—	—	Minor Arterial	Arterial	60/30-50
King Rd	—	Minor Arterial	Minor Arterial	Arterial	60/20-50
Linwood Ave	—	Minor Arterial	Minor Arterial	Arterial	60/35-50
Lake Rd	—	Minor Arterial	Minor Arterial	Arterial	60/30-60
Oatfield Rd	—	Minor Arterial	Minor Arterial	Arterial	60/35-40
Railroad Ave	—	Minor Arterial	Collector	Collector	60/20-35
River Rd	—	—	Minor Arterial	Arterial	60/20-35
32nd Ave	—	—	Collector	Collector	60/25-40
34th Ave	—	—	Collector	Collector	60/35-40
37th Ave	—	—	Local	Collector/ Neighborhood Route	60/30-40
42nd Ave	—	—	Collector	Collector/ Neighborhood Route	60/30-35
43rd Ave	—	—	Collector	Collector	40-60/25-30
Bell Ave	—	—	Collector	Collector	60/30-40
Home Ave	—	—	Local	Neighborhood Route	50/20-25
Jackson St	—	—	Collector	Collector	60-80/15-60
Jefferson St	—	—	Collector	Collector	50-70/20-45
Main St	—	—	Collector	Collector	80/30-55
Monroe St	—	—	Collector	Collector	60-70/20-45
Oak St	—	—	Collector	Collector	60/35-50
Rusk Rd	—	—	Collector	Collector	40/25-30
Stanley Ave	—	—	Collector	Collector	60/20
Washington St	—	—	Collector	Collector	60/20-40

Sources: ODOT, Oregon Highway Plan, 1999, and Metro, 2010 Regional Transportation Plan (RTP), Regional System Concepts and Policies.

Roadway Characteristics

Field inventories of posted speed limits, number of roadway lanes, and intersection controls were conducted to determine characteristics of major roadways in the TSP study area. These characteristics define roadway capacity and operating speeds through the street system, which affect travel path choices for drivers in Milwaukie.

Posted Speed Limits

A limited inventory of the posted speeds in Milwaukie can be seen in Figure 3-9. Collector roadways such as King Rd, Railroad Ave, and Monroe St have posted speeds ranging from 25 to 40 miles per hour (mph). The majority of local access roadways in Milwaukie are posted at 25 mph. Arterial roadways such as McLoughlin Blvd, Hwy 224, and Johnson Creek Blvd are posted at higher speeds ranging from 30 to 50 mph.

Intersection Controls

Figure 3-10 illustrates the existing intersection controls at major roads in Milwaukie. Traffic signals exist mainly along McLoughlin Blvd and Hwy 224. Harrison St, Lake Rd, and Linwood Ave have a few signals and one of the intersections along Johnson Creek Blvd is also signalized. The study intersections for this TSP Update include eighteen signalized intersections and four intersections without signals.

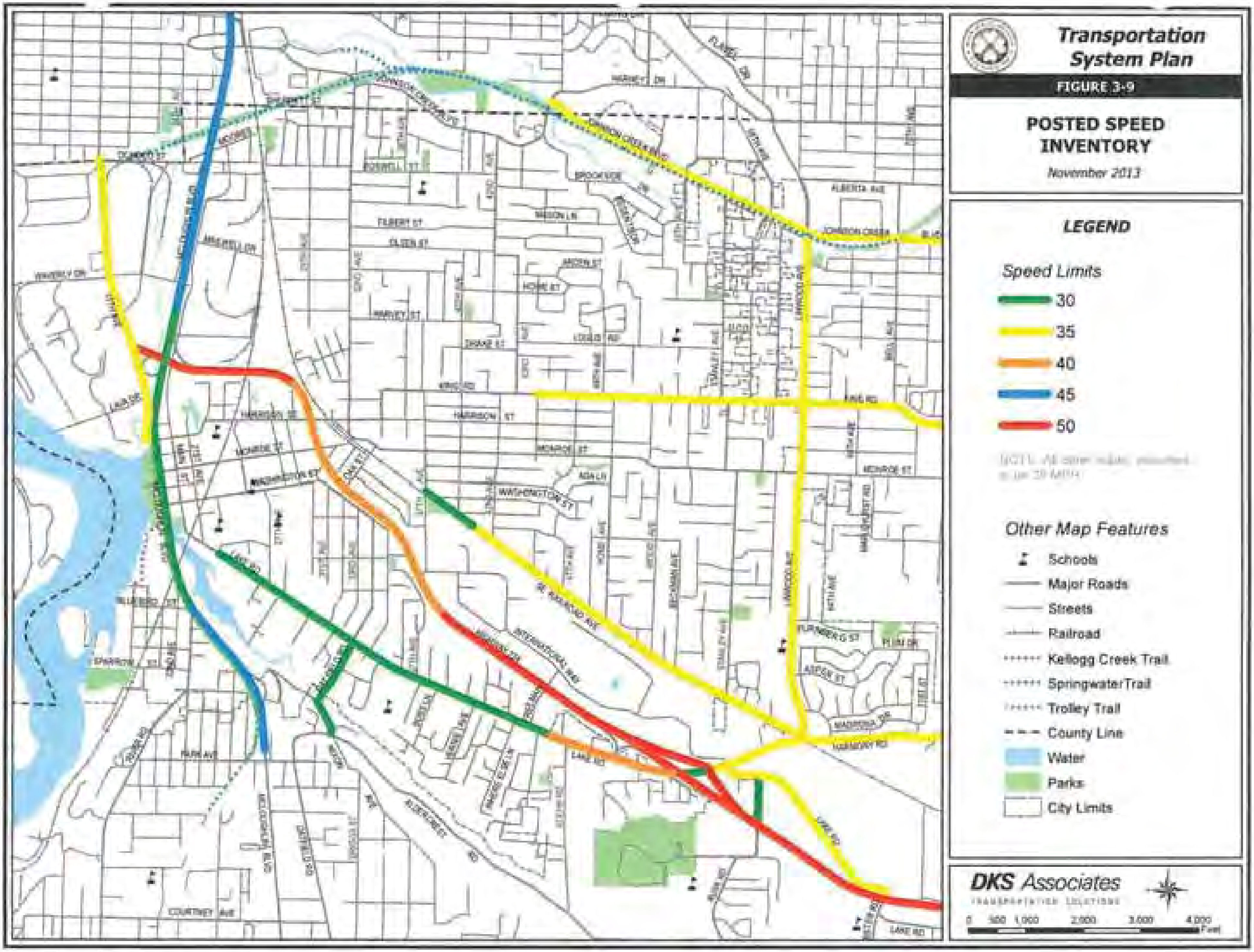
Roadway Width

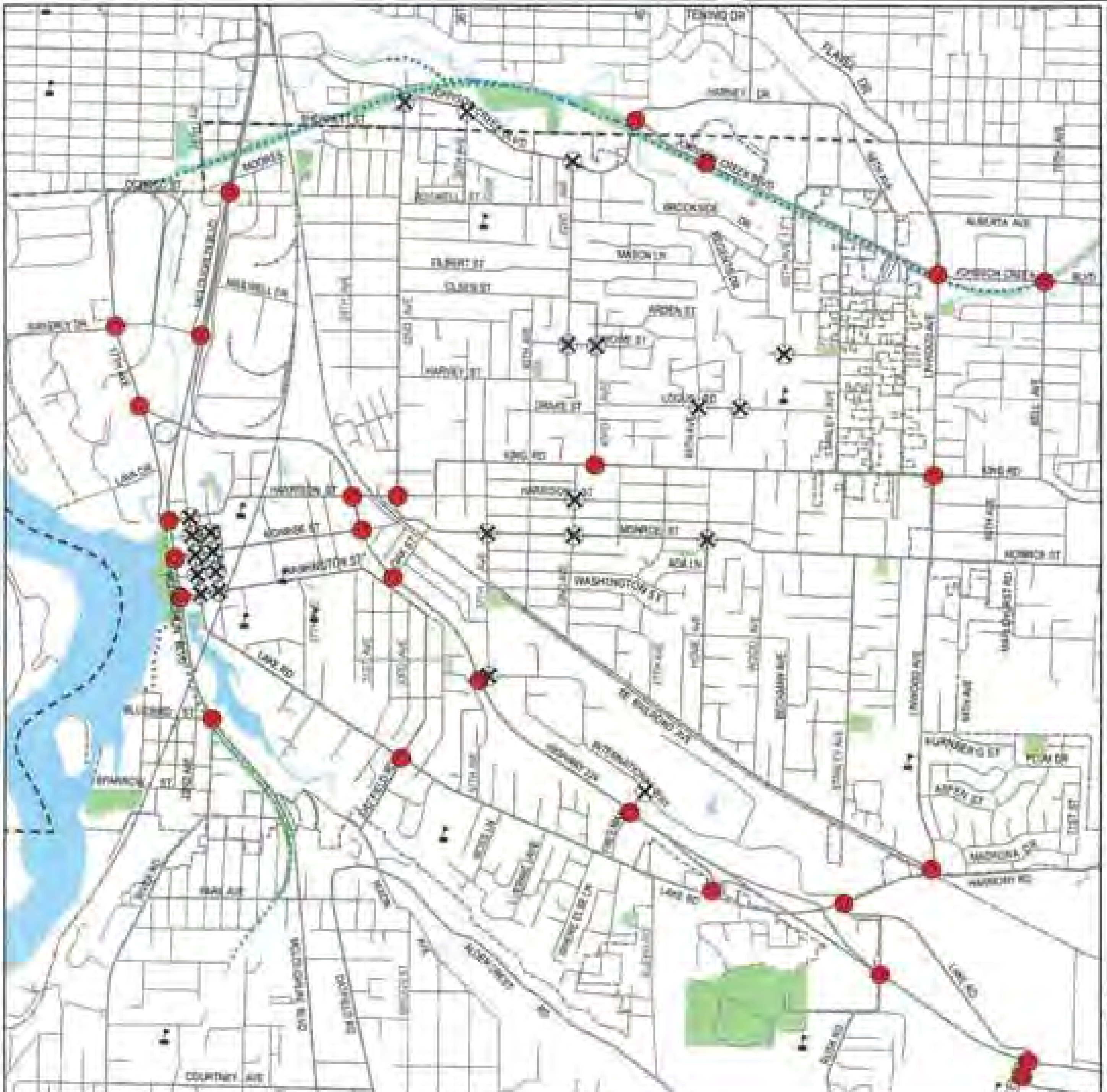
The widest roadways are McLoughlin Blvd and Hwy 224. Harrison St widens near Hwy 224, but is primarily a two-lane road. King St has three lanes, as do some sections of Lake Rd. The remaining roads in the city are one or two lane roads.

Stormwater Management

A roadway is not only limited to what can be seen on the surface; there are also other aspects which can affect a roadway's performance and longevity, such as its the base, the materials and methods used in construction, and drainage features. Many of these topics go beyond the scope of a transportation system plan; however, the issue of drainage will be briefly touched upon. A properly designed, constructed, and maintained stormwater drainage system—which can include a combination of gutters, curbs, storm drains, and storm sewers—minimizes water pollution and reduces the risk of flooding and erosion that can interrupt functioning of the transportation system.

Figure 3-11 shows the locations of the City of Milwaukie's stormwater system. This map also shows locations identified by City staff where rainwater drainage has been problematic. Many of these locations correlate to streets with no gutters, curbs, or sidewalks. Railroad Ave, for instance, has drainage issues along its length from 37[th] Ave nearly to Linwood Ave. Many of the streets with drainage issues do not have curbs, gutters, or sidewalks. However, there are many other locations throughout the city that do not have these amenities and do not have drainage issues.


Transportation System Plan
FIGURE 3-9
POSTED SPEED INVENTORY
November 2013
LEGEND
Speed Limits
30
35
40
45
50
Other Map Features
Schools
Major Roads
Streets
Railroad
Kellogg Creek Trail
Springwater Trail
Trolley Trail
County Line
Water
Parks
City Limits
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet
WASHINGTON ST
MONROE ST
HARRISON ST
KING RD
LINWOOD AVE
LAKE RD
INTERNATIONAL WAY
COURTNEY AVE



Transportation System Plan

FIGURE 3-10

INTERSECTION CONTROLS

November 2013

LEGEND

Intersection Control

- All-Way Stop
- Signalized

Other Map Features

- Schools
- Kellogg Creek Trail
- SpringwaterTrail
- Trolley Trail
- Major Roads
- Streets
- Railroad
- County Line
- Water
- Parks
- City Limits

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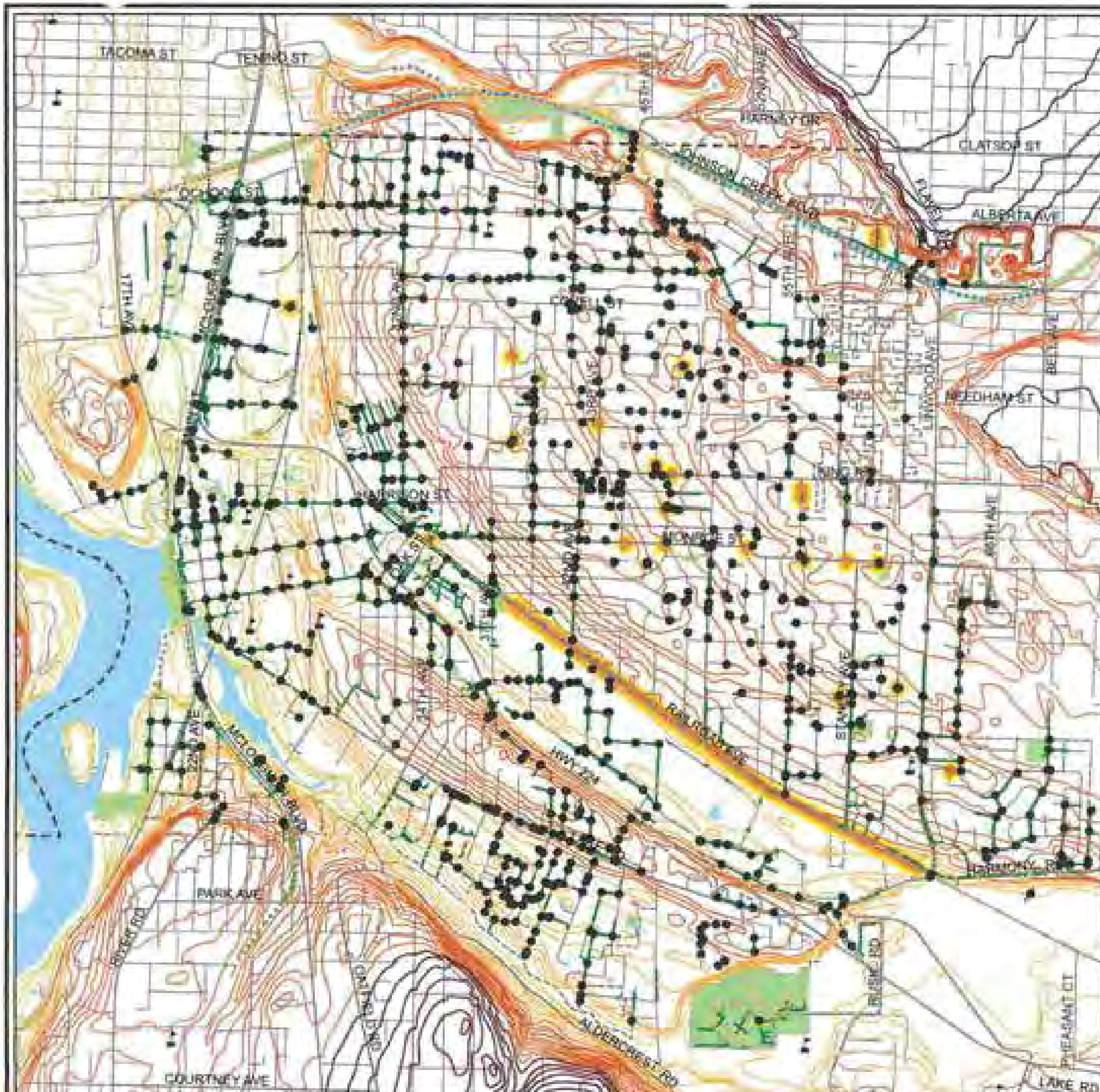
0 500 1,000 2,000 3,000 4,000 Feet

Transportation System Plan

FIGURE 3-11

STORMWATER AND TOPOGRAPHY

November 2013



LEGEND

Stormwater Features

- Manholes and Drywells
- Pipes
- Locations with Drainage Issues

Elevation Above Sea Level

- < 50 feet
- 50 - 100 feet
- 100 - 200 feet
- > 200 feet

Other Map Features

- Schools
- Kellogg Creek Trail
- SpringwaterTrail
- Trolley Trail
- Major Roads
- Streets
- Railroad
- County Line
- Water
- Parks
- City Limits

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0 500 1,000 2,000 3,000 4,000 Feet

Pavement Conditions

The City of Milwaukie has conducted an extensive visual inspection of its roadways as part of an ongoing Pavement Management System (PMS). PMS is a tool for making cost-effective decisions about pavement maintenance and rehabilitation. Pavement conditions are recorded in the TSP to document existing conditions, but no recommendations are made about the schedule of surface maintenance projects. The PMS tool is utilized by the Street Surface Maintenance Program (SSMP), which was established in 2006 to fund the assessment, maintenance, and repair of street surfaces in the city. It is the function of the SSMP to determine the schedule of surface maintenance projects. Figure 3-12 shows the location and extent of current, completed, and future SSMP projects.

As part of the ongoing SSMP project selection process, sections of a roadway have been rated on a Pavement Condition Index (PCI), a scale that rates a roadway's condition from 0 to 100. High numbers correlate to newer streets in good condition (70-100), while lower numbers (50 or less) indicate roads that have deteriorated to the point of needing rehabilitation or replacement. Milwaukie's complete PCI survey is updated on an annual basis.

An average PCI was calculated for the three different city street classifications—arterial, collector, and residential/local—based on the length of street covered by a specific PCI rating. These findings are summarized in Table 3-5. From the table, it can be seen that, on average, the road condition for all three street types is relatively close. On average, arterial streets have the highest rating, followed by collectors and then residential/local streets.

Table 3-5 Average Pavement Condition Index

Classification	Length (lane miles)	Average Pavement Condition Index
Arterial	12.23	78
Collector	24.97	64
Residential/Local	111.1	58

Source: City of Milwaukie PCI Survey, 2013

Table 3-6 lists the breakdown of PCI ratings throughout the city for each street type by length of roadway and percentage. This more detailed look into the pavement condition shows that the majority of the arterial (73.1%), collector (61.8%) and residential/local (61.8%) streets can be considered in good to excellent condition. Over half of Milwaukie's streets rank in the very good to good category. In general 36%, or 26.73 miles, of the streets in the city are considered to be in poor to very poor condition. The street sections with the lowest PCI included Maple Ct, 56th Ave, and Lloyd St.

Table 3-6 Pavement Condition Index Rating by Functional Classification

Rating (PCI Score)	Street Type (as rated by segment)			
	Arterial	Collector	Residential/Local	Total
Very Good (85-100)	61.7%	44.4%	45.4%	**46.4%**
Good (70-85)	11.4%	25.3%	16.4%	**17.5%**
Poor (50-70)	6.9%	26.7%	14.8%	**16.3%**
Very Poor (0-50)	20%	3.6%	23.4%	**19.8%**

Source: City of Milwaukie PCI Survey, 2013

Motor Vehicle Volume

Twenty-four-hour traffic count data was collected at select locations within the city. It is useful to analyze this data to determine traffic flow throughout the day on the transportation network. Figure 3-13a is an hour-by-hour breakdown of traffic volumes along McLoughlin Blvd and Hwy 224, and shows two distinct peaks in traffic volumes on the Milwaukie's two highest traffic volume streets.[8] These two peaks represent the a.m. and p.m. peak commuter traffic. The traffic volumes observed on McLoughlin Blvd show the typical a.m. and p.m. peak spike in commuter vehicular traffic demand. Hwy 224 also shows a.m. and p.m. peak spikes in demand, it is however unusual that the a.m. peak hour is greater than the p.m. peak hour. This type of travel pattern is unusual, because the a.m. peak hour usually consists of commuter traffic, whereas, the p.m. peak hour traffic volume contains many of the a.m. commuters, as well as those with retail and other miscellaneous destinations.

Figure 3-13b shows the 24-hour, two-way existing traffic volumes on streets in Milwaukie from 2005 and 2006. The locations of these counts correspond to locations counted on an annual basis by ODOT[9] and/or Clackamas County.[10] When compared to 24-hour traffic counts taken for the 1997 TSP, there has been growth on many of the streets within city limits. Figure 3-13c shows the location and change in traffic volume at select locations recorded in 1995 (basis for 1997 Milwaukie TSP).

In addition, an inventory of peak-hour traffic counts at study area intersections was conducted in the Fall/Winter of 2006. The traffic turn movement counts establish baseline information for future monitoring and identify current existing problem areas. Turn movement counts were conducted at twenty-two intersections during the evening peak period (4:00-6:00 p.m.) to determine existing operating conditions and are shown in Figures 3-14a and 3-14b. The p.m. peak-hour turn movements are useful when analyzing the operational characteristics of an intersection, since they generally represent the hour of highest traffic volume demand. It is assumed that if an intersection operates sufficiently during the p.m. peak hour it will operate sufficiently during the rest of the day. Study intersections were chosen in coordination with the City staff to address major roadways and noted areas of concern.

The p.m. peak-hour signal warrants were evaluated for all study area intersections without signals. The intersections of Harrison St/Main St and 32nd St/Johnson Creek Blvd both met the p.m. peak-hour signal warrants. This indicates that further study of these intersections is recommended to see if they would meet other ODOT required signal warrants. The peak-hour warrants can be found in Appendix G.

[8] The 24-hour tube count data was collected in 2001 and was not refreshed as part of the 2007 update. Analysis of available data from Clackamas County and ODOT as well as from the PMLR project demonstrated that there have been no significant changes overall in traffic volumes since 2006-07. It was not necessary to refresh these data at this time; a more extensive update to the TSP in the future should revisit this issue.
[9] ODOT Annual Traffic Counting Program.
[10] Clackamas County Annual Traffic Counting Program.

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FIGURE 3-12

LOCATION OF STREET SURFACE MAINTENANCE PROGRAM (SSMP) PROJECTS

November 2013

LEGEND

- Current SSMP Projects (FY 13'/14')
- Future SSMP Projects
- Completed SSMP Projects

Other Map Features

- Schools
- Kellogg Creek Trail
- SpringwaterTrail
- Trolley Trail
- County Line
- Water
- Major Roads
- City Limits

*Current as of November 2013. Location and extent of future projects subject to change.

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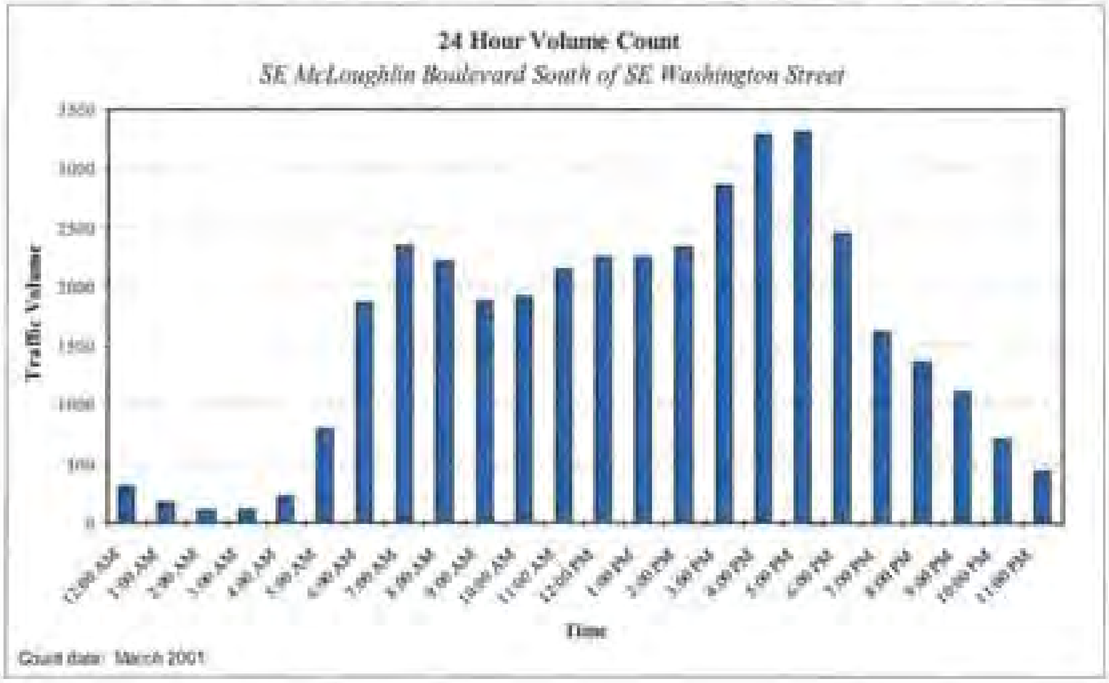
0 500 1,000 2,000 3,000 4,000 Feet

Figure 3-13a 24-Hour Tube Count Data on McLoughlin Blvd and Hwy 224



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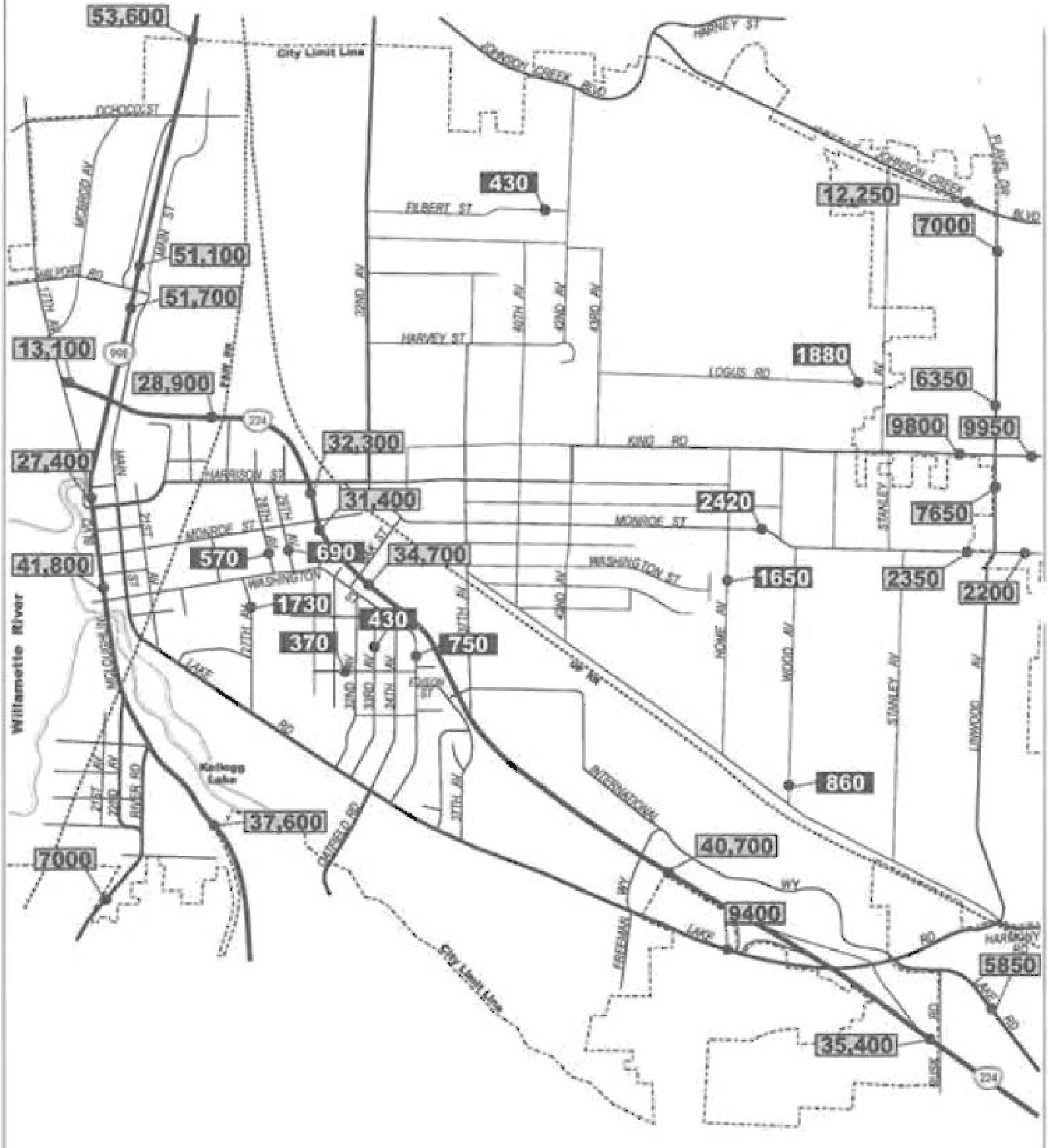

LEGEND

00 - 24 Hour Count Volume & Count Location (Fall 2006)

00 - 24 Hour Count Volume & Count Location (2005)

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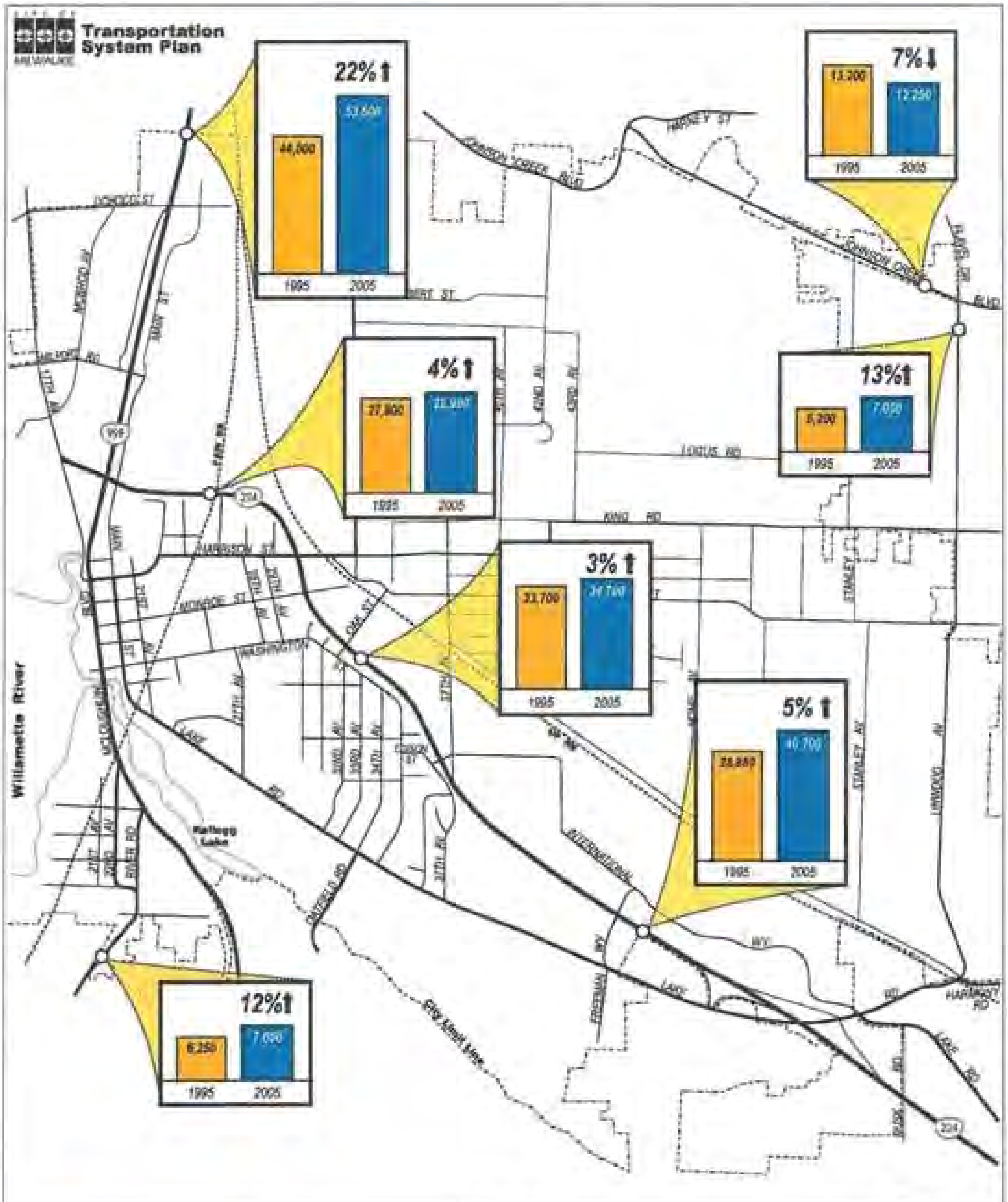
NO SCALE

Figure 3-13b

24 HOUR COUNT VOLUMES

March 2007



LEGEND

00 - 24 Hour Count Volume (1995)

00 - 24 Hour Count Volume (2005)

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NO SCALE

Figure 3-13c

24 HOUR COUNT VOLUMES HISTORIC COMPARISON

March 2007

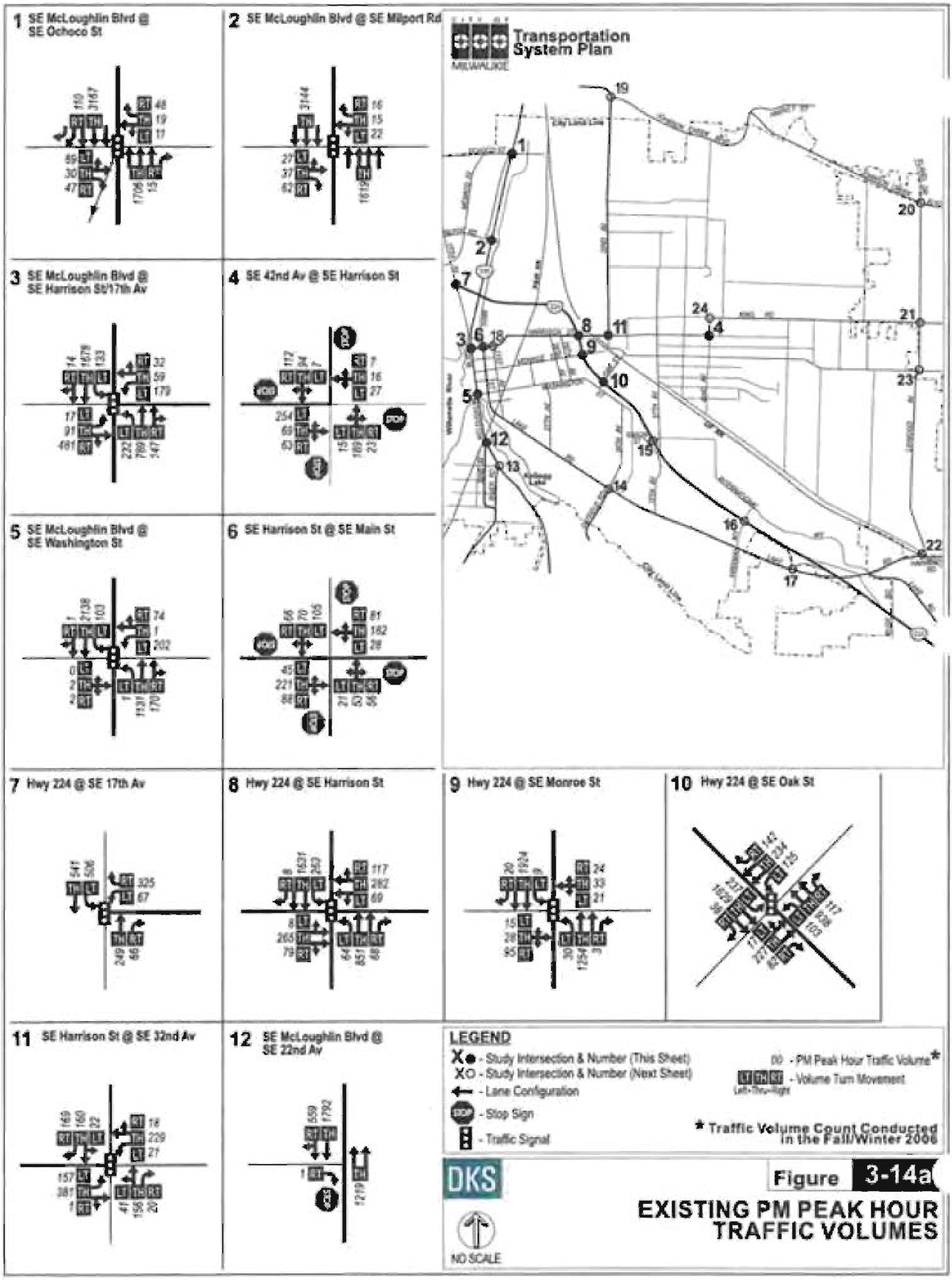

Figure 3-14a

EXISTING PM PEAK HOUR TRAFFIC VOLUMES

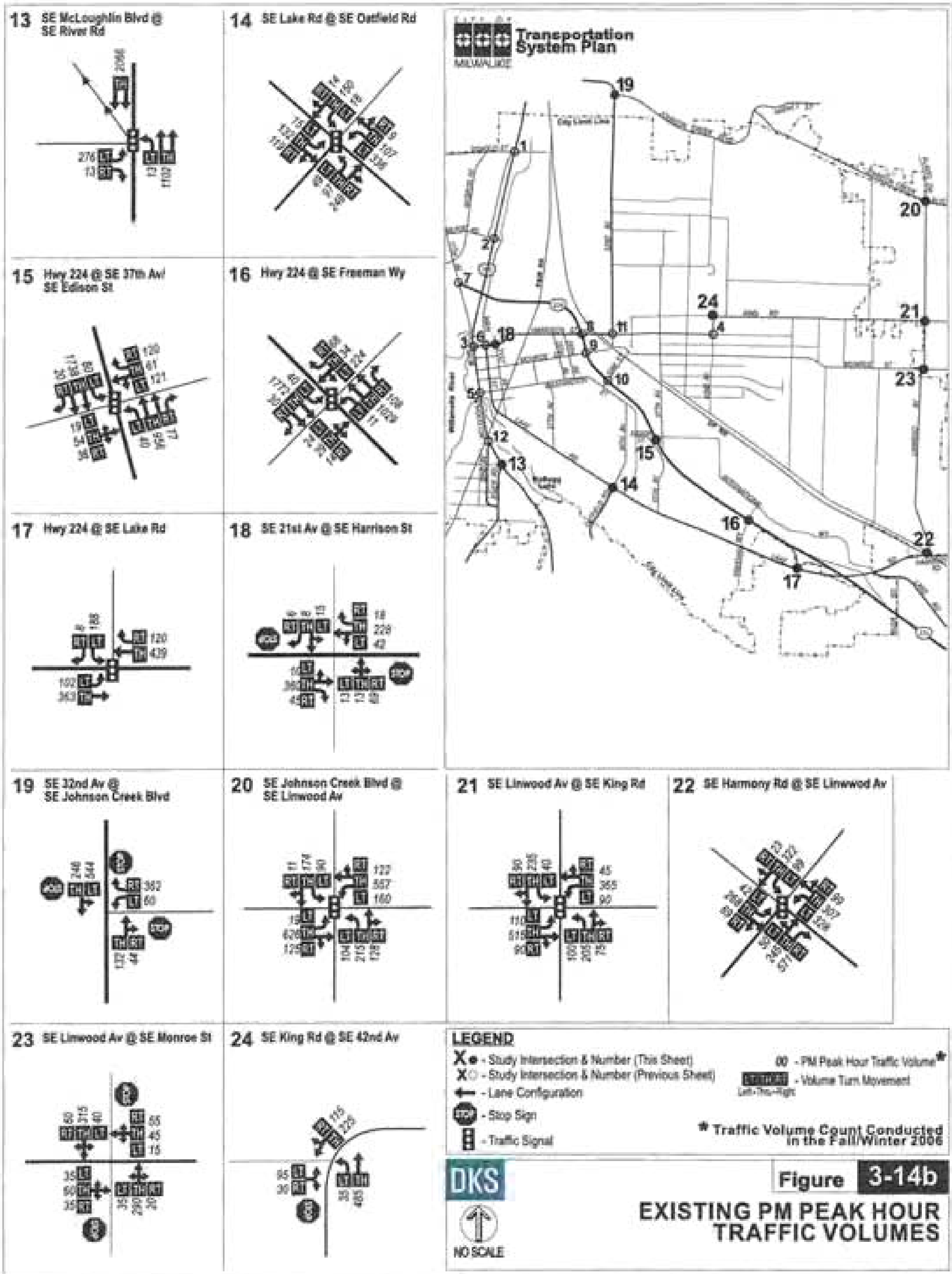

Figure 3-14b

EXISTING PM PEAK HOUR TRAFFIC VOLUMES

Land Use

In addition to major regional highways, such as Hwys 224 and 99E, land use within Milwaukie is a key factor in understanding current transportation patterns and roadway traffic volumes as it plays a large role in driving transportation choices. The adopted land use zoning designations within the city boundaries are shown in Figure 3-15.

Measures of Effectiveness

Level of service (LOS) is used as a measure of effectiveness for the operation of both signalized and unsignalized intersection operation. It is similar to a "report card" rating based upon average vehicle delay.

- LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak-hour travel demand.
- LOS D and E are progressively worse peak-hour operating conditions.
- LOS F represents conditions where average vehicle delay exceeds 80 seconds per vehicle entering a signalized intersection and demand has exceeded capacity.

LOS F is typically evident in long queues and delays. LOS D or better is generally the accepted standard for signalized intersections in urban conditions.

At intersections without signals, a LOS E and even LOS F can occur for a specific turning movement; however, the majority of traffic may not be delayed (in cases where major street traffic is not required to stop). When these conditions exist, it generally provides a basis to study the intersections further to determine the availability of acceptable gaps for vehicles that are stopped and waiting to enter the traffic flow. It also indicates an intersection where traffic signal warrants should be conducted to determine if the intersection is reaching a point where it could be considered for signalization. A summary of level of service descriptions for signalized and unsignalized intersections is provided in Appendix F.

Intersections within the city are subject to one or more measure of effectiveness standards from the City, Metro, and ODOT. Milwaukie has a LOS D standard during the peak operating conditions for all intersections that fall within the City's jurisdiction.[11] Metro also uses a LOS standard, but further refines its requirements to include the top two peak hours. Their LOS standard is F for the first peak hour and E for the second peak hour.[12] ODOT uses a volume to capacity ratio (V/C) as a measure of effectiveness, which is similar to LOS, but is a ratio of the volume of vehicles traveling through an intersection to its calculated capacity. Similar to Metro, ODOT has two sets of maximum acceptable V/C ratios for the Hwys 99E and 224 in Milwaukie. These standards are outlined in Table 3-7.

Turn movement counts taken at the study intersections and conducted during the evening peak periods were used to determine the existing 2006 LOS based on the 2000 Highway Capacity Manual methodology for signalized and unsignalized intersections.[13]

[11] Milwaukie Municipal Code, Section 19.1407.4(A).
[12] Regional Transportation Plan, Metro, 2000, Table 1.2.
[13] *2000 Highway Capacity Manual*, Transportation Research Board, 2000.

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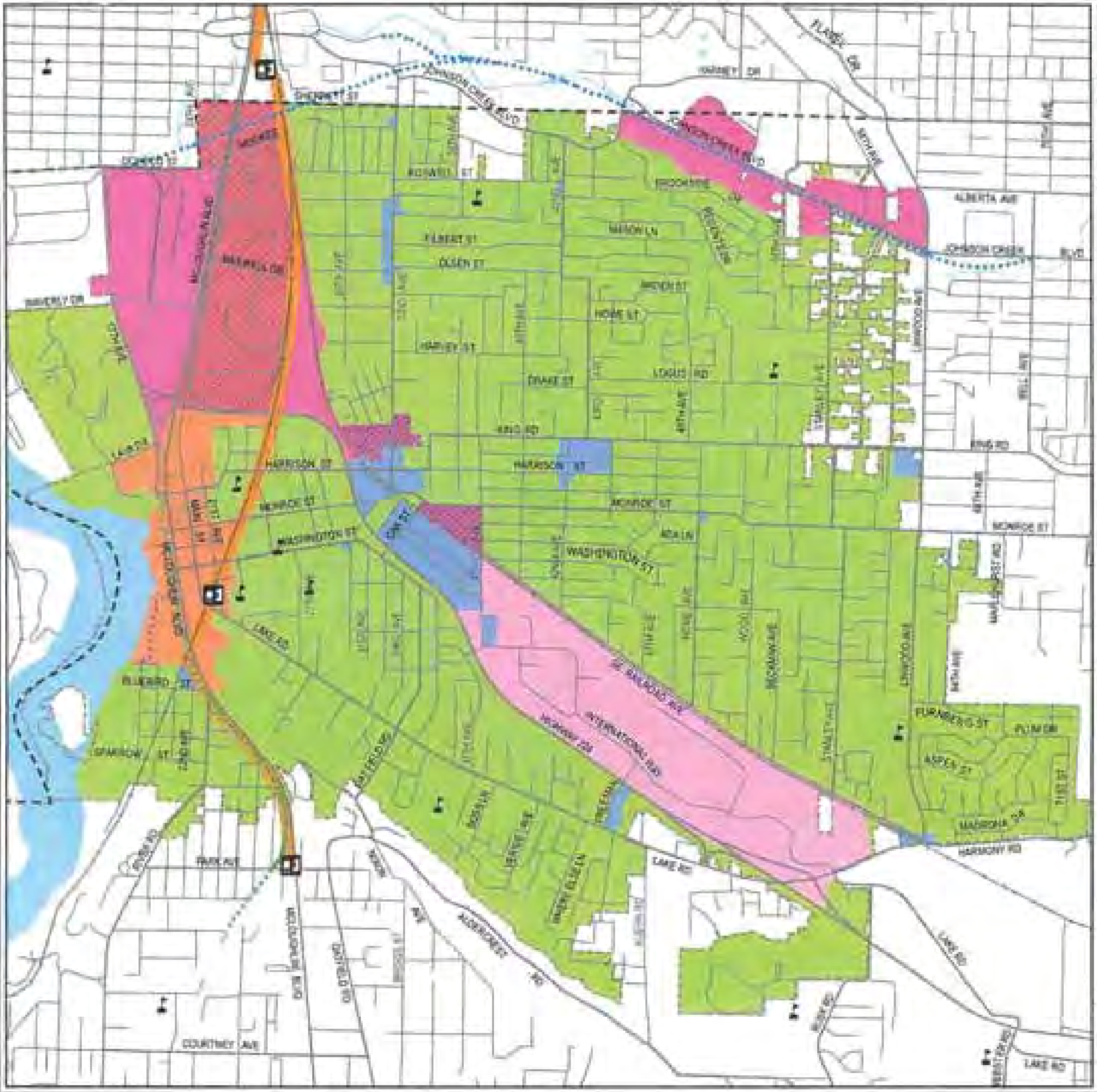
FIGURE 3-15

ZONING MAP

November 2013



LEGEND

Zoning

- Business Industrial
- Manufacturing
- Commercial
- Downtown
- MTSA (Manfucaturing - Tacoma Station Area)
- Residential
- Mixed Use

Other Map Features

- Schools
- Kellogg Creek Trail
- SpringwaterTrail
- Trolley Trail
- Light Rail Station
- Light Rail Transit
- Major Roads
- Streets
- Railroad
- County Line
- Water
- City Limits

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0 500 1,000 2,000 3,000 4,000 Feet

Traffic counts and level of service calculation sheets can be found in Appendix G. A list of results for existing p.m. peak-hour intersection operation at the twenty-two study intersections is shown in Table 3-7. All but four study intersections operate at an LOS of D or better. The intersection of Johnson Creek Blvd/32nd Ave operates at LOS F during the peak hour.

Table 3-7 Existing P.M. Peak-Hour Study Area Intersection Operations

Intersection	Minimum Acceptable Measure of Effectiveness (MOE)			Level of Service (LOS)	Average Delay (Seconds)	Volume/ Capacity (V/C)
	City[14]	Metro[15]	ODOT[16]			
Two-Way Stop Controlled Intersections						
McLoughlin Blvd @ 22nd Ave		F/E	0.99/0.99	A/D	26.4	0.01
Harrison St @ 21st Ave	D			A/C	18.0	0.10
All-Way Stop Controlled Intersections						
Harrison St @ Main St	D			B	13.2	0.39
42nd Ave @ Harrison St	D			B	14.3	0.22
Johnson Creek Blvd @ 32nd Ave	D			F	>50	0.77
Signalized Intersections						
McLoughlin Blvd @ Ochoco St		F/E	1.10/0.99	B	10.1	0.85
McLoughlin Blvd @ Milport Rd		F/E	1.10/0.99	A	4.4	0.78
McLoughlin Blvd@ Harrison St		F/E	1.10/0.99	D	47.1	0.99
McLoughlin Blvd @ Washington St		F/E	1.10/0.99	C	20.0	0.88
Hwy 224 @ 17th Ave		F/E	0.99/0.99	C	20.7	0.59
Hwy 224 @ Harrison St		F/E	0.99/0.99	D	40.0	0.89
Hwy 224 @ Monroe St		F/E	0.99/0.99	B	19.0	0.75
Hwy 224 @ Oak St		F/E	0.99/0.99	D	44.1	0.88
Harrison St @ 32nd Ave	D	F/E		B	10.5	0.45
McLoughlin Blvd @ River Rd		F/E	0.99/0.99	D	35.5	0.99
Lake Rd @ Oatfield Rd		F/E		D	36.0	0.62
Hwy 224 @ 37th Ave		F/E	0.99/0.99	C	25.5	0.82
Hwy 224 @ Freeman Way		F/E	0.99/0.99	C	30.5	0.94
Hwy 224 @ Lake Rd		F/E	0.99/0.99	B	16.1	0.68
Johnson Creek Blvd @ Linwood Ave	D	F/E		D	53.6	0.97
Linwood Ave @ King Rd	D	F/E		D	47.5	0.83
Linwood Ave @ Harmony Rd	D	F/E		E	64.5	0.94

Signalized and All-Way Stop Intersection LOS:

- **LOS** = Level of Service
- **Delay** = Average vehicle delay in the peak hour for entire intersection
- **V/C** = Volume to Capacity Ratio
- **MOE** = (ODOT & Metro) First Peak Hour/Second Peak Hour

Unsignalized Intersection LOS:

- **A/A** = Major Street turn LOS/Minor street turn LOS

[14] Milwaukie Municipal Code, Section 19.1407.4(A).
[15] Regional Transportation Plan, Metro, 2000, Table 1.2.
[16] 1999 Oregon Highway Plan Alternative Highway, Maximum Volume to Capacity Ratios Within Portland Metropolitan Region, Oregon Department of Transportation, January 2006, Table 7.

Safety

ODOT ranks intersections in their Safety Priority Index System (SPIS) based on the most current three years of collision data. The SPIS values range from one to one hundred, with lower values equating to lower collision rates. The score is derived from the number of collisions, the type of collisions, collision severity, and traffic volumes. Each year, a list of the top 10% SPIS sites is generated and the top 5% sites are investigated by ODOT for safety problems. If ODOT identifies a correctable problem, a benefit/cost analysis is performed and appropriate projects are initiated, often with funding from the Highway Safety Improvement Program. None of the 22 study intersections were identified as being on the SPIS top 10% list.

In addition to SPIS data, intersection safety is also analyzed using intersection collision rates. Collision rates are measured as the number of collisions per million entering vehicles (MEV). This measure allows comparison of intersections with varying volumes. ODOT provided collision data for the study intersections along the State facilities, McLoughlin Blvd and Hwy 224. All collisions involving a fatality, injury, or property damage greater than $1,500 are included in the reports supplied by ODOT. The crash rates and corresponding data can be seen in Table 3-8. Further investigation should be conducted at the intersection of Hwy 224/Lake Rd, since the corresponding crash rate is greater than 1.0, indicating that the intersection might have safety problems.

Table 3-8 SPIS Rating of Milwaukie TSP Update Study Area Intersections

Inter-section Number	ODOT SPIS Rating	Street	Cross Street	Intersection Collisions (2002-2005)[1]	Fatal	Injury	Corridor Collisions 2002-2005[2]	Collision Rate 2002-2005[3]
17	74.81	Hwy 224	Lake Rd	15	1	7	21	1.12
10	34.42	Hwy 224	Oak St	22	0	12	16	0.52
2	50.42	McLoughlin Blvd	Milport Rd	9	0	4	18	0.17
3	49.48	McLoughlin Blvd	Harrison St	8	0	3	24	0.19
15	20.2	Hwy 224	Edison St	1	0	1	7	0.03
8	52.82	Hwy 224	Harrison St	10	0	4	18	0.25
13	23.72	McLoughlin Blvd	River Rd	5	0	0	15	0.13
12	14.47	McLoughlin Blvd	22nd Ave	1	0	1	16	0.03
7	11.03	Hwy 224	17th Ave	2	0	1	9	0.10
1	21.27	McLoughlin Blvd	Ochoco St	5	0	4	8	0.09
16	21.7	Hwy 224	Freeman Way	4	0	3	5	0.11
5	39.68	McLoughlin Blvd	Washington St	2	0	1	6	0.05
9	26.95	Hwy 224	Monroe St	5	0	2	7	0.13
4	N/A	42nd Av	Harrison St	4	0	1	N/A	0.42
6	N/A	Harrison St	Main St	6	0	4	N/A	0.53
11	N/A	Harrison St	32nd Ave	12	0	8	N/A	0.80
14	N/A	Lake Rd	Oatfield Rd	7	0	1	N/A	0.49
18	N/A	21st Ave	Harrison St	3	0	2	N/A	0.33
19	N/A	32nd Ave	Johnson Creek Blvd	0	0	0	N/A	0.00*
20	N/A	Johnson Creek Blvd	Linwood Ave	7	0	6	N/A	0.27
21	N/A	Linwood Ave	King Rd	2	0	1	N/A	0.09
22	N/A	Harmony Rd	Linwood Ave	19	0	10	N/A	0.72

[1] Collisions within the intersection: reported by City/County/State Police to ODOT.
[2] Collisions along McLoughlin Blvd or Hwy 224 within 0.05 miles of the intersection: reported by City/County/State Police to ODOT.
[3] Collision Rate = (Number of Collisions x 1,000,000)/(Number of Years of Data x 365 x Annual Average Daily Traffic)
*No crashes were recorded at this intersection.

Heavy Vehicles

The economical movement of raw materials and finished products depends on efficient truck movement to and through urban areas. The designation of through truck routes provides for efficient movement while at the same time maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. McLoughlin Blvd and Hwy 224 are identified by ODOT,[17] Metro, and the City of Milwaukie as truck routes. The City identifies truck routes on roads under its jurisdiction. Truck routes are illustrated in Figure 3-16.

Truck (or heavy vehicle) volumes were collected as part of the intersection turn movement counts. Any vehicle with more than two axles was considered a heavy vehicle. The number of trucks was totaled and divided by the total number of vehicles in the traffic stream to get the percentage of trucks. Seven of the twenty-two studied intersections present truck volumes exceeding 100 vehicles per hour (vph), with volumes exceeding 150 vph at the Hwy 99E and Ochoco St intersection.

[17] *1999 Oregon Highway Plan*, The Oregon Department of Transportation, May 1999.

Transportation System Plan

FIGURE 3-16

TRUCK ROUTES

November 2013

LEGEND

Freight Routes

- Major Regional
- Minor Preferred (Local)
- Weight Restricted Minor Preferred (Local)

Freight Volumes

- 0 - 50 Heavy Vehicles/Hour
- 51 - 100 Heavy Vehicles/Hour
- 101 - 150 Heavy Vehicles/Hour
- > 150 Heavy Vehicles/Hour

Other Map Features

- Schools
- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail
- Light Rail Transit
- Light Rail Station
- Major Roads
- Streets
- Railroad
- County Line
- Water
- Parks
- City Limits

DKS Associates
TRANSPORTATION SOLUTIONS

0 500 1,000 2,000 3,000 4,000 Feet

Summary of Motor Vehicle Findings

The following summarizes key motor vehicle findings related to the level of activity documented as well as deficiencies for this mode of travel. These findings will be utilized to help guide future improvements to address the deficiencies for this mode of travel in the transportation network.

- The functional classification of roadways found in the city of Milwaukie allows for the proper hierarchy of roadways that balances mobility and access. Currently the business industrial area south of Railroad Ave, north of Hwy 224, east of 37th Ave and west of Lake Rd has roadways without functional classification. International Way serves as an existing facility that provides connectivity within this area, and access to arterials and collectors.
- Street drainage issues appear to be located in the southeast area of the city, and are typically due to locations not being connected to the stormwater pipe system. An area of specific concern today is the area along Railroad Ave from Harmony Rd to 37th Ave.
- There is currently one study area intersection that does not meet jurisdictional operating standards: Johnson Creek Blvd/32nd Ave. Additionally, four other intersections are reaching capacity:
  - McLoughlin Blvd/Harrison St
  - McLoughlin Blvd/River Rd
  - Hwy 224/Freeman Way
  - Johnson Creek Blvd/Linwood Ave
- Many of the study intersections in Milwaukie have low reported collision rates. Two intersections have collisions of 10 or more. These are the intersections of Hwy 224/Lake Rd (which also included a fatality) and Hwy 224/Harrison St.
- The majority of heavy vehicle counts collected at study area intersections occur along major regional truck routes (such as McLoughlin Blvd and Hwy 224), however the intersection of Lake Rd/Oatfield Rd had a high number of heavy vehicles counted during the p.m. peak hour (100-150 heavy vehicles). Neither of these facilities are designated as truck routes, indicating that trucks could be utilizing these facilities as a "cut-through" route due to congestion and/or access issues on the major regional truck routes.

RAIL

There is one other mode of transportation in Milwaukie: the railway system. Figure 3-17 shows the rail facilities and crossings in Milwaukie.

There are three rail freight lines, two Union Pacific Railroad (UPRR) lines and one Oregon Pacific Railroad (OPR) line that currently traverse Milwaukie. The UPRR main line, also named the C line, is the main line between Portland and Eugene. It extends from northern Milwaukie, south and east through the city to the east and operates twenty-four freight trains a day and six Amtrak passenger trains per day with maximum authorized speeds of 45 and 50 mph, respectively. There are four at-grade railroad crossings along this line on Harrison Ave, Oak St, 37th Ave, and Harmony Ave, all of which are gated.

The UPRR Tillamook line, also known as the FD line, is leased to Portland & Western Railroad (PNWR). It extends from Portland in the north through Milwaukie and exits to the south. PNWR operates four trains per day along this line with a maximum authorized speed of 45 mph. There are twelve railroad crossings along this line, including one underpass, four overpasses, and three crossings without gates on Wren St, Bluebird St, and Bobwhite St.

The rail line operated by Oregon Pacific passes through the northwestern corner of the city of Milwaukie and has three at-grade railroad crossings, two which are without gates. These crossings without gates are at Milport Rd and McBrod Ave.

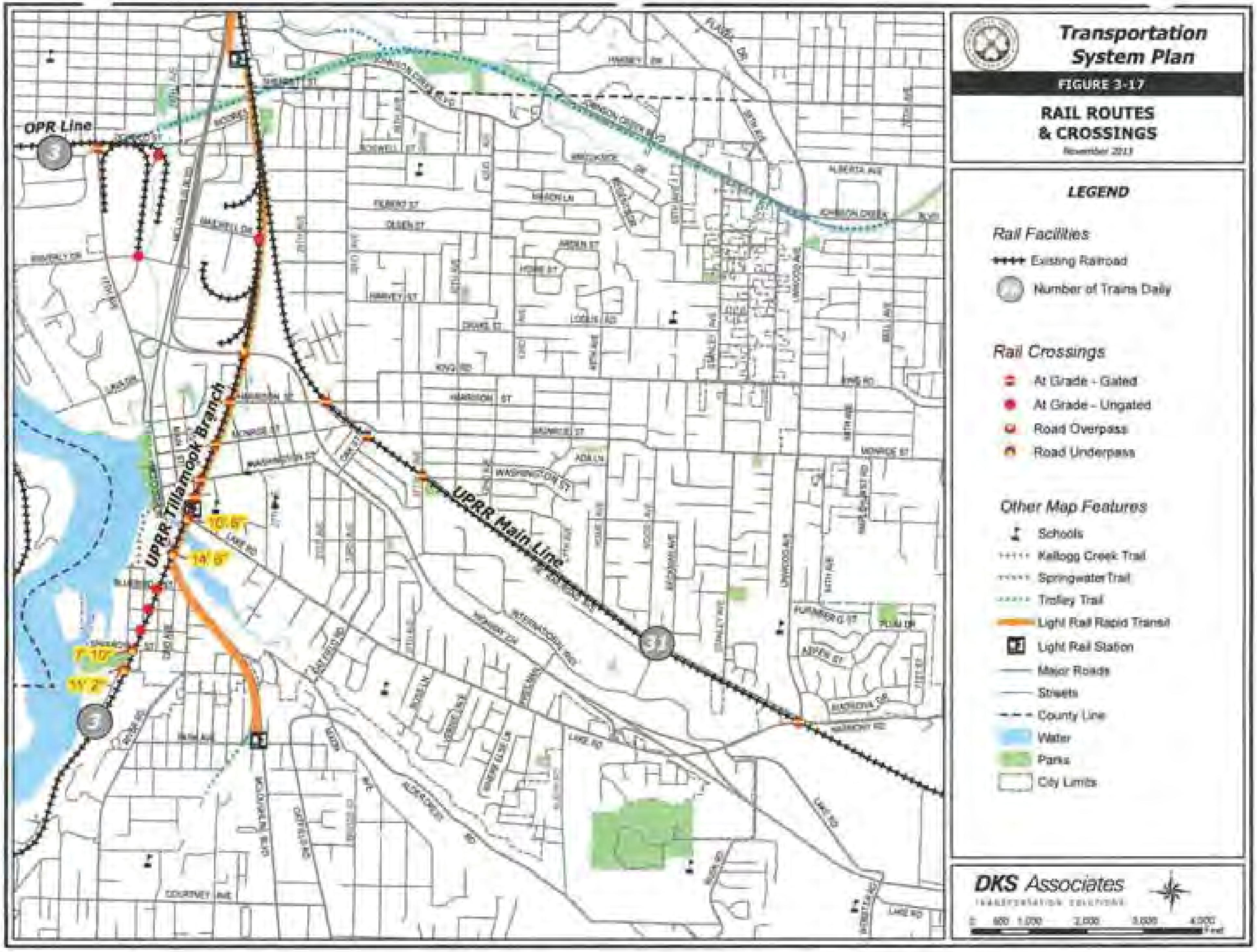
There are no airports, pipelines, ferries, or ports within Milwaukie's city limits or its UGMA.

Summary of Rail Findings

The following summarizes key findings related to other modes of travel in Milwaukie. These findings will be utilized to help guide future improvements to address the deficiencies for this mode of travel in the transportation network.

- The maximum authorized speeds within Milwaukie for many of the existing rail lines are 45-50 miles per hour. Many of the existing crossings in the city are at-grade facilities that are gated. However, there are six at-grade crossings that do not have gates. Three occur in the north Milwaukie industrial area east and west of McLoughlin Blvd, and the other three occur in the Island Station neighborhood to the south.
- Typical vertical clearance for underpasses (whether they are roadway or railway) is 14 feet.[18] This is a typical clearance to allow for trucks to clear the underpass, even if they are not on a freight-classified facility. The three underpasses at Lake Rd, Sparrow St, and Lark St do not meet this typical vertical clearance.
- The traffic generated by heavy trucks cutting through neighborhoods has both real and perceived impacts on neighborhood livability, including noise, vibration, safety, aesthetics, and air quality. Accessibility issues on Hwy 224 and McLoughlin Blvd, as well as weight restrictions on Johnson Creek Blvd, cause trucks to divert onto local streets not intended or preferred for freight traffic.

[18] Based on *A Policy on Geometric Design of Highways and Streets*, Fourth Edition, American Association of State Highway and Transportation Officials (AASHTO), page 389.



Transportation System Plan
FIGURE 3-17
RAIL ROUTES & CROSSINGS
November 2013
LEGEND
Rail Facilities
Existing Railroad
Number of Trains Daily
Rail Crossings
At Grade - Gated
At Grade - Ungated
Road Overpass
Road Underpass
Other Map Features
Schools
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Light Rail Rapid Transit
Light Rail Station
Major Roads
Streets
County Line
Water
Parks
City Limits
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet
OPR Line
3
UPRR Tillamook Branch
UPRR Main Line
31
3
10' 6"
14' 6"
7' 10"
11' 2"

PARKING

City Parking Policies

On-street parking is generally available in residential areas of Milwaukie. The Milwaukie Municipal Code includes requirements for off-street parking for both residential and commercial properties. Milwaukie's Zoning Ordinance incorporates both minimum and maximum parking requirements based on specific uses.

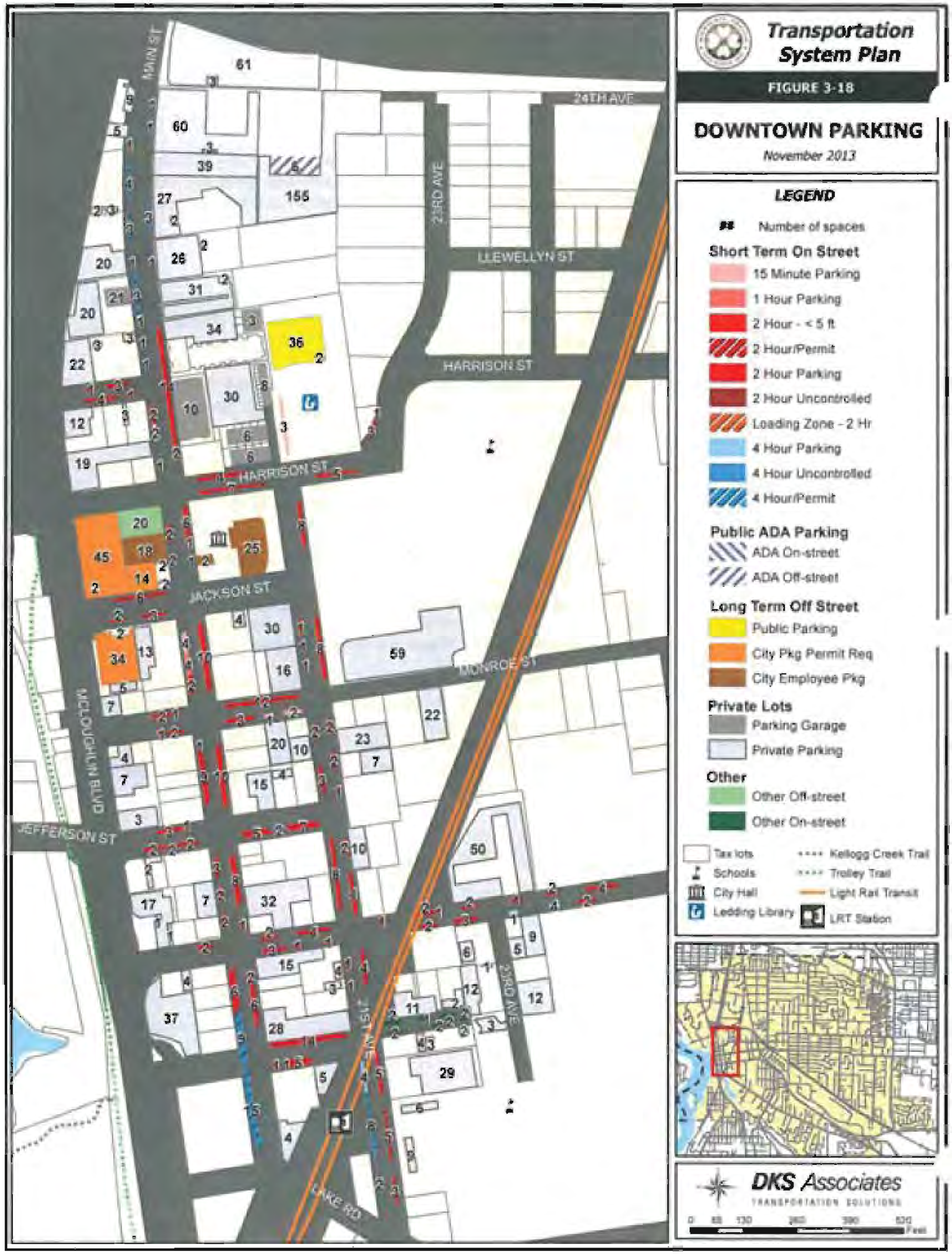
Downtown Milwaukie Parking

Downtown Milwaukie, the area bounded by McLoughlin Blvd, 21st Ave, Hwy 224, and Lake Rd, has parking characteristics that are different from other areas of the city. The off-street parking requirements in the Downtown Zones are the same as the rest of the city, except that no off-street parking is required in the Downtown Storefront Zone or in the Downtown Office Zone north of Washington St and east of McLoughlin Blvd. The Code also limits the development of parking facilities in the Downtown Residential and Downtown Open Space Zones.

The majority of the on-street parking in the downtown area is short-term in nature, which consists of 15-minute to 4-hour parking. The majority of the off-street parking is private surface parking serving businesses in the downtown area. Figure 3-18 illustrates the locations of on- and off-street parking. Table 3-9 summarizes the parking supply as well as the type and public/private nature of the parking.

Since 1993, the City has operated a permit system to allow employees of downtown businesses to park in three to four downtown parking lots, as well as in specifically marked on-street spaces. This parking permit program includes 151 parking spaces downtown. Permits can be obtained through the City of Milwaukie for a cost of $25 per month. All off-street public parking is available on a first-come, first-served basis only. There are no reserved spaces.

It is the City's practice to conduct regular detailed inventory and utilization studies of the parking within the downtown core area. The December 2012 utilization study found that there are many pockets of utilization in specific areas of downtown, particularly in the core commercial area along Main Street between Washington and Harrison Streets. However, there is an overall abundance of underutilized and available parking in the peak hour (11:00 a.m. to 12:00 p.m.).


Transportation System Plan
FIGURE 3-18
DOWNTOWN PARKING
November 2013
LEGEND
Number of spaces
Short Term On Street
15 Minute Parking
1 Hour Parking
2 Hour - < 5 ft
2 Hour/Permit
2 Hour Parking
2 Hour Uncontrolled
Loading Zone - 2 Hr
4 Hour Parking
4 Hour Uncontrolled
4 Hour/Permit
Public ADA Parking
ADA On-street
ADA Off-street
Long Term Off Street
Public Parking
City Pkg Permit Req
City Employee Pkg
Private Lots
Parking Garage
Private Parking
Other
Other Off-street
Other On-street
Tax lots
Schools
City Hall
Ledding Library
Kellogg Creek Trail
Trolley Trail
Light Rail Transit
LRT Station
DKS Associates
TRANSPORTATION SOLUTIONS
Feet
MAIN ST
24TH AVE
23RD AVE
LLEWELLYN ST
HARRISON ST
JACKSON ST
MONROE ST
MCLOUGHLIN BLVD
JEFFERSON ST
21ST AVE
LAKE RD

As Table 3-9 indicates, the greatest concentration of underutilized parking spaces is in private lots, which represents 84% of all parking in downtown. Private lots (both surface parking and garages) comprise 1,221 total parking spaces and reach peak occupancy of just 42.0%. This leaves 708 unused spaces in the private supply.

Table 3-9 Inventory of Existing Downtown Parking

Type of Parking		Total Inventory	Percentage of Inventory
On-Street			
Short-term (4 hours or less)		366	95%
Unmarked		11	3%
ADA parking		8	2%
	Subtotal	**385**	**100%**
Off-Street			
Short-term (public)		29	2%
Long-term (public)		123	9%
City employee parking		42	3%
ADA parking (public)		28	2%
Private parking garage		59	4%
Private surface parking		1,162	80%
	Subtotal	**1,443**	**100%**
All Parking		**1,828**	**100%**

Source: City of Milwaukie
Data Collected: December 13, 2012

Table 3-10 summarizes the utilization of downtown parking in December 2012.

Table 3-10 Use of Parking Spaces by Type

Type of Parking	Total Number of Spaces	Total Spaces Occupied at Peak Hour	Total Spaces Empty at Peak Hour	Peak-Hour Occupancy (%)
15 Minutes (on-street)	14	3	11	21.4
1 Hour (on-street)	4	3	1	75.0
2 Hours (on-street)	270	135	135	50.0
2 Hours, or all day with permit (on-street)	11	5	6	45.4
2-Hour loading zones (on-street)	5	0	5	0
4 Hours (on-street)	9	6	3	66.7
4 Hours, or all day with permit (on-street)	53	37	16	69.8
Unmarked (on-street)	11	9	2	81.8
ADA Spaces (on-street)	8	1	7	12.5
Subtotal On-Street	***385***	***199***	***186***	***51.7***
City permit (off-street)	87	60	27	69.0
Library/public (off-street)	65	27	38	41.5
City employee (off-street)	42	15	27	35.7
ADA spaces (off-street)	28	4	24	14.3
Subtotal Public Off-Street	***222***	***106***	***116***	***47.7***
Private lots (surface, garage)	1,221	513	708	42.0

Subtotal Private Off-Street	*1,221*	*513*	*708*	*42.0*
All Parking	1,828	818	1,010	44.7

Source: City of Milwaukie. Occupancy data was collected for the peak hour (11:00 a.m.-12:00 p.m.) on December 13, 2012.

Parking Demand

Parking ratios express the actual number of parking spaces available to serve demand for land uses (i.e., office, retail, residential, and/or mixed use development). The number of spaces represented by a parking ratio may exceed actual demand for parking or fall short of that demand. Demand ratios, on the other hand, are generally expressed in the context of peak-hour use of a specific built supply of parking. In other words, demand ratios represent an estimate of the actual number of spaces occupied at the peak hour relative to occupied land uses. Effectively managing the relationship between land uses and built and occupied parking supply is a fundamental challenge of parking management.

An understanding of actual demand also allows a city to estimate the impact of new development on an existing supply of parking. For downtown Milwaukie, two indicators help describe parking demand:

- **The actual current Built Ratio** of publicly available parking spaces, in relation to total built land uses in downtown Milwaukie.
- **The actual current Demand Ratio** for parking spaces per total built land use based on actual usage data from the most recent update of parking utilization.

Parking demand ratio calculations revealed two different, but equally useful, correlations:

- **Built Spaces to Built Land Use:** This represents the total number of existing parking spaces correlated to total existing land use square footage (occupied or vacant) within the study area. There are approximately 399,074 gross square feet of commercial uses in the Downtown Zones and a total of 1,828 parking spaces. Based on these numbers, there are approximately 4.58 parking spaces per 1,000 square feet of built land.
- **Combined Demand to Built Land Use:** This represents peak-hour occupancy within the Downtown Zones, combining the on and off-street supply (actual parked vehicles correlated with actual occupied building area). Parking spaces in downtown are utilized at a rate of 44.7% in the peak hour (818 vehicles parked). Building vacancy in downtown is approximately 11%, (approximately 355,176 of 399,074 gross square feet of building area occupied). Therefore, the actual current peak-hour demand ratio is approximately 2.3 parking spaces per 1,000 square feet of built land use.

Table 3-11 summarizes the analysis used to determine the built ratio of parking to built land use (i.e., 399,074 gross square feet) and general demand for that parking based on the peak-hour occupancy/demand for all parking inventoried in the study area.

Table 3-11 Downtown Parking Demand—Mixed Land Use to Built Supply

Sites in Downtown	Gross Square Footage (built)/ Gross Square Footage (occupied)[19]	Total Spaces Inventoried in Downtown[20]	Built Ratio of Parking (sq ft)	Total Spaces Parked in Peak Hour	Actual Ratio of Parking Demand/ 1,000 sq ft

[19] Assumes downtown vacancy rate of 11%, per City of Milwaukie data base.

92	399,074/355,176	1,628	4.58/1,000 sq ft	818	2.3/1,000 sq ft

To date, parking in downtown Milwaukie has been built at an average rate of over 4.5 spaces per 1,000 square feet of development. This rate appears to have been effective, though significant stall availability currently exists within the on- and off-street parking system.

Land uses in downtown Milwaukie are generating parking demand ratios of 2.3 spaces per 1,000 gross square feet of commercial/retail development. It is important to recognize that the current parking demand number is also reflective of the current level of use by other modes (i.e., transit, bike, carpool, and walking). If the City had higher expectations and success in increasing alternative mode uses in the future, the parking "demand" ratio would be influenced downward from its current level.

Summary of Parking Findings

The following summarizes key findings related to parking in Milwaukie. These findings will be utilized to help guide future improvements to address the deficiencies for this element related to the transportation environment.

- On-street parking comprises approximately 21% of the total parking supply (private and public) in the downtown area, while off-street parking comprises the remaining 79%.
- The total utilization of on-street parking in the downtown area is on average 52% throughout the day. While public off-street parking utilization is approximately 48% during the day. By comparison, the private off-street parking utilization is approximately 42% over the day.
- Parking space types with the highest utilization throughout the day are 1-hour, 4-hour, and unmarked parking spaces. All three of these types of parking are generally 65-80% occupied during the day and represent approximately 20% of the total on-street parking supply. Two-hour parking spaces are generally 50% occupied during the day.

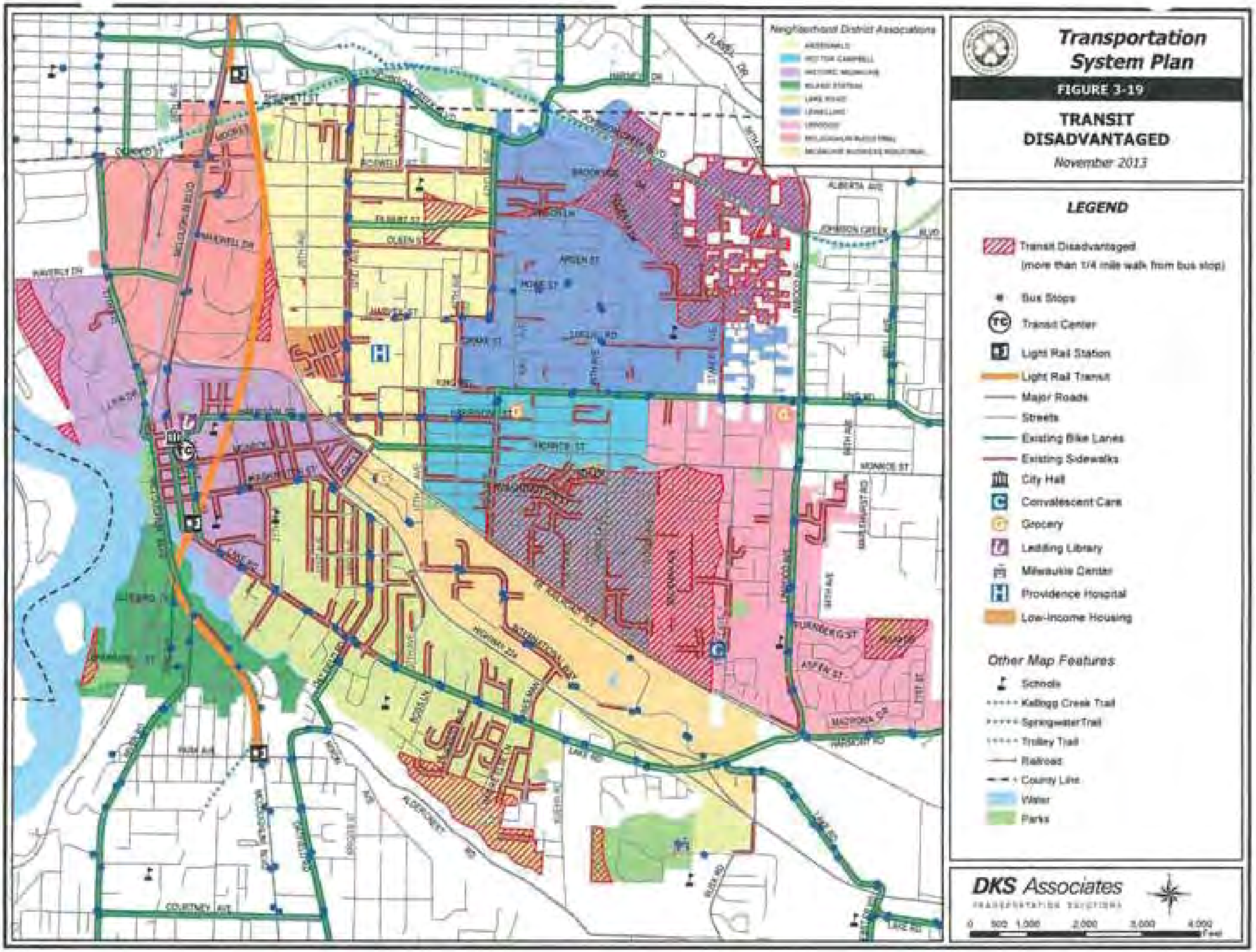
ENVIRONMENTAL JUSTICE

As stated by the Environmental Protection Agency, "Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."[21] Within the context of the TSP, Environmental Justice is an effort to identify underserved and vulnerable populations so Milwaukie can improve transportation services while avoiding future impacts.

Figure 3-19 identifies the location of low-income housing (indicating populations most likely to be dependant on public transportation), areas of Milwaukie that are outside of the public transit coverage area, as well as the location of features such as hospitals, schools, and libraries. Transit coverage is based on comparing land that has a high enough density to support transit service versus a 1/4-mile walking distance buffer around transit stops.[22] One significant gap in transit coverage area can be seen in the residential area north of Railroad Ave, stretching

[20] This number represents all on-street spaces as well as public and private off-street lots in operation within the study zone and summarized in Table 3-11, above.
[21] U.S. EPA, Environmental Justice, Compliance and Enforcement. Website, 2007
[22] Planning Commission TOD Committee, Walking Distance Research. http://www.fairfaxcounty.gov/planning/tod_docs/walking_distance_abstracts.pdf. Fairfax County, Virginia

east/west from Stanley Ave to 42^{nd} Ave. Other smaller gaps in transit coverage can be seen to the northeast and along the perimeter of the city.


Transportation System Plan
FIGURE 3-19
TRANSIT DISADVANTAGED
November 2013
Neighborhood District Associations
LEGEND
Transit Disadvantaged (more than 1/4 mile walk from bus stop)
Bus Stops
Transit Center
Light Rail Station
Light Rail Transit
Major Roads
Streets
Existing Bike Lanes
Existing Sidewalks
City Hall
Convalescent Care
Grocery
Ledding Library
Milwaukie Center
Providence Hospital
Low-Income Housing
Other Map Features
Schools
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Railroad
County Line
Water
Parks
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet

In addition to regular public transit services, programs run by TriMet and the Milwaukie Center[23] provide transportation to senior citizens and disabled persons. The Milwaukie Center's transportation program provides four transit opportunities. Daily buses provide door-to-door service to and from the Center for lunch, shopping, and other activities. These buses have wheelchair-lift capacity, and phone-in requests are available with 24-hour notice. User fees are charged for the daily service. Rides are $1.50 one way or $3 per day to the Milwaukie Center. Rides are $2 one way to the grocery store or $4 round trip. Riders may purchase a 5-, 10-, or 20-ride card. Scholarships are available for riders who need financial assistance.

TriMet operates a fixed-route shuttle service (#152) between the Milwaukie Transit Center and Clackamas Town Center which stops at the Center. Transportation Reaching People (TRP) offers volunteer-provided services to take elderly/disabled residents for medical appointments, shopping, and personal needs. TriMet LIFT is a door-to-door transportation service for people who are unable to ride regular buses due to disability. This program targets those who are unable to use public transportation due to a disability or disabling health condition, and covers areas 3/4 of a mile past the outermost portions of TriMet's bus and light rail (MAX) services. These services are available on appointment from 4:30 am to 2:30 am, seven days a week. Cost is $1.60 each way.

Summary of Environmental Justice Findings

The following summarizes key findings related to environmental justice in Milwaukie. These findings will be utilized to help guide future improvements to address the deficiencies for this element related to the transportation environment:

- Almost all of the facilities and/or land uses that would typically be dependent or rely upon transit/transportation facilities have support of these types of transportation facilities.
- The lack of pedestrian and bicycle connectivity within the city also contributes to the lack of transportation options for the transit dependant population in the city.

ENVIRONMENTAL RESOURCES

As a Transportation Planning Rule (TPR) requirement, a city's transportation system shall minimize adverse economic, social, environmental, and energy consequences.[24] An Environmental Resources Map is included here as Figures 3-20 through 3-22; showing Title 3 areas, the local Goal 5 inventory, National Wetland Inventory, identified historic properties, and known cultural resources.

The goal of Title 3 of the Metro Functional Plan is to protect water quality and floodplain areas. Since floodplains reduce flood hazards, control soil erosion, and reduce pollution of the region's waterways, the region's health and public safety are protected. It can be seen in Figure 3-20 that there are Title 3 areas dispersed throughout the city, including bands along Johnson Creek, the Willamette River, around Kellogg Lake, and along Kellogg Creek. Many of the Title 3 areas are also encompassed by floodplain, vegetation, and wetland zones. Endangered species habitat also correlates closely with the location of the Title 3 areas.

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[23] http://ncpd.com/wp-content/uploads/2011/02/[illegible].pdf
[24] OAR 660-012-0035, Environmental Considerations for Transportation Planning.

Local jurisdictions are required by Statewide Planning Goal 5 to adopt plans to protect natural resources and conserve scenic and historic areas and open spaces. Fish and wildlife habitats are among the natural resources that are protected by Goal 5. Figure 3-21 identifies the Goal 5 areas within Milwaukie.

Summary of Environmental Resources Findings

The following summarizes key findings related to environmental resources in Milwaukie. These findings will be utilized to help guide future improvements to address the deficiencies for this element related to the transportation environment.

- The 100-year flood plain affects lands to the west of McLoughlin from Waverly Dr to Washington St, then crosses to the east side of McLoughlin Blvd from Washington St to Oatfield Rd. This is of particular concern for any potential improvements associated within this area.
- Two large wetland and wetland buffer areas have been identified. One is located on the southeast corner of 37th Ave/Railroad Ave, while the other is located on the south side of Railroad Ave near 47th Ave. When considering potential improvements in this area, the City should be cautious about impacts to these areas.

Transportation System Plan

FIGURE 3-20

WETLANDS, FLOOD & CULTURAL FEATURES

November 2013

LEGEND

- Historic Resource
- 100 Year Flood Plain*
- Willamette Greenway
- 1996 Flood Extent
- Wetland
- Vegetated Corridor
- 10' Contours

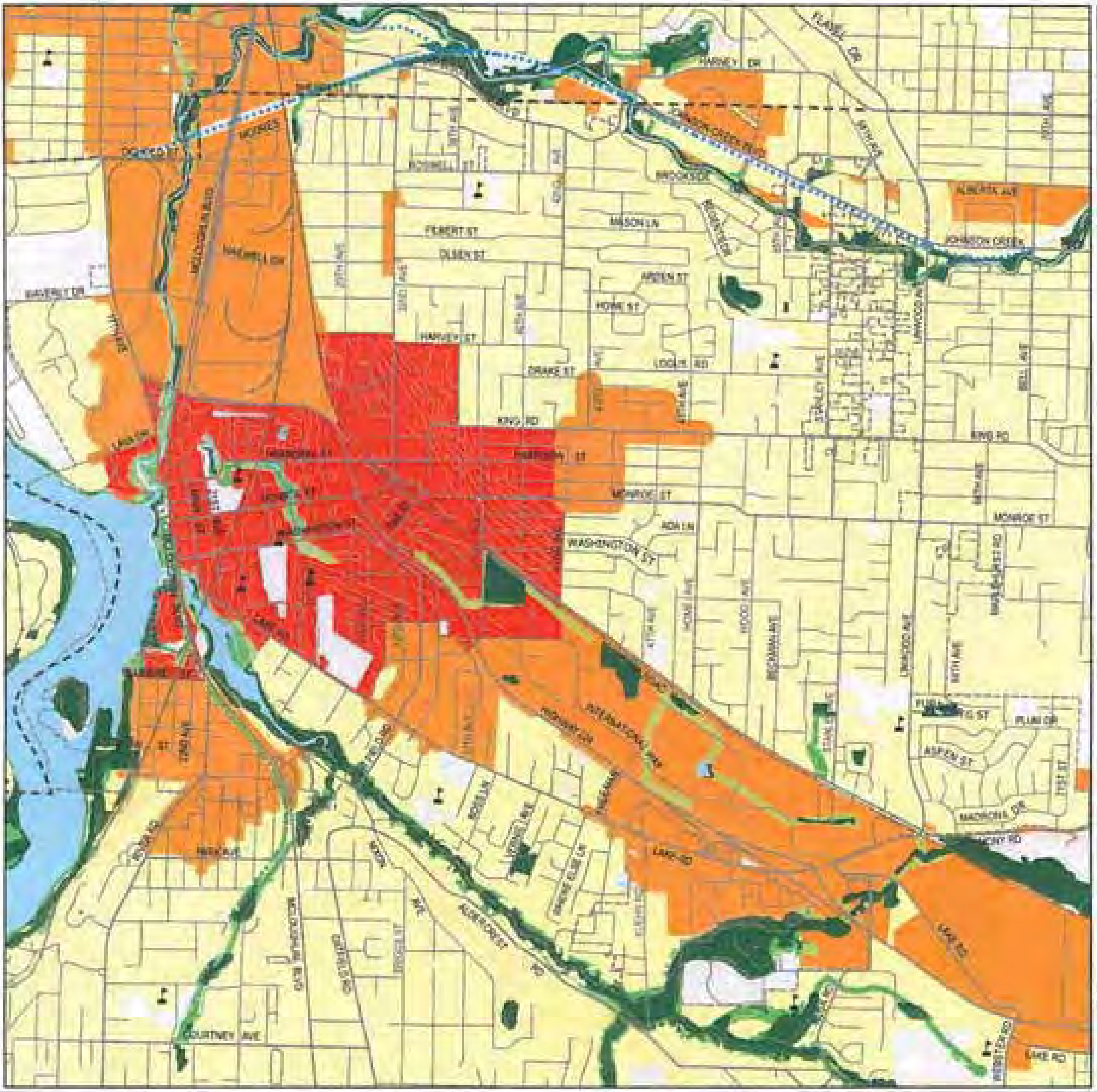
Other Map Features

- Schools
- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail
- Major Roads
- Streets
- Railroad
- County Line
- Water
- City Limits

*Source: Metro RLIS; FEMA with local input

DKS Associates
TRANSPORTATION SOLUTIONS

0 500 1,000 2,000 3,000 4,000 Feet



Transportation System Plan

FIGURE 3-21

ENVIRONMENTAL RESOURCES - GOAL 5

November 2013

LEGEND

Goal 5 Conservation Value

- HIGH
- MODERATE
- LOW

Goal 5 Development Value

- HIGH
- MEDIUM
- LOW
- NOT RANKED

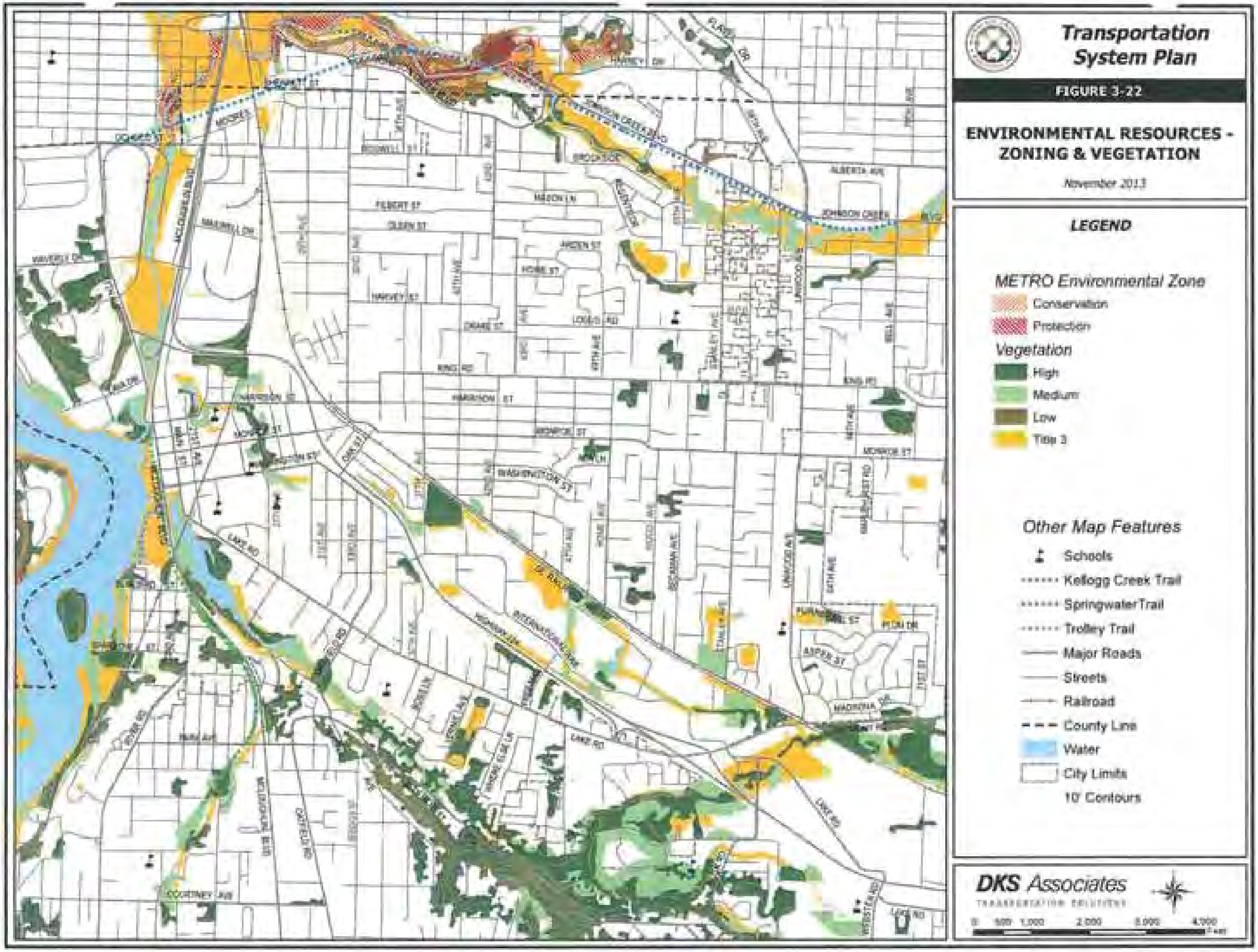
Other Map Features

- Schools
- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail
- Major Roads
- Streets
- Railroad
- County Line
- City Limits
- Water
- 10' Contours

DKS Associates

TRANSPORTATION SOLUTIONS

0 500 1,000 2,000 3,000 4,000 Feet


Transportation System Plan
FIGURE 3-22
ENVIRONMENTAL RESOURCES - ZONING & VEGETATION
November 2013
LEGEND
METRO Environmental Zone
Conservation
Protection
Vegetation
High
Medium
Low
Title 3
Other Map Features
Schools
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Major Roads
Streets
Railroad
County Line
Water
City Limits
10' Contours
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000
Feet
JOHNSON CREEK BLVD
KING RD
HARRISON ST
MONROE ST
WASHINGTON ST
LAKE RD
LINWOOD AVE
MCLOUGHLIN BLVD
OATFIELD RD
COURTNEY AVE
WEBSTER RD

4 Future Forecasting Process

TRAVEL DEMAND AND LAND USE

Metro's urban area transportation forecast model is used to determine future traffic volumes in Milwaukie. This forecast model translates assumed land uses into person trips, selects travel modes and assigns motor vehicles to the roadway network. These traffic volume projections form the basis for identifying potential roadway deficiencies and evaluating alternative circulation improvements. This chapter will describe the forecasting process, including key assumptions and the land use scenario developed from the existing Comprehensive Plan designations and allowed densities.

PROJECTED LAND USE GROWTH

Land use is a key factor in developing a functional transportation system. Considerations must include the amount of land to be developed, the type of land uses that will be developed, and the relationship between mixed land uses and associated demands on the transportation system.

Projected land uses developed for the study area reflect Milwaukie's Comprehensive Plan and Metro's land use assumptions for the year 2035.[1] Complete land use data sets have been developed for the following conditions.

- Existing 2010 (base travel forecast for the region).
- Future 2035 Conditions.

The following sections summarize the forecasted growth in land uses that influence travel within the City of Milwaukie.

GROWTH WITHIN MILWAUKIE

The base year travel model is updated periodically to reflect the most current and up-to-date inputs related to land use for the region. For this study, the available base model provided by Metro represents land uses for 2010. This land use database includes the number of dwelling

[1] Metro works cooperatively with local agencies to determine local existing and future land uses that incorporate existing land uses and reflects input from local agencies. These land uses are then regionally adopted and updated when new travel demand models are developed.

units (housing), retail employees, service employees, and other employees. Table 4-1 summarizes the aggregated land use data for the 2010 base and future 2035 scenarios within the study area. This land use data is divided into smaller areas called Transportation Analysis Zones (TAZs), which contain a portion of the households, retail, service and other employees. This land use creates varying trip modes such as motor vehicle, pedestrian, bicycle and transit trips.

Table 4-1 Milwaukie TSP Study Area Land Use Summary

Land Use	2010	2035	Increase	Percent Increase
Households (HH)	9,791	11,668	877	19%
Retail Employees (RET)	1,405	1,902	497	35%
Service Employees (SER)	3,860	4,943	1,083	28%
Other Employees (OTH)	6,754	7,792	1,038	15%

Source: Metro (subset of TAZ data that approximates Milwaukie city limits)

The overall operation of the transportation system is affected as land uses change. Retail land use typically generates a higher number of trips per acre of land than households and other land uses during the p.m. peak period. The location and design of retail land use in a community can greatly affect future transportation system operation. Additionally, if an area within the city is homogeneous in land use character (i.e. all employment or residential), the transportation system typically supports significant trips coming to or from the area rather than within the area. Integration of residential, commercial, and employment land uses within a small geographic area promotes sustainable livability, where residents can work, shop, and play locally. Among other significant benefits, this reduces long-distance traveling by residents who would otherwise be seeking services outside their locality.

Table 4-1 displays the projected employment growth (approximately 2,600 jobs) in Milwaukie that is projected to occur over a 25-year period. The transportation system should be monitored to make sure that land uses in the plan are balanced with transportation system needs. A primary purpose of a TSP is to determine those needs and help identify transportation projects for all modes that help balance future needs with the forecasted 2035 land uses.

Within the study area there are approximately 36 TAZs used by Metro for planning purposes. The number of TAZs in the study area has increased from 31 since the last TSP update, due to Metro's continued refinement of the regional travel demand model. The TAZ boundaries are shown in Figure 4-1.

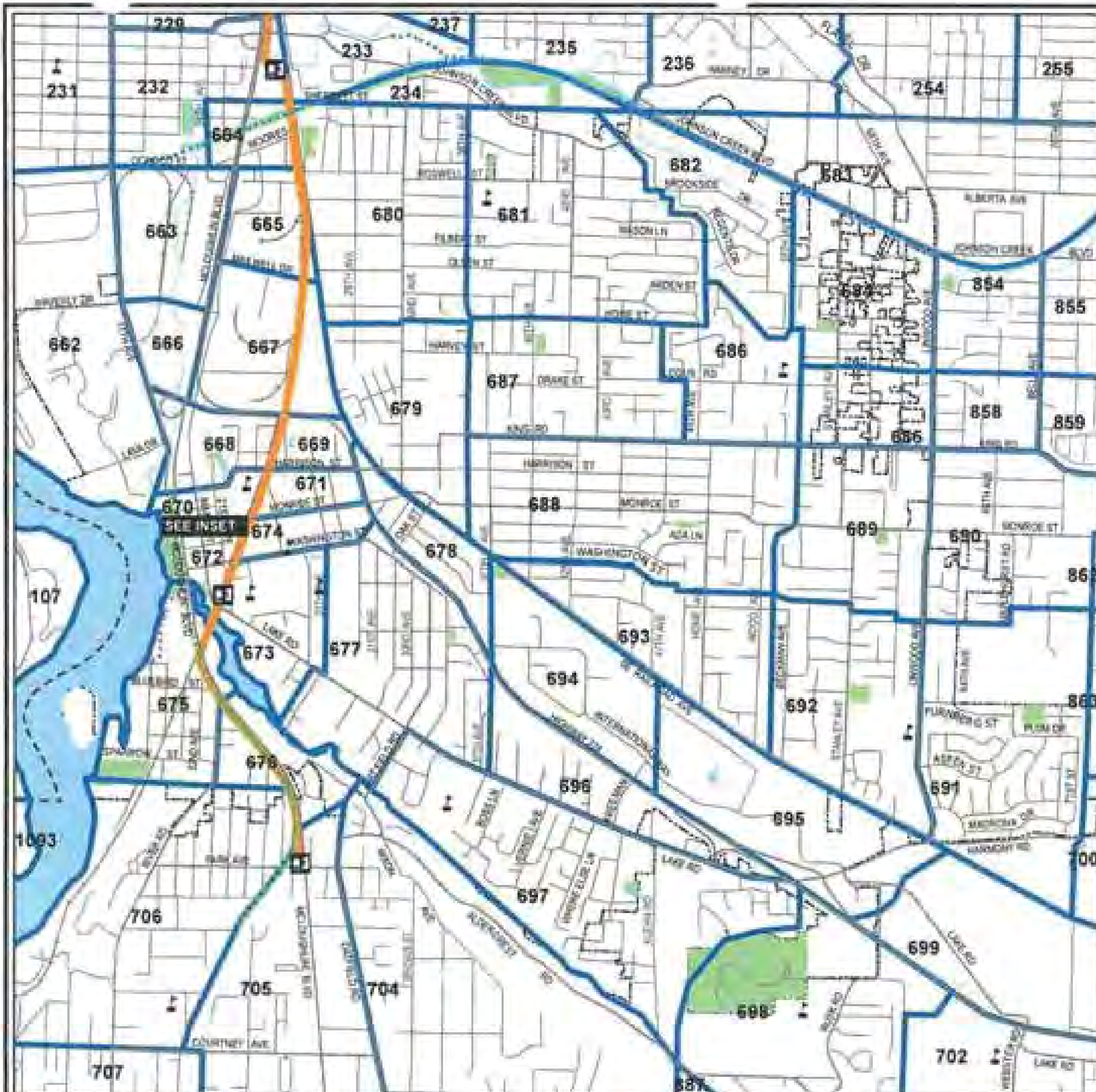
METRO AREA TRANSPORTATION MODEL

Accurately forecasting travel demand of estimated future population and employment is important for determining future transportation system needs. The objective of the transportation planning process is to provide necessary information to aid decision-making of where and when transportation system improvements should be made to meet future travel demand. Metro uses VISUM, a computer-based transportation modeling program to process large amounts of data related to land use and person trips for several modes of travel for the Portland Metropolitan area. The modeling process for the Milwaukie TSP uses the 2010 and 2035 travel demand models during the 2-hour p.m. peak period to develop future forecasts within Milwaukie. These models are "Beta" versions that have been updated since the adoption of Metro's 2035 Regional Transportation Plan (RTP).[2]

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

1. **Trip Generation:** Converts land use type into total person trips.
2. **Trip Distribution:** Determines the origins and destinations within the region.
3. **Mode Choice:** Determines which mode of travel (i.e. motor vehicle, bicycle, pedestrian, transit, carpool, etc.) each trip will use.
4. **Traffic Assignment:** Assigns the trips by mode to specific routes in the transportation network that match the trip distribution locations.

[2] Use of the Beta model is consistent with guidance from Metro. Memo: *Administrative Interpretation of 2035 Regional Transportation Plan, No 2012-2 – Guidance for Transportation System Plans and Corridor Plans about regional population and employment forecasts recommended for use in planning efforts in 2012*, John Williams, Metro, May 2, 2012.



Transportation System Plan

FIGURE 4-1

TRANSPORTATION ANALYSIS ZONES

November 2013

LEGEND

Transportation Analysis Zones

- Metro Beta Model Transportation Analysis Zones
- #### Transportation Analysis Zone Number

Other Map Features

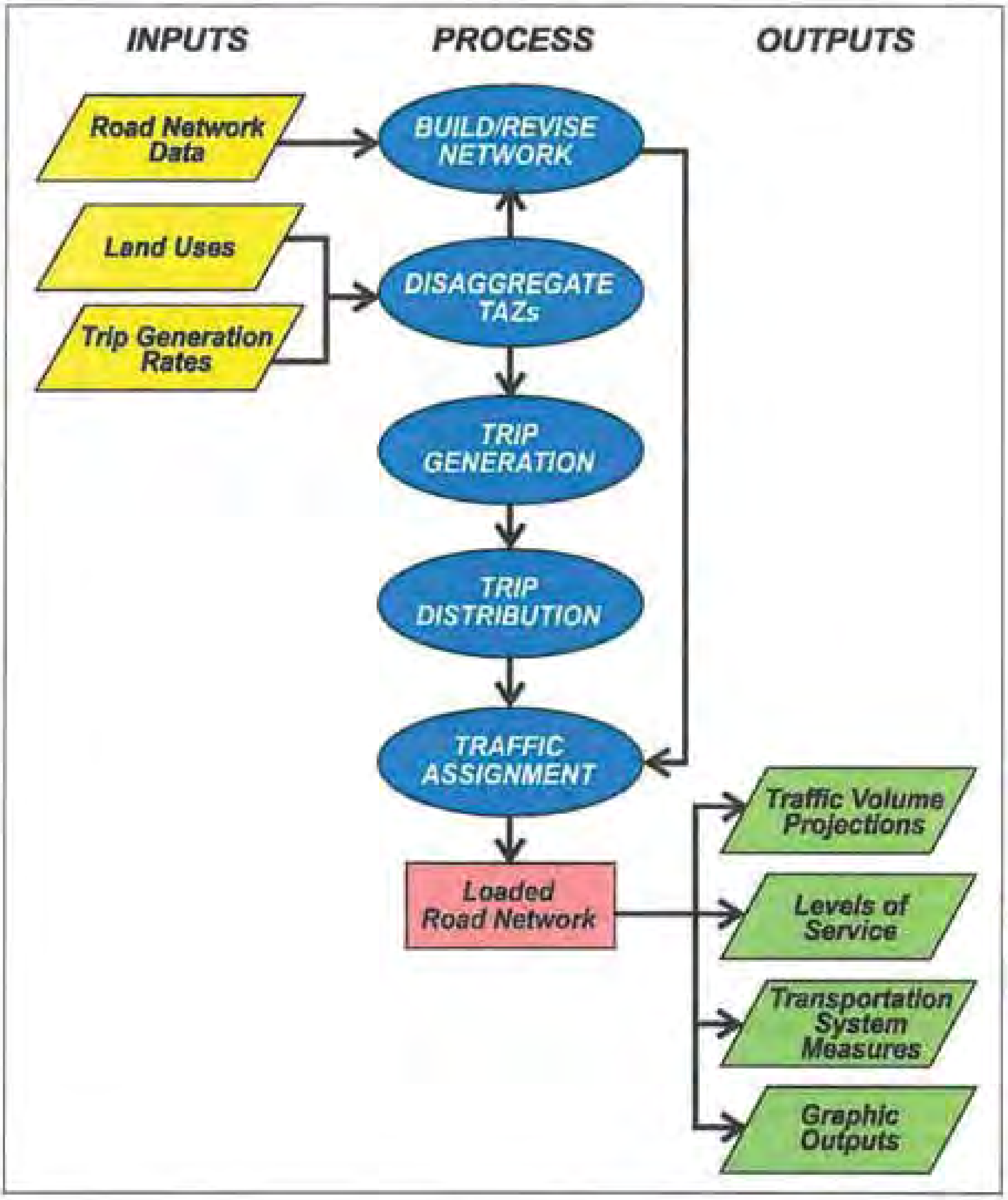
- Schools
- Kellogg Creek Trail
- SpringwaterTrail
- Trolley Trail
- Light Rail Station
- Light Rail Transit
- Major Roads
- Streets
- Railroad
- County Line
- Water
- Parks
- City Limits

DKS Associates

TRANSPORTATION SOLUTIONS

0 500 1,000 2,000 3,000 4,000 Feet

Figure 4-2: Travel Forecasting Model Process



The base roadway network in the existing 2010 traffic model reflects the current street and roadway system. The future 2035 roadway system in the Metro model consists of a "low build" condition that is typically consistent with the RTP financially constrained system. It includes both projects for which funding has been identified and the funded projects listed in the 2007 Milwaukie TSP. Projects in both the RTP and the TSP were then validated in the study process. Forecasts of p.m. peak period traffic flows were produced for every major roadway segment within Milwaukie. Traffic volumes were projected on all arterials and most collector streets. While most local streets are not included in the model, many are represented by TAZ connectors in the model process.

TRIP GENERATION

The trip generation process translates land use quantities (number of dwelling units, retail employees, service employees and other employees) into vehicle trip ends (number of vehicles entering or leaving a TAZ) using trip generation rates established during the model verification process. The Metro trip generation process is elaborate, entailing detailed trip characteristics for various types of housing, retail, service, other employment, and special activities. Typically, most traffic impact studies rely on the Institute of Transportation Engineers (ITE) research for analysis.[3] The model process is tailored to variations in travel characteristics and activities in the region. For reference, Table 4-2 provides a summary of the approximate average evening peak-hour trip rates used in the Metro model. These are averaged over a broad area and do not account for pass-by trips; thus, they are different than driveway counts represented by ITE for similar land uses. This data provides a reference for the trip generation process used in the model.

Table 4-2 Approximate Average P.M. Peak Period Trip Rates Used in Metro Model

	Average Trip Rate/Unit		
Unit	In	Out	Total
Household (HH)	0.69	0.35	1.04
Retail Employee (RET)	0.89	1.23	2.12
Service Employee (SER)	0.19	0.47	0.66
Other Employee (OTH)	0.13	0.39	0.52

Source: DKS Associates/Metro Regional Travel Demand Model

Table 4-3 summarizes the total estimated 2010 and 2035 motor vehicle trips for Milwaukie as well as the estimated growth in vehicle trips during the two-hour p.m. peak period. Using the forecasted land use and calculated trip rate values, the total number of in- and out-trips can be produced for each TAZ in the region. Vehicle trips in Milwaukie are expected to grow by approximately 16% between 2010 and 2035 if the land develops according to the 2035 land use assumptions. Assuming a 25-year horizon to the 2035 scenario, this represents annualized growth rate of approximately 0.61% per year.

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

Table 4-3 Milwaukie Vehicle Trip Generation (2-Hour P.M. Peak Period)

	2010 Trips	2035 Trips	Percent Increase
Milwaukie TSP update Study Area	21,328	24,816	16%

Source: Metro Regional Travel Demand Model

TRIP DISTRIBUTION

This step estimates how many trips travel from one area in the model to any other area. Distribution is based on the number of trip ends generated in each TAZ zone pair, and on factors that relate the likelihood of travel between any two TAZs to the travel time between the zones.

In projecting long-range future traffic volumes, it is important to consider potential changes in regional travel patterns. Although the location and amount of traffic generation in Milwaukie are essentially a function of future land use in the city, the distribution of trips is influenced by expected congestion on roadways and regional growth, particularly in neighboring areas such as Portland, Oregon City, and the unincorporated Clackamas County areas. The model and trip distribution can also be used to help define the number of internal, external, and through trips for Milwaukie. These types of trips are as follows:

- **Internal trips** are trips that start and end within the city limits of Milwaukie.
- **External trips** are trips that either start in Milwaukie and end outside the city, or start outside the city and end within the city.
- **Through trips** are trips that pass through Milwaukie and have neither an origin nor a destination in Milwaukie.

Table 4-4 quantifies the internal, external, and through trips for all roadways within Milwaukie, as forecasted by the Metro regional travel demand model for 2010 and 2035. The number of internal versus external or through trips reveals that few people actually both live and work in Milwaukie. The much larger number of external than internal trips represents the people who live outside of Milwaukie and work in the city, or live in Milwaukie but work outside of the city. The high number of through trips through the city indicates that Milwaukie functions as a conduit for a significant number of people between their jobs and homes, both of which are outside the city limits of Milwaukie. Comparing the percentage of trips for the model year 2035 versus 2010 shows there is a slight decrease (2%) in the percentage of external trips during the p.m. peak period. It also shows that the percentage of through trips slightly increases over the 25-year time span.

Table 4-4 Milwaukie Vehicle Trip Distribution (2-Hour P.M. Peak Period)

Trip Type	2010	2035	% Change
Internal Trips (I-I)	10%	10%	0%
External Trips (X-I or I-X)	51%	49%	-2%
Through Trips (X-X)	39%	41%	+2%

Source: DKS Associates/Metro Regional Travel Demand Model

I = Internal location
X = External location

MODE CHOICE

This step in the modeling process determines how many trips will be made by various modes (single-occupant vehicle, transit, carpool, pedestrian, bicycle, etc.). The 2010 mode splits are incorporated into the base model and adjustments to that mode split may be made for a future scenario dependant upon any anticipated changes in transit or carpool use. These considerations are built into the forecasts used for 2035. Based upon analysis of the forecasted mode choice in 2035, a study was performed to determine the level of non-single-occupant-vehicle (non-SOV) mode share. The travel model provides estimates of the various modes of travel that can be generally assessed at the transportation analysis zone level. Figure 4-3 summarizes the level of non-SOV mode share estimated for 2035 using the regional travel demand forecast model in comparison to the modal targets established in the RTP through Table 1-3 of the 2008 RTP. Generally, the areas served by transit service have the highest levels of non-SOV mode choice. The targets are based on the 2040 design type for areas around the region, as follows for each design type and non-SOV target:

- 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%).

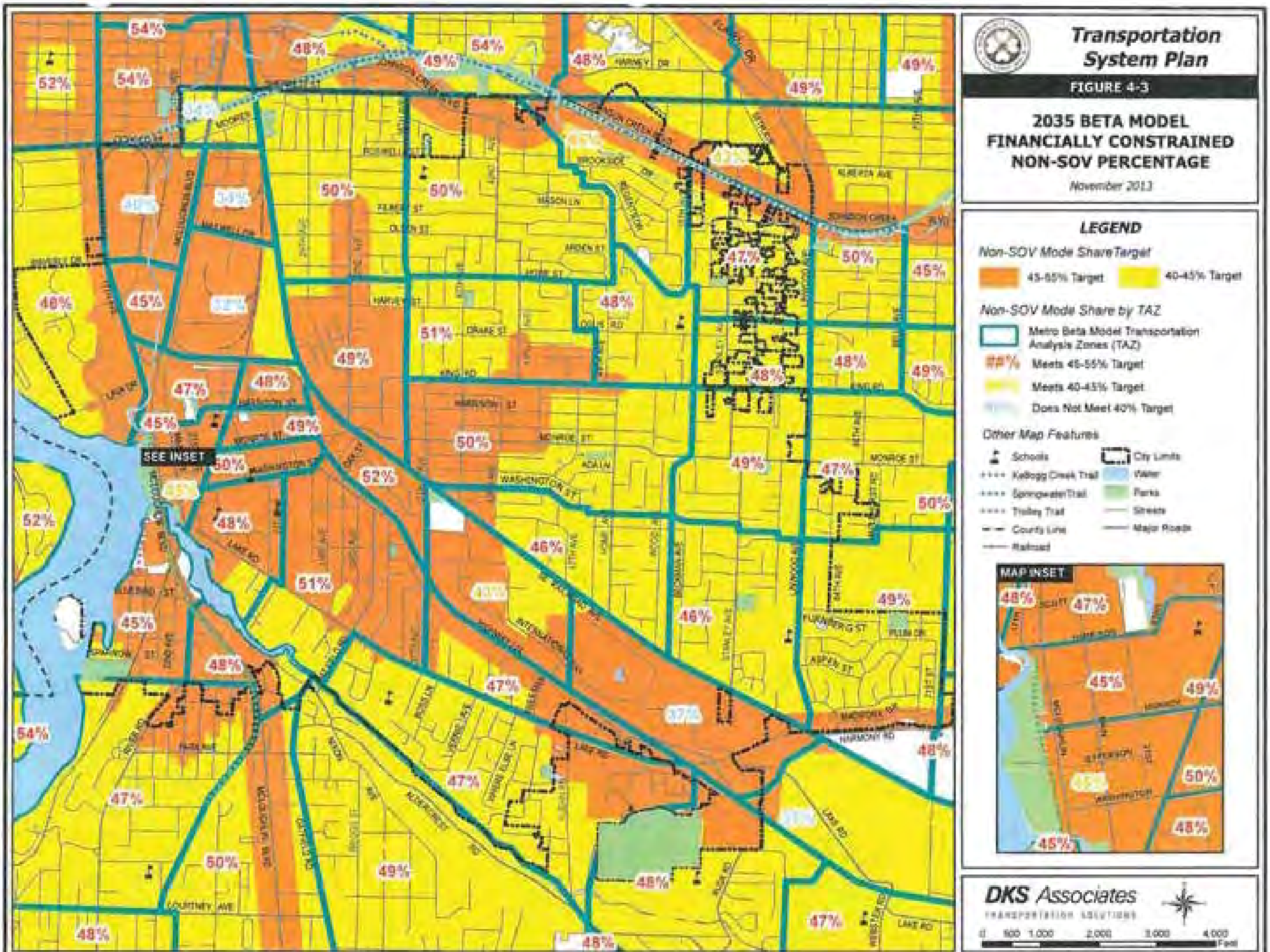
These non-SOV targets are aggregated by design type groupings (as listed above) and colored in Figure 4-3 as orange (45-55% target) and yellow (40-45% target). For each TAZ, the 2035 non-SOV share is listed. In general, the change from year 2010 is 2% growth or less. The 2035 non-SOV share for each TAZ 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.

Generally, the areas served by transit service have the highest levels of non-SOV mode choice.

TRAFFIC ASSIGNMENT

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

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


Transportation System Plan
FIGURE 4-3
2035 BETA MODEL
FINANCIALLY CONSTRAINED
NON-SOV PERCENTAGE
November 2013
LEGEND
Non-SOV Mode Share Target
45-55% Target
40-45% Target
Non-SOV Mode Share by TAZ
Metro Beta Model Transportation Analysis Zones (TAZ)
##% Meets 45-55% Target
Meets 40-45% Target
Does Not Meet 40% Target
Other Map Features
Schools
Kellogg Creek Trail
Springwater Trail
Trolley Trail
County Line
Railroad
City Limits
Water
Parks
Streets
Major Roads
MAP INSET
SEE INSET
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet
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HARVEY DR
WASHINGTON ST
MONROE ST
HARRISON ST
KING RD
DRAKE ST
LAKE RD
HARMONY RD
ASPEN ST
COURTNEY AVE

MODEL VERIFICATION

The base 2010 traffic volumes from the regional model were compared against actual traffic volume counts at specific locations on key arterials and at key intersections. These key intersections and corridors created "screenlines" (imaginary lines drawn across the transportation system that intersect many roadways). The screenlines are used to back-check the actual volume against the model volume to make sure that the model is predicting traffic volumes and travel patterns that reflect actual existing conditions. Most arterial traffic volumes meet screenline tolerances for forecast adequacy.[4] If roadways and/or intersection volumes are not within this tolerance, modifications to the roadway network in the base model are made to help adjust and calibrate the model to bring those volumes to within acceptable tolerance levels. These same changes in the base model are made to the future model if those changes do not conflict with a planned project in the future model (e.g., a roadway being widened or improved). Based on this performance, the existing and future models are used for future forecasting and assessment of circulation change.

MODEL APPLICATION TO MILWAUKIE

Intersection turn movements were extracted from the model at study area intersections for both the base year 2010 and forecast year 2035 scenarios. A "post processing" technique[5] is utilized to refine model travel forecasts to the volume forecasts utilized for 2035 intersection analysis. "Post processing" is a technique that uses existing traffic count data, base year model data, and future year model data to estimate future volumes by adding the increment of future traffic volume growth to the existing count data. This approach minimizes the effects of any model error by adding the increment of growth projected based on changes in land use to the base year counts.

[4] Typically within a 10% variance.

[5] National Cooperative Highway Research Program (NCHRP) 255, Highway Traffic Data for Urbanized Area Project Planning and Design, Transportation Research Board, Washington DC, 1982.

5 Pedestrian Element

Walking is the most affordable and accessible of all transportation modes. It is also clean, low-impact, and healthy for the individual. A safe and comfortable pedestrian environment allows people of all ages and abilities to travel independently. This chapter summarizes strategies used in evaluating the future needs of the city of Milwaukie's pedestrian network, recommends improvements for the network, outlines pedestrian needs for the next 22 years, and identifies projects that address the city's needs.

GOALS AND POLICIES

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Listed below are the specific TSP Goals that guide the City's policies on pedestrian access and connectivity:

- **Goal 1 Livability** guides the City to provide convenient, accessible and coordinated pedestrian facilities and to minimize barriers to pedestrian travel.
- **Goal 2 Safety** calls for the design and maintenance of safe and accessible walkways.
- **Goal 3 Provide Travel Choices** directs the City to provide an integrated network of walkways that connect people with transit.
- **Goal 4 Quality Design** calls for pedestrian facilities to be integrated with street and development planning in a context-sensitive manner.
- **Goal 5 Reliability and Mobility** calls for enhanced connectivity, which particularly benefits pedestrians.
- **Goal 6 Sustainability** guides the City to increase the use of walking as a low-impact form of travel.

NEEDS

There are generally three different types of pedestrian trips: residential, service, and recreational trips. The deficiencies in Milwaukie's pedestrian system affect each group differently, but common to all three are the needs for connectivity, access and safety. The most common overall need is to provide a safe and interconnected system that makes pedestrian travel a viable option, especially for residential trips less than 1/2 mile in length and recreational trips less than one mile in length.

Facilities

Throughout Milwaukie, pedestrian facilities are generally deficient. Although some arterial and collector streets in the city provide limited sidewalks as shown in Figure 3-2, the north and east areas have many collectors and arterials lacking sidewalks. Many of the neighborhood and local streets throughout the city do not have pedestrian facilities. The perimeter of the city is well-served by three off-street multiuse paths, the Springwater Trail, Kellogg Creek Trail into Riverfront Park, and Trolley Trail, though gaps in the trail network exist to the east and south. Improvements are needed throughout the city, but especially on key connecting corridors that link neighborhoods to schools, parks, and commercial centers.

The Portland-Milwaukie Light Rail (PMLR) project, which is currently under construction, is building new sidewalks and pedestrian crossings around the new station in the south downtown area and will also significantly improve pedestrian facilities at the new station areas at Tacoma St and Park Ave.

City policy directs most development to fill in sidewalk gaps directly adjacent to new development. There is currently no policy to allow development to fill gaps in the pedestrian network if the gap is not adjacent to the developing site. The City should explore a different policy to collect fees from new development to help improve connections and crossings that may not be adjacent to the developing parcel.

Connectivity

Milwaukie's pedestrian network is disconnected, largely due to the lack of convenient crossings of large regional facilities: Hwy 99E, Hwy 224, and the Union Pacific Railroad. The wide design and high vehicle speeds of these roadways result in potentially unsafe and unpleasant pedestrian crossings. Without direct connections across these barriers, pedestrians are forced to travel out of direction and sometimes use busy arterial and collector streets to meet their destinations. Even where pedestrian crossings do exist, many are deficient. The use of asphalt on railroad crossings is a concern for pedestrians, since asphalt is more likely to buckle than concrete and results in uneven walking surfaces. Uneven walking surfaces are particularly problematic for elderly and disabled individuals. Numerous dead-end and curvilinear streets throughout the city also contribute to the disconnected pedestrian network. Connectivity improvements are needed in two key areas: (1) crossing improvements at most highways, railroads, and arterials,[1] and (2) connections to schools, parks, and transit routes.

FACILITIES

The most common type of pedestrian facility is a concrete sidewalk that is separated from the roadway by an extruded curb. Sidewalks must be built to current City of Milwaukie design standards and comply with the Americans with Disabilities Act, which requires at least 4 ft of unobstructed sidewalk.[2] Wider sidewalks are desirable to promote pedestrian travel on all roadways.

Some of Milwaukie's streets are not only important local connections, but are also designated as regionally important pedestrian streets. Streets identified in the Metro 2004 RTP as transit/mixed use corridors (streets in downtown Milwaukie, 17th Ave, Harrison St, King Rd, and 32nd Ave) are areas that are served by quality transit service and will generate substantial pedestrian traffic near neighborhood-oriented retail development, schools, parks, and bus stops.

[1] Any potential new crossing location would need to meet Oregon Department of Transportation (ODOT) crossing guidelines and criteria to make sure the crossing is warranted and safe.
[2] *Americans with Disabilities Act*, Uniform Building Code.

These corridors should include such pedestrian design features as wide sidewalks with buffering from traffic, pedestrian-scale lighting, benches, bus shelters, and street trees.

Milwaukie has three identified off-street multiuse paths in the Metro RTP regional trails and greenways system: the Springwater Trail, the Trolley Trail, and the Kellogg Creek greenway. The majority of the Springwater Trail within the city has been constructed. However, there is a gap between the Milwaukie section of the Springwater Trail and the section along the east bank of the Willamette River. The Trolley Trail, a project led by the North Clackamas Parks District, is currently under construction. The final segment of the Trolley Trail within the city will be completed in conjunction with the PMLR project. These facilities will be designed and built according to regional standards, as well as local jurisdictional standards.

RECOMMENDATIONS

Strategies

Milwaukie's pedestrian system is challenged by an incomplete arterial/collector sidewalk system, a lack of local street connectivity, arterial crossings with potential safety and connectivity issues, and a lack of complete multiuse trails (see Chapter 3).

The City has several strategies for addressing pedestrian system needs and guiding project prioritization. The prioritization process helps to focus community investment on those projects that are most effective at addressing critical needs, while deferring other projects of lesser importance. The strategies for pedestrian facilities include:

- Key pedestrian corridors to connect neighborhoods with schools, parks, activity centers, and major transit stops.
- Arterial crossing and safety enhancements.
- Fill gaps in the network where some sidewalks exist.
- Pedestrian corridors that connect to major recreational uses.
- Enforcement of laws that protect pedestrians.
- Education about pedestrian safety and available walking routes.

These strategies would be implemented by projects that address needs and deficiencies. The projects fall into three categories:

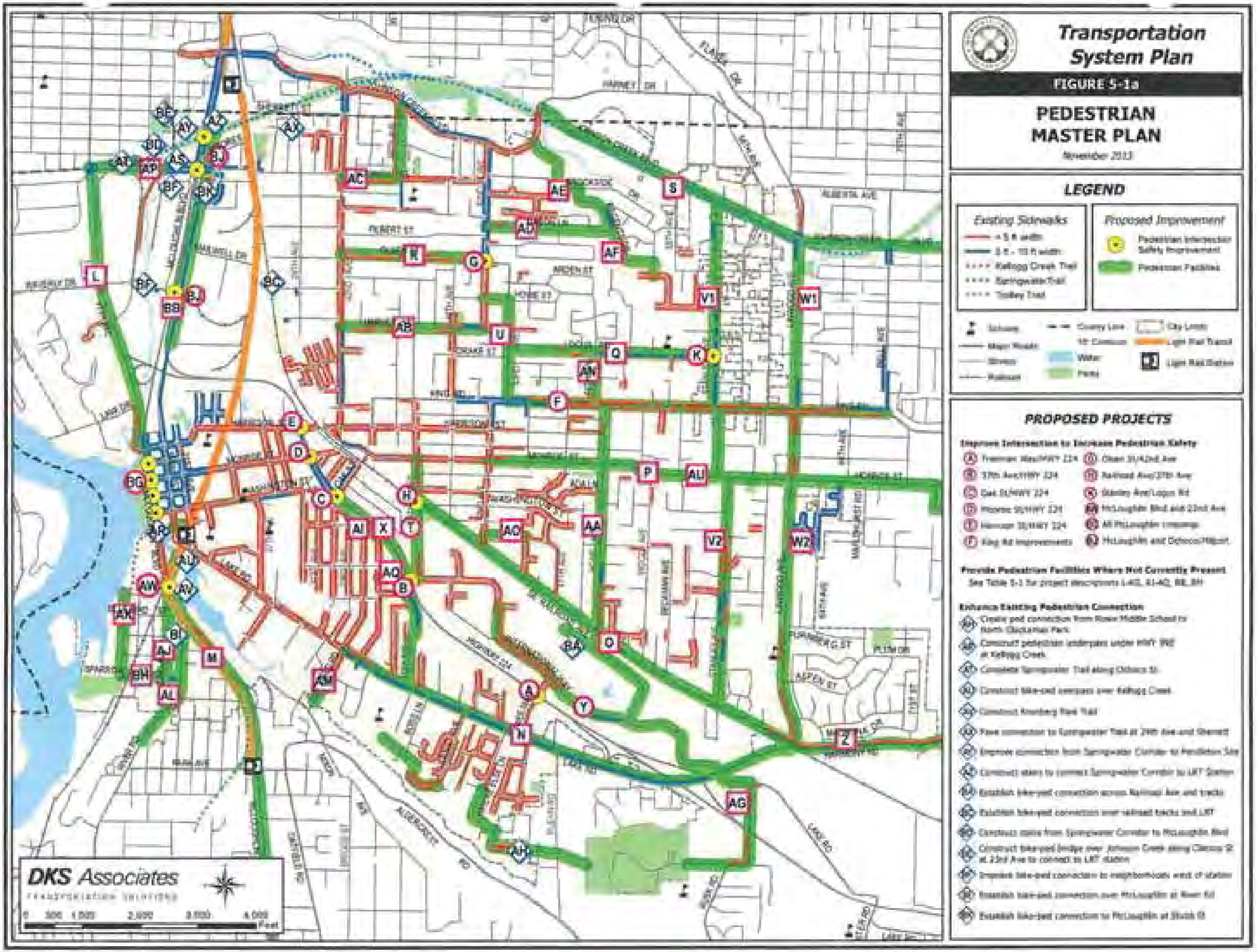
- **Capital:** projects that require construction of some sort of physical infrastructure. Capital projects typically require ongoing maintenance that must be programmed into the maintenance schedule.
- **Operational:** projects which involve actions that make the existing transportation infrastructure more useable. They can include upkeep of existing facilities, educational campaigns, or distributing information about the use of the transportation network. They are typically smaller in scale and dollars than capital projects, and are implemented more broadly than in one specific location.
- **Policy:** Projects that improve the pedestrian environment that typically do not result in a physical improvement, but rather in a fundamental change in the way pedestrian travel is perceived or treated within Milwaukie. Proposed policy projects are listed below.
  - Ensure overhanging vegetation and other sidewalk obstructions are removed; ensure sidewalk safety hazards are repaired.

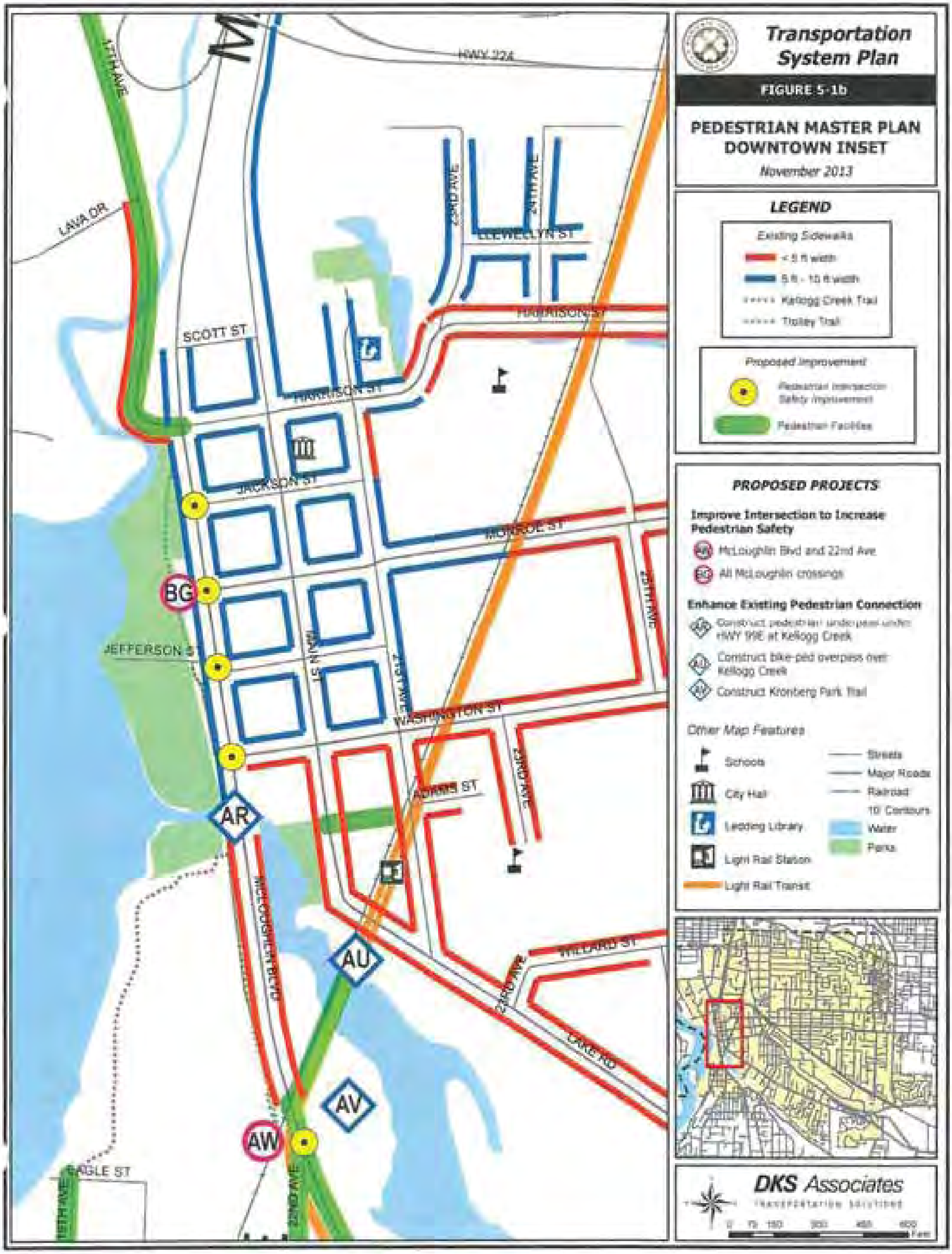
- Enforce speeding laws, utilizing tools such as photo radar, to make the streets generally safer; enforce laws related to pedestrian crossings and crosswalks.
- Utilize safe routes to schools programs and resources to increase pedestrian safety around schools.
- Support mixed-use development and services near residential areas to encourage walking; reexamine vehicle-centered policies, such as high amounts of required parking.
- Construct sidewalks or appropriate walkways everywhere; i.e., complete streets as development occurs or capital funds become available.
- Educate the general public about pedestrian safety; inform the general public about traffic laws related to pedestrians.

Master Plan

The Pedestrian Master Plan includes a list of projects that could address system needs and achieve the strategies for improving the pedestrian system (see Figure 5-1a). An inset map showing more detail in the downtown area is provided in Figure 5-1b. Some projects from the master plan were selected for inclusion in a Pedestrian Action Plan, which consists of projects that the community has identified for the City to give priority in allocating funding and/or pursuing additional funding. As development occurs, streets are rebuilt, and as other opportunities (grant programs) arise, projects on the master plan should be pursued as well.

The planning-level cost estimates provided for each project in Table 5-1 are based on general unit costs for transportation improvements but do not reflect the unique project elements that can significantly add to project costs. For each of these projects, the City will refine the cost estimate to include right-of-way requirements and costs associated with special design details.


Transportation System Plan
FIGURE 5-1a
PEDESTRIAN MASTER PLAN
November 2013
LEGEND
Existing Sidewalks
< 5 ft width
5 ft - 10 ft width
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Proposed Improvement
Pedestrian Intersection Safety Improvement
Pedestrian Facilities
Schools
Major Roads
Streets
Railroad
County Line
10' Contours
Water
Parks
City Limits
Light Rail Transit
Light Rail Station
PROPOSED PROJECTS
Improve Intersection to Increase Pedestrian Safety
Freeman Way/HWY 224
37th Ave/HWY 224
Oak St/HWY 224
Monroe St/HWY 224
Harrison St/HWY 224
King Rd Improvements
Olsen St/42nd Ave
Railroad Ave/37th Ave
Stanley Ave/Logus Rd
McLoughlin Blvd and 22nd Ave
All McLoughlin crossings
McLoughlin and Ochoco/Milport
Provide Pedestrian Facilities Where Not Currently Present
See Table 5-1 for project descriptions L-AG, AI-AQ, BB, BH
Enhance Existing Pedestrian Connection
Create ped connection from Rowe Middle School to North Clackamas Park
Construct pedestrian underpass under HWY 99E at Kellogg Creek
Complete Springwater Trail along Ochoco St
Construct bike-ped overpass over Kellogg Creek
Construct Kronberg Park Trail
Pave connection to Springwater Trail at 29th Ave and Sherrett
Improve connection from Springwater Corridor to Pendleton Site
Construct stairs to connect Springwater Corridor to LRT Station
Establish bike-ped connection across Railroad Ave and tracks
Establish bike-ped connection over railroad tracks and LRT
Construct stairs from Springwater Corridor to McLoughlin Blvd
Construct bike-ped bridge over Johnson Creek along Ochoco St at 22nd Ave to connect to LRT station
Improve bike-ped connection to neighborhoods west of station
Establish bike-ped connection over McLoughlin at River Rd
Establish bike-ped connection to McLoughlin at Stubb St
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet



Transportation System Plan
FIGURE 5-1b
PEDESTRIAN MASTER PLAN DOWNTOWN INSET
November 2013
LEGEND
Existing Sidewalks
< 5 ft width
5 ft - 10 ft width
Kellogg Creek Trail
Trolley Trail
Proposed Improvement
Pedestrian Intersection Safety Improvement
Pedestrian Facilities
PROPOSED PROJECTS
Improve Intersection to Increase Pedestrian Safety
McLoughlin Blvd and 22nd Ave
All McLoughlin crossings
Enhance Existing Pedestrian Connection
Construct pedestrian underpass under HWY 99E at Kellogg Creek
Construct bike-ped overpass over Kellogg Creek
Construct Kronberg Park Trail
Other Map Features
Schools
City Hall
Ledding Library
Light Rail Station
Light Rail Transit
Streets
Major Roads
Railroad
10' Contours
Water
Parks
DKS Associates
HWY 224
17TH AVE
LAVA DR
23RD AVE
24TH AVE
LLEWELLYN ST
HARRISON ST
SCOTT ST
JACKSON ST
MONROE ST
JEFFERSON ST
MAIN ST
21ST AVE
WASHINGTON ST
ADAMS ST
22ND AVE
25TH AVE
MCLOUGHLIN BLVD
WILLARD ST
LAKE RD
EAGLE ST
BG
AR
AU
AV
AW

Table 5-1 Pedestrian Master Plan Projects

Map ID[3]	Priority	Type	Project Name	Project Description[4]	From	To	Cost ($1,000s[5])
High Priority Projects							
N/A	High	P	Study of Pedestrian Crossings on Hwy 224	Examine alternatives for improving pedestrian crossings at five intersections along Hwy 224 (Harrison St, Monroe St, Oak St, 37th Ave, Freeman Way)	Harrison St	Freeman Way	$50
A	High	C	Intersection Improvements at Hwy 224 and Freeman Way	Improve pedestrian crossing.	Location-specific	Location-specific	$20
B	High	C	Intersection Improvements at Hwy 224 and 37th Ave	Improve pedestrian crossing.	Location-specific	Location-specific	$20
C	High	C	Intersection Improvements at Hwy 224 and Oak St	Improve pedestrian crossing.	Location-specific	Location-specific	$20
D	High	C	Intersection Improvements at Hwy 224 and Monroe St	Improve pedestrian crossing.	Location-specific	Location-specific	$20
E	High	C	Intersection Improvements at Hwy 224 and Harrison St	Improve pedestrian crossing.	Location-specific	Location-specific	$20
L	High	C	17th Ave Improvements	Fill in sidewalk gaps on both sides of street; fill in gaps in existing bicycle network with bike lanes; and/or provide multiuse path. Improve intersection safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.	Ochoco St	McLoughlin Blvd	$1,000
O	High	C	Railroad Ave Capacity Improvements	Pedestrian aspect: Fill in sidewalk gaps on both sides of street or construct multiuse path on one side.	37th Ave	Harmony Rd	$1,800

[3] See Figure 5-1.
[4] The projects in this table assume traditional sidewalks on both sides of the street. In some cases it may be appropriate to construct a nontraditional pedestrian facility on one side of the street. See Chapter 10 Street Design for more information on the City's approach to designing pedestrian facilities.
[5] Project costs are order-of-magnitude estimates and are in 2012 dollars. Future costs may be more due to inflation. In the case of operational projects, estimated costs are for the entire 22-year planning period.

Map ID[1]	Priority	Type	Project Name	Project Description[4]	From	To	Cost ($1,000s[3])
P	High	C	Monroe St Neighborhood Greenway	Fill in sidewalk gaps on both sides of street.	42nd Ave	City limit	$1,800
U	High	C	43rd Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	Howe St/42nd Ave	King Rd/43rd Ave	$600
V1	High	C	Stanley Ave Neighborhood Greenway (north)	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	King Rd	$$1,900
V2	High	C	Stanley Ave Neighborhood Greenway (south)	Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,800
W2	High	C	Linwood Ave Sidewalks (south)	Fill in sidewalk gaps on both sides of street (part of Linwood Ave road-widening project).	King Rd	Railroad Ave	$2,150
Y	High	C	International Way Sidewalks	Fill in sidewalk gaps on both sides of street.	Criterion Ct	Lake Rd	$840
Z	High	C	Harmony Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	Linwood Ave	City limits	$40
AL	High	C	River Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	McLoughlin Blvd	City limits	$690
AR	High	C	Kellogg Creek Dam Removal and Hwy 99E Underpass	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/ped undercrossing between downtown Milwaukie and Riverfront Park.	Location-specific	Location-specific	$9,900
AU	High	C	Kellogg Creek Bike/Ped Bridge	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500
AV	High	C	Kronberg Park Trail	Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E.	Kellogg Creek Bridge	River Rd	$300
AW	High	C	Intersection Improvements at McLoughlin Blvd and 22nd Ave	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200
AX	High	C	Improved Connection to Springwater Trail at 29th Ave and Sherrett St	Pave the connection to Springwater Trail at 29th Ave and Sherrett St. (TSAP)	Location-specific	Location-specific	$20
AY	High	C	Improved Connection from Springwater Trail to Pendleton Site (Ramps)	Construct ramps to improve existing connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$630

Map ID[3]	Priority	Type	Project Name	Project Description[4]	From	To	Cost ($1,000s[5])
AY	High	C	Improved Connection from Springwater Trail to Pendleton Site (Widened Undercrossing)	Widen existing undercrossing to improve connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$100
AZ	High	C	Improved Connection from Springwater Trail to Tacoma Station	Construct stairs to connect Springwater Trail to Tacoma station. (TSAP)	Location-specific	Location-specific	$80
BL	High	C	Adams St Connector	Construct pedestrian- and bicycle-only facility on Adams St between 21st Ave and Main St	21st Ave	Main St	$450
N/A	High	C	Intersection Curb Ramp Improvements	Install curb ramps at all intersections with sidewalks (approximately 700 intersections).	Citywide	Citywide	$3,500
Medium Priority Projects							
F	Med	C	King Rd Blvd Treatments	Install street boulevard treatments: widen sidewalks and improve multiple crossings.	43rd Ave	Linwood Ave	$550
M	Med	C	McLoughlin Blvd Sidewalks	Fill in sidewalk gaps on both sides of street.	Washington St	Southern city limits	$650
N	Med	C	Lake Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	Where Else Ln	Hwy 224	$2,200
Q	Med	C	Logus Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	43rd Ave	49th Ave	$850
T	Med	C	37th Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	Lake Rd	Harrison St	$870
AE	Med	C	Brookside Dr Sidewalks	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	Regents Dr	$20
AT	Med	C	Springwater Trail Completion	Contribute to regional project to complete Springwater Trail ("Sellwood Gap") along Ochoco St.	17th Ave	19th Ave	$90
BA	Med	C	Bicycle and Pedestrian Overpass over Railroad Ave	Establish a dedicated bicycle and pedestrian connection across Railroad Ave and the railroad tracks.	Railroad Ave	International Way	$2,200
BB	Med	C	Bicycle/Pedestrian Improvements to Main St	Construct multiuse path or other improved bike/ped facilities on Main St to provide safer connection between downtown and Tacoma station. (TSAP)	Hanna Harvester Dr	Tacoma station	$2,900
BC	Med	C	Bicycle/Pedestrian Connection from Eastern Neighborhoods to Tacoma Station Area	Establish bike/ped connection over existing railroad tracks and light rail to Tacoma station area. (TSAP)	Olsen St & Kelvin St	Mailwell Dr	$4,000

Map ID[1]	Priority	Type	Project Name	Project Description[4]	From	To	Cost ($1,000s[3])
BD	Med	C	Improved Connection from Springwater Trail to McLoughlin Blvd	Construct stairs or other facility to connect Springwater Trail to west side of McLoughlin Blvd. (TSAP)	Location-specific	Location-specific	$500
BE	Med	C	Bicycle/Pedestrian Connection over Johnson Creek	Construct bike/ped bridge over Johnson Creek along Clatsop St at 23rd Ave to connect Tacoma station area with adjacent neighborhood. (TSAP)	Location-specific	Location-specific	$400
BF	Med	C	Improved Bicycle/Pedestrian Connections on West Side of Tacoma Station Area	Improve bike/ped connections to adjacent neighborhood to west of Tacoma station area at Ochoco St and Milport Rd. (TSAP)	Location-specific	Location-specific	$500
N/A	Med	C	Downtown Streetscape Improvements	Install sidewalk bulbouts, lighting, and pedestrian amenities.	Downtown	Downtown	$7,300[6]
N/A	Med	O	Pedestrian Walkway Amenities	Install amenities, such as benches, along key walking routes.	Citywide	Citywide	$60
Low Priority Projects							
G	Low	C	Intersection Improvements at Olsen St and 42nd Ave	Improve pedestrian crossing.	Location-specific	Location-specific	$20
H	Low	C	Intersection Improvements at Railroad and 37th Ave	Improve pedestrian crossing.	Location-specific	Location-specific	$10
K	Low	C	Intersection Improvements at Stanley Ave and Logus Rd	Improve pedestrian crossing.	Location-specific	Location-specific	$20
R	Low	C	Olsen St Sidewalks	Fill in sidewalk gaps on north side of street.	32nd Ave	42nd Ave	$470
S	Low	C	Johnson Creek Blvd Sidewalks	Fill in sidewalk gaps on both sides of street.	Harney St	City limits	$410
W1	Low	C	Linwood Ave Sidewalks (north)	Fill in sidewalk gaps on both sides of street (part of Linwood Ave road-widening project).	Johnson Creek Blvd	King Rd	1,050
X	Low	C	Hwy 224 Sidewalks	Fill in sidewalk gaps on both sides of street.	Oak St	37th Ave	$460

[6] Estimated $500,000 per block face.

Map ID[3]	Priority	Type	Project Name	Project Description[4]	From	To	Cost ($1,000s[5])
AA	Low	C	Home Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	Railroad Ave	King Rd	$830
AB	Low	C	Harvey St Sidewalks	Fill in sidewalk gaps on both sides of street.	32nd Ave	42nd Ave	$590
AC	Low	C	Roswell St Sidewalks	Fill in sidewalk gaps on both sides of street.	32nd Ave	36th Ave	$210
AD	Low	C	Mason Lane Sidewalks	Fill in sidewalk gaps on both sides of street.	42nd Ave	Regents Dr	$740
AF	Low	C	Regents Dr Sidewalks	Fill in sidewalk gaps on both sides of street.	Brookside Dr	Winsor Dr	$540
AG	Low	C	Rusk Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	Lake Rd	North Clackamas Park	$730
AH	Low	C	Pedestrian Connection to North Clackamas Park	Create pedestrian connection between the school and the park.	Rowe Middle School	North Clackamas Park	$1,400
AI	Low	C	Washington St Sidewalks	Fill in sidewalk gaps on both sides of street.	32nd Ave	35th Ave	$130
AJ	Low	C	22nd Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	McLoughlin Blvd	Sparrow St	$360
AK	Low	C	19th Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	Kellogg Creek Trail	Sparrow St	$330
AM	Low	C	Oatfield Rd Sidewalks	Fill in sidewalk gaps on both sides of street.	Guilford Ct	City limits	$150
AN	Low	C	49th Ave Sidewalks	Fill in sidewalk gaps on both sides of street.	Logus Rd	King Rd	$270
AO	Low	C	Franklin St Sidewalks	Install sidewalks on both sides of street to connect to Campbell Elementary School.	42nd Ave	45th Ave	$220
AP	Low	C	Ochoco St Sidewalks	Construct sidewalks on Ochoco St to connect bus stops to Goodwill.	19th Ave	McLoughlin Blvd	$1,300
AQ	Low	C	Edison St Sidewalks	Fill in sidewalk gaps on both sides of street.	35th Ave	37th Ave	$130
AY	Low	C	Improved Connection from Springwater Trail to Pendleton Site (Tunnel)	Construct tunnel under Springwater Trail to improve connection to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$1,200
BG	Low	C	Intersection Improvement at all Crossings of McLoughlin Blvd	Improve all existing crossings of McLoughlin Blvd (e.g., extended time for crossing, signage). (ODOT to do.)	Location-specific	Location-specific	—
BH	Low	C	Bike/Ped Path on Sparrow St	Establish a dedicated bicycle and pedestrian connection on Sparrow St, connecting River Rd to Trolley Trail	River Rd	Trolley Trail	$350
BI	Low	C	Bike/Ped Overpass over McLoughlin Blvd at River Rd	Establish a dedicated bicycle and pedestrian connection across McLoughlin Blvd.	Kronberg Park	River Rd	$2,500

Map ID[1]	Priority	Type	Project Name	Project Description[4]	From	To	Cost ($1,000s[5])
BJ	Low	C	Crossing Improvements for McLoughlin Blvd at Ochoco St and Milport Rd	Construct improvements at Ochoco St and Milport Rd to improve bike/ped crossing of McLoughlin Blvd (per ODOT, this will require full intersection improvements). (TSAP)	Location-specific	Location-specific	$8,320
BK	Low	C	Bicycle/Pedestrian Connection between McLoughlin Blvd and Stubb St	Establish bike/ped connection to McLoughlin Blvd sidewalk at west end of Stubb St. (TSAP)	Location-specific	Location-specific	$20
N/A	Low	O	Pedestrian Walkway Signage	Provide maps and wayfinding signage on streets that identify ways to get around the city.	Citywide	Citywide	$10

Notes:

C = Capital Project
O = Operational Project
P = Policy Project

High = High priority
Med = Medium priority
Low = Low priority

TSAP = Tacoma Station Area Plan

The Pedestrian Master Plan project list includes several enhanced pedestrian crossing projects. These crossings are located on major roadways with volumes and speeds that would require significant crossing enhancements based on published guidelines in the *Traffic Control Devices Handbook.*[7] Table 5-2 provides a description of possible crossing enhancements.

Table 5-2 Potential Measures for Enhancing Pedestrian Crossings

Improvement	Description	Illustration	Cost Range
Marked Crosswalk	White thermoplastic markings at street corner. Alternative material could include nonwhite color or textured surfaces.		$1,000 to $2,000 per crossing. Textured crossing materials beyond thermoplastic markings could be more expensive depending on materials used.
New Corner Sidewalk Ramp	Construct ADA compliant wheelchair ramps consistent with City standards.		$3,000 to $5,000 per corner.
Median Refuge	Construct new raised median refuge area. Minimum width 6 ft. and minimum length of 30 ft. Curb can be mountable to allow emergency vehicles to cross, if required.		$10,000 to $20,000, depending on overall length and amenities.
Pedestrian Countdown Timer Signal	Install supplemental pedestrian signal controls to indicate the time remaining before crossing vehicles get 'green' signal indication.		$2,500 per signal head ($10,000 per intersection)
Curb Extensions	Construct curb extension on road segments with on-street parking. Reduces pedestrian crossing area, and exposure to vehicle conflicts.		$20,000 to $30,000, depending on design amenities and aesthetic treatments.

Source: DKS Associates

[7] *Traffic Control Devices Handbook*, Institute of Transportation Engineers, 2001: Chapter 13, Table 13-2.

ACTION PLAN

The Pedestrian Action Plan (Table 5-3) identifies the highest priority projects that are reasonably expected to be funded with local funds by 2035, which meets the requirements of the State's Transportation Planning Rule.[5] The action plan project list is based upon a 2007 citywide project ranking process. In 2007, all of the modal master plan projects were ranked by the TSP Advisory Committee after consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added.

Table 5-3 Pedestrian Action Plan

Map ID	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
L	17th Ave Improvements	Fill in sidewalk gaps on both sides of street; fill in gaps in existing bicycle network with bike lanes; and/or provide multiuse path. Improve intersection safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.	Ochoco St	McLoughlin Blvd	$1,000	Match
BL	Adams St Connector	Construct pedestrian- and bicycle-only facility on Adams St between 21st Ave and Main St	21st Ave	Main St	$450	Match
O	Railroad Ave Capacity Improvements	Pedestrian aspect: Fill in sidewalk gaps on both sides of street or construct multiuse path on one side.	37th Ave	Harmony Rd	$1,800	Match
P	Monroe St Neighborhood Greenway	Fill in sidewalk gaps on both sides of street.	42nd Ave	City limits	$1,800	Match
AR	Kellogg Creek Dam Removal and Hwy 99E Underpass	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/ped undercrossing between downtown Milwaukie and Riverfront Park.	Location-specific	Location-specific	$9,900	Match
V1	Stanley Ave Neighborhood Greenway (north)	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	King Rd	$1,900	Match
V2	Stanley Ave Neighborhood Greenway (south)	Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,800	Match
W2	Linwood Ave Sidewalks (south)	Fill in sidewalk gaps on both sides of street (part of Linwood Ave road-widening project).	King Rd	Railroad Ave	$2,150	Match
A-E	Intersection Improvements at Hwy 224 Crossings	Improve pedestrian crossings at Freeman Way, 37th Ave, Oak St, Monroe St, and Harrison St	Location-specific	Location-specific	$100 ($20 each)	Match

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

AU	Kellogg Creek Bike/Ped Bridge	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500	Match
AV	Kronberg Park Trail	Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E	Kellogg Creek Bridge	River Rd	$300	Match
AW	Intersection Improvements at McLoughlin Blvd and 22nd Ave.	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200	Match
N/A	Study of Pedestrian Crossings on Hwy 224	Examine alternatives for improving pedestrian crossings at five intersections along Hwy 224 (Harrison St, Monroe St, Oak St, 37th Ave, Freeman Way)	Harrison St	Freeman Way	$50	Match

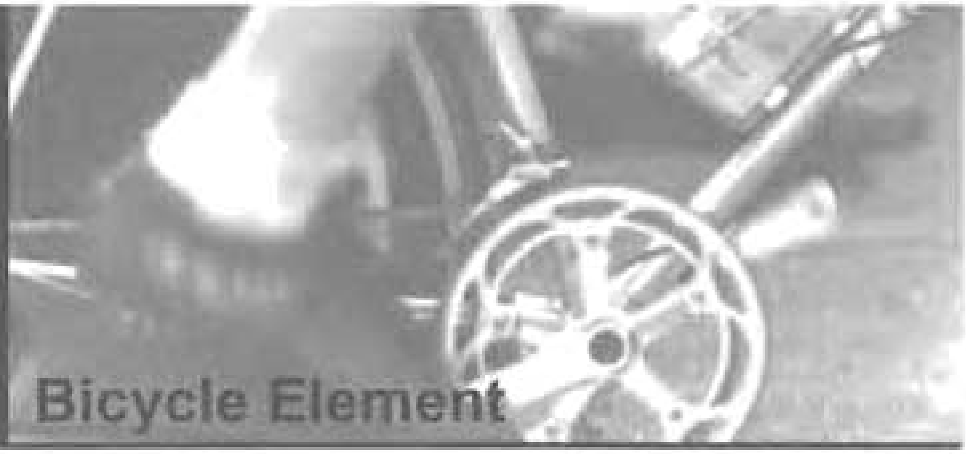
REGIONAL TRANSPORTATION PLAN (RTP) COMPLIANCE

The projects identified in the master plan list and further refined in the action plan list are consistent with the Metro 2035 Regional Transportation Plan (RTP). The RTP includes specific goals that can be used to measure the success of regional planning efforts to improve the overall transportation system. Specifically, the master plan and action plan projects identified in this chapter comply with Metro's goals for regional mobility and non-single-occupant-vehicle (non-SOV) modal targets. Chapter 8 includes a discussion of the performance measures and targets that the City has adopted to achieve the relevant RTP goals.

Three of the goals in the 2035 RTP relate to the regional pedestrian system in particular:

- Reduce the number of pedestrian fatalities plus serious injuries by 50% compared to 2005.
- Triple the walking mode share compared to 2005.
- Increase by 50% the number of essential destinations accessible within 30 minutes by trails or within 15 minutes by sidewalks for all residents compared to 2005.

All of the master plan and action plan projects identified in this chapter will contribute significantly toward meeting these regional goals.



6 Bicycle Element

The bicycle is a human-powered vehicle that allows people of all ages to move independently, at relatively low cost and with little impact to the environment. Bicycling promotes the well-being of people who live and work in Milwaukie, with the added benefit of reducing auto traffic on city streets. This chapter outlines bicycle needs in Milwaukie over the next 22 years and recommends policy, operational and facility improvements to the city's bicycle system.

TSP GOAL AND POLICY FRAMEWORK

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Several of these TSP Goals guide the City's policies on bicycle access and connectivity, specifically the following:

- **Goal 1 Livability** calls for convenient bicycling facilities, and removal of barriers that impede capacity.
- **Goal 2 Safety** directs the City to design safe bicycle connections between parks, schools, and other activity centers in Milwaukie.
- **Goal 3 Travel Choices** calls for an integrated citywide network of bikeways.
- **Goal 4 Quality Design** directs the City to integrate bicycle facilities into both public and private street and development projects.
- **Goal 6 Sustainability** calls for the City to increase bicycling as a means of transportation.

NEEDS

Milwaukie needs a safe and interconnected bicycle system that provides options for all types of bicyclists. The deficiencies in Milwaukie's existing bicycle system can be categorized into three areas: Connectivity, Crossings, and Street Designations. Each of these categories is described in this section.

Connectivity

The lack of east/west and north/south on-street bicycle facilities creates significant gaps in the bicycle system for travel both in and around the city. There are two east/west roadways that include bike lanes in the city: King Rd and Lake Rd. However, neither of these facilities reaches the downtown area and/or connects with other facilities that could allow for travel to other destinations. There are also two north/south roadways that have bike lanes: Linwood Ave and 17th Ave. Similar to the east/west roadways, these corridors are not continuous.

Three off-street facilities serve Milwaukie (the Springwater Corridor, the Trolley Trail, and the Kellogg Creek Trail), but they are not continuous. For example, while the connectivity of the Springwater Corridor was upgraded in 2006 with completion of the "Three Bridges" project (three bridges constructed to cross over the Union Pacific Railroad, McLoughlin Blvd, and Johnson Creek), the trail ends just east of 17th Ave. Additionally, there are a limited number of connections through the city to the Springwater Corridor, especially to the west of 45th Ave. The Trolley Trail, which will be completed in conjunction with the Portland-Milwaukie Light Rail (PMLR) project, ends at Riverfront Park, nearly one mile south of the Springwater Corridor. The Kellogg Creek Trail connects the Milwaukie Riverfront area to the Island Station neighborhood but does not easily connect to points south.

Major facilities, such as McLoughlin Blvd, Hwy 224, and the railroads, create barriers to bicycling through the city, particularly for east-west travel. This lack of connectivity (both on-street and off-street) causes significant problems for bicyclists and limits this mode of travel, especially where they make it more difficult for bicyclists to access major transit stops downtown.

Crossings

Throughout the city, there is a need for convenient and safe crossings at arterials and collectors. There are many locations where bicycle routes cross arterials, highways, or railroad tracks, and few of these crossings were designed to accommodate bicyclists. Typically, such intersections have limited sight-distance, inadequate pavement space for bicycles, no means for tripping a signal, or no direct safe connection. The following locations were identified as specific problem crossings:

- 17th Ave/Hwy 224
- 17th Ave/Harrison St/Hwy 99E
- Railroad crossing of 21st Ave at Adams
- Johnson Creek Blvd/Springwater Corridor
- King Rd/Stanley Ave
- Linwood Ave/Springwater Corridor
- King Rd/Linwood Ave
- Monroe St/Linwood Ave
- Linwood Ave/Harmony Rd

Street Designations

The designation of certain roadways for bicycle travel does not serve all of the needs for bicycle travel in and around the city. Many trips that connect to parks, schools, retail activity centers, etc., occur off of arterial and collector streets. These trips should generally be accommodated on lower volume streets, preferably on designated routes. Such facilities could be considered "shared" facilities or could have a specific designation such as a "bike boulevard" or "neighborhood greenway," where actual treatments to the roadway are made that enhance the bicycle environment and make additional connections to bicycle destinations.

BICYCLE FACILITY IMPROVEMENT TOOLBOX

Types of Bicyclists

Bicyclists are a varied group of people with different skill levels, abilities, bicycling experience, and trip types. For example, there are everyday commuters, avid recreational riders, children going to school, and families riding around in their neighborhoods. Their needs and comfort level with the bicycle infrastructure in Milwaukie will vary as a result of these differences. The City needs to accommodate these different types of bicyclists by providing adequate facilities for all different types of riders.

Bicycle trips are typically longer than walking trips and shorter than motor vehicle trips, and are attractive at distances up to three miles. Bicycle facilities can generally be categorized as multiuse paths, cycle tracks, bike lanes, shared roadways, and neighborhood greenways. Each of these facilities serves a particular purpose for bicycle travel. Bike lanes, cycle tracks, and multiuse paths can all accommodate trips of up to three miles. However, if the trip is shorter, or if the destination or origin of the trip is not next to a roadway with a bike lane, many bicycle trips can also be made on local streets. Table 6-1 summarizes each of these facilities with a general description of the elements inherent to each facility.

Table 6-1 Bikeway Types

Bikeway	Description
Multiuse path	Off-street route, typically recreational-focused, which can be used by several transportation modes, including bicycles, pedestrians, and other nonmotorized modes (i.e., skateboards, roller blades, etc.).
Cycle track	Exclusive bike facility within the roadway, with elements of both a separated path and a bike lane. Separated from motor vehicle traffic by parked cars, bollards, landscaping, or other barriers.
Bike lane	Area within street right-of-way specifically designated for bicycle use.
Shared roadway	Roadways where bicyclists and autos share the same travel lane. May include a wider outside lane and/or bike boulevard treatment (priority given to through bikes on local streets).
Neighborhood greenway	Lower-order, lower-volume streets with various treatments to promote safe and convenient bicycle travel and enhance pedestrian travel as well. Usually accommodate bicyclists and motorists in the same travel lanes, often with no specific vehicle or bicycle lane delineation. Assign higher priority to through bicyclists, with secondary priority assigned to motorists. Also include treatments to slow vehicle traffic to enhance the bicycling environment.

Bicycle Facility Design Considerations

Multiuse Paths

As their name implies, multiuse paths are designed to accommodate many types of users, and are typically constructed along an independent path such as a stream or greenway. Paths can also be built parallel to a roadway, but are most effective when built independent of a road, separating bicyclists from auto traffic. The American Association of State Highway Transportation Officials (AASHTO)[1] and the Oregon Department of Transportation (ODOT)[2] state that mixed-use paths can be designed along roadways, provided several design considerations are met:

Figure 6-1 Multiuse Path

Photo credit: Vince Schreck, www.pdxfamilyadventures.com

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

Cycle Tracks

Figure 6-2 Cycle Track

Photo credit: Michael O'Hare, www.citiesforpeople.net

Cycle tracks can take a number of forms, depending on the nature of the existing street infrastructure. They combine some elements of a fully separated path with those of a bike lane in the roadway. The key element of a cycle track is that it uses parked cars, bollards, landscaping, curbing, or other barriers to provide some separation from motor vehicle traffic. Cycle tracks may be one-way or two-way, and they may be located at road level, sidewalk level, or an intermediate level. They are distinct from the sidewalk and are designed exclusively as bike facilities. A recommended minimum width is 7 feet, with an additional 2-ft "door zone" buffer (where adjacent to parked cars). Pavement markings on the cycle track provide guidance for bicyclists, as well as for motorists and pedestrians that may cross the cycle track at driveways or intersections.

There are currently no cycle tracks in Milwaukie, and no potential cycle track routes have been identified to date. However, this type of facility represents an option for future bike

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

[2] *Oregon Bicycle and Pedestrian Plan, An Element of the Oregon Transportation Plan*, Oregon Department of Transportation, Adopted June 14, 1995.

improvements that might be most appropriate in certain settings to provide safer bike routes in high-traffic corridors.

Bike Lanes

When possible, bike lanes should be directly adjacent to the curb, rather than adjacent to parked cars or combined with sidewalks. The recommended width of six feet provides sufficient travel space and additional room for bicyclists to steer clear of the curb or parked cars while maintaining a comfortable distance from adjacent moving traffic. Wide bike lanes also enable bicyclists to maneuver around drainage grates, manhole covers, glass and debris. Provision of bike lanes also benefits motor vehicles, which gain greater shy distance/emergency shoulder area, and pedestrians, who gain a buffer between walking areas and moving vehicles. Where right-of-way is limited, the bike lane can be reduced to 5 feet. Alternatively, widening the curb travel lane (for example, from 12 feet to 14 or 15 feet) can provide better bicycle accommodations and a greater measure of safety as well. However, with higher-volume roadways (e.g., streets with more than 3,000 Average Daily Trips), dedicated bike lanes are much more desirable than wide outside lanes.

Figure 6-3 Bike Lane

Photo credit: LA-32 Neighborhood Council, http://la32nc.org/category/transportation/

The signing and marking of bike lanes should follow the *Manual on Uniform Traffic Control Devices* (MUTCD). Design features in the roadway can improve bicycle safety as well. For example, using curb storm drain inlets rather than catch basins significantly improves bicycle facilities.

Shared Roadways

Figure 6-4 Shared Roadway

Photo credit: Portland Bureau of Transportation, www.portlandoregon.gov/transportation/

Shared roadways can be designed to safely accommodate both bicycle and auto traffic. Figure 6-5 illustrates an example of an appropriate warning sign with a supplemental "Share the Road" plaque that may be used to draw more attention to the fact that slow-moving forms of transportation may be using the roadway. When used, the supplemental plaque must be installed below the warning sign on the same signpost. Directional pavement markings may also be considered on shared roadways to supplement the bicycle warning signs when desired. The pavement markings illustrated in Figure 6-5 below are typically called "Sharrows" or "Shared Lane Markings" and are utilized on bicycle travel routes that have on-street parking but no designated bike lanes. Sharrows are commonly used on streets where dedicated bike lanes are desirable but are not possible for any number of reasons. The marking helps to align bicyclists, to shift their travel pattern out of the direction of a parked car door opening into their travel path.

Figure 6-5 Bicycle Signs and Markings

Bicycle Warning Sign	"Share the Road" Plaque	Bike Route Sign	Bicycle Pavement Marking	Bicycle Wayfinding Signage

It should be noted, however, that while posting "Bike Route" signage for bicyclists is an acceptable way for the City to demarcate bike routes, such signs should be coupled with pavement markings and/or way finding signage for bicyclists to get the most value out of the City's investment. Although this is an adopted MUTCD sign, it does not provide much information. Adding wayfinding information such as distances to various destinations, directional arrows, and estimated travel times makes the sign much more useful. These signs are most effective when placed in useful locations, such as where a bike route makes a turn that is not intuitive to riders.

Neighborhood Greenways

The term "neighborhood greenway" has recently evolved from the "bike boulevard" concept of treatments, which improve the network of safe bicycle routes by generally utilizing streets with lower traffic volumes and vehicle speeds, such as minor collectors or local streets that pass through residential neighborhoods. The neighborhood greenway treatments also make these routes safer for pedestrians and motorists (for example, through inclusion of traffic-calming devices), while at the same time incorporating low-impact stormwater treatment measures such as bioswales and raingardens. The general traffic calming provided by neighborhood greenway improvements adds to neighborhood livability.

Figure 6-6 Neighborhood Greenway

Image credit: Bicycle Transportation Alliance/Owen Walz; owenwalzdesign.com

Traffic controls along a neighborhood greenway assign priority to bicyclists while encouraging through-vehicle traffic to use alternate parallel routes. Traffic calming and other treatments along the corridor reduce motor vehicle speeds so that motorists and bicyclists generally travel at the same speed, creating a safer and more comfortable environment for all users. Neighborhood greenways also incorporate treatments to facilitate safe and convenient crossings of major streets. Neighborhood greenways work best in well-connected street grids, where riders can follow reasonably direct and logical routes and where higher-order, parallel streets exist to serve through-vehicle traffic.

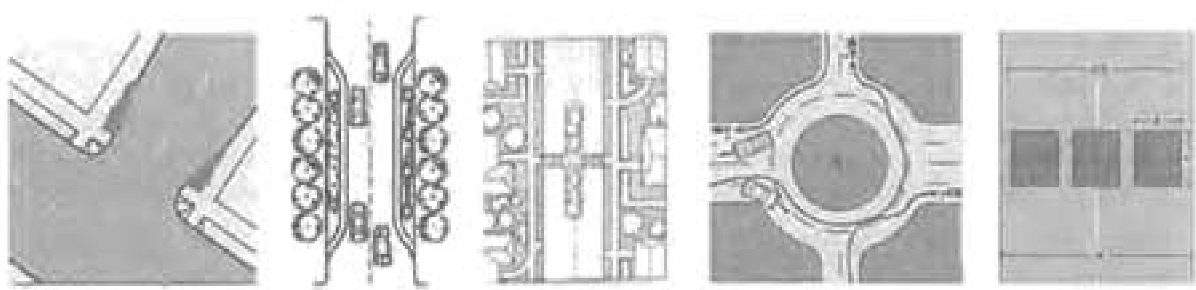
Milwaukie's neighborhood greenway network could be developed through a variety of improvements ranging from minor street enhancements (e.g., directional pavement markings) to larger-scale projects (e.g., intersection signalization). The various treatments fall into five major application levels based on their degree of physical intensity, with Level 1 representing the least physically intensive treatments that can be implemented at relatively low cost:

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

Corridors targeted for higher-level applications would also receive relevant lower-level treatments. For instance, a street targeted for Level 3 applications should also include Level 1 and 2 applications as necessary. It should be noted that some applications might not be appropriate on all streets. In other words, it may not be necessary to implement all Level 2 applications on a particular street designated for Level 2 treatment in order to create a functional neighborhood greenway.

Figure 6-7 shows examples of some of the types of intersection treatments and traffic-calming measures that could be appropriate for application on neighborhood greenway routes. Some study and analysis is necessary to determine which measures would be most effective in specific locations. Within Chapter 11 Neighborhood Traffic Management, Table 11-1 provides more examples of traffic-calming measures.

Figure 6-7 Sample Traffic-Calming Measures



Bulbout — Choker — Center Median — Traffic Circle — Speed Cushion

Experience from other cities that have implemented neighborhood greenways shows that on-street vehicle parking can function as a traffic-calming measure. Drivers generally seem to slow down in response to the physical narrowing of the travel lane and the higher perceived risk of collision. In addition, parked cars create a barrier between moving cars on the street and pedestrians on the sidewalk. This barrier enhances both actual and perceived safety for pedestrians. Allowing or encouraging on-street vehicle parking can be one tool employed to make neighborhood greenways safe and pleasant for nonmotorized travel.

Bicycle Parking

Bicycle parking and storage facilities are an important component of an effective bicycle system. Lack of proper storage facilities discourages potential riders from traveling by bicycle. Bike racks should be located at significant activity generators including schools, parks, and commercial areas, as well as at major transit stops. Racks should be placed in highly visible locations and within convenient proximity to main building entrances. Bike racks should be designed to provide two points of contact to the bicycle so the user can lock both the wheel and the frame to the rack. Bike lockers, showers, and caches of repair equipment (patch kits, tire tubes, etc.) would be helpful at locations where long-term parking is expected, such as the future light rail (MAX) stations (downtown, on Park Ave, and at Tacoma St), downtown bus stops, and major employment centers. The attractiveness of bicycle parking is also improved by providing covered parking and/or secured facilities where bicycles may be locked away.

RECOMMENDATIONS

Strategies

Bikeway improvements are aimed at closing the gaps in the bicycle network along arterial and collector roadways, establishing low-traffic routes that parallel arterials and collectors, and providing multimodal links to improve livability. To meet the TSP goals and policies outlined in Chapter 2, and address the needs outlined in this chapter, the City should take the following steps for improving the bicycle system:

- Fill in gaps in the existing bike corridor network (on arterials and collectors).
- Construct new bike lanes on strategic arterials and collectors.
- Connect key bicycle corridors to schools, parks, activity centers, and major transit stops.
- Improve crossing safety and connectivity.
- Designate neighborhood greenways on lower-volume streets that connect major bicycle facilities and/or bicycle destinations.
- Maintain bike lanes, off-street paths, signage, and other facility improvements.
- Construct and improve multiuse paths for recreational and commuter use.
- Involve bicyclists in the design and planning of bicycle and road facilities.
- Educate bicyclists and motorists about bicycle routes, laws, and opportunities.
- Directly implement or encourage the establishment of a bike-share program. This strategy could range from City ownership and administration of a bike-share system to revisions to the Municipal Code to allow for bike-share facilities owned by other private or public entities.

These strategies will be used to guide and develop projects that address the needs of the bicycling community in Milwaukie as well as those of bicyclists throughout the region. The projects resulting from these strategies fall into three categories: capital, operational and maintenance, and policy. Capital strategies involve building physical infrastructure. Operational and maintenance strategies aim to make existing infrastructure more usable. Policy-oriented strategies seek to modify public processes in order to more effectively support bicycling as a viable transportation mode. Key projects in each of these categories are described below.

Capital

These projects are typically large-scale infrastructure projects or projects that require some sort of physical infrastructure to be built. Capital projects also typically require ongoing maintenance that must be programmed into the existing maintenance schedule.

Key projects

17th Ave between Waverly Dr and Harrison St is a key bicycle connection between downtown Milwaukie and the Sellwood neighborhood in Portland. This connection will be improved by constructing bike lanes and/or a multiuse path. In addition, several potential neighborhood greenway corridors have been identified to enhance Milwaukie's bicycle network. The corridors were identified with respect to major bicycling destinations as well as their proximity to desired bicycle travel routes. The recommended corridors are shown in Figure 6-8a and described below:

- Monroe St between downtown Milwaukie and Linwood Ave.
- Stanley Ave between Railroad Ave and Johnson Creek Blvd.
- A corridor roughly following 40th Ave north from Monroe St and then splitting into two separate corridors at Harvey St. One neighborhood greenway would continue north on 40th Ave and follow Olsen St and 42nd Ave to connect with Johnson Creek Blvd. The second neighborhood greenway would follow Harvey St west from 40th Ave and follow Balfour St, 29th Ave, and Van Water St to connect with the Springwater Corridor. If 29th Ave is extended to the south, the neighborhood greenway should connect to the south as well (see Figure 8-4, which shows the future extension of 29th Ave).
- A corridor following 19th Ave south from Eagle St to Sparrow St, then east on Sparrow St to River Rd. This corridor could be extended east on Sparrow St with construction of a multiuse path connecting to the Trolley Trail.

These neighborhood greenways should be targeted for Level 4 applications, including signage, pavement markings, intersection treatments, and traffic calming. Each corridor currently includes some boulevard components (e.g., speed humps). Due to limited street connectivity, Level 5 bike boulevard applications (traffic diversion) are not recommended for these corridors. To identify and develop additional site-specific treatments, the City should involve the bicycling community, neighborhood groups, and the Public Works Department. Further analysis and engineering work may also be necessary to determine the feasibility of some applications.

Operational and Maintenance

These projects involve actions that make existing infrastructure more useable. They include upkeep of existing facilities, educational campaigns, or distributing information about the use of the transportation network. They are typically smaller in scale and dollars than capital projects and are implemented more broadly than in one specific location.

Key projects

- Driver and bicyclist education, including driver and biker awareness classes, "Share the Road" safety class, bike safety education for kids and adults.
- Encouraging bicycling through community events to get new bicyclists involved and interested in how to commute by bike.
- Consider applying rumble strips or other treatments to safely define bike lanes in places, such as Johnson Creek Blvd, where vehicles commonly cross into the bike lane.

Policy

These projects do not typically improve the bicycle environment in a physical manner, but rather result in a fundamental change to the way bicycle travel is thought of and treated within the city of Milwaukie.

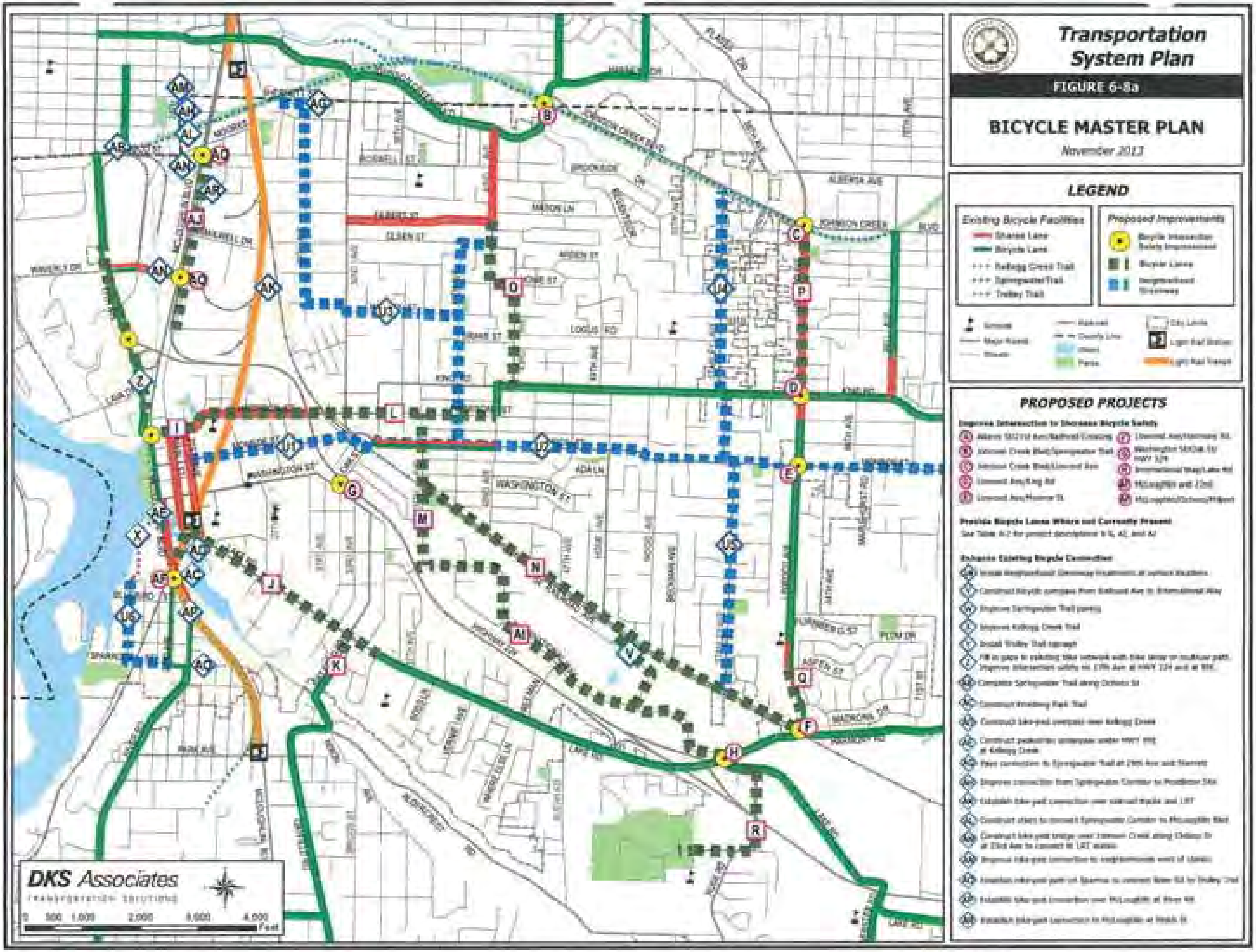
Key projects

- Enforce traffic laws that protect bicyclists.
- Collect and maintain bicycling traffic counts to measure the effect of improvements.

- Work with the City of Portland and Clackamas County when implementing bike boulevards, bike lanes, and multiuse paths to ensure good connectivity beyond Milwaukie.
- Consider establishing a committee to advise and advocate for implementation of the projects in this plan.

Master Plan

The Bicycle Master Plan is composed of a list of projects that address the identified needs (see Figure 6-8a). An inset map showing more detail in the downtown area is provided in Figure 6-8b. Summarized in Table 6-2, the master plan represents the "wish list" of bicycle-related projects in Milwaukie. The planning-level cost estimates provided in Table 6-2 are based on general unit costs for transportation improvements but do not reflect the unique elements that can significantly add to project costs. As projects are pursued, each of these project costs will need further refinement in order to detail right-of-way requirements and costs associated with special design details.



Transportation System Plan
FIGURE 6-8a
BICYCLE MASTER PLAN
November 2013
LEGEND
Existing Bicycle Facilities
Shared Lane
Bicycle Lane
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Proposed Improvements
Bicycle Intersection Safety Improvement
Bicycle Lanes
Neighborhood Greenway
School
Railroad
County Line
Water
Parks
City Limits
Light Rail Station
Light Rail Transit
PROPOSED PROJECTS
JOHNSON CREEK BLVD
KING RD
WASHINGTON ST
LAKE RD
HARMONY RD
DKS Associates
transportation solutions
0 500 1,000 2,000 3,000 4,000 Feet


Transportation System Plan
FIGURE 6-8b
BICYCLE MASTER PLAN DOWNTOWN INSET
November 2013
LEGEND
Existing Bicycle Facilities
Shared Facility
Bicycle Lane
Kellogg Creek Trail
Trolley Trail
Proposed Improvement
Intersection Improvements
Bike Lanes
Neighborhood Greenway
PROPOSED PROJECTS
Improve Intersection to Increase Safety
AF McLoughlin and 22nd
Provide Bicycle Lanes Where not Currently Present
I Fill in gaps in bike lanes on Harrison St
Enhance Existing Bicycle Connection
X Improve Kellogg Creek Trail
Z Fill in gaps in existing bike network and improve intersection safety on 17th Ave and HWY 224/99E
AC Construct Kronberg Park Trail
AD Construct bike-ped overpass over Kellogg Creek
AE Construct pedestrian underpass under HWY 99E at Kellogg Creek
DKS Associates
TRANSPORTATION SOLUTIONS
0 75 150 300 450 600 Feet
HWY 224
LAVA DR
23RD AVE
24TH AVE
LLEWELLYN ST
HARRISON ST
SCOTT ST
JACKSON ST
MONROE ST
JEFFERSON ST
MAIN ST
21ST AVE
25TH AVE
WASHINGTON ST
ADAMS ST
23RD AVE
WILLARD ST
LAKE RD
MCLOUGHLIN BLVD
EAGLE ST
20TH AVE
Z
I
AE
X
AD
AC
AF

Table 6-2 Bicycle Master Plan Projects

Map ID[3]	Priority	Type	Project Name	Project Description	From	To	Cost ($1,000s[4])
High Priority Projects							
E	High	C	Intersection Improvements at Linwood Ave and Monroe St	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10
G	High	C	Hwy 224 Crossing Improvements at Oak and Washington St	Improve intersection crossing safety for bicyclists at Washington St and Oak St.	Location-specific	Location-specific	$10
J	High	C	Lake Rd Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	Main St	Guilford Dr	$3,400
N	High	C	Railroad Ave Capacity Improvements	Bicycle aspect: Fill in gaps in existing bicycle network with bike lanes, cycle track, multiuse path, or other facilities.	37th Ave	Linwood Ave	$4,800
U1	High	C	Monroe St Neighborhood Greenway (downtown)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	21st Ave	Hwy 224	$85
U2	High	C	Monroe St Neighborhood Greenway (central)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Hwy 224	42nd Ave	$80
U3	High	C	Monroe St Neighborhood Greenway (east)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	42nd Ave	Linwood Ave	$165
U4	High	C	29th/Harvey/40th Neighborhood Greenway	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	Monroe St	$220
U5	High	C	Stanley Ave Neighborhood Greenway (north)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	King Rd	$135
U6	High	C	Stanley Ave Neighborhood Greenway (south)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	King Rd	Railroad Ave	195

[3] See Figure 6-3a.
[4] Project costs are order-of-magnitude estimates and are in 2012 dollars. Future costs may be more due to inflation. In the case of operational projects, estimated costs are for the entire 22-year planning period.

Map ID[1]	Priority	Type	Project Name	Project Description	From	To	Cost ($1,000s[4])
Z	High	C	17[th] Ave Improvements	Fill in sidewalk gaps on both sides of street, fill in gaps in existing bicycle network with bike lanes, and/or provide multiuse path. Improve intersection safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.	Ochoco St	McLoughlin Blvd	$1,000
AC	High	C	Kronberg Park Trail	Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E.	Kellogg Creek Bridge	River Rd	$300
AD	High	C	Kellogg Creek Bike/Ped Bridge	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500
AE	High	C	Kellogg Creek Dam Removal and Hwy 99E Underpass	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/ped undercrossing between downtown Milwaukie and Riverfront Park.	Location-specific	Location-specific	$9,900
AF	High	C	Intersection Improvements at McLoughlin Blvd and 22[nd] Ave	Improve safety of Trolley Trail crossing at 22[nd] Ave.	Location-specific	Location-specific	$200
AG	High	C	Improved Connection to Springwater Trail at 29[th] Ave and Sherrett St	Pave the connection to Springwater Trail at 29[th] Ave and Sherrett St. (TSAP)	Location-specific	Location-specific	$20
AH	High	C	Improved Connection from Springwater Trail to Pendleton Site (Ramps)	Construct ramps to improve existing connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$630
AH	High	C	Improved Connection from Springwater Trail to Pendleton Site (Widened Undercrossing)	Widen existing undercrossing to improve connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$100
N/A	High	O	Bike Lane Maintenance	Sweep bike lanes to remove debris.	Citywide	Citywide	$1,200
N/A	High	O	Bicycle-friendly Street Grates	Install bicycle-friendly street grates.	Citywide	Citywide	$60
Medium Priority Projects							
I	Med	C	Harrison St Bike Lanes	Fill in gaps in existing bicycle network with bike lanes (cost included with Harrison St road widening project).	Hwy 99E	21[st] Ave	$300
K	Med	C	Oatfield Rd Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	Guilford Ct	Lake Rd	$380

Map ID[7]	Priority	Type	Project Name	Project Description	From	To	Cost ($1,000s[4])
U7	Med	C	19th and Sparrow Neighborhood Greenway	Designate as a "neighborhood greenway" and install traffic-calming improvements. This would connect the south end of Kellogg Creek Trail to River Rd.	Eagle St	River Rd	$800
V	Med	C	Bicycle and Pedestrian Overpass over Railroad Ave	Establish a dedicated bicycle and pedestrian connection across Railroad Ave and the railroad tracks.	Railroad Ave	International Way	$2,200
AB	Med	C	Springwater Trail Completion	Contribute to regional project to complete Springwater Trail ("Sellwood Gap") along Ochoco St.	17th Ave	19th Ave	$90
AI	Med	C	International Way Bicycle Facilities	Construct bike lanes or other bike facilities.	37th Ave	Lake Rd	$400
AJ	Med	C	Bicycle/Pedestrian Improvements to Main St	Construct multiuse path or other improved bike/ped facilities on Main St to provide safer connection between downtown and Tacoma station. (TSAP)	Hanna Harvester Dr	Tacoma station	$2,900
AK	Med	C	Bicycle/Pedestrian Connection from Eastern Neighborhoods to Tacoma Station Area	Establish bike/ped connection over existing railroad tracks and light rail to Tacoma station area. (TSAP)	Olsen St & Kelvin St	Maibell Dr	$4,000
AL	Med	C	Improved Connection from Springwater Trail to McLoughlin Blvd	Construct stairs or other facility to connect Springwater Trail to west side of McLoughlin Blvd. (TSAP)	Location-specific	Location-specific	$500
AM	Med	C	Bicycle/Pedestrian Connection over Johnson Creek	Construct bike/ped bridge over Johnson Creek along Clatsop St at 23rd Ave to connect Tacoma station area with adjacent neighborhood. (TSAP)	Location-specific	Location-specific	$400
AN	Med	C	Improved Bicycle/Pedestrian Connections on West Side of Tacoma Station Area	Improve bike/ped connections to adjacent neighborhood to west of Tacoma station area at Ochoco St and Milport Rd. (TSAP)	Location-specific	Location-specific	$500
N/A	Med	O	Bicyclist Education	Promote bicycling through bike use and route selection education.	Citywide	Citywide	$10
N/A	Med	O	Community Bicycle Rides	Support community bike rides to encourage bike use.	Citywide	Citywide	$5
Low Priority Projects							
B	Low	C	Springwater Trail Intersection Improvements at 45th Ave	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10

Map ID[1]	Priority	Type	Project Name	Project Description	From	To	Cost ($1,000s[4])
C	Low	C	Intersection Improvements at Johnson Creek Blvd and Linwood Ave	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10
D	Low	C	Intersection Improvements at Linwood Ave and King Rd	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10
H	Low	C	Intersection Improve-ments at International Way and Lake Rd	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10
L	Low	C	Harrison St Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	Hwy 224	42nd Ave	$10
M	Low	C	37th Ave Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	Harrison St	Hwy 224	$3,200
O	Low	C	43rd Ave Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	King Rd	Filbert St	$1,100
P	Low	C	Linwood Ave Bike Lanes (north)	Fill in gaps in existing bicycle network with bike lanes.	Queen Rd	Johnson Creek Blvd	$1,900
Q	Low	C	Linwood Ave Bike Lanes (south)	Fill in gaps in existing bicycle network with bike lanes.	Juniper St	Harmony Rd	$320
R	Low	C	Rusk Rd Bike Lanes	Fill in gaps in existing bicycle network with bike lanes.	Lake Rd	North Clackamas Park	$1,000
X	Low	C	Kellogg Creek Trail Improvements	Resurface trail and provide wayfinding signage to/from trail.	Milwaukie Riverfront	Treatment Plant	$680
AH	Low	C	Improved Connection from Springwater Trail to Pendleton Site (Tunnel)	Construct tunnel under Springwater Trail to improve connection to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$1,200
AO	Low	C	Bike/Ped Path on Sparrow St	Establish a dedicated bicycle and pedestrian connection on Sparrow St, connecting River Rd to Trolley Trail	River Rd	Trolley Trail	$350
AP	Low	C	Bike/Ped Overpass over McLoughlin Blvd at River Rd	Establish a dedicated bicycle and pedestrian connection across McLoughlin Blvd.	Kronberg Park	River Rd	$2,500
AQ	Low	C	Crossing Improvements for McLoughlin Blvd at Ochoco St and Milport Rd	Construct improvements at Ochoco St and Milport Rd to improve bike/ped crossing of McLoughlin Blvd (per ODOT, this will require full intersection improvements). (TSAP)	Location-specific	Location-specific	$8,320

Map ID[1]	Priority	Type	Project Name	Project Description	From	To	Cost ($1,000s[4])
AR	Low	C	Bicycle/Pedestrian Connection between McLoughlin Blvd and Stubb St	Establish bike/ped connection to McLoughlin Blvd sidewalk at west end of Stubb St. (TSAP)	Location-specific	Location-specific	$20
N/A	Low	O	Milwaukie Bike Map	Produce a Milwaukie Bike Map.	Citywide	Citywide	$60
N/A	Low	O	Police Enforcement on Drivers	Enforce laws related to bike lanes and bicycle safety.	Citywide	Citywide	$10
N/A	Low	O	Bike Lane Striping	Restripe existing bike lanes and stripe bike lanes on streets where buses and bicyclists share the road.	Citywide	Citywide	$20
N/A	Low	C	Springwater Trail Signage	Install wayfinding signage for Springwater Trail.	Citywide	Citywide	$20
N/A	Low	O	North Clackamas Greenway Corridor Study	Study feasibility of corridor for multiuse path construction (possibly along Kellogg Creek).	Downtown	Clackamas Regional Center	$50

Notes:

C = Capital Project
O = Operational Project
P = Policy Project

High = High priority
Med = Medium priority
Low = Low priority

TSAP = Tacoma Station Area Plan

Action Plan

The Bicycle Action Plan (Table 6-3) identifies the highest priority projects that are reasonably expected to be funded with local funds by 2035, which meets the requirements of the State's Transportation Planning Rule.[5] The action plan project list is based upon a 2007 citywide project ranking process. In 2007, all of the modal master plan projects were ranked by the TSP Advisory Committee after consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added.

Table 6-3 Bicycle Action Plan

Map ID	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Z	17th Ave Improvements	Fill in sidewalk gaps on both sides of street, fill in gaps in existing bicycle network with bike lanes, and/or provide multiuse path. Improve intersection safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.	Ochoco St	McLoughlin Blvd	$1,000	Match
U1	Monroe St Neighborhood Greenway (downtown)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	21st Ave	Hwy 224	$85	Match
U2	Monroe St Neighborhood Greenway (central)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Hwy 224	42nd Ave	$80	Match
U3	Monroe St Neighborhood Greenway (east)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	42nd Ave	Linwood Ave	$165	Match
U5	Stanley Ave Neighborhood Greenway (north)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	King Rd	$135	Match
U6	Stanley Ave Neighborhood Greenway (south)	Designate as a "neighborhood greenway" and install traffic-calming improvements.	King Rd	Railroad Ave	$195	Match
N	Railroad Ave Capacity Improvements	Bicycle aspect: Fill in gaps in existing bicycle network with bike lanes, cycle track, multiuse path, or other facilities.	37th Ave	Linwood Ave	$4,800	Match
AD	Kellogg Creek Bike/Ped Bridge	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500	Match

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

AE	Kellogg Creek Dam Removal and Hwy 99E Underpass	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/ped undercrossing between downtown Milwaukie and Riverfront Park.	Location-specific	Location-specific	$9,900	Match
U4	29th/Harvey/40th Neighborhood Greenway	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	Monroe St	$220	Match
AC	Kronberg Park Trail	Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E.	Kellogg Creek Bridge	River Rd	$300	Direct
N/A	Bike Lane Maintenance	Sweep bike lanes to remove debris.	Citywide	Citywide	$1,200	Direct

REGIONAL TRANSPORTATION PLAN (RTP) COMPLIANCE

The projects identified in the master plan list and further refined in the action plan list are consistent with the Metro 2035 Regional Transportation Plan (RTP). The RTP includes specific goals that can be used to measure the success of regional planning efforts to improve the overall transportation system. Specifically, the master plan and action plan projects identified in this chapter are in line with Metro's goals for regional mobility and non-single-occupant-vehicle (non-SOV) modal targets. Chapter 8 includes a discussion of the performance measures and targets that the City has adopted to achieve the relevant RTP goals.

Three of the goals in the 2035 RTP relate to the regional bicycle system in particular:

- Reduce the number of bicyclist fatalities plus serious injuries by 50% compared to 2005.
- Triple the biking mode share compared to 2005.
- Increase by 50% the number of essential destinations accessible within 30 minutes by trails and bicycling compared to 2005.

All of the master plan and action plan projects identified in this chapter will help the region meet these goals. At the community level in Milwaukie, some of these goals are already met. For example, there is no record of bicyclist fatalities or serious injuries in 2012. And given the relatively compact nature of the city, no destination is more than 30 minutes away by bicycle. Certainly, the strategies outlined in this chapter will allow Milwaukie to contribute further to the region meeting those goals. It is the effort to increase the biking mode share where Milwaukie can play a more active role in meeting the regional goal. As more data and tools become available to help measure local biking mode share, it will become easier to gauge the success of the projects identified in this chapter in increasing that share.

7 Public Transit Element

This chapter summarizes the public transit needs within the city of Milwaukie and recommends improvements for addressing those needs over the next 22 years.

INTRODUCTION

Milwaukie's public transit policies support transportation, land use, economic development, and environmental goals. The availability, convenience and desirability of public transit are key aspects of a system that must support the movement of people to, from, and through Milwaukie. Transit trips reduce single-occupant vehicle trips (which reduces traffic and energy consumption), serve community members who cannot drive (including the elderly, disabled and youth), and minimize transportation system impacts to the environment, such as vehicle emissions and soil and water pollution from impervious surface runoff.

Job creation and retention in the city are also influenced by Milwaukie's transit service. So too are the City's revitalization goals for the downtown, which rest on a moderately dense, mixed use land use pattern. The availability of high quality and dependable transit enables the development of more downtown land for new housing and commercial space with relatively less land being consumed for parking.

TSP GOALS AND POLICY FRAMEWORK

The overall transportation system and the city itself are enhanced as the public transit system improves. Several of the goals of this TSP (see Chapter 2) establish refined policies that assert the importance of transit to the success of the whole transportation system:

- **Goal 1 Livability** calls for a transportation system that is accessible to all members of the community.
- **Goal 3 Provide Travel Choices** directs the City to collaborate with transit providers to improve transit service and to generally support projects that reduce dependence on single-occupant vehicles.
- **Goal 4 Quality Design** requires developers to build appropriate transit-supportive improvements.
- **Goal 6 Sustainability** guides the City to develop an energy efficient transportation system that minimizes environmental impacts.
- **Goal 7 Efficient and Innovative Funding** calls for a cost-effective transportation system.

- **Goal 8 Compatibility** directs the City to coordinate with TriMet and other transit providers to plan for improvements to transit service.
- **Goal 9 Economic Vitality** insists that transportation facilities be built to support the land uses outlined in the Comprehensive Plan, such as the Town Center concept for downtown.

The City's Comprehensive Plan establishes the policy framework for providing transit and integrating it with other transportation modes and adjacent land uses. These policies can be found in the Air, Water and Land Resources Quality Element, Economic Base and Industrial/Commercial Land Use Element, Neighborhood Element and the Transportation, Public Facilities and Energy Conservation Element. The Comprehensive Plan includes several specific directions for guiding the City to a complete transit system, as well as general goal statements and policies toward the same end. In sum, the policies are:

- **Travel-Related:** Reduction of congestion, improved connectivity between Milwaukie and Portland.
- **Access-Related:** Accommodation of elderly and disabled citizens, service to all neighborhoods, pedestrian and bicycle connections to transit stops and routes.
- **Land-Use-Related:** Increased density of housing and jobs near transit facilities.
- **Transit-Experience-Related:** Ensure transit facilities are safe, well-maintained, and convenient.
- **Environment-Related:** Reduction of regional air pollution and development of a compact, walkable downtown.
- **Planning-Related:** Require new development to provide transit amenities as appropriate, prioritize street improvements on transit streets, coordinate on regional transit initiatives including high-capacity transit planning and coordinate with TriMet on service delivery and facility improvements.

The TSP affirms these goals, and supports them by identifying system deficiencies and needs, new service enhancements, capital improvements and policy improvements.

NEEDS

The public transit system in Milwaukie must achieve four goals for it to be a complete system. A complete transit system in Milwaukie would provide or allow for:

1. Service for the greatest number of potential users.
2. Service for the neediest citizens.
3. A safe experience for all users.
4. Convenient service.

Public Transit Coverage and Service

TriMet is the regional transit provider for the Portland metro area and provides transit service to and from Milwaukie, with ten bus routes: 28, 29, 31, 32, 33, 34, 70, 75, 99, and 152. These routes, their approximate headways (time between arrivals), and the locations of stops, shelters, and the transit center and park-and-rides are shown in Figure 7-1.

The preponderance of transit needs in Milwaukie can be divided into two categories: new service (where there isn't any today) and enhanced services (where more service is desired). As described in Figure 7-1, most of Milwaukie currently enjoys nearby bus service. Ten bus routes currently run through the city, with buses making frequent stops and providing most of the city's neighborhoods with weekday service. The exceptions are in portions of the Hector Campbell, Linwood, and Lewelling neighborhoods (shown in red on Figure 7-1) which have pockets that are outside a 1/4-mile walk distance to the nearest bus stop. These portions of Milwaukie, which comprise approximately 15% of its land area, will only be served with the establishment of new, proximate bus routes and stops.

Figure 7-2 illustrates the second category of need, showing how service levels drop on existing routes during the weekend when the same criteria are applied (1/4-mile walk distance to nearest bus stop). Because five of the ten bus lines do not run on the weekend, nearly the entire southern half of the city is left without convenient bus service. Even during periods of maximum service (called peak times), several lines do not run frequently enough to meet the needs of the Milwaukie transit users.[1] During peak hours, only six of the ten bus routes operate with headways of 30 minutes or less, while the remaining five lines operate with headways greater than 30 minutes.

[1] Headways have been criticized, for example, as being too great (i.e. too much waiting) for the routes serving Lake Rd, Oatfield Rd, and Harvey St.

Transportation System Plan

FIGURE 7-1

PEAK HOUR TRANSIT COVERAGE

November 2013

LEGEND

Transit Facilities

- > 1/4 Mile Walk to Bus Stop during Peak Operating Hours
- Bus Routes < 30 Min. Frequency
- Bus Routes > 30 Min. Frequency
- Stop
- Shelter
- Light Rail Station
- Light Rail Transit
- Park-and-Ride
- Transit Center

Neighborhood District Associations

- ARDENWALD
- HECTOR CAMPBELL
- HISTORIC MILWAUKIE
- ISLAND STATION
- LAKE ROAD
- LEWELLING
- LINWOOD
- MCLOUGHLIN INDUSTRIAL
- MILWAUKIE BUSINESS INDUSTRIAL

Other Map Features

- Schools
- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail
- Major Roads
- Streets
- Railroad
- County Line
- Water
- Parks
- City Limits

DKS *Associates*

TRANSPORTATION SOLUTIONS

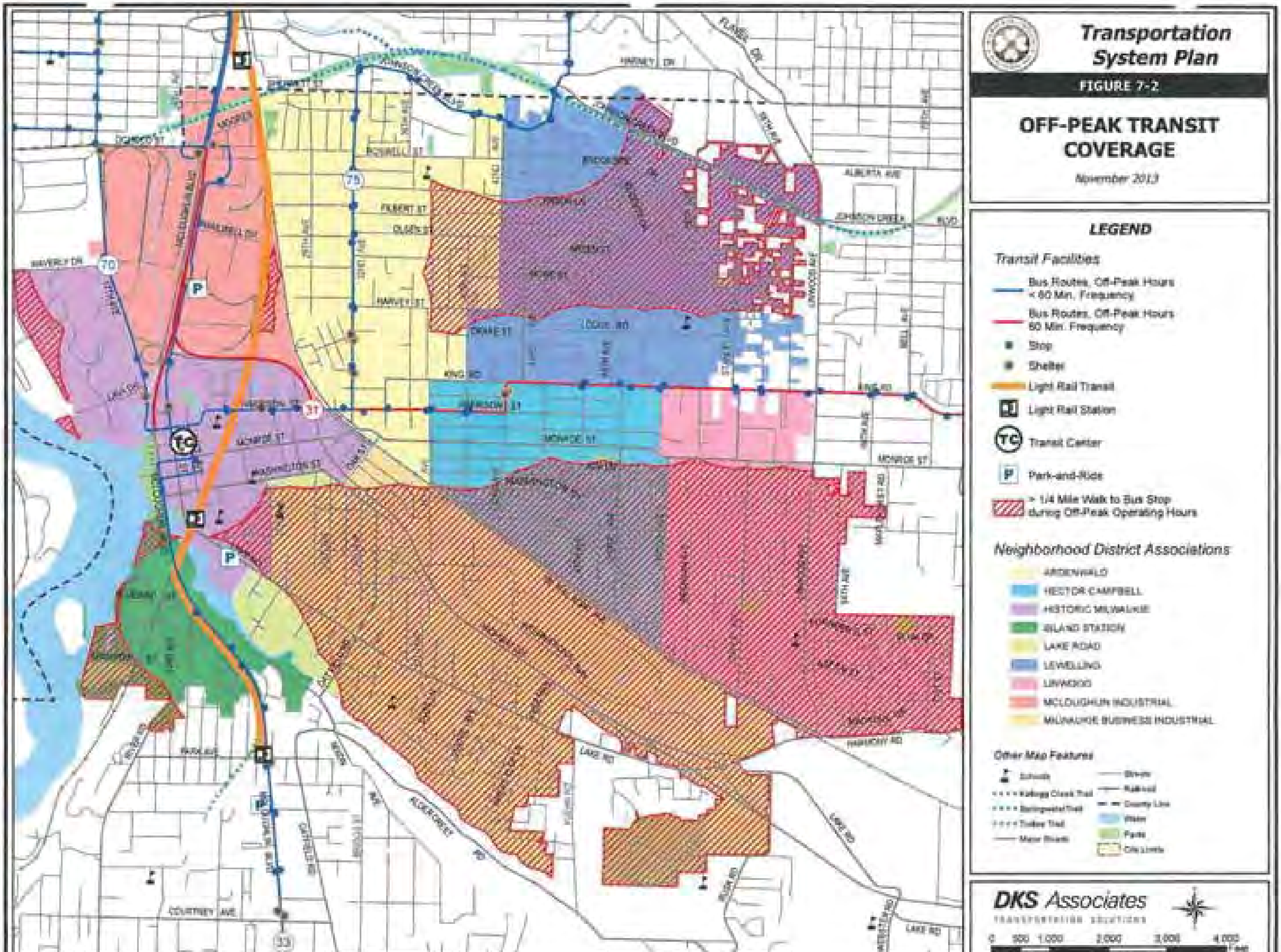
0 500 1,000 2,000 3,000 4,000 Feet

Transportation System Plan

FIGURE 7-2

OFF-PEAK TRANSIT COVERAGE

November 2013



Public Transit Supportive Facilities

Many TriMet facilities in Milwaukie are in need of improvement. Certain bus stops are perceived as unsafe, either because of their proximity to unpleasant site or traffic conditions, isolated location, low ridership, lack of supporting nearby land uses, or neglected physical condition..

Park-and-ride facilities in the city are insufficient for Milwaukie commuters, causing these commuters to seek parking downtown or on neighborhood and collector streets, or to dispense with transit options entirely. Bike parking facilities are also reported as inadequate at existing park-and-rides.

Gaps in city facilities, especially sidewalks, contribute to underutilization of the transit system. Every transit user is a pedestrian, since many people arrive at bus stops on foot, and all wait for buses in the pedestrian realm. While the transit system does not require sidewalks on every street in the city, it is vastly improved when sidewalks are provided on both sides of streets with bus stops, and at least one sidewalk on local streets that connect to transit stops. Good lighting is essential for safety and visibility.[2] Finally, the City should maintain clear striping of bike lanes where bus routes and bike routes are co-located on a street (although this situation should be avoided where possible).

The new Portland-Milwaukie Light Rail (PMLR) line, scheduled to open in 2015, represents a new transit facility that will connect Milwaukie with downtown Portland. The new line will run from the Portland State University campus at SW 6th Ave and College St, through the South Waterfront area (with a direct link via aerial tram to the Oregon Health & Science University) and across the Willamette River to the Oregon Museum of Science & Industry, and south alongside McLoughlin Blvd to downtown Milwaukie, terminating at SE Park Ave.

System Deficiencies

Though transit service in Milwaukie needs to be improved in many ways, its greatest deficiencies are in the areas of Service Levels, Safety, and Convenience of Service. Several factors contribute to this perception and point to the community's desired areas of improvement:

- New routes are needed to serve the Hector Campbell, Linwood and Lewelling neighborhoods where the nearest bus stops are more than a 1/4-mile walk away. This is an environmental justice issue as well as a livability issue for people living in these transit-deficient pockets.
- Additional runs (i.e. increased frequencies or shorter headways) are needed for many routes, especially on evenings and weekends.
- Bus shelters or improved shelters and related features are needed for certain locations, notably where daily boardings exceed TriMet's standards for shelter upgrades.
- Shelters at main stops along bus routes need adequate lighting and TransitTracker[3] information.

[2] Bus stop lighting is typically provided by nearby streetlights, if the street is well lit. However, nighttime illumination can still be poor or nonexistent, and the cost of hard-wiring bus stops with lights is significant and impractical in many locations. TriMet has recently started to install solar lighting systems primarily along frequent bus corridors, using environmentally friendly LED (light emitting diodes) inside select shelters. The city should work with TriMet to have these systems installed where needed in Milwaukie.
[3] "TransitTracker" is the name of TriMet's Global Positioning System technology for tracking how far a bus or MAX train is from a stop. This real-time information is then made available to riders on the street via electronic displays

- The downtown Transit Center needs to be "dissolved" by establishing a bus layover facility somewhere outside of the downtown.
- More park-and-ride parking lots are needed in certain locations.
- Bus rapid transit is needed for routes to connect with Oregon City and Clackamas Town Center.
- Coordination between bicycle facilities and transit services is needed.
- The expansion of Milwaukie's sidewalk system needs to consider the importance of sidewalks on transit streets and local streets adjacent to transit streets.
- Convenient service needs to serve Milwaukie's significant elderly population.

RECOMMENDATIONS

The City's policies on public transit, compared to the current state of the system, reveal a disparity between the City's goals for transit service and use, and the system's ability to meet those goals today. To close this gap, the City and TriMet should simultaneously pursue three types of improvements that will increase transit service and benefit Milwaukie residents, employees, and the greater population:

- **Service Enhancements:** Make transit more convenient for users through new routes and stops, and enhanced service on established routes.
- **Capital Improvements:** Enhance the transit experience for users. These improvements take the form of capital projects that upgrade transit facilities in the city (e.g. shelters, bus stops, park-and-rides).
- **Policy Improvements:** Establish new policies or policy direction that clarifies and expands how the City can help facilitate transit use and a transit experience that better meets the needs of local system users.

The City and TriMet are collaborators in making these improvements, although their relative interests and authorities are shared in differing proportions for each. Service Enhancements are largely in TriMet's control, with the City providing direction and little else. Policy Improvements have the opposite character, as these are within the City's realm of authority, with the transit agency providing input. Implementation of Capital Improvements is more equally shared, with the two entities working closely together to select and construct the improvements with funds from either government or a third party grantor to which either or both governments may apply.

A complete list of all three improvement types is included as Table 7-1, Public Transit Master Plan Projects, located at the end of this chapter. The high priority Service Enhancement and Capital Improvement projects are illustrated in Figure 7-3, also located at the end of this chapter. The high priority recommendations are also summarized below.

Service Enhancements

TriMet's service enhancements are determined through its five-year Transit Investment Plan (TIP), which lays out the agency's strategies and programs to meet regional transportation and

installed in bus shelters and MAX stations, online, or over the phone. "Transit Priority Intersections" enable preferential treatment of buses at intersections by extending the green time along the bus route, or actuating the green light at intersections upon detection of an approaching bus.

livability goals. The Regional Transportation Plan and local transportation system plans guide the TIP, which is updated annually and seeks to meet current and future demands for service. Through its TIP updates, TriMet partners with jurisdictions like Milwaukie to develop criteria for expanding transit service. The City should coordinate with TriMet on the annual TIP update process on the programming of Milwaukie's desired service enhancements.

Two new east-west bus routes are envisioned for Milwaukie: one utilizing Johnson Creek Blvd east of 42nd Ave, and one utilizing Railroad Ave. The Johnson Creek line would extend to 82nd Ave to serve the numerous jobs between 42nd and 82nd Aves and connect with the I-205 light rail (MAX) line. The Railroad Ave route would require a complete upgrade of the street itself, with sidewalks, stormwater drainage, and bus shelters. The route is envisioned to connect to the east with Harmony Rd, to serve Clackamas Community College, Clackamas Town Center and the eastern suburbs. Downtown Milwaukie is envisioned as the western terminus for the new line (see Figure 7-3).

A third east-west service enhancement—bus rapid transit—is requested for the Line 31 rush hour route, which utilizes Hwy 224. The opening of the I-205 light rail in 2009 has increased the need for TriMet to consider converting this part-time route to high-frequency service, subject to available funding for operations and bus fleet expansion.

Service enhancements for north-south routes include conversion of Lines 33 and 99 in the McLoughlin Blvd corridor to high-frequency light rail service (with continued high-frequency non-light-rail transit to Oregon City) and extending service on Linwood Ave north of King Rd, continuing on Flavel Dr into Portland. There may be a need for a circulator bus to connect light rail riders to employment locations south of the Tacoma St area when Lines 33 and 99 are discontinued.

In general, more service is desired on existing routes. Reduced headways (more frequent bus runs) are desired for the routes serving Lake Rd, Oatfield Rd, Linwood Ave, International Way, and Logus Rd. Additionally, weekend service is desired for more routes, including those serving King Rd, Oatfield Rd, McLoughlin Blvd, 17th Ave, and 32nd Ave.

Other service enhancements would improve the reliability and/or ridership on Milwaukie transit routes. These include extending the hours of service for certain routes (e.g. between 6 p.m. and 10 p.m.), adding TransitTracker technology at more stops, and establishing transit priority intersections along transit corridors. Where TriMet can improve its system efficiencies and operations, for instance through signal prioritization, interlining routes, curb extensions and other similar devices, the City will provide willing consultation and collaboration. The City acknowledges that the transit system is a regional entity and that service enhancements that benefit the overall system are generally a benefit to the City's small piece of the system.

Capital Improvements

Capital improvements within Milwaukie can be thought of as user amenities that improve the convenience and attractiveness of the transit system, which in turn bolsters ridership. Typical examples of capital improvements include park-and-rides, bus shelters, attractive signage with timetable information, benches, bike racks, trash receptacles, and public art.

The selection of capital improvements depends on needs and availability of funds. TriMet prioritizes bus stop upgrades, for example, based on the number of boardings at the location, the type of service provided at the location (e.g. local bus, express bus, frequent bus, MAX, etc.) and special circumstances such as the presence of a nearby senior center.

Most of the bus stops in Milwaukie are considered "basic stops," and currently have minimal amenities (poles with signs only and a schedule display). TriMet typically provides a shelter at a bus stop that sees an average of 35 daily boardings.[4] Based on 2006 boarding data, there is one stop in Milwaukie that should have a shelter but does not: Harrison St/24th Ave.[5] This stop should be upgraded to a shelter.

Park-and-ride lots are very valuable for commuters. There is currently one small shared-use park-and-ride in Milwaukie, located south of downtown on Lake Rd. This type of small, shared use park-and-ride is useful for residents making short car trips to connect with local bus service.

A second park-and-ride, the 300-plus-space Southgate park-and-ride was constructed in 2008 and is located north of Hwy 224 and east of McLoughlin Blvd. This type of park-and-ride is designed for regional use, attracting users from farther distances who are often seeking to connect with higher capacity transit service like frequent service bus, or light rail. When Lines 33 and 99 are discontinued after the start of light rail service to Milwaukie, consideration should be given to converting the Southgate park-and-ride for use as local employee parking.

Additional park-and-ride lots of both types should be considered for better serving Milwaukie commuters and Clackamas County commuters bound for Portland.

A downtown park-and-ride is a special case. A park-and-ride structure downtown could serve both local and regional transit users, as well as downtown employees and visitors. A structure of this type is envisioned to support the PMLR, but under a special set of circumstances that would allow the City to share the facility for public parking, eventually phasing out the commuter parking as downtown Milwaukie develops (see Chapter 12 Downtown Parking). This option will require additional research regarding location and funding options.

Policy Improvements

By adopting policies that reinforce its transit goals and the improvements described in this TSP update, the City reaffirms its commitment to a complete transit system and takes new steps toward realizing that vision.[6] Key policy recommendations are described below. Other policy suggestions, each contributing toward establishing the complete system, are summarized in "Other Transit Policies."

Serve the "Transit Disadvantaged" Portions of Milwaukie

One high priority policy is the elimination of "transit disadvantaged" portions of the city, based on weekday peak-hour service, by providing new transit service for these areas. The City's Comprehensive Plan establishes that the transportation system provide travel choices and allow people to reduce the number of trips made by single-occupant vehicles.[7] This policy bolsters the City's position that underserved areas be the focus of new transit investments.

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[4] Although ridership is the primary criterion for determining shelter placement warrants, TriMet also considers other factors like LIFT service usage, funding and maintenance by others, development of adjacent property and opportunities for consolidating bus stops.

[5] The Linwood/King stop currently has 29 daily boardings, according to TriMet. The City and TriMet should track the data for this stop on an annual or semiannual basis given the intensification of land use at the Wichita Shopping Center in 2007.

[6] The term "reaffirm" is emphasized here. The City of Milwaukie currently enacts several important transit-supportive policies and provisions located elsewhere in this TSP, in the Milwaukie Municipal Code (Subsection 19.504.10) and the Comprehensive Plan. These include goals such as street connectivity (which enables bus routes and pedestrian access from neighborhood to transit streets), safe pedestrian crossings at regular intervals along principal roadways, development standards that implement State Transportation Planning Rule requirements for building entrances that face transit streets (not parking lots), and appropriate levels of density along transit streets to support transit use.

[7] This policy is included in the Comprehensive Plan as Goal 3 Travel Choices.

Provide Park-and-Rides Downtown and on Milwaukie's Fringe

Park-and-ride policies are suggested that would facilitate structured parking in downtown (see Downtown Parking chapter), and guide the size of new park-and-rides in other locations—smaller within the city to serve Milwaukie residents, and larger on the city's fringe to serve North Clackamas County commuters. These "fringe" park-and-rides, if associated with light rail, (such as that under study for Park Ave and McLoughlin Blvd) should be annexed to the City of Milwaukie to ensure effective and efficient policing.

Improve Public Transit Safety

The Milwaukie Police Department should be consulted and enlisted in the effort to ensure passengers' sense of safety at and on all TriMet facilities in the city. A policy should be adopted that specifically discourages loitering at transit facilities.

Maintain Public Transit Facilities

The maintenance of transit facilities can be improved through the enlistment of city neighborhoods, through a policy that would enable Neighborhood District Associations to initiate improvements by contacting TriMet directly. The transit agency would, in turn, commit to make best efforts to complete the needed maintenance or repair.

Request Dedication for Bus Stop Improvements

The City already requires easements or dedications for new or upgraded bus stops when an adjacent site applies for land use or development permits. Where desired bus stop improvements are adjacent to sites being developed or redeveloped for which an easement or dedication is not required, City policy should be updated to ensure that easements or dedications are requested of project developers and property owners.[8] The NDAs can be effective advocates for the transit system in this process.

Reinvest Public Transit "Savings" Within Milwaukie

The city's level of transit service, while high, falls well short of achieving the goals of the community and the Comprehensive Plan. Consequently, the City takes the position that any savings derived from new capacity, (either through light rail, bus rapid transit, or other new enhancement) be contained and reinvested within the Milwaukie service area. The City would prefer that investments in service upgrades not all come in the form of route conversions to high-frequency transit. Although these conversions are supported, the City's preference would be that savings associated with these conversions (from eliminated bus operations, for example), be retained and reinvested in needed bus system enhancements elsewhere in town. The ultimate goal of this policy would be to achieve a net gain of distributed service throughout the city—both through new projects like light rail, and increased bus service as a result of the new projects.

Other Public Transit Policies

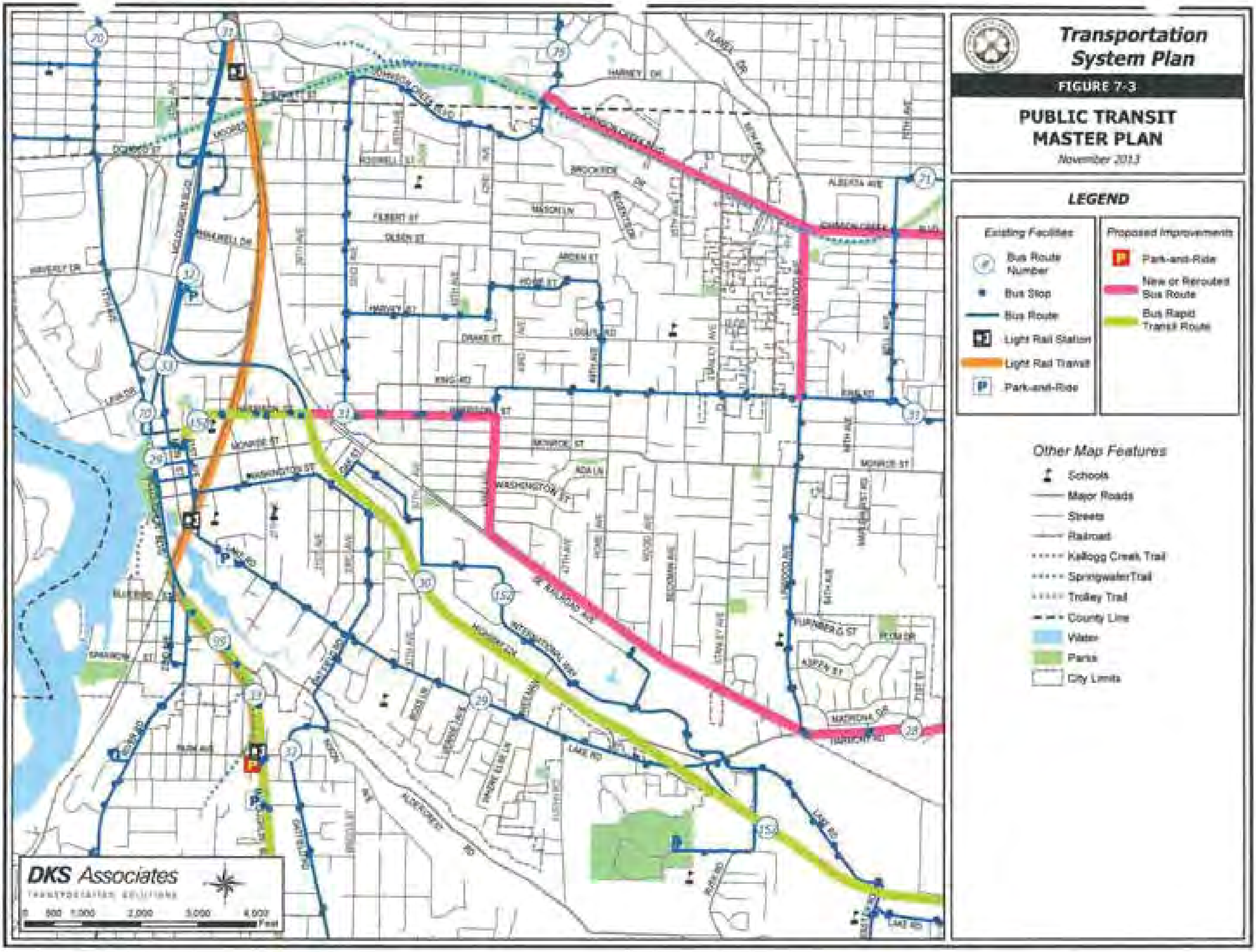
- **Shared Use Park-and-Ride Facilities:** Explore the use of local church parking lots as park-and-ride facilities, in conjunction with a policy to suitably size these facilities based on their location.
- **Frequency of Service:** Add a policy to increase headways on all transit routes in the city so that buses run at least every 30 minutes.

[8] Frequently TriMet is unable to improve bus stops because the property required to make the improvement is privately owned.

- **Bike/Bus Connection:** Identify priority intersections for making connections between bike and bus transportation modes. Ensure that bike parking is installed at all park-and-ride facilities.
- **East-West Travel:** Add a policy that recognizes the need for east-west transit travel south of downtown Portland. Center-to-center commuting is an example of east-west travel.
- **Equitable Ticket Pricing:** Add a policy to ensure that ticket prices from park-and-rides south of downtown are the same as those north of downtown.
- **Interagency Coordination:** Continue to support the Milwaukie Center Bus Service and TriMet's LIFT service through interagency referrals, coordination, and signage as necessary.

Master Plan

TriMet's TIP includes many new services expansions in Milwaukie and the surrounding area over the next 22 years. The Public Transit Master Plan includes potential improvements identified by the transit working group, which included participation from TriMet. Table 7-1 summarizes the transit master plan for both capital projects and service enhancements.



Transportation System Plan
FIGURE 7-3
PUBLIC TRANSIT MASTER PLAN
November 2013
LEGEND
Existing Facilities
Bus Route Number
Bus Stop
Bus Route
Light Rail Station
Light Rail Transit
Park-and-Ride
Proposed Improvements
Park-and-Ride
New or Rerouted Bus Route
Bus Rapid Transit Route
Other Map Features
Schools
Major Roads
Streets
Railroad
Kellogg Creek Trail
SpringwaterTrail
Trolley Trail
County Line
Water
Parks
City Limits
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet

Table 7-1 Public Transit Master Plan Projects

Priority	Type	Project Name	Project Description	From	To	Cost ($1,000s[a])
High Priority Projects						
High	C	Downtown Transit Center Improvements	Construct new bus layover facility outside of the downtown core.	Location-specific	Location-specific	$1,250
High	SE	Railroad Ave Capacity Improvements	Transit aspect: Provide bus service to extend to Clackamas Town Center and points east.	Harrison St	Eastern city limits	TBD
High	SE	Johnson Creek Blvd Bus Service	Identified bus route need.	45th Ave	Eastern city limits	TBD
High	SE	Park-and-Ride Bus Service	Reroute bus line #70 to serve the Milwaukie park-and-ride on Main St.	Location-specific	Location-specific	TBD
High	O	Milwaukie Transportation Management Association Program	Implement a transportation management association for downtown employers.	Milwaukie Town Center	Milwaukie Town Center	$200
High	SE	Downtown Loop Bus	Establish bus service from downtown to Tacoma and Park Ave stations.	Downtown	Tacoma station, Park Ave station	TBD
High	SE	Neighborhood Loop Bus	Establish bus service between eastern neighborhoods and downtown.	Eastern city limits	Downtown	TBD
Medium Priority Projects						
Med	C	Harrison St Transit Shelter at 24th Ave	Install transit shelter at Harrison St and 24th Ave, as this stop currently meets minimum boarding requirements.	Location-specific	Location-specific	$5
Med	SE	Weekend Service Improvements	Increase weekend bus service on bus lines #31, #32, #33, #70, and #75.	Citywide	Citywide	TBD
Low Priority Projects						
Low	C	Bike Lane Striping	Restripe existing bike lanes and stripe bike lanes on bus routes where buses and bicyclists share the road.	Citywide	Citywide	$20
Low	C	Bus Shelter Safety Improvements	Add TransitTracker and LED lighting units at main stops along bus routes.	Citywide	Citywide	TBD
Low	C	Hwy 224 Rapid Bus Improvements	Construct improvements that enhance rapid bus service east to Clackamas Town Center.	Milwaukie Town Center	Clackamas Town Center	TBD

[a] Project costs are order-of-magnitude estimates and are in 2012 dollars. Future costs may be more due to inflation. In the case of operational projects, estimated costs are for the entire 22-year planning period.

Priority	Type	Project Name	Project Description	From	To	Cost ($1,000s*)
Low	SE	Linwood/Flavel Bus Service	Identified bus route need.	Northern city limits	King Rd	TBD
Low	SE	Bus Line Service Improvements	Add frequent service to bus line #31. Add more runs to bus lines #152, #32, and #33 between 6pm and 10pm.	Location-specific	Location-specific	TBD
Low	SE	Transit Priority Signalization	Implement transit priority signalization along key transit corridors.	Citywide	Citywide	TBD
N/A	C	McLoughlin Blvd Rapid Bus Improvements	Construct improvements that enhance rapid bus service south to Oregon City.	Milwaukie Town Center	Oregon City Town Center	TBD

Notes:

C = Capital Project
SE = Service Enhancements
P = Policy Project

High = High priority
Med = Medium priority
Low = Low Priority

TBD = Costs to be determined. These projects are under the jurisdiction of and/or will be funded by TriMet.

Action Plan

The Public Transit Action Plan identifies the highest priority projects that are reasonably expected to be funded with local funds by 2035, which meets the requirements of the State's Transportation Planning Rule.[10] The action plan project list is based upon a 2007 citywide project ranking process. In 2007, all of the modal master plan projects were ranked by the TSP Advisory Committee after consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added.

Table 7-2 Public Transit Action Plan

Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Downtown Transit Center Improvements	Construct new bus layover facility outside of the downtown core.	Location-specific	Location-specific	$1,250	Match
Railroad Ave Capacity Improvements	Provide bus service to extend to Clackamas Town Center and points east.	Harrison St	Eastern city limits	TBD	Direct (TriMet)
Downtown Loop Bus	Establish bus service from downtown to Tacoma and Park Ave stations.	Downtown	Tacoma station, Park Ave station	TBD	Direct (TriMet)
Neighborhood Loop Bus	Establish bus service between eastern neighborhoods and downtown.	Eastern city limits	Downtown	TBD	Direct (TriMet)

REGIONAL TRANSPORTATION PLAN (RTP) COMPLIANCE

The projects identified in the master plan list and further refined in the action plan list are consistent with the Metro 2035 Regional Transportation Plan (RTP). Specifically, the projects identified are in line with Metro's goals for regional mobility and non-single-occupant-vehicle (non-SOV) modal targets.

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

The Street Network element of the TSP focuses on maintaining traffic flow and mobility on arterial and collector roadways, protecting residential neighborhoods from excessive through traffic and travel speeds, providing reasonable access to and from residential areas, improving safety, and promoting efficient through-street movement. This chapter summarizes strategies used to evaluate the future needs of Milwaukie's street network, and recommends projects to improve the operations of the motor vehicle system (for automobiles, trucks, buses, and other vehicles).

TSP GOAL AND POLICY FRAMEWORK

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Several of these TSP Goals guide the City's policies on auto mobility and access, and street connectivity, specifically the following:

- **Goal 1 Livability** directs the City to protect residential areas from excessive speed, and minimize the "barrier" effect transportation facilities have on the community.
- **Goal 2 Safety** calls for the use of coordinated street design standards and access control measures.
- **Goal 3 Travel Choices** directs the City to integrate pedestrian and bicycle facilities into existing and new roadways.
- **Goal 4 Quality Design** addresses the need to relate the design of a street to its intended users.
- **Goal 5 Reliability and Mobility** directs the City to enhance street connectivity and maintain traffic flow, especially on arterials and collectors.
- **Goal 7 Efficient and Innovative Funding** calls for an emphasis on maintaining existing facilities.

FUNCTIONAL CLASSIFICATION

Any discussion of the City's street network should begin with the definition of the different types, or functional classifications. Functional street classifications encompass both the design characteristics of streets and the character of service the streets are intended to provide. The City's functional classifications form a hierarchy of streets ranging from those that are primarily for travel mobility (arterials) to those that are primarily for access to property (local streets). The functional classification system is developed with the recognition that individual streets do not act independently of each other but form a network of streets that work together to serve travel needs on a local, citywide and regional level.

These classifications guide design standards, levels of access, traffic control, law enforcement, and the provision for federal, State, and regional transportation funding. The City's functional classification system includes regional routes, arterials, collectors, neighborhood routes, and local streets. Figure 8-1 shows current functional classifications, including a few small changes from the last TSP update in 2007. Specifically, due to construction of the Portland-Milwaukie Light Rail (PMLR) alignment through downtown, the classification of Lake Rd between 21st Ave and Main St has been changed from "arterial" to "local," the classification of Main St between Lake Rd and Washington St has been changed from "collector" to "local," and the section of Adams St between Main St and 21st Ave has been changed from a "collector" street to not being a street (that section is permanently closed to vehicular traffic). Table 8-1 described the general characteristics and functions of each of these classifications.

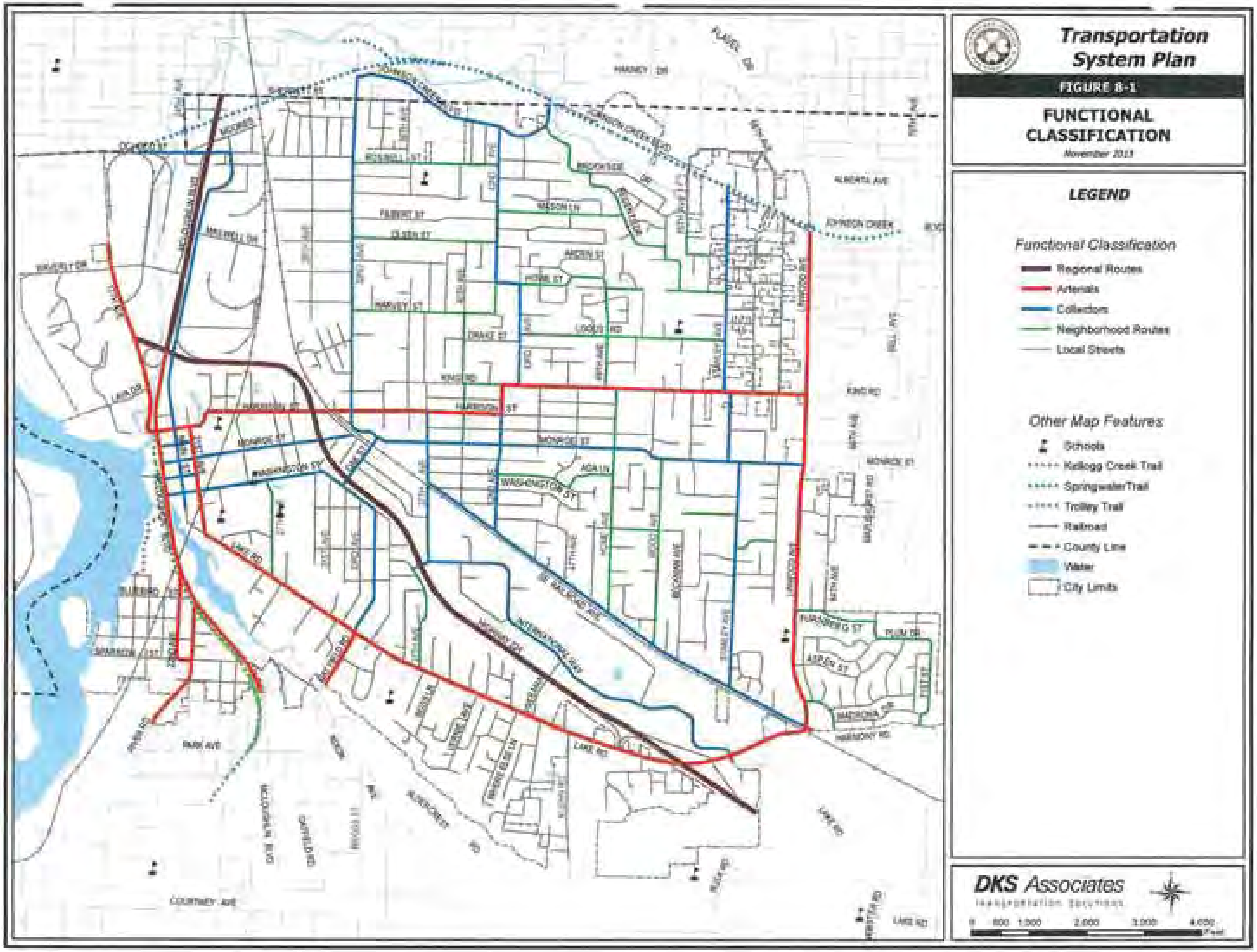
Table 8-1 City of Milwaukie Functional Classifications

Classification	Description	Typical Total Vehicles per Day	Typical Number of Lanes	Other Street Elements
Regional Routes	• High volume, generally high-speed facilities. • May be used for travel within the city, but typically they are used for trips between cities, especially those that are separated by a significant distance. • Rank high on the mobility scale because they have multiple travel lanes in both directions and limited access points. • Rank low on the access scale because access to private property is generally prohibited. • The City's regional route designation matches the regional definition of these roads by Metro and ODOT.	20,000	4 or more	
Arterials	• High volume, moderate speed streets that carry vehicles within the city and between adjacent cities in the surrounding metropolitan area. • Some are under the jurisdiction of and/or maintained by other agencies, such as ODOT, Clackamas County, and the City of Portland. • Rank high on the mobility scale but also provide limited access to a wide range of land uses. • Link major commercial, residential, industrial, and institutional areas. • Typically spaced about one mile apart to assure mobility and reduce the incidence of cut-through traffic on neighborhood routes and local streets. • Management objective is to provide for safe and efficient traffic flow along with pedestrian and bicycle movements. Within downtown, local	10,000	3 or more	Bicycle lanes and sidewalks

Classification	Description	Typical Total Vehicles per Day	Typical Number of Lanes	Other Street Elements
	access is a priority.			
Collectors	• Moderate volume, moderate speed streets that provide access and circulation within and between residential neighborhoods, commercial areas, and industrial areas. • Serve a citywide function of connectivity and are typically spaced about 1/2 mile apart. • Distribute trips between the neighborhood street system and the arterial street system, linking a wide range of land uses. • Access control for collectors is not as high a priority as for arterials, but is especially needed near street intersections. • Since collectors often traverse residential neighborhoods, neighborhood traffic management measures are often needed to manage traffic impacts through these areas.	5,000-10,000	2-3[1]	Bike lanes or shared roadway; sidewalks
Neighborhood Routes	• Moderate volume, low speed streets. • Do not provide citywide circulation, as they mainly serve the immediate neighborhood in which they are located. Typically have residential frontage. • Connect neighborhoods to collectors and arterials. • Neighborhood routes are similar to local streets in design, but they are generally longer in length and have higher traffic volumes. In order to retain the neighborhood character and livability of these streets, additional design treatments in the form of traffic management devices are often needed to manage traffic volume impacts.	1,500 to 5,000	2	Shared roadway, sidewalks, on-street parking
Local Streets	• Low volume, low speed streets that emphasize access to adjacent land uses over mobility. • All streets that are not regional routes, arterials, collectors or neighborhood routes are classified as local streets. • Connect neighborhoods to collectors and arterials • Most local streets are adjacent to residential uses and serve residential transportation needs; however, there are a number of local streets that exclusively serve the city's two industrial areas. • Local streets rank high on the access scale, so driveways and intersections are more closely spaced than on other types of streets.	Less than 1,500	2	Shared roadway, pedestrian facilities, on-street parking.

The design of a roadway can vary from segment to segment due to adjacent land uses and demands, the objective is to have a standard that defines key characteristics provides consistency, and also defines application criteria to provide the flexibility needed to suit conditions. Street design standards and options are discussed in further detail in Chapter 10 Street Design.

[1] As a result, these streets are likely to need turn lanes at some intersections or center left-turn lanes as volumes approach 10,000 vehicles per day.



Transportation System Plan
FIGURE 8-1
FUNCTIONAL CLASSIFICATION
November 2013
LEGEND
Functional Classification
Regional Routes
Arterials
Collectors
Neighborhood Routes
Local Streets
Other Map Features
Schools
Kellogg Creek Trail
SpringwaterTrail
Trolley Trail
Railroad
County Line
Water
City Limits
DKS Associates
0 500 1,000 2,000 3,000 4,000 Feet

TRANSPORTATION NETWORK NEEDS

This section identifies the study area deficiencies for the 2035 baseline scenario, which only includes transportation system improvements that have committed funding (such as STIP and CIP) to be constructed and implemented as a "low build" condition. The increase in vehicle volume as forecasted by the 2035 Metro RTP ("low build") travel demand model and resulting intersection operations are also summarized.

2035 Baseline Network Assumptions

The 2035 base case scenario includes transportation improvements that are reasonably expected to be funded and constructed by the year 2035.[2] This scenario includes both the Transportation Demand Management (TDM) improvements identified later in this chapter and a subset of capacity projects identified in the Regional Transportation Plan (RTP) financially constrained system, shown below in Table 8-2.

Table 8-2 RTP Financially Constrained Motor Vehicle Capacity Improvements

RTP Project #	Location	Improvement	Jurisdiction	Timeline	2007 Cost ($1,000s)
10002	Johnson Creek Blvd (45th Ave to 82nd Ave)	Widen from 3 to 5 lanes and widen bridge over Johnson Creek	Clackamas Co.	2018-2025	$30,000
10003	Harmony Rd (Hwy 224 to 84th Ave)	Widen to 3 lanes with bike lanes and sidewalks where needed	Clackamas Co.	2008-2017	$20,000
10005	West Monterey (82nd Ave to Fuller Rd)	New two-lane extension	Clackamas Co.	2018-2025	$6,200
10009	Fuller Rd (Otty Rd to Johnson Creek Blvd)	Widen Street and add turn lanes, sidewalks, on-street parking, central median, and landscaping	Clackamas Co.	2008-2017	$4,000
10019	West Sunnybrook Rd (82nd Ave to Harmony Rd)	Construct 3-lane extension	Clackamas Co.	2008-2017	$6,970
10869	Sunrise Project (JTA Portion)	Improvements consistent with Supplemental EIS (2-lane mainline from I-205 to 122nd)	ODOT	2008-2017	$150,000

2035 Baseline Traffic Volumes

As can be seen in Figure 8-2a, traffic volumes at the study locations are projected to increase by approximately 10% to 70% during the p.m. peak hour, with most locations generally projected to have approximately 10% to 25% growth. This corresponds to increases of approximately 140 vehicles during the p.m. peak hour on King Rd and 230 to 570 vehicles on Linwood Ave. The traffic volumes on McLoughlin Blvd are projected to increase by over 500 vehicles north of Hwy 224, and by 230 vehicles south of River Rd. On Hwy 224, about 500 more

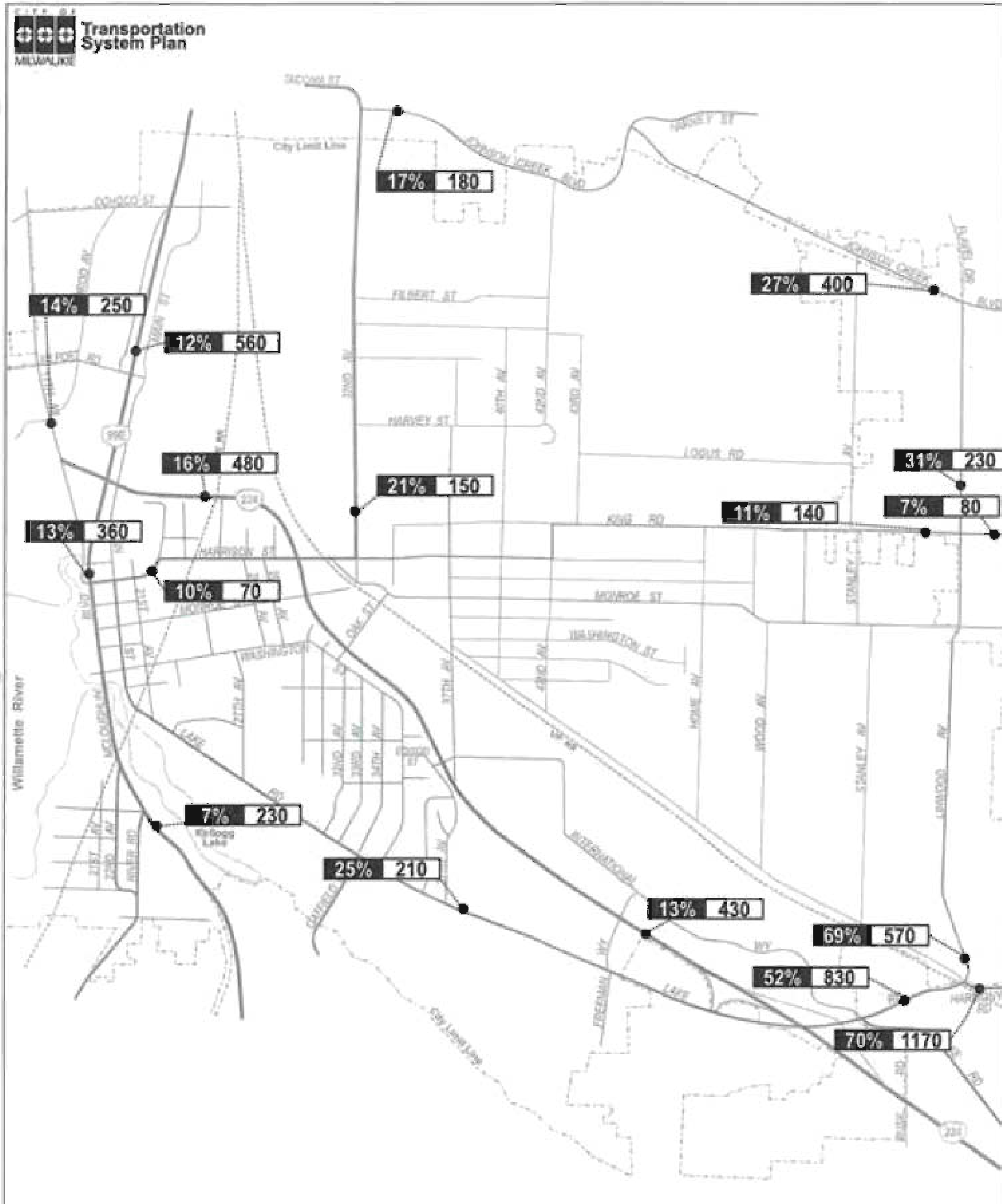
[2] Forecasting for the 2035 base case scenario takes into consideration PMLR as a factor as part of the region's transportation system

vehicles are expected in the p.m. peak hour east of McLoughlin Blvd, and 430 vehicles are expected west of the interchange with Lake Rd. The largest projected traffic increase is on Harmony Rd east of Linwood Ave (to over 1,000 vehicles), which is related to future transportation projects that will change capacity and circulation in the area such as the Harmony Rd extension to Sunnybrook Rd and the construction of the Jobs & Transportation Act (JTA) portion of the Sunrise Corridor. The forecasted increase in volume means that many of the study intersections will fail to meet the performance standards of the City of Milwaukie or the Oregon Department of Transportation (ODOT) in 2035.

2035 Baseline Corridor Operations

Assessing traffic volumes alone does not consider the ability for transportation facilities to handle traffic demand. A volume-to-capacity (V/C) plot provides a comparison between traffic demand and available capacity. These plots are generally used as a high-level measure to provide an overall quality of the transportation system, since the plots do not consider the full spectrum of operational details (such as traffic control, signal timing, etc) that affect transportation facility performance. Rather, such plots provide a general assessment that can identify corridors or segments that may have insufficient capacity or require additional analysis.

Figure 8-2b shows the 2035 p.m. peak period V/C for major corridors in the study area. Many streets in Milwaukie would continue to have a V/C ratio below 0.85, indicating generally uncongested conditions during the peak hour. Two primary corridors, Linwood Ave and Hwy 224, would be approaching capacity, with V/C ratios nearing 1.0. Both Hwy 99E and 17th Ave would be over capacity (V/C > 1.0). These corridors would be unable to fully accommodate traffic demand during the p.m. peak hour. The excess traffic demand would extend the duration of congestion at these locations or would divert to other routes that have additional capacity.



LEGEND

00% - Percentage Increase 2012 - 2035

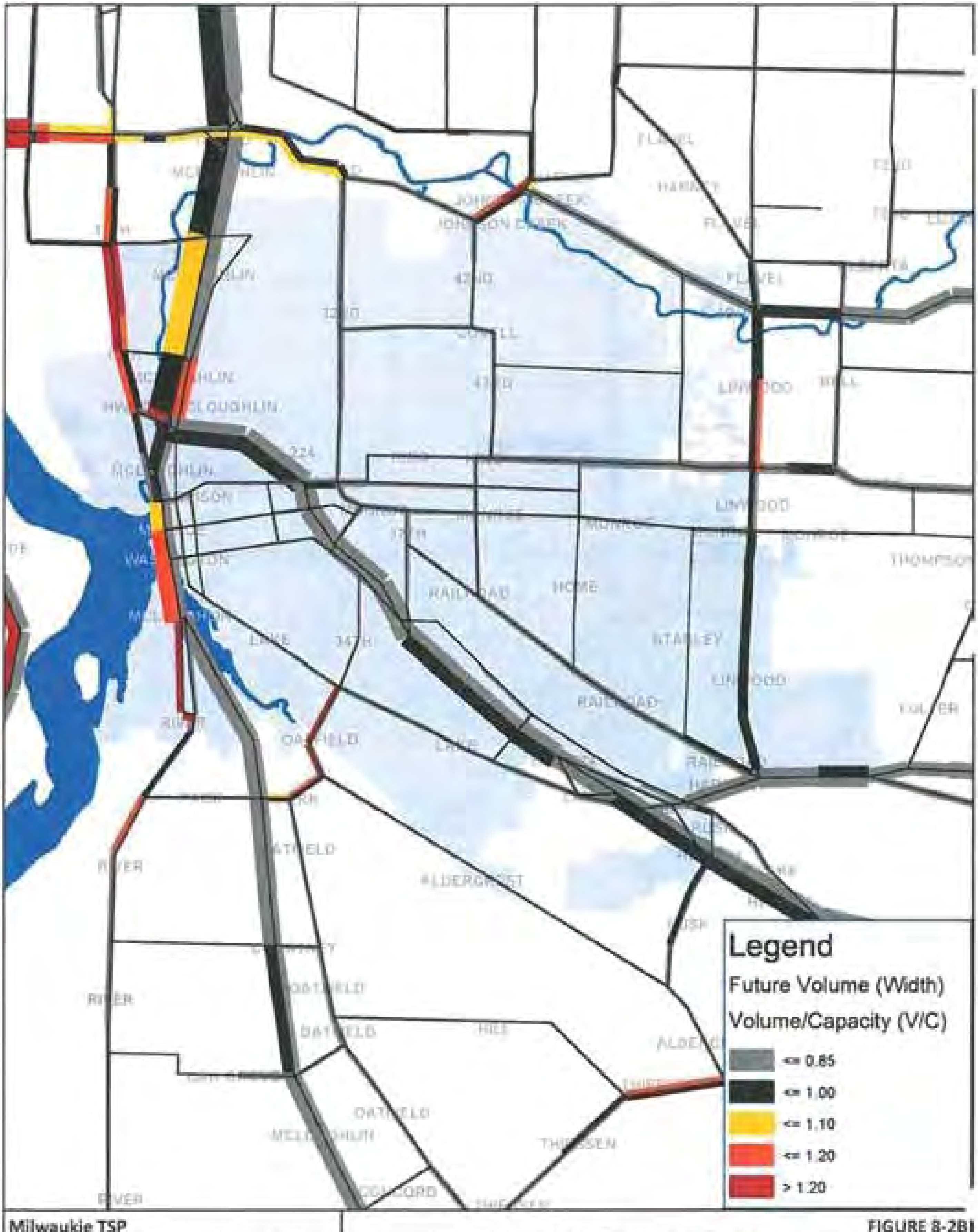
00 - Volume Difference 2012 - 2035

DKS

No Scale

Figure **8-2A**

PERCENT INCREASE IN PM PEAK HOUR VOLUMES



Milwaukie TSP	FIGURE 8-2B
Note: Raw Travel Demand Model Plot	2035 PM Peak Hour Volume/Capacity for Major Roads

2035 Baseline System Measures

Travel Time Reliability

Travel time reliability on Hwy 99E (McLoughlin Blvd) and Hwy 224 was assessed using the travel demand model and creating daily (for each hour) traffic profiles using the Hours of Congestion tool developed by DKS Associates working in conjunction with ODOT. The daily traffic profiles were used to estimate the travel time along the corridor by time of day to create daily corridor speed profiles. In addition, a summary metric of buffer index (BI) was produced to quantify the travel time variability throughout the day. In general, a higher BI score indicates more variability (less reliability) in travel times.

Table 8-3 Summary of Travel Time Reliability Measures by Corridor

Corridor	Direction	Year 2010		Year 2035		Change (2035-2010)	
		Ave Speed (mph)	Buffer Index*	Ave Speed (mph)	Buffer Index*	Ave Speed (mph)	Buffer Index[3]
Hwy 99E	Northbound	28	**2.5**	22	**2.6**	-6	+0.1
	Southbound	30	1.9	23	**2.2**	-7	+0.3
Hwy 224	Eastbound	40	0.6	30	**2.3**	-10	+1.7
	Westbound	42	0.2	36	1.0	-6	+0.8

Based on an assessment of the average daily travel time, each corridor would drop approximately 5-10 miles per hour. The largest drop in speed is projected to occur along Hwy 224 in the eastbound direction (10 miles per hour speed reduction), which also has the largest increase in buffer index, indicating that future travel times will be much less reliable than current conditions.

Vehicle Miles Traveled per Capita (VMT/capita)

Another system measure of effectiveness is vehicle miles traveled (VMT), which 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.

A system planning-level evaluation of the transportation conditions in the existing year and the "low build" alternative scenario was conducted using the travel demand model. This analysis considered the magnitude of system impacts, rather than the site-specific benefit that a particular improvement project could provide to the localized area. The VMT/capita for the base year (2010) was 3.44; under the "low build" scenario, the VMT/capita for 2035 is 2.99, a 13% drop from the base year.

2035 Baseline Intersection Capacity Analysis

This section presents the results of the capacity analysis to determine the potential intersection improvements that would be necessary as part of a long-range master plan. The improvements outlined in the following section are a guide to be used in defining the specific types of rights-of-way and street improvements that will be needed as traffic growth and infill development occurs.

[3] A buffer index (BI) score of 0.0 is free-flow, with larger numbers indicating increased speed variability. Generally, a buffer index between 1.0 and 2.0 represents corridors with significant peak period congestion and values above 2.0 represent severe congestion that spreads into multiple hours. Corridors with a buffer index greater than 2.0 are shown highlighted in bold font.

Table 8-4 summarizes the results of the needs analysis to forecast how the TSP study intersections will perform, given the 2035 base case scenario. Based on the analysis, approximately half (14 of 24) of the study intersections would meet acceptable jurisdictional operating standards in 2035; however, 10 of the 24 intersections would not meet standard. The locations that would not meet standard are generally located along the major regional facilities, Hwy 99E and Hwy 224. The Minimum Acceptable Measures of Effectiveness for intersections during the peak hour are as follows:

- City of Milwaukie = Level of Service D
- Metro/ODOT = 0.99/0.99 (1.10/0.99 in designated Town Centers & Specific Corridors)

Table 8-4 2035 Base Case Intersection Level of Service (P.M. Peak Hour)

Intersection	Existing 2012			Future 2035 Base Case		
	Level of Service (LOS)	Average Delay (Seconds)	Volume/ Capacity (V/C)	Level of Service (LOS)	Average Delay (Seconds)	Volume/ Capacity (V/C)
Two-Way Stop Controlled Intersections						
McLoughlin Blvd @ 22nd Ave	A/D	26.4	0.01	A/E	**38.7**	0.01
Harrison St @ 21st Ave	A/C	18.0	0.10	A/C	17.1	0.25
King Rd @ 42nd Ave	A/B	14.3	0.26	A/C	18.6	0.44
Monroe St @ Linwood Ave	A/D	31.2	0.51	A/F	**>50**	**>1.0**
All-Way Stop Controlled Intersections						
Harrison St @ Main St	B	13.2	0.39	C	17.0	0.71
42nd Ave @ Harrison St	B	12.8	0.22	C	23.7	0.86
Johnson Creek Blvd @ 32nd Ave	**F**	**>50.0**	**0.77**	F	**>50.0**	**1.45**
Signalized Intersections						
McLoughlin Blvd @ Ochoco St	B	10.1	0.85	C	26.8	1.04
McLoughlin Blvd @ Milport Rd	A	4.4	0.78	A	7.9	0.91
McLoughlin Blvd@ Harrison St	D	47.1	0.99	E	**79.0**	**1.18**
McLoughlin Blvd @ Washington St	C	20.0	0.88	E	**68.4**	**1.14**
Hwy 224 @ 17th Ave	C	20.7	0.59	C	23.2	0.74
Hwy 224 @ Harrison St	D	40.0	0.89	E	**74.7**	**1.13**
Hwy 224 @ Monroe St	B	19.0	0.75	C	27.1	0.87
Hwy 224 @ Oak St	D	44.1	0.88	E	**58.3**	1.01
Harrison St @ 32nd Ave	B	10.5	0.45	B	18.6	0.70
McLoughlin Blvd @ River Rd	D	35.5	0.99	F	**>80.0**	**1.14**
Lake Rd @ Oatfield Rd	D	36.0	0.62	D	42.2	0.81
Hwy 224 @ 37th Ave	C	25.5	0.82	F	**>80.0**	**1.26**
Hwy 224 @ Freeman Way	C	30.5	0.94	D	52.7	**1.06**
Hwy 224 @ Lake Rd	B	16.1	0.68	D	35.3	0.89
Johnson Creek Blvd @ Linwood Ave	D	53.6	0.97	F	**>80.0**	**1.55**
Linwood Ave @ King Rd	D	47.5	0.83	E	**61.1**	0.94
Linwood Ave @ Harmony Rd	**E**	**64.5**	0.94	F	**>80.0**	**1.55**

Notes: A/A=major street LOS/minor street LOS.
Signalized and all-way stop delay = average vehicle delay in seconds for entire intersection.
Unsignalized delay = highest minor street approach delay.
Intersections shown in **bold type** exceed jurisdictional standards.
Intersections and corresponding LOS or V/C are illustrated in Figure 8-3

Milwaukie's needs, in terms of capacity improvements, are generally greater on regionally significant routes such as Hwy 99E (McLoughlin Blvd) and Hwy 224 due to the role these routes play in carrying people to destinations throughout the region while passing through the city.

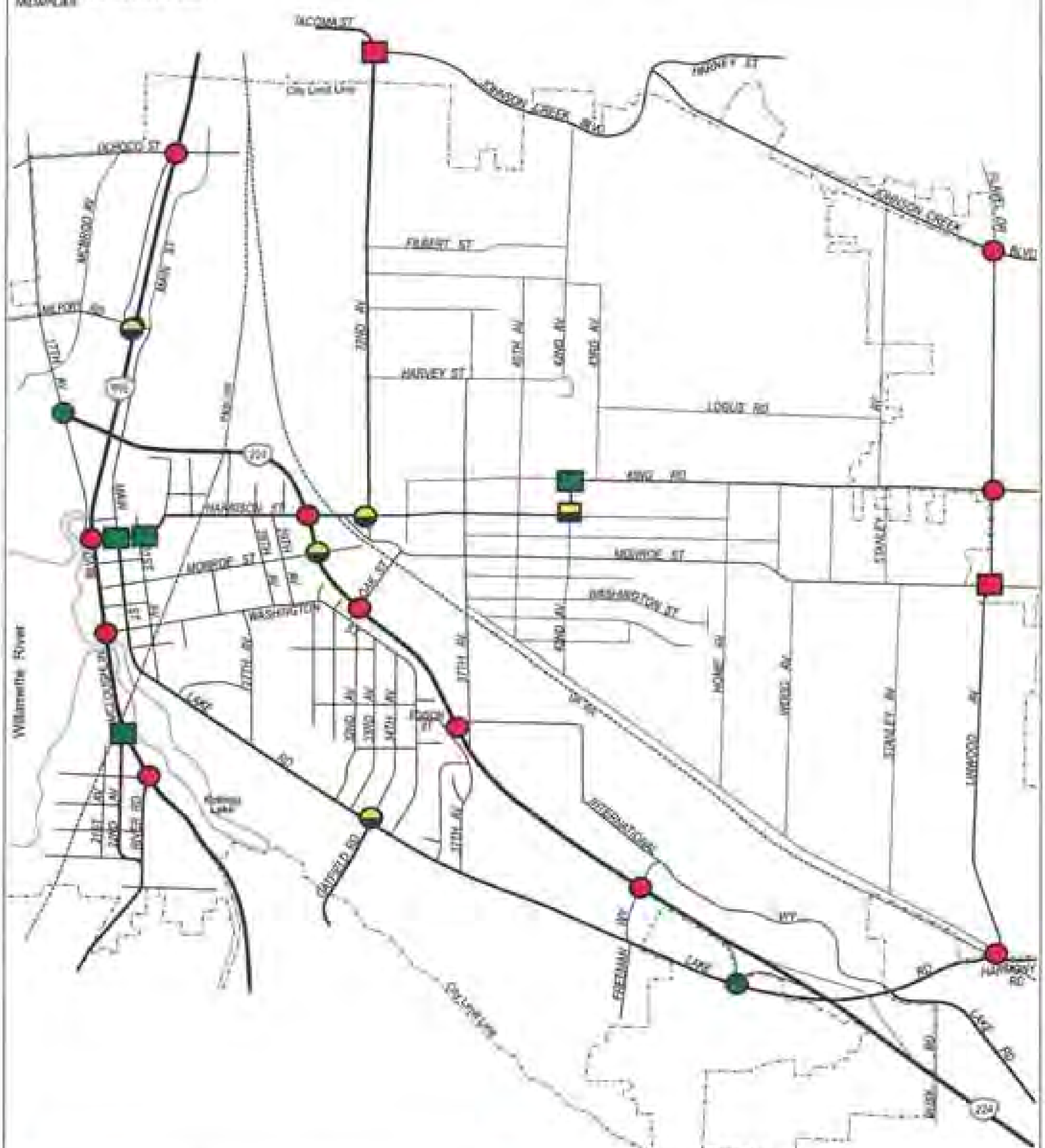
Two of the study intersections currently do not meet the City's Minimum Acceptable Measure of Effectiveness of LOS D: (1) Johnson Creek Blvd at 32nd Ave, and (2) Linwood Ave at Harmony Rd.

- **Johnson Creek Blvd at 32nd Ave:** As part of the PMLR project, a traffic signal and westbound left-turn lane are planned to be constructed for this intersection by TriMet. Table 8-4 considers the intersection as-is and so represents the projected LOS if the planned improvements are NOT made.
- **Linwood Ave at Harmony Rd:** This intersection is within the jurisdiction of Clackamas County and is being addressed as part of the County's current TSP update project. Milwaukie City Council has indicated willingness to consider the current LOS E to be acceptable, given neighborhood concerns about the traffic implications of a major improvement to the intersection.

Figure 8-3 depicts the study area intersections with good, adequate, or poor operational performance during the p.m. peak hour in the year 2035. As can be seen in this figure, approximately half (10 of 24) of the study intersections will operate under poor conditions in 2035. The high growth in volumes along regional facilities such as McLoughlin Blvd and Hwy 224 will not only bring those facilities close to capacity but will also create significant delay on side streets. The future operational analysis for each intersection is outlined in the following sections.

The introduction of the light rail line may affect operational performance at key intersections downtown. As a result, a future update to the TSP may need to include new intersections on the study list (e.g., Washington St and Main St, Washington St and 21st Ave).

Transportation System Plan



LEGEND

- Good Operations (LOS A, B, or C, & V/C < 0.84)
- Acceptable Operations (LOS D & 0.84 < V/C < 0.95)
- Poor to Failed Operations (LOS E or F & V/C > 0.95)
- Unsignalized Intersection
- Signalized Intersection

DKS

Figure 8-3

2035 FUTURE NO-BUILD OPERATIONS STUDY AREA INTERSECTIONS

Table 8-5 summarizes the existing and future needs that have been identified and lists potential strategies to address each need.

Table 8-5 Summary of Motor Vehicle System Gaps and Needs

Reference ID	Location	Need	Potential Strategies to Address Need				
			Intersection Control	Lane Channelization	Alternative Route Improvements	Transportation System Management & Operations (TSMO)	Corridor Extension/ Widening
		Existing Intersection Needs					
N1	Johnson Creek Blvd @ 32nd Ave	Intersection capacity	X	X	X	X	
N2	Linwood Ave @ Harmony Rd	Intersection capacity		X	X	X	
N3	Hwy 224 @ Lake Rd	Safety improvements	X	X			
		Future Intersection Needs					
N4	Monroe St @ Linwood Ave	Intersection capacity	X	X	X	X	
N5	Hwy 224 @ Harrison St	Intersection capacity		X	X	X	
N6	McLoughlin Blvd (Hwy 99E) @ Harrison St	Intersection capacity		X	X	X	
N7	McLoughlin Blvd (Hwy 99E) @ Washington St	Intersection capacity		X	X	X	
N8	McLoughlin Blvd (Hwy 99E) @ River Rd	Intersection capacity		X	X	X	
N9	Hwy 224 @ 37th Ave	Intersection capacity		X	X	X	
N10	Hwy 224 @ Freeman Way	Intersection capacity		X	X	X	
N11	Johnson Creek Blvd @ Linwood Ave	Intersection capacity		X	X	X	
N12	Linwood Ave @ King Rd	Intersection capacity		X	X	X	
		Future Corridor Needs					
N13	Johnson Creek Blvd	Corridor capacity			X	X	X
N14	Linwood Ave	Corridor capacity			X	X	X
N15	McLoughlin Blvd (Hwy 99E)	Corridor capacity			X	X	X
N16	Oatfield Rd	Corridor capacity			X	X	X
		Arterial/Collector Grid System Gaps					
N17	Johnson Creek Blvd (near 42nd Avenue) to Lake Rd (near Oatfield Rd)	North-south arterial connection					X
N18	McLoughlin Blvd (Hwy 99E) to Linwood Ave (between Johnson Creek Blvd and	East-west collector connection					X

	Harrison St/King Rd)							
N19	Railroad Ave (near Home Ave) to Aldercrest Rd (near Kellogg Rd)	North-south collector connection						X

STRATEGIES

The future street system needs in Milwaukie cannot be met through a single "fix-all" cure. Instead, a set of interrelated strategies need to be implemented to meet performance standards, serve future growth and conform to the city's future needs. Strategies for managing the forecasted future travel demand are multifaceted.

The impact of future growth to Milwaukie would be severe without investment in both capital improvements and operating improvements. Strategies for meeting automobile facility needs include Transportation System Management and Operations (TSMO), Transportation Demand Management (TDM), and adding capacity to roads and intersections.

The following sections outline the types of improvements that could be used to manage the system given future growth. Phasing of implementation is necessary, since funding and staging constraints limit the City's ability to implement all improvements at once. This requires prioritization of projects and periodic updating to reflect current needs. Most importantly, it should be understood that as regional growth outpaces local growth, the improvements outlined in the following sections are a guide to managing the increased traffic volume in the city as it occurs over the next 22 years.

Transportation System Management and Operations (TSMO)

Transportation System Management and Operations (TSMO) focuses on low cost strategies within the existing transportation infrastructure to enhance operational performance. The strength of a TSMO approach is it focuses on maximizing urban mobility while treating all modes of travel as a coordinated system. TSMO strategies include signal improvements, traffic signal coordination, traffic calming, access management, local street connectivity, and intelligent transportation systems (ITS). Traffic signal coordination and ITS projects typically provide the most significant tangible benefits to the traveling public. The primary focus of TSMO measures are improvements that result in regional-scale benefits. However, there are a number of TSMO measures that could be used in a smaller scale environment such as Milwaukie.

Intelligent Transportation Systems (ITS)

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

Clackamas County has prepared an ITS plan for the urbanized area of Clackamas County. The Clackamas County ITS Plan[4] has identified arterial signal control ITS projects on major streets throughout the county. Within the TSP study area, McLoughlin Blvd, Hwy 224, Johnson Creek

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

Blvd, King Rd, and Harmony Rd have been identified for planned fiber optic cable, transit priority corridor status, and closed-circuit cameras at several major intersections.

Other ITS projects to consider within Milwaukie may include:

- Transit signal priority
- Signal coordination and optimization
- Traffic monitoring and surveillance
- Information availability
- Incident management

To support future ITS projects, including traffic signal operations, the City of Milwaukie and Clackamas County could require that roadway improvement projects include the installation of three-inch conduit along arterial and selected collector roadways to serve new ITS equipment in the corridor. A three-inch conduit would ensure adequate wiring capacity to accommodate future ITS projects.

Neighborhood Traffic Management

There are some Neighborhood Traffic Management elements, such as speed humps, in place in Milwaukie. The City should continue this effort with additional traffic-calming measures (where applicable) and work with the community to find the traffic-calming solution that best meets their needs and maintains roadway function. Neighborhood Traffic Management techniques are covered in more detail in Chapter 11.

Access Management

Access Management is a policy tool that seeks to balance mobility (efficient, safe, and timely travel) with property access. Proper implementation of access management techniques should result in reduced congestion, accident rates, roadway widening, air pollution, and energy consumption.

The presence of numerous driveways can erode the capacity of arterial and collector roadways. Access management is the practice of limiting the number and spacing of driveways and intersections on arterial and collector facilities to maintain the capacity of the facilities and preserve their functional integrity. Preservation of capacity is particularly important for maintaining the traffic flow on higher volume roadways such as Linwood Ave and King Rd. The city needs a balance of streets that provide access with streets that serve mobility.

Several access management strategies have been identified to improve local access and mobility in Milwaukie:

- Develop specific access management plans for regional routes, arterial and collector streets in Milwaukie to maximize the capacity of the existing facilities and protect their functional integrity.
- Work with land use development applications to consolidate driveways where feasible.
- Provide left-turn lanes where warranted for access onto cross streets.
- Construct raised medians to limit driveway access to right-in/right-out turning movements, as appropriate.

New development and roadway projects on city streets should meet the City's adopted access spacing standards, which are summarized in Table 8-6.

Table 8-6 Access Spacing Standards for City Street Facilities

Access Treatment	Functional Classification	Intersection				Desirable Signal Spacing[5]	Median Control
		Public Road		Private Drive			
		Type	Spacing	Type	Spacing		
Full control (freeway)	Arterials	Interchange	2-3 mi	None	N/A	None	Full
Partial control	Arterials	At grade	530-1000 ft	Lt/Rt Turns	300 ft	1000 ft	Partial/None
Partial control	Collectors	At grade	300-600 ft	Lt/Rt Turns	150 ft	1,000 ft	None

Many existing roadways and driveways do not meet these standards because they were installed when traffic volumes were substantially lower and before the City established access spacing criteria. As traffic volumes increase, controlling access on arterial and collector roadways will be important to maintaining a safe and functioning street network.

Access Management for State Facilities

The Oregon Highway Plan (OHP) defines access spacing standards on State facilities for roadways such as McLoughlin Blvd and Hwy 224. These standards are shown in Table 8-7. Preserving capacity on State facilities is especially important, since substandard performance due to a lack of capacity could force drivers to look for alternative routes along city streets.

Table 8-7 Access Spacing Standards for ODOT Facilities

Facility	Location	Highway Classification	National Highway System	Truck Route	Freight Route	Access Spacing Standard (ft)
McLoughlin Blvd(Hwy 99E)	North city limits to Hwy 224	Statewide	Yes	Yes	Yes	990
	Hwy 224 to Scott St	District	No	Yes	No	500
	Scott St to River Rd	District (Special Transportation Area)*	No	Yes	No	175*
	River Rd to South city limits	District	No	Yes	No	500
Hwy 224	17th Ave to McLoughlin Blvd	District	No	No	Yes	500
	McLoughlin Blvd to East city limits	Statewide (Expressway)	Yes	Yes	Yes	2640

*Minimum access management spacing for public road approaches is the existing city block spacing or the city block spacing as identified in the local comprehensive plan. Public road connections are preferred over private driveways, and in Special Transportation Areas, driveways are discouraged. However, where driveways are allowed and where land use patterns permit, the minimum access management spacing for driveways is 175 feet (55 meters) or midblock if the current city block is less than 350 feet (110 meters).[6]

[5] Generally, signals should be spaced to minimize delay and disruptions to through traffic. Signals may be spaced at intervals closer than those shown to optimize capacity and safety.
[6] Oregon Department of Transportation (ODOT), 1999 Oregon Highway Plan (OHP).

Traffic Signal Spacing

Traffic signals that are spaced too closely on a corridor can result in poor operating conditions and safety issues due to the lack of adequate storage for queuing vehicles. Milwaukie is built-out, and as a result there will not likely be many new roads constructed within the city. However, as traffic volumes increase as a result of in-fill development and regional growth, new signals on the existing street system may be necessary to manage traffic flow. When this is the case, the City will evaluate traffic signal warrants to determine if a traffic signal is an appropriate solution. Traffic signals should only be implemented when deemed necessary by the City Engineering Director to enhance safety and promote mobility. P.M. peak-hour signal warrants have already been met for the intersections at Johnson Creek Blvd/32nd Ave and Harrison St/42nd Ave. Future year 2035 traffic volume projections at the intersection of Linwood Ave/Monroe St would trigger peak-hour signal warrants.

Local Street Connectivity

The local street network in Milwaukie is nearly built out and is not well connected in many neighborhoods. Access opportunities for entering or exiting neighborhoods are limited. There are many long blocks or cul-de-sacs outside of the downtown area that force out-of-direction travel when traveling between and within neighborhoods. Additionally, Milwaukie has many barriers that limit connectivity such as McLoughlin Blvd, Hwy 224, and the Union Pacific Railroad (UPRR) tracks. The combination of these barriers and the lack of connectivity cause many intracity trips to travel along the few through streets that do connect across these barriers.

Increasing connectivity between neighborhoods has many benefits, including: reducing out-of-direction travel and VMT, enhancing accessibility between various travel modes, balancing traffic levels between streets, and reducing public safety response time.

Topography and environmental conditions limit the potential for connectivity in several areas of Milwaukie. However, in several areas there is potential to connect streets over time. Figure 8-4 shows the Proposed Street Connectivity Plan for Milwaukie. Some of the localized congestion on roads such as Linwood Ave, King Rd, 32nd Ave, or Monroe St could be improved through enhanced street connectivity. Several short roadway connections are needed to connect disjointed local streets and reduce out-of-direction travel for vehicles, pedestrians, and bicyclists. In limited cases, a short length of new road would be necessary for improved connectivity.

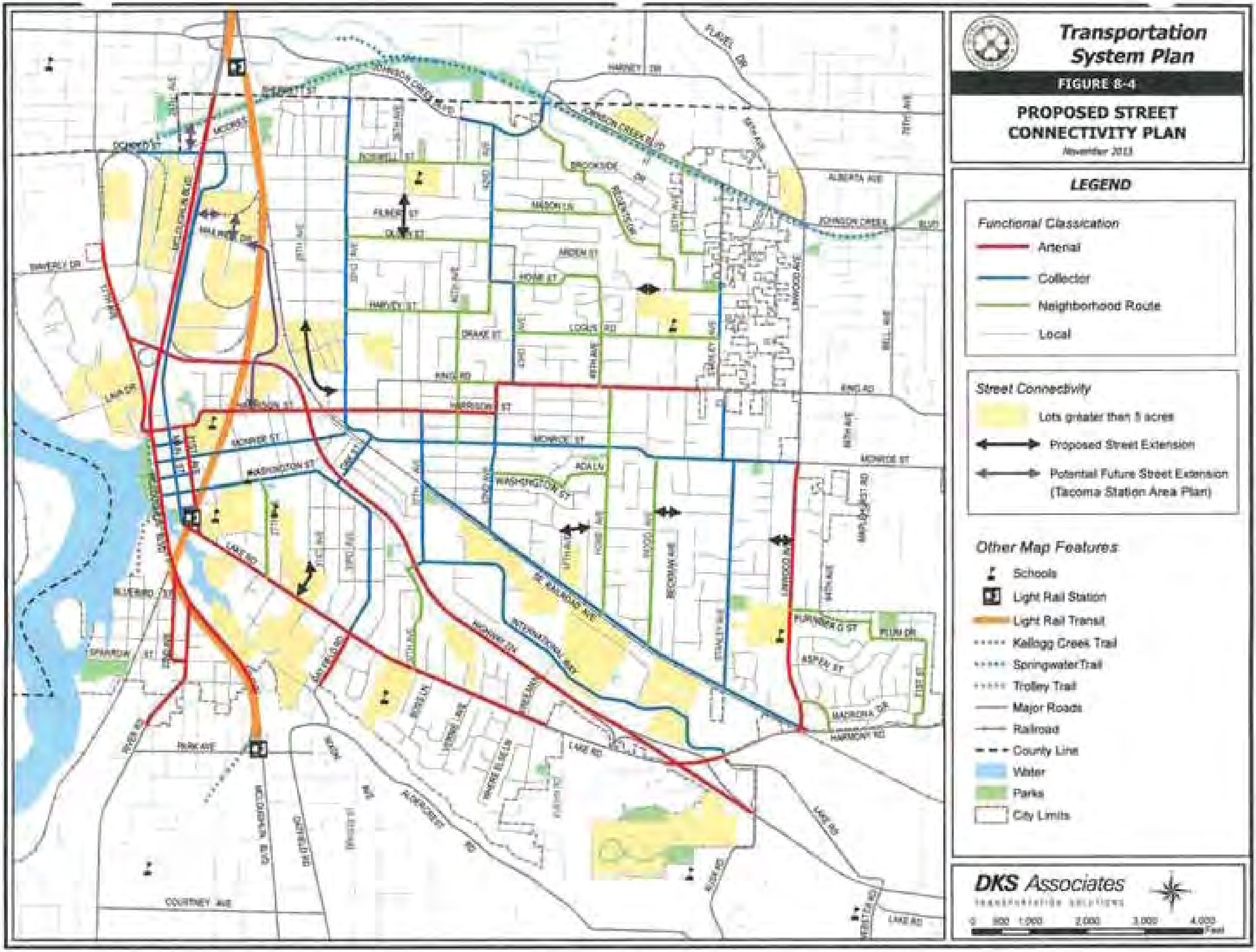
The arrows on Figure 8-4 represent potential connections and the general direction for the placement of the connection. In each case, the specific alignments and design will be determined upon development review. If a connection is made that increases neighborhood connectivity, such a change could trigger reclassification of a street from a "local" to a "neighborhood route." When the opportunity arises during land development, the City requires new local connections that will result in a grid of vehicle access every 530 feet and bicycle/pedestrian access every 300 feet.[7]

The arrows shown on Figure 8-4 indicate priority local and neighborhood connections only. Local connections for existing stub end streets, cul-de-sacs, or extended cul-de-sacs in the road network are, for the most part, not identified on this figure. Pedestrian connections from any cul-de-sac should be considered mandatory as future development and redevelopment occur. The goal is improved connectivity for all modes of transportation.

There are several large parcels (5 acres or greater) in Milwaukie that are either undeveloped or that are developed but have land value that exceeds the building value based on an

[7] This standard meets the Metro RTP access spacing requirements for new residential or mixed use developments.

assessment of available GIS data. Figure 8-4 shows the locations of these parcels. Each of these sites already has frontage on a public street, but only 1 or 2 of the parcels are located where a future street connection would be useful and practical. Figure 8-4 shows where future street connections are desired near these sites. The City's Public Works Standards and the standards for public facility improvements found in the City's Zoning Ordinance will ensure that adequate street connections are established as needed at the time of development or redevelopment of any of these particular sites.


Transportation System Plan
FIGURE 8-4
PROPOSED STREET CONNECTIVITY PLAN
November 2013
LEGEND
Functional Classication
Arterial
Collector
Neighborhood Route
Local
Street Connectivity
Lots greater than 5 acres
Proposed Street Extension
Potential Future Street Extension (Tacoma Station Area Plan)
Other Map Features
Schools
Light Rail Station
Light Rail Transit
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Major Roads
Railroad
County Line
Water
Parks
City Limits
DKS Associates
0 500 1,000 2,000 3,000 4,000 Feet
HARMONY RD
MONROE ST
KING RD
HARRISON ST
LAKE RD
JOHNSON CREEK BLVD
LINWOOD AVE
INTERNATIONAL WAY
SE RAILROAD AVE
COURTNEY AVE
PARK AVE
LOGUS RD
HARVEY ST
WASHINGTON ST
ALBERTA AVE
MADRONA DR
ASPEN ST
FLAVEL DR
HARNEY DR
BROOKSIDE DR
MASON LN
ARDEN ST
HOME ST
DRAKE ST
WAVERLY DR
BLUEBIRD ST
SPARROW ST
DOGWOOD ST

Arterial and Collector Street Connectivity

According to the principles established in Metro's 2035 RTP, arterial streets should be spaced no farther than 1 mile apart and collector streets should be accessible within 1/2 mile of any point in Milwaukie.[6] Given the pattern of existing development in Milwaukie and the various constraints that have influenced it to date, there are not many opportunities to improve the existing network of arterial and collector streets.

The following is an assessment of the gaps identified using the Metro 2035 RTP standards:

- **Gap 1** (arterial gap on Johnson Creek Blvd between 32nd Ave and 45th Ave): The 2007 TSP update downgraded the classification of Johnson Creek Blvd between 40th Ave and Brookside (the section within Milwaukie city limits) from arterial to collector to better coordinate with the street's neighborhood collector designation in the City of Portland and to reflect the low-density residential land surrounding the corridor.
- **Gap 2** (arterial gap on 42nd Ave between Johnson Creek Blvd and King Rd): From Johnson Creek Blvd, 42nd Ave does not connect directly to King Rd; instead, the connection is made by either going 1 block east on Howe St to 43rd Ave or 2 blocks west on Harvey St to 40th Ave. Extending 42nd Ave as an arterial would require significant property acquisition in an established low-density residential neighborhood. There are also 3 historic properties along 42nd Ave between Johnson Creek Blvd and King Rd.
- **Gap 3** (arterial gap on 42nd Ave between Harrison St and Railroad Ave): The existing route is a collector street that goes through an established low-density residential neighborhood.
- **Gap 4** (arterial gap between Railroad Ave and Lake Rd): Establishing an arterial connection would involve crossing an active rail line and going through an existing industrial park. A new connection would require improvement of a very problematic intersection (International Way, 37th Ave, and Hwy 224) as well as crossing Hwy 224 and going into an established residential neighborhood at a different angle than the existing grid alignment there.
- **Gap 5** (collector gap along Kelvin/Howe/Willow St between Hwy 99E and Linwood Ave): Establishing a collector connection would involve bisecting the city's primary manufacturing/industrial area and crossing two active freight rail lines and the new light rail. The existing residential streets are not well aligned to allow easy crossing of other intersecting collectors. The eastern end of the connection would be through an unimproved roadway with a steep slope adjacent to a large wetland property on the north.
- **Gap 6** (collector gap at Home Ave between Railroad Ave and Lake Rd): The connection south from Home Ave would have to cross an active rail line and a protected water quality resource, then cross Hwy 224. A connection between Hwy 224 and Lake Rd would be at an angle to the existing alignment in an established low-density residential neighborhood.
- **Gap 7** (collector gap at Vernie/Maplewood from Lake Rd to Aldercrest Dr): A collector connection would be very close to protected wetlands, go through an existing low-density residential neighborhood, and have to cross Kellogg Creek to get to Aldercrest Dr (in Clackamas County's jurisdiction).

This assessment of gaps does not represent a proposal to establish arterials or collectors in the identified areas. Rather, it is presented to show existing conditions in Milwaukie with respect to specific connectivity standards in Metro's 2035 RTP.

[6] Regional Transportation Functional Plan, Title 1, 3.08.110.C.

Transportation Demand Management

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

Generally, TDM focuses on promoting alternative modes of travel for large employers as a way to reduce the VMT. This is due in part to the Employee Commute Options (ECO) rules that were passed by the Oregon Legislature in 1993 to help protect the health of Portland area residents from air pollution and to ensure that the area complied with the Federal Clean Air Act.[9]

Currently, Metro supports an online tool, "Drive less. *Connect*," (through the Regional Travel Options program) that promotes a ride-matching service connecting carpoolers and bike buddies. Since its launch in 2011, commuters avoided using approximately 50,000 gallons of gasoline and saved roughly $308,000 collectively by joining carpools, biking, and riding transit.

Research has shown that a comprehensive set of complementary policies implemented over a large geographic area can have a measured effect on the VMT to/from that area.[10] However, the same research indicates that for TDM measures to be effective, they should go beyond the low-cost, noncontroversial measures commonly used such as carpooling, establishing transportation coordinators or associations, and designation of priority parking spaces.

The more effective TDM measures include parking and congestion pricing, improved services for alternative modes of travel, and other market-based measures. However, TDM includes a wide variety of actions that are specifically tailored to the individual needs of an area. In general, TDM elements and programs have a potential trip reduction ranging between 1% and 10%. To help implement TDM measures in the future, the City should consider setting TDM goals and policies for new development.

With an increase in the number of projected regional trips through the city, regional TDM measures should help to reduce congestion and be a benefit to the City of Milwaukie and the region. The RTP includes TDM projects for the Milwaukie area in the 2035 financially constrained plan. These measures are identified in Table 8-8.

[9] Oregon Administrative Rules, Chapter 340, Division 30.
[10] *The Potential for Land Use Demand Management Policies to Reduce Automobile Trips*, ODOT, by ECO Northwest, June 1992.

Table 8-8 TDM Improvements Included in the RTP Financially Constrained System

Metro Project ID	Location	Improvement	Jurisdiction	Timeline	Cost ($1,000s)
10020	Countywide	Advanced transportation system management and ITS program	Clackamas County	2008-2017	$6,514
10901	Regionwide	Milwaukie Light Rail Extension	TriMet	2008-2017	$1,148,000
10159	Regionwide	Springwater Trail Access Improvements	Portland	2008-2017	$3,032
11331	Regionwide	Frequent Service Bus Capital Improvements (Phase 1)	TriMet	2008-2017	$16,000
11230	Regionwide	Frequent Service Bus Capital Improvements (Phase 2)	TriMet	2008-2017	$15,000
11332	Regionwide	I-205 BRT	TriMet	2008-2035	$30,000
10990	Regionwide	Park-and-Ride Management Strategy Implementation	TriMet	2008-2035	$1,000
10988	Regionwide	Incremental Increases in Park-and-Ride Lots and Capacities	TriMet	2008-2017	$20,000
11333	Regionwide	Bus Stop Improvements	TriMet/SMART	2008-2035	$14,000
11042	Regionwide	Bus Priority Treatments	TriMet	2008-2035	$5,029
11043	Regionwide	Priority Pedestrian Access to Transit Improvements	TriMet	2008-2035	$5,000

The Metro regional travel model includes assumptions about which modes of transportation people choose to use. Targets for trips using non-single-occupant-vehicle (non-SOV) modes have been set for some 2040 Plan areas. For Milwaukie, the model forecast assumes completion of the projects included in the RTP financially constrained scenario, with a non SOV Modal Target of 45% to 55% in the designated Town Center area and 40% to 45% in Industrial/Employment areas. All other areas within Milwaukie do not have a non-SOV target.[11] Milwaukie will only be able to achieve these targets through a continued effort to implement TDM strategies and promote alternative modes of travel.

Parking Requirements

The City of Milwaukie currently has off-street parking ratios (minimum and maximum) and standards that are consistent with the Transportation Planning Rule (TPR) and RTP parking ratio requirements. Chapter 12 outlines the specific parking strategies for downtown Milwaukie.

Roadway and Intersection Operational and Capacity Improvements

The TSP process identified a number of roadway and intersection capacity improvements. This section summarizes the evaluation of intersection of the three types of capacity and connectivity improvements:

- City Street and Intersection Improvements
- McLoughlin Blvd (Hwy 99E) Alternatives

[11] Information related to non-SOV target percentages and designated areas can be found in the Metro Regional Transportation Plan, Table 1.3 page 1-65, and on Figure 3.5 page 3-14.

- Hwy 224 Alternatives
- Hwy 224/99E Refinement Plan

Conceptual diagrams illustrating the recommended improvements can be found in Appendix D, Conceptual Design Options.

City Street and Intersection Improvements

Most of the study intersections that are on city streets will require improvements to meet City standards under forecasted 2035 conditions. Table 8-9 summarizes the improvements needed for these study intersections to meet City standards; more detailed descriptions of the improvements follow.

Table 8-9 Improvements Needed for City Intersections to Meet City Standards

Intersection	Improvement	Before	After
Linwood Ave @ Monroe St	• Signalization	A/F	B
Johnson Creek Blvd @ 32nd Ave*	• Signalization with westbound left-turn lane	F	D
Johnson Creek Blvd @ Linwood Ave	• Add eastbound (EB) right-turn lane • Add westbound (WB) right-turn lane • Add northbound (NB) right-turn lane	F	D
Linwood Ave @ King Rd	• Protected/permissive left-turn phasing northbound (NB) and southbound (SB)	E	D

*This intersection is in the City of Portland. As such, improvements will be determined by the City of Portland. Project is planned by TriMet as part of the PMLR project.

- **Linwood Ave/Monroe St:** This location would meet traffic signal warrants for the p.m. peak hour with year 2035 traffic volumes. The addition of the traffic signal would allow Monroe Street traffic to access or cross Linwood Avenue by providing gaps in traffic. The addition of the traffic signal would significantly reduce delay and improve operations on Monroe St (LOS F to LOS B), though additional delay would be added to traffic on Linwood Ave that does not currently stop.
- **Johnson Creek Blvd/32nd Ave:** This intersection is in the city of Portland which has an operating standard of LOS D. P.M. peak-hour signal warrants are currently met at this intersection. Installing a traffic signal and a westbound left-turn lane would improve the LOS at this intersection from F to D.[12] This improvement is consistent with TriMet plans as part of the PMLR project. As an alternative improvement, widening the existing bridge north of 32nd Ave would be necessary to provide a southbound left-turn lane at this intersection and realign the intersection so that 32nd Ave would form a T-intersection with Johnson Creek Blvd. While this realignment would be more conducive to serve traffic demands along Johnson Creek Blvd, the primary travel corridor, bridge widening would significantly increase the project cost. A roundabout may be an alternative for this location.

  While not studied, the two all-way stop controlled intersections east of 32nd Ave (36th and 42nd Aves) would likely require similar treatment (traffic signal with turn lanes) to meet operational standards. As with the 32nd Ave intersection, the scale of the improvements does not fit well in the residential neighborhood setting. Limiting the project to signals alone would

[12] Signalization alone would improve the delay from approximately 135 seconds to 110 seconds, and the intersection would still operate at LOS F in the TSP forecast year, 2035. Changes to the intersections in this corridor should be coordinated to ensure that they work together to improve safety and are designed for the posted speed (25 mph).

not bring the intersection operations to the desired standard but would relieve traffic congestion.

The City of Portland has jurisdiction of Johnson Creek Blvd from Tacoma St to just west of 40th Ave, the section that includes the 32nd Ave intersection. Portland does not have plans to modify the bridge or the roadway. Clackamas County has jurisdiction north of Brookside Dr and continuing eastward. The County's TSP includes a project to widen the bridge over Johnson Creek.

Milwaukie has jurisdiction over the intersection of Johnson Creek Blvd/42nd Ave, and will coordinate with Portland and Clackamas County if improvements are considered in this corridor. The project listed in the master plan is for signalization only at 42nd Ave. This project is intended to balance the needs of the affected neighborhood and other stakeholders. The number and location of the existing stop signs along Johnson Creek Blvd serve to reduce traffic speeds, which is valued by the adjacent neighborhood. Therefore, before a traffic signal is installed at the intersection of Johnson Creek Blvd and 42nd Ave, the City shall conduct a study that analyzes the advantages of the traffic signal to the adjacent neighborhood and the City's transportation system.

- **Johnson Creek Blvd/Linwood Ave:** Adding eastbound, westbound, and northbound right-turn lanes would improve the operations at this intersection from F to D. No additional improvement would be necessary for the operation of this intersection to meet City standards. Any intersection improvements should protect, if not improve, the Springwater Trail crossing through this intersection.
- **Linwood Ave/King Rd:** Aside from modifying phasing at this intersection or increasing street connectivity throughout the city with parallel routes to Linwood Ave and King Rd, there are no simple solutions to improve operation of this intersection.

McLoughlin Blvd (Hwy 99E) Alternatives

While most intersections along McLoughlin Blvd (Hwy 99E) do not meet future operating standards (V/C of 1.1 within the Town Center), the intersections of McLoughlin Blvd with Ochoco St and Milport St are near capacity but still operate within the ODOT operating standards. Because access is severely restricted from McLoughlin Blvd, the City and ODOT have investigated options for improving freight-related access and circulation for the North Industrial Area. Since both of these intersections are forecasted to meet standards in 2035, improvements focus on access and circulation, not capacity improvements. These potential improvements are outlined in more detail in Chapter 9 Freight Element and Appendix D.

The intersection of McLoughlin Blvd and 17th Ave is primary portal to downtown Milwaukie from McLoughlin Blvd, especially for vehicles traveling to Milwaukie from the north. Improvements to this intersection would be difficult because of the intersection's geometry[13] and phasing, and the proximity of Johnson Creek Blvd.

The phasing for eastbound and westbound traffic is currently split phase (one side operates independent of the other side). This phasing arrangement increases the amount of time required for vehicles traveling on Harrison St/17th Ave and also decreases the potential time for northbound and southbound vehicle movements.

[13] 17th Ave is perpendicular to McLoughlin Blvd for only a short distance of less than 100 feet. After this distance, the road makes a 90-degree bend to the north and runs parallel to McLoughlin Blvd. This geometry is a result of the close proximity of Johnson Creek and the Willamette River.

Shifting traffic away from this intersection and can improve how it functions (its V/C ratio). One way to do this would be to restrict eastbound left turns from 17th Ave onto McLoughlin Blvd Travelers needing to make this turn could instead be directed through the intersection, to turn left at the next intersection (Harrison St/Main St) and left on Scott St, and right onto northbound McLoughlin Blvd. Forcing this movement would allow for the split phasing at the intersection of Harrison St and McLoughlin Blvd to be removed and improve intersection operations. This option could redirect up to 20 drivers, who normally access McLoughlin Blvd via this intersection, into downtown Milwaukie during the p.m. peak hour.

The interchange of McLoughlin Blvd and Hwy 224 currently connects southbound traffic on McLoughlin Blvd to eastbound on Hwy 224 and westbound traffic on Hwy 224 to northbound on McLoughlin Blvd. It does not provide for a direct connection of the northbound McLoughlin Blvd or eastbound Hwy 224 to southbound McLoughlin Blvd traffic. The construction of a full interchange between McLoughlin Blvd and Hwy 224 would shift vehicles to the interchange and improve operations at the intersection of McLoughlin Blvd and 17th Ave. This interchange, along with the rest of the McLoughlin Blvd/Hwy 224 corridor between Tacoma St and 17th Ave should be studied as part of a Hwy 224/99E Refinement Plan to determine the most cost-effective set of improvement options for the corridor and the City of Milwaukie.

Improvement of the intersection of 17th Ave and Harrison St could involve any number of options, including an increase in the intersection's capacity, improved local connectivity, and parallel routes to decrease demand at the intersection. The City should work with ODOT and Metro to create a solution to maintain operational levels at this intersection while minimizing possible negative impact of any improvements to the intersection. Any improvement recommended by the Hwy 224/99E Refinement Plan should also include improvements to this intersection.

McLoughlin Blvd and River Rd

Without improvements, the intersection of McLoughlin Blvd/River Rd would operate at unacceptable levels during the p.m. peak hour in 2035 (V/C of 1.14 exceeds Town Center target of 1.1). A sketch-level operational analysis conducted for two potential improvement alternatives found that either would improve the intersection to the point of meeting operational mobility standards. The two alternatives are described below.

- **Alternative 1:** One possible improvement would leave the intersection of McLoughlin Blvd and 22nd Ave open in its current configuration. The intersection of McLoughlin Blvd and River Rd would require a second northbound left-turn lane and additional right-of-way to operate within ODOT standards (a V/C ratio of 1.10). This option would improve the operations of the intersection (V/C ratio of 1.06) in a similar manner to the second option (the current geometry requires an exclusive pedestrian phase that limits the intersection operations for motor vehicles).[14] However, this alternative would be less disruptive and is preferred by the Island Station Neighborhood District Association.

- **Alternative 2:** The second alternative would involve consolidating the three intersections into one. Currently, vehicles turning from 22nd Ave onto McLoughlin Blvd are limited to right-in and right-out turns. River Rd has one shared lane to access McLoughlin Blvd, and vehicles access River Rd from McLoughlin Blvd via Bluebird St. The consolidation of the three intersections would greatly decrease the number of access points (and conflict points) to McLoughlin Blvd, and therefore result in safer, more efficient operations. To improve operations to acceptable standards, a second northbound left-turn to access McLoughlin

[14] It should be noted that ODOT STIP project titled "OR99E: Kellogg Creek - MP 9.19" (key# 12855) will eliminate the exclusive pedestrian phase and provide signal interconnection between the River Rd intersection and the intersection of McLoughlin Blvd at Washington St. This project is scheduled for construction in 2007.

Blvd would be necessary at this new intersection. An eastbound right-turn lane would also be necessary to accommodate the high right-turn volume from the highway, and would result in a V/C ratio of 1.06.

Hwy 224

Four of the seven study intersections along Hwy 224 are projected to exceed ODOT's V/C ratio requirements (1.1 within the Town Center, 0.99 outside of the Town Center) during 2035 peak-hour operations. Both short-term and long-term solutions are necessary to achieve an acceptable level of mobility on Hwy 224, while allowing for cross-city connectivity.

Short-Term Solutions

Short-term solutions are designed to relieve congestion at multiple intersections. They may not completely alleviate congestion, but can be implemented with relatively low cost at specific locations (versus the generally high cost, large-scale long-term solution). The intersections of Harrison St at Hwy 224 and Oak St at Hwy 224 are the two locations for short-term solutions. The short-term solution is to provide signal-protected left turns. This would require three types of changes: signal phasing, optimizing the signal timing to balance mobility and cross-street connectivity, and some physical modifications at the Harrison St intersection. The physical changes would convert the existing shared through/left-turn lanes at Harrison St into left-turn lanes and restripe the intersection as necessary to align the left-turn lanes. The intersection of Hwy 224/Oak St already has left-turn lanes on Oak St and would not require restriping. ODOT approval would be required for modifications to both intersections. A detailed traffic study would be required to ensure that the new phasing does not detrimentally affect the intersection operations and a signal progression study would be required.

Modifying the intersection of Hwy 224 and 37th Ave may be an additional short-term improvement. The northern leg of the intersection of Hwy 224 and 37th Ave is difficult because 37th Ave currently splits just north of the highway into 37th Ave and International Way. This geometric layout is confusing and increases the potential for possible conflicts. The consolidation of these two approaches into one would improve safety and traffic operations by creating a simpler intersection with one northern approach.

Long-Term Solutions

Long-term solutions for Hwy 224 address mobility along the corridor and cross street connectivity within the city, and require major investments that exceed the forecasted revenue. The alternatives that have been explored in order to meet the Oregon Highway Plan v/c target are outlined below. Alternatives 1-3 have been determined to be infeasible due to the improvement cost and limited forecasted revenue out to 2035. Alternative 4 is the recommended approach for the Hwy 224 corridor for the current planning period, along with establishing alternative mobility targets through a refinement plan.

- **Alternative 1—Seven-Lane:** The Hwy 224 seven-lane cross section alternative would involve increasing the number of through lanes for each direction from two to three, beginning north of Harrison St to south of Lake Rd. This option would require the acquisition of right-of-way, and increase the crossing distance at the intersections. It would solve the future operational deficiencies at the study intersections out to 2035.

  While widening Hwy 224 does allow for adequate intersection operations at study area intersections, it would create an even greater barrier to local connectivity. For this reason, some additional alternatives were evaluated to help reduce the potential side street delay and improve the potential east/west connectivity across Hwy 224. In addition, capacity improvements such as widening facilities along the entire corridor are not consistent with

Metro's regional prioritization of transportation improvements (which place more focus on intersection or system management improvements).

- **Alternative 2—Modified Split Diamond Interchange:** Construction of a modified split diamond interchange between Harrison St and 37th Ave would involve elevating Hwy 224 from Harrison St to 37th Ave and constructing two tight urban interchanges (which require less right-of-way space than standard freeway interchanges). Monroe St and Oak St would pass under Hwy 224 with a frontage road under Hwy 224 to connect between Harrison St and 37th Ave. To improve connectivity within the city, this option includes the construction of an at-grade rail crossing along Monroe St and the extension of Monroe St to 32nd Ave. This configuration allows for much better intersection operations due to the removal of the Hwy 224 traffic through the intersections. A planning-level operational analysis revealed that the intersections would operate within the State's mobility standards.
- **Alternative 3—Hwy 224 Overpass/Underpass:** Grade separation of the highway would improve the localized intersection operations, but would divert traffic bound for or leaving Hwy 224 to other streets. An overpass over Hwy 224 could be placed at several locations, including Harrison St, Freeman Way and International Way/37th Ave. An option to the overpasses would be to construct Hwy 224 below grade with City streets passing over the highway. This alternative improves intracity connectivity by removing the barrier effect caused by Hwy 224.
- **Alternative 4—Hwy 224 TSMO Improvements:** Improve arterial corridor operations by expanding traveler information and upgrading traffic signal equipment and timings. Install upgraded traffic signal controllers, establish communications to the central traffic signal system, provide arterial detection (including bicycle detection where appropriate), and routinely update signal timings. Provide real-time and forecasted traveler information on arterial roadways including current roadway conditions, congestion information, travel times, incident information, construction work zones, current weather conditions, and other events that may affect traffic conditions. TSMO improvements also include ongoing maintenance and parts replacement (such as monitoring systems; providing power; and replacing cameras, loops, or other data collectors and devices).

Hwy 224/99E Refinement Plan

The City and ODOT should complete a Refinement Plan to determine and recommend alternative mobility targets.[15] The Refinement Plan would provide options for alternative mobility targets, which could include expanding the number of hours beyond the current two-hour measure, establishing a travel-time measure, or other measures. This plan should also consider ways to reduce the highway's barrier effect for all modes through an increased level of connectivity across the facility, consistent with City goals. The Refinement Plan should be completed within one to five years of the adoption of the October 2013 updates to the TSP.

[15] Provisions for alternative mobility targets are allowed per the Regional Functional Plan, Title 1, 3.08.230 and Oregon Highway Plan, Policy 1F3. The Oregon Transportation Commission shall approve the alternative mobility targets in order for them to become effective.

RECOMMENDATIONS

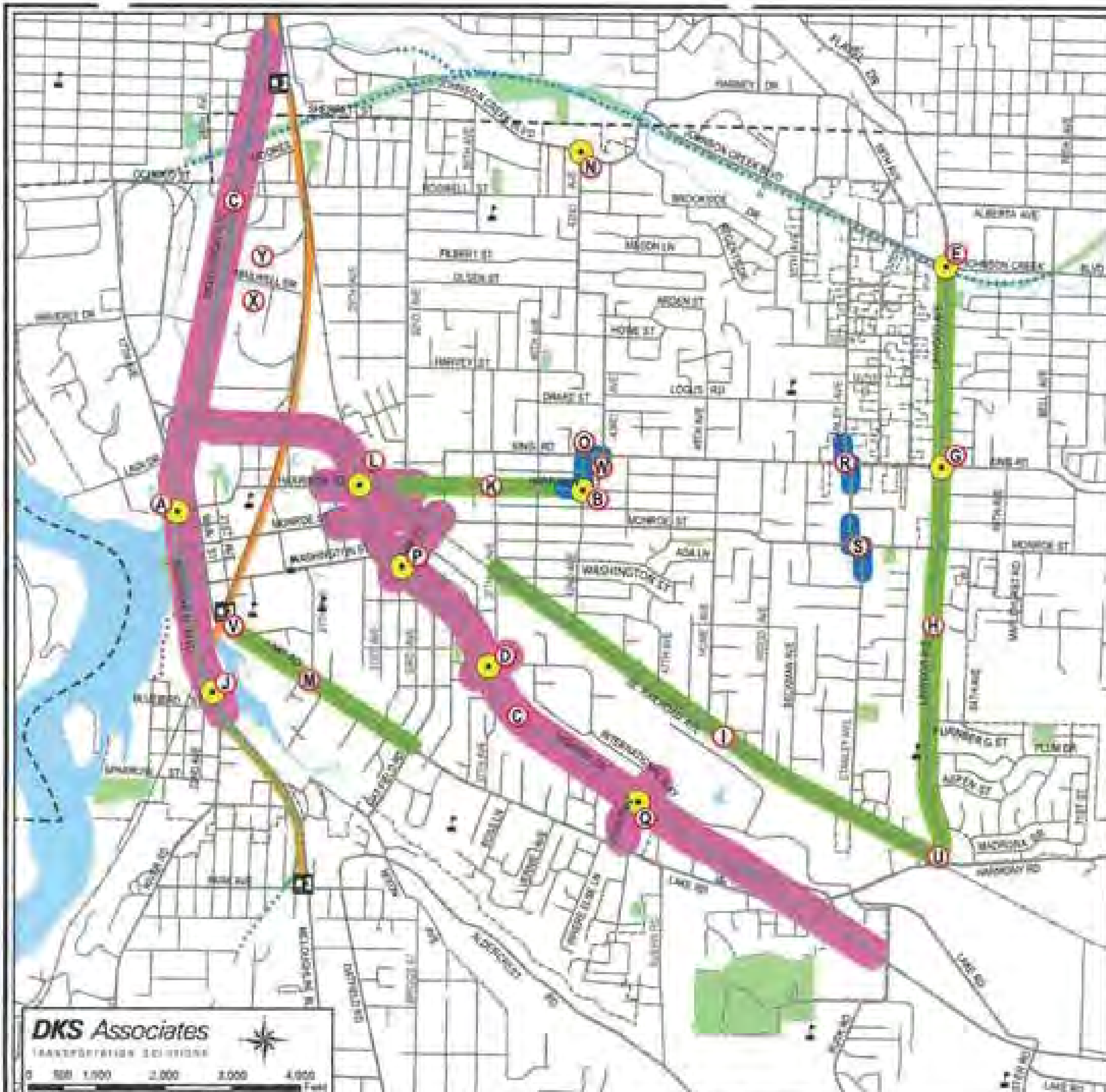
To meet the TSP goals and policies outlined in Chapter 2, the City should take the following steps for improving the street network:

- Manage and improve the entire roadway system consistent with the City's transportation policies and street classifications.
- Work with ODOT and Clackamas County to implement their access control standards on their facilities to reduce conflicts among vehicles and trucks, as well as conflicts between vehicles and pedestrians.
- Identify local street system improvements that are cost-effective in improving State facility conditions. These projects could be candidates for State financial assistance.
- Work with Metro to develop travel forecasts for the City that are used to assess future regional travel needs. The City will participate in verifying housing and employment forecasts to be used when Metro updates the Regional Transportation Plan.
- Coordinate with ODOT regarding implementation of the Oregon Highway Plan for expressways and Special Transportation Areas, including developing alternative mobility targets for Hwy 224 and McLoughlin Blvd.

Master Plan

The Street Network Master Plan is the list of projects needed to mitigate motor vehicle street network deficiencies. Figure 8-5 depicts the approximate locations of the Street Network Master Plan projects, which are also summarized in Table 8-10. This list is a "wish list" of motor vehicle related projects in Milwaukie. Some projects from the master plan were selected for inclusion in the Street Network Action Plan, which consists of projects that the community has identified as its top priorities for allocating and/or pursuing funding. As development occurs, streets are rebuilt, or other opportunities arise, projects on the master plan should be addressed.

The planning-level cost estimates in Table 8-10 are based on general unit costs for transportation improvements, but do not reflect the unique project elements that can significantly add to project costs. For each of these projects, the City will refine the cost estimate to include right-of-way requirements and costs associated with special design details at the time of development.



Transportation System Plan

FIGURE 8-5

STREET NETWORK MASTER PLAN

November 2013

LEGEND

Proposed Street Network Improvements

- Travel Route Improvement
- Corridor Refinement Plan
- Roadway Widening Project
- Intersection
- Schools
- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail
- Light Rail Station
- Light Rail Tracks
- Major Roads
- Streets
- Railroad
- County Line
- Water
- Parks
- City Limits

PROPOSED PROJECTS

Table 8-10 Street Network Master Plan Projects

Map ID[16]	Priority	Type	Project Name	Project Description	From	To	Cost ($1,000s)[17]
High Priority Projects							
C	High	C	Hwy 224 & Hwy 99E Refinement Plan	Conduct refinement study to establish alternative mobility targets for Hwy 224 and McLoughlin Blvd for locations not meeting applicable State targets, and explore ways to minimize barrier effect and improve auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to River Rd	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	$270
D	High	C	Intersection Improvements at Hwy 224 and 37th Ave	Consolidate the two northern legs of 37th Ave and International Way into one leg at Hwy 224.	Location-specific	Location-specific	$2,100
H	High	C	Linwood Ave Capacity Improvements (north)	Widen to standard three lane cross section. Widen bridge over Johnson Creek.	Johnson Creek Blvd	King Rd	$9,300
H	High	C	Linwood Ave Capacity Improvements (south)	Widen to standard three lane cross section.	King Rd	Harmony Rd	$12,500
P	High	C	Intersection Improvements at Hwy 224 and Oak St	Add left-turn-lanes and protected signal phasing on Oak St approaches.	Location-specific	Location-specific	$20
R	High	C	Stanley Ave Connectivity at King Rd	Enhance connection along Stanley Ave at King Rd.	Location-specific	Location-specific	$60
S	High	C	Stanley Ave Connectivity at Monroe St	Enhance connection along Stanley Ave at Monroe St.	Location-specific	Location-specific	$60
V	High	C	Intersection Improvements at McLoughlin Blvd and 22nd Ave	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200

[16] See Figure 8-4.
[17] Project costs are order-of-magnitude estimates and are in 2012 dollars. Future costs may be more due to inflation. In the case of operational projects, estimated costs are for the entire 22-year planning period.

Map ID[16]	Priority	Type	Project Name	Project Description	From	To	Cost ($1,000s)[17]
Medium Priority Projects							
A	Med	C	Intersection Improvements at McLoughlin Blvd and 17th Ave	Prohibit left-turn movement from 17th Ave to northbound McLoughlin Blvd and include in Hwy 224 & Hwy 99E Refinement Plan.	Location-specific	Location-specific	$20
E	Med	C	Intersection Improvements at Johnson Creek Blvd and Linwood Ave	Add eastbound right-turn lane and westbound right-turn lane.	Location-specific	Location-specific	$880
G	Med	C	Intersection Improvements at Linwood Ave and King Rd	Implement protected/permissive left-turn phasing for northbound and southbound approaches.	Location-specific	Location-specific	$20
J	Med	C	Intersection Improvements at McLoughlin Blvd and River Rd	Consolidate a single access point for the area at Bluebird St with full intersection treatment and signalization or add second northbound left-turn lane at River Rd.	Location-specific	Location-specific	$980
K	Med	C	Harrison St Capacity Improvements	Widen to standard three lane cross section.	32nd Ave	42nd Ave	$2,800
L	Med	C	Intersection Improvements at Harrison St and Hwy 224	Add left-turn-lanes and protected signal phasing on Harrison St approaches.	Location-specific	Location-specific	$20
O	Med	C	Harrison St and King Rd Connection	Enhance connection between King Rd and Harrison St	King Rd	Harrison St	$60
Low Priority Projects							
B	Low	C	Intersection Improvements at 42nd Ave and Harrison St	Signalize intersection to facilitate dominant traffic flow.	Location-specific	Location-specific	$280
I	Low	C	Railroad Ave Capacity Improvements	Widen to standard three lane cross section.	37th Ave	Linwood Ave	$14,200
M	Low	C	Lake Rd Capacity Improvements	Widen to standard three lane cross section.	21st Ave	Oatfield Rd	$8,100
N	Low	C	Johnson Creek Blvd and 42nd Ave Signalization	Replace 3-way stop with signal when warranted.	Location-specific	Location-specific	$270

Map ID[16]	Priority	Type	Project Name	Project Description	From	To	Cost ($1,000s)[17]
Q	Low	C	Hwy 224 Access Modifications at Freeman Way	Modify access at Freeman Way to improve intersection functioning.	Location-specific	Location-specific	$1,400
W	Low	C	Intersection Improvements at 42nd Ave and King Rd	Realignment of intersection to improve traffic movements between 42nd Ave and King Rd east of 42nd Ave.	Location-specific	Location-specific	$200
X	Low	C	Local Street Connections in Tacoma Station Area	Connect local streets within Tacoma station area: 24th Ave between Ochoco St/Moores St & Clatsop St; Omark St between Mailwell Dr & Beta St (w/midblock connection from Main St); and Mailwell Dr to Harrison St via 26th Ave. (TSAP)	Location-specific	Location-specific	$8,120
Y	Low	C	Local Street Improvements in Tacoma Station Area	Construct street improvements on Stubb St, Beta St, Ochoco St, Hanna Harvester Dr, and Mailwell Dr. (TSAP)	Location-specific	Location-specific	$5,280

Notes:

C = Capital Project
O = Operational Project
P = Policy Project

High = High priority
Med = Medium priority
Low = Low priority

TSAP = Tacoma Station Area Plan

Action Plan

The Street Network Action Plan (Table 8-11) identifies the highest priority projects that are reasonably be expected to be funded with local funds by 2035, which meets the requirements of the State's Transportation Planning Rule.[18] The action plan project list is based upon a 2007 citywide project ranking process. In 2007, all of the modal master plan projects were ranked by the TSP Advisory Committeeafter consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added.

Table 8-11 Street Network Action Plan

Map ID	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
P	Intersection Improvements at Hwy 224 Crossings (Oak St)	Add left-turn lanes and protected signal phasing on Oak St approaches.	Location-specific	Location-specific	$20	Match
V	Intersection Improvements at McLoughlin Blvd and 22nd Ave	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200	Match
C	Hwy 224 & Hwy 99E Refinement Plan	Conduct refinement study to establish alternative mobility targets for Hwy 224 and McLoughlin Blvd for locations not meeting applicable State targets, and explore ways to minimize barrier effect and improve auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to River Rd	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	$270	Match

The completion of the action plan project list would improve transportation operations at several locations in Milwaukie. The study intersections would operate as listed in Table 8-12 with the inclusion of action plan projects during the year 2035 p.m. peak hour. Approximately one third of study intersections (8 of 24 locations) would not meet performance standards with the inclusion of the action plan projects. Six of these intersections would be located on ODOT facilities (McLoughlin Blvd or Hwy 224), while the remaining two locations would be on City of Milwaukie facilities (Linwood Ave). Additional refinement plans for McLoughlin Blvd and Hwy 224 are needed to identify appropriate improvements and/or alternate mobility targets for traffic mobility along the corridors.

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

Table 8-12 2035 Action Plan Intersection Level of Service (P.M. Peak Hour)

Intersection	Existing 2012			Future 2035 Action Plan Scenario		
	Level of Service (LOS)	Average Delay (Seconds)	Volume/ Capacity (V/C)	Level of Service (LOS)	Average Delay (Seconds)	Volume/ Capacity (V/C)
Two-Way Stop Controlled Intersections						
McLoughlin Blvd @ 22nd Ave	A/D	26.4	0.01	**A/E**	**38.7**	0.01
Harrison St @ 21st Ave	A/C	18.0	0.10	A/C	17.3	0.24
King Rd @ 42nd Ave	A/B	14.3	0.26	A/C	18.9	0.46
Monroe St @ Linwood Ave	A/D	31.2	0.51	B	11.6	0.66
All-Way Stop Controlled Intersections						
Harrison St @ Main St	B	13.2	0.39	C	19.4	0.78
42nd Ave @ Harrison St	B	12.8	0.22	C	24.4	0.86
Johnson Creek Blvd @ 32nd Ave[19]	**F**	**>50.0**	**0.77**	D	46.9	0.93
Signalized Intersections						
McLoughlin Blvd @ Ochoco St	B	10.1	0.85	C	32.8	1.08
McLoughlin Blvd @ Milport Rd	A	4.4	0.78	A	9.5	0.95
McLoughlin Blvd@ Harrison St	D	47.1	**0.99**	**F**	**83.8**	**1.20**
McLoughlin Blvd @ Washington St	C	20.0	0.88	**E**	**67.3**	**1.14**
Hwy 224 @ 17th Ave	C	20.7	0.59	C	24.2	0.77
Hwy 224 @ Harrison St	D	40.0	0.89	**E**	**79.6**	**1.17**
Hwy 224 @ Monroe St	B	19.0	0.75	C	31.8	0.97
Hwy 224 @ Oak St	D	44.1	0.88	**E**	**66.9**	1.06
Harrison St @ 32nd Ave	B	10.5	0.45	B	17.3	0.72
McLoughlin Blvd @ River Rd	D	35.5	0.99	**F**	**>80.0**	**1.14**
Lake Rd @ Oatfield Rd	D	38.0	0.62	D	42.7	0.80
Hwy 224 @ 37th Ave	C	25.5	0.82	**F**	**>80.0**	**1.30**
Hwy 224 @ Freeman Way	C	30.5	0.94	**E**	**58.4**	**1.08**
Hwy 224 @ Lake Rd	B	16.1	0.68	D	39.1	0.91
Johnson Creek Blvd @ Linwood Ave	D	53.6	0.97	**F**	**>80.0**	**1.23**
Linwood Ave @ King Rd	D	42.6	0.79	D	42.0	0.88
Linwood Ave @ Harmony Rd	**E**	**65.0**	0.94	**F**	**>80.0**	**1.55**

Notes: A/A=major street LOS/minor street LOS
Signalized and all-way stop delay = average vehicle delay in seconds for entire intersection
Unsignalized delay = highest minor street approach delay
Intersections shown in **bold type** exceed jurisdictional standards

[19] Intersection is assumed to have a traffic signal and westbound left-turn lane constructed by TriMet.

REGIONAL TRANSPORTATION PLAN (RTP) COMPLIANCE

The projects identified in the master plan list and further refined in the action plan list are consistent with the Metro 2035 Regional Transportation Plan (RTP) goals for regional mobility and non-SOV modal targets. It is expected that the City would continue coordination with Metro and Clackamas County as other plans are updated to maintain consistency and coordination on projects that are regionally implemented.

9 Freight Element

This chapter summarizes strategies to address the future needs of Milwaukie's freight system. The Freight Plan is intended to outline all freight needs over the next 22 years, develop projects to address those needs and identify costs for those projects.

The quality of the local freight network, i.e., those transportation facilities necessary for the movement of bulk goods and materials, is essential to the economic health of the city. While all cities have some need for local delivery of goods, a majority of Milwaukie's employment is in the heavy manufacturing, warehousing, and distribution sectors. These employment sectors are dependent on the efficient movement of large quantities of both raw materials and products. A well-functioning and reliable system for the movement of freight into and out of Milwaukie contributes significantly to the City's ability to attract and retain industrial investment—and the jobs and tax proceeds that come with that investment.

TSP GOAL AND POLICY FRAMEWORK

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Several of these TSP Goals guide Milwaukie's policies on freight access and connectivity, specifically the following:

- **Goal 1 Livability** guides the City to protect residential neighborhoods from excessive noise and pollutants associated with freight transportation.
- **Goal 4 Quality Design** calls for street designs that to support the streets' intended uses, including truck turning movements, as applicable.
- **Goal 5 Reliability and Mobility** calls for maintaining traffic flow and mobility on arterial and collector roadways.
- **Goal 6 Compatibility** directs the City to coordinate with ODOT to address improvements to the commercial railroad system and the State highway system within Milwaukie.
- **Goal 9 Economic Vitality** calls for a safe and efficient freight system that facilitates the movement of goods.

NEEDS

This section outlines the basic needs for freight in Milwaukie, based on existing deficiencies and future forecasting.

Accessibility

In Milwaukie the land uses that are most associated with freight movement are located north of downtown along Hwy 99E (McLoughlin Blvd) and in southeast Milwaukie along Hwy 224. The function of these highways in these areas is critical to serving the movement of freight and goods. Both of these industrial areas are accessible by truck and rail. While rail access tends to function well (despite limitations due to Union Pacific's scheduling priorities), truck access is constrained and is projected to become more problematic as traffic volumes increase in the future (see Chapter 8). A third industrial area in the city along Johnson Creek Blvd, though smaller than the others, is also highly constrained by the transportation system.

The north Milwaukie industrial area (defined as the area south of city limits, west of the Union Pacific Railroad, east of 17th Ave and north of Hwy 224) has limited access to and from Hwy 99E. The eastern half of the area is particularly difficult to access: automobiles can only enter via the signalized intersections of Ochoco St/Hwy 99E and Milport Rd/Hwy 99E. Left turns from Hwy 99E at both of these locations are prohibited and right turns are allowed only at Ochoco St. Together these restrictions force trucks to use the frontage roads of Main St (on the east side of Hwy 99E) and Frontage Rd (to the west of Hwy 99E). Although restricted turn movements from Hwy 99E in this area improve through-vehicle performance and reduces delay on Hwy 99E, it forces freight vehicles to attempt difficult turning maneuvers and to travel out of their intended direction.

The intersection configurations at and near the Hwy 99E/Milport Rd intersection limit the utility of the intersection. The two frontage roads are very close to Hwy 99E. The stacking distance on Milport Rd between Hwy 99E and Frontage Rd is approximately 70 feet; the distance between Main St and Hwy 99E is just fifty feet, barely enough room to store one large trailer semi-truck. In addition, the alignment of the all-way stop control intersection of Main St/Milport Rd makes it particularly difficult for trucks to turn from Main St onto Hwy 99E.

The International Way industrial area is north of Hwy 224, between 37th Ave to the west, Lake Rd to the east, and Railroad Ave to the north. Access to and from the area is via three intersections: the signalized intersection of International Way, 37th Ave and Hwy 224; a signalized intersection at Freeman Way and Hwy 224; and a signalized intersection of International Way and Lake Rd, which is approximately 300 feet from the interchange of Lake Rd with Hwy 224. As discussed in Chapter 8, the intersection at 37th Ave and Hwy 224 is not well configured. The two intersections on 37th Ave are approximately 70 feet apart, making it difficult for trucks to access Hwy 224 because there is only space for one truck to wait for the signal to turn green and allow access to Hwy 224. A second concern is the curvature of the approach to Harmony Rd and Lake Rd at the eastern end of International Way, which is difficult for trucks to maneuver.

Ingress and egress to the third industrial area in Milwaukie, in the northeast corner of the city, is provided via Johnson Creek Blvd. Johnson Creek Blvd however, is limited to two axle-vehicles to the west of 45th Ave, effectively prohibiting heavy truck access to the west. The result is that trucks traveling to and from this area with origins or destinations in that direction must travel south via Linwood Ave, adding several miles of out-of-direction travel.

Connectivity

Several significant regional facilities that provide for regional movement of freight are located, in part, within Milwaukie. These are most notably the Union Pacific Railroad's (UPRR) Brooklyn Sub mainline and the Hwy 99E, and Hwy 224 mobility corridor. Access to these facilities allows Milwaukie businesses to connect to the national transportation network via Brooklyn Yard and I-205. Informal surveys of industrial businesses have confirmed that most out-bound and in-bound heavy truck trips use I-205. While these regional facilities do provide mobility for local users, they are operated by ODOT and UPRR primarily for the benefit of regional through-movements.

There is a need to minimize delay in accessing regional freight facilities. Milwaukie should acknowledge the need to serve those through-movements, while also striving to preserve and expand access for trips originating or terminating within the city. This is a primary concern for the north industrial area due to the out-of-direction travel required to access the area and the delays associated with leaving the area.

In addition, local and regional freight system users would benefit from improvements in the connections between these regional routes. Currently Hwy 99E and Hwy 224 connect with a partial interchange that facilitates direct access between southbound Hwy 99E to eastbound Hwy 224, and westbound Hwy 224 to northbound Hwy 99E. Other movements are not directly accommodated and require vehicles to utilize city streets such as 17th Ave (Hwy 224 westbound to Hwy 99E southbound) and Harrison St (Hwy 99E northbound to Hwy 224 eastbound).

Rail Crossings

The majority of the at-grade rail crossings in Milwaukie are constructed of asphalt. This surface material becomes uneven and deteriorates more quickly than concrete or rubberized materials that are more commonly used at railroad crossings. Elderly and disabled citizens, as well as adults with baby strollers, are experiencing difficulties walking across the asphalt railroad crossings. Bicyclists may also have difficulty crossing the railroad tracks at these locations. These are of primary concern on arterials and collectors, where vehicle traffic is the heaviest and the asphalt material deteriorates at a faster rate.

As discussed in Chapter 8, all at-grade rail crossings, regardless of materials, cause interruptions to the transportation network. These are particularly acute at crossings such as the UPRR crossing of Harrison St and the UPRR crossing of Harmony Rd, where frequent train crossings interrupt important auto circulation routes and impact emergency services.

Truck Maneuverability

Truck turning movements are difficult due to intersection alignments and/or geometries at several locations, including the Main St and Omark Dr intersections with Mailwell Dr.

Neighborhood Livability

Heavy vehicles and trains frequently create real and perceived neighborhood impacts. The impacts include noise, vibration, safety, aesthetics, and air quality. They are particularly noticeable when trains or trucks pass through or near residential neighborhoods.

RECOMMENDATIONS

Strategies

To address the needs described above, the City will pursue the following strategies.

Accessibility

Several alternatives for improving truck access and local circulation in the North Milwaukie industrial area were examined during the preparation of the 2007 TSP update. The purpose of this detailed analysis was to develop and analyze various alternatives to improve access and circulation for freight to and from this area. The work was conducted with an awareness of the potential impacts that the Portland-Milwaukie Light Rail (PMLR) project could have on access to the area. To help develop alternatives that would meet the access and circulation needs of this area, a separate sub-group of the Freight Working Group was established to help develop a problem statement, goal statement, and evaluation criteria to help guide the development and analysis of the various alternatives.

The preferred alternative among the participants of the sub-group was the construction of an overpass of Hwy 99E at Ochoco St with alternative access to Hwy 99E via on/off lanes, and restricting access at Milport Rd to right-out movements, in concert with a "Tillamook" branch alignment of light rail. The detailed analysis for this process can be found in Appendix D. Because this access issue sits within the larger question of the best design of the Hwy 99E/Hwy 224 corridor, the Freight Working Group recommended forwarding these findings to a future Hwy 99E/Hwy 224 Corridor Refinement Plan, rather than including a specific improvement or set of improvements in the Freight Master Plan.

Rail Crossings

Improving the quality of the materials at at-grade crossings and pursuing the grade separation of key crossings, such as the UPRR and Harrison St, and the UPRR and Harmony Rd crossings, are included in the master plan. The City should not support the introduction of any new at-grade heavy rail crossings in the city.

Truck Maneuverability

Intersections that are part of the local freight network or provide access to regional facilities ought be designed to fully accommodate truck turning maneuvers. As part of new design guidelines, the City should adopt clear standards for adequate turning radii, lane widths and other geometric requirements of heavy vehicles for those streets that are local preferred freight routes or internal circulation routes within industrial areas. The master plan includes a project to correct two Mailwell Dr intersections that are currently problematic for truck maneuvers.

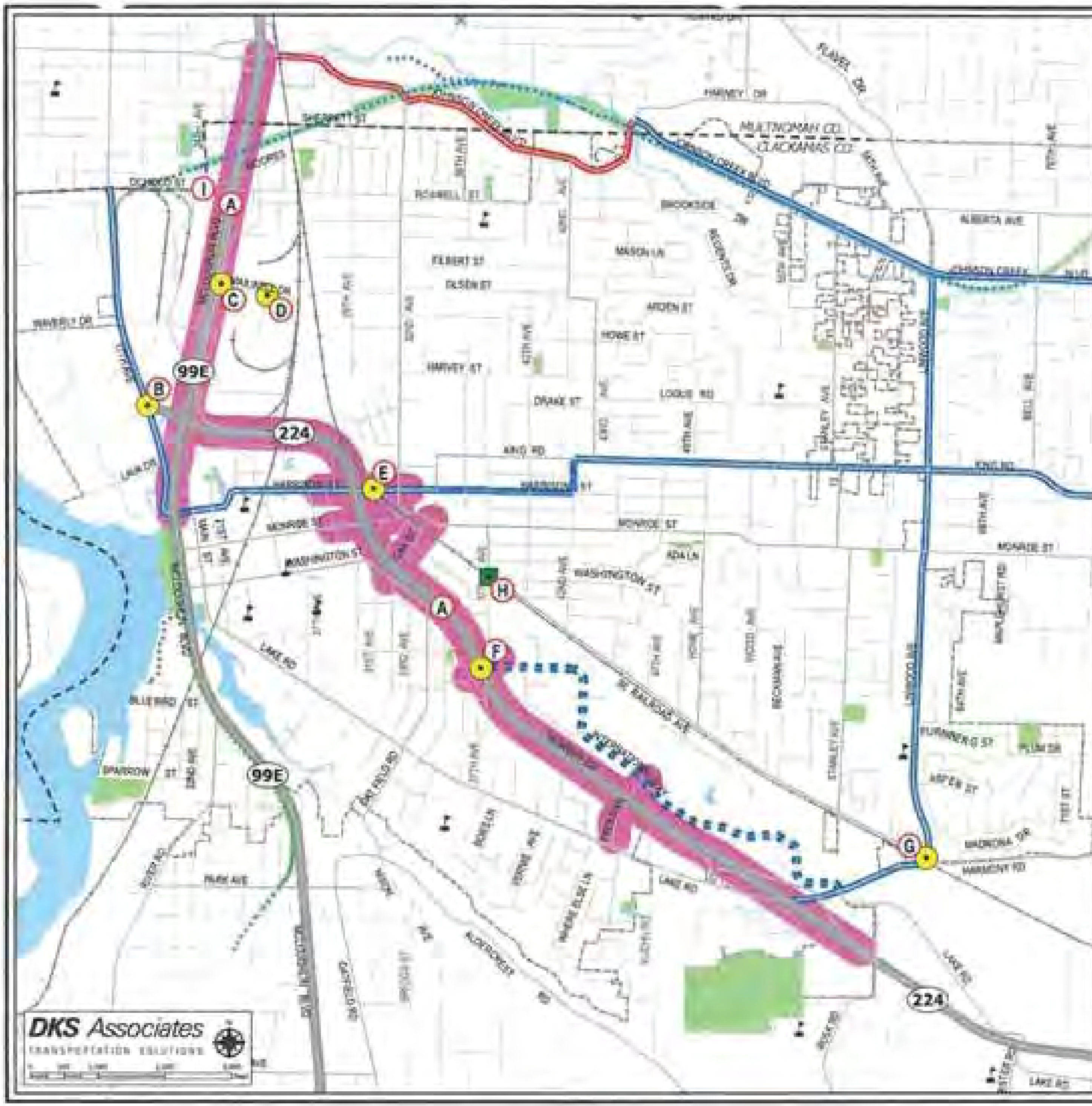
Neighborhood Livability

In support of minimizing residential impacts, the City actively encourages all heavy vehicles to use, to the extent practical, the identified local freight routes. Potential strategies to reduce freight traffic on local streets not identified as freight routes, such as traffic calming and diversion treatments, can be found in Chapter 11 Neighborhood Traffic Management. The rail crossing improvements described above also address livability issues. The rail crossing safety improvements, which could allow the creation of a "Quiet Zone," included in the Street Network Master Plan would also reduce the negative impacts of freight facilities on residential areas.

Master Plan

A list of potential freight projects was developed to meet the identified needs for freight. These projects form the basis for the Freight Master Plan. The master plan shown in Figure 9-1 and summarized in Table 9-1 is an overall plan and summarizes the "wish list" of freight related projects in Milwaukie. The projects on the master plan were then used to create a Freight Action Plan. The action plan consists of projects that the community identified as higher priority projects and that the City could reasonably expect to fund. As development occurs, streets are rebuilt and as other opportunities (grant programs) arise, other projects on the master plan will be pursued.

The planning level cost estimates provided for each project are based on general unit costs for transportation improvements, but do not reflect the unique project elements that can significantly add to the estimated project costs. Each of these project costs will need further refinement to detail right-of-way requirements and costs associated with specific design details as projects are pursued.



Transportation System Plan

FIGURE 9-1

FREIGHT MASTER PLAN

November 2013

LEGEND

Existing Freight Routes

- Major Arterial
- Minor Preferred (Local)
- Weight Restricted Minor Preferred (Local)

Proposed Improvements

- Intersection Improvement
- Intersection Upgrade
- Corridor Refinement Plan
- Minor Preferred Freight Route (Local)

- Major Roads
- Streets
- Railroad
- Springwater Trail
- Kellogg Creek Trail
- Trolley Trail
- County Line
- Parks
- Water
- City Limits

PROPOSED PROJECTS

Improve Corridor

A. Conduct Refinement Plan for HWY 99E/HWY 224 focused on motor vehicle and freight mobility
- HWY 99E Project Limits: Tacoma St to 17th Ave
- HWY 224 Project Limits: HWY 99E to Lake Rd Interchange

Improve Intersection

B. **17th Ave/HWY 224**
Upgrade intersection turning radii to better accommodate freight movements

C. **Main St/Mailwell Dr**
Upgrade intersection turning radii to better accommodate freight movements

D. **Mailwell Dr/Omark Dr**
Upgrade intersection turning radii to better accommodate freight movements

E. **Harrison St/Union Pacific Railroad Crossing**
Upgrade crossing to grade separated facility (outcome of crossing dependent upon 99E/224 Refinement Plan findings)

F. **HWY 224/37th Ave**
Consolidate two northern legs of 37th Ave and Industrial Way into one leg at HWY 224.

G. **Linwood/Harmony/Lake Road Intersection Improvements**
Add northbound right turn lane and westbound right turn lane AND/OR grade separate Harmony Road from Union Pacific Railroad and align as a through east-west movement

H. **Railroad Crossing Improvements at 37th Ave**
Improve road transition to railroad crossing

I. **Signage and Intersection Improvements at McLoughlin Boulevard and Ochoco St.**
Establish signage for trucks and improve intersection (TSAP)

Table 9-1 Freight Master Plan Projects

Map ID[1]	Priority	Type	Project Name	Project Description	From	To	Cost(s) ($1,000s[2])
High Priority Projects							
A	High	C	Hwy 224 & Hwy 99E Refinement Plan	Conduct refinement study that focuses on minimizing barrier effect and improving auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to 17th Ave	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	$270
E	High	C	Harrison St Railroad Crossing Separation	Upgrade Harrison crossing of Union Pacific Railroad tracks to grade-separated facility. Assess as part of Hwy 224 & Hwy 99E Refinement Plan.	Location-specific	Location-specific	$30,700
F	High	C	Hwy 224 Intersection Improvements at 37th Ave	Consolidate the two northern legs of 37th Ave and International Way into one leg at Hwy 224.	Location-specific	Location-specific	$2,100
I	High	C	Signage and Intersection Improvements at McLoughlin Blvd and Ochoco St	Establish signage for trucks and improve intersection. (TSAP)	Location-specific	Location-specific	$1,600
Medium Priority Projects							
C	Med	C	Intersection Improvements at Main St and Mailwell Dr	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	$60
Low Priority Projects							
B	Low	C	Intersection Improvements at Hwy 224 and 17th Ave	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	$60
D	Low	C	Intersection Improvements at Mailwell Dr and Omark Dr	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	$60

Notes:

C = Capital Project
O = Operational Project
P = Policy Project

High = High priority
Med = Medium priority
Low = Low priority

TSAP = Tacoma Station Area Plan

[1] See Figure 9-1.
[2] Project costs are order-of-magnitude estimates and are in 2012 dollars. Future costs may be more due to inflation. In the case of operational projects, estimated costs are for the entire 22-year planning period.

Action Plan

The Freight Action Plan (Table 9-2) identifies the highest priority projects that are reasonably expected to be funded with local funds by 2035, which meets the requirements of the State's Transportation Planning Rule.[3] The action plan project list is based upon a 2007 citywide project ranking process. In 2007, all of the modal master plan projects were ranked by the TSP Advisory Committee after consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added.

Table 9-2 Freight Action Plan

Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Hwy 224 & Hwy 99E Refinement Plan	Conduct refinement study that focuses on minimizing barrier effect and improving auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to 17th Ave	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	$270	Match

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

10 Street Design

This chapter describes the importance of street design, why it matters, and the street design options available in Milwaukie. This chapter also explores the benefits of a well-designed street and illustrates the relationship between street design, functional classification, and land use. Street design recommendations in this chapter are policy-based, not project-based. They direct the City to implement balanced and flexible street design standards that reflect the community's vision and include new and innovative design options.

GOALS AND POLICIES

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Listed below are the specific TSP Goals that guide the City's policies on street design:

- **Goal 1 Livability** guides the City to design and construct transportation facilities in a manner that enhances livability.
- **Goal 2 Safety** guides the City to design safe transportation facilities.
- **Goal 4 Quality Design** guides the City to design streets to support their intended users and calls for the implementation of street design standards that promote context-sensitive transportation facilities that fit the physical context, respond to environmental resources, and maintain safety and mobility.
- **Goal 6 Sustainability** guides the City to take the natural environment into account when planning and designing transportation facilities.

STREET DESIGN

What is Street Design

A street's design determines how it will look and function. How a street looks and functions is ultimately dependent upon which street elements are included, their dimensions, and how they relate to each other. Street elements may include, but are not limited to: travel lanes, parking lanes, bicycle lanes, green zones,[1] pedestrian facilities, traffic-calming devices, and green street treatments. A street with two travel lanes and a gravel shoulder, for example, looks very different than one with four travel lanes and sidewalks. These two types of streets also function differently. The two-lane street likely has lower traffic volumes but, without pedestrian facilities, does not support safe pedestrian travel. The four-lane street likely has higher traffic volumes and, with sidewalks, supports safe pedestrian travel; however, without bike lanes, it probably does not support safe bicycle travel.

Since different streets serve different purposes, a functional classification system, which is a hierarchy of street designations, provides a framework for identifying which street elements to include in a street's design. A street's functional classification does not dictate which street elements to include. It does, however, provide a framework for determining the size and type of street elements to consider.

The City's functional classification system is used to balance the opposing needs for both mobility and access. These functions are opposing, since high speeds and continuous movement are desirable for mobility, while low speeds and traffic breaks are desirable for access to private property. Streets with a higher classification, such as arterial streets, emphasize a higher level of mobility for through-movement. They look and function very differently than streets with a lower classification, such as local streets, which emphasize the land access function. The different functional classifications are more fully discussed in Chapter 8.

Why Milwaukie Has Street Design Options

The City's street design standards are contained in and/or referenced by the Milwaukie Municipal Code which is the City's main regulatory document. As required by the Code, street design standards are applied to new streets and to existing streets when development triggers the need for additional public street improvements. Since the majority of land in Milwaukie has already been developed, street design standards are most frequently applied to existing streets, many of which were only partially improved when constructed.[2] Many of the city's residential streets, for example, were constructed without bicycle, pedestrian, or stormwater facilities. Retrofitting an existing street with needed improvements is typically a much more complicated process, both in terms of design and construction, than constructing a new street.

The City has some flexibility when applying its existing design standards. The addition, alteration, or elimination of most street elements requires extensive review. When this type of review occurs, the City's existing design standards identify the elements that should be included and their required and minimum allowed dimensions. They also identify which elements are most important to include when right-of-way is insufficient or which elements are most appropriate to alter or eliminate in certain situations.

The City's existing street design standards allow for more innovative types of designs, such as skinny streets, green streets, and alternative pedestrian facilities, all of which the community

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[1] The green zone is the area between the curb and sidewalk and is commonly called a landscape strip.

[2] Partially improved streets are often referred to as incomplete streets.

strongly supports. Green street development, in particular, has far reaching benefits for the region and the city. In addition to reducing stormwater runoff to streams and rivers, which improves water quality and wildlife habitat in general, green street development would help recharge the local aquifer, the city's main water supply.

For these reasons, the City has flexibility when applying existing street design standards, more design guidance, and more street design options. Three of the main reasons are summarized below.

- When making improvements to existing streets, existing street design standards often need to be modified to "fit" the existing street conditions.
- Even when a typical street design would work, more environmentally friendly designs and alternative pedestrian facilities may be appropriate.
- More design flexibility and options enable the City to allow street improvements that respond to the character of the surrounding natural and built environments.

The City recognizes the diversity of public opinion and development patterns that exist within Milwaukie and acknowledges that street design should not be a "one size fits all" approach. That is why the City has multiple street design options that support a street's intended users and its functional classification while also responding to adjacent land uses, neighborhood character, and environmental considerations.

Why Street Design Matters

Streets are the cornerstone of our transportation network. They are used by all modes of travel for a wide variety of commercial, recreational, and travel purposes. Since they traverse the entire city they also greatly influence neighborhood character. Street design matters because well-designed streets are a significant community asset. Poorly designed streets, on the other hand, can have a detrimental effect on commercial activities, recreational opportunities, personal mobility, emergency response, and property values. Since the design of a street is so closely tied to how it performs and how people experience the city, it is important for the City to carefully consider how it wants its streets to look and function and to design them accordingly.

Benefits of Good Street Design

The benefits of good street design occur on many levels. Benefits vary depending on the function of the street and the type of design implemented, but may include:

- Improved livability.
- Increased safety for pedestrians, bicyclists, drivers, and transit riders.
- Increased pedestrian and bicycle activity.
- Increased social and recreational opportunities.
- Decreased environmental impacts through localized stormwater management or reduced stormwater runoff.
- Enhanced air and water quality.
- Street beautification.
- Increased property values.

Many of these benefits come from enhancements to pedestrian and green zones, which are the areas between the curb (or edge of roadway where no curb exists) and the outer edge of the right-of-way (see Figure 10-1). The green zone acts as a buffer between motor vehicle traffic and pedestrian traffic. This buffer area increases pedestrian comfort and safety, reduces the affect of road spray on pedestrians, allows for more separation between pedestrians and vehicle exhaust fumes, and when combined with mature street trees, can reduce vehicle speeds by giving the appearance of a narrower street. Reduced vehicle speeds are a safety benefit for all modes of travel, and an environment that supports walking, creates opportunities for social contact, reduces motor vehicle reliance, and contributes to healthier and more active communities.

As its name implies, the green zone provides a space for street trees and other plantings that benefit the environment through improved air and water quality. When appropriately designed, green zone plantings can also manage local stormwater runoff, which reduces the transportation system's impact on local streams and rivers. The green zone also provides a space for placement of utilities, fire hydrants, and other street furniture, so that the sidewalk can remain uncluttered, allowing for unimpeded pedestrian passage. Additionally, this area can be used for the placement of transit shelters and benches, which increases the safety and comfort of transit users.

STREET DESIGN ELEMENTS

The purpose of this chapter is to create a policy framework that will guide street design decisions to meet the needs and values of the community. The first step in this process is to describe the different street elements, which are listed below. This is followed by a discussion about which elements are optional and which are required (see the Street Design Cross Sections section) and what alternative design options are available and preferred by the community (see the Street Design Alternatives section).

All streets are composed of a number of different elements; however, not all elements are included on all streets. A street's functional classification, adjacent land uses, and available right-of-way width all influence which elements are included. When a specific element is included, it is generally located in the same location on the street relative to other elements. However, an element's design, dimension, and relationship to adjacent elements can and should vary depending upon neighborhood character, traffic management needs, and/or social, cultural, or environmental factors.

The following is a description of the different street elements or zones that comprise most streets.

Development Zone

The development zone is not in, but adjoins, the public right-of-way. In commercial or industrial zones, a building face may clearly define the edge of the right-of-way. In residential zones, the outer edge of the right-of-way is often not clearly or accurately marked. Access to the development zone is almost always through the public right-of-way in the form of a driveway or sidewalk.

Pedestrian Zone

The pedestrian zone is the public space between the development zone and the green zone. This area should support pedestrian activities by providing a comfortable space for walking, socializing, and accessing private property and buildings in the development zone. The needs for this space, its width and lighting, for example, depend upon the functional classification of the street and adjacent land uses. In general, pedestrian zones should be wider in dense commercial zones and on streets with high traffic volumes and speeds and may be narrower on local streets with low traffic volumes.

A typical pedestrian zone is at least five feet wide when adjacent to a green zone and at least six feet wide when adjacent to a street zone.

Green Zone

The green zone is the public space that separates the pedestrian zone from the street zone. It functions as a buffer between pedestrians and motor vehicle, bicycle, and other street zone users. It also offers a place to locate street trees, bike racks, street furniture, transit amenities, utilities, and plantings designed to manage stormwater runoff. The green zone can provide visual appeal for all users by balancing the hard concrete and asphalt surfaces from which a street is constructed. A green zone with mature street trees has the added benefit of framing the street and shielding pedestrians from the elements.

A typical green zone is at least five feet wide.

Street Zone

The street zone may contain many or few elements, depending on its functional classification. Typical elements include parking lane(s), turning lane(s), travel lane(s), and bike lane(s) or mixed vehicle lane(s) that include bicycles. Skinny streets or one-way streets offer different street zone variations as well. In general, the street zone serves as a conduit for mobility and access to private property. Streets that serve an important mobility function (e.g., arterials and collectors) are typically wider than streets that primarily exist to provide access to property (e.g., local).

Typical lane widths:

- Parking lane, 6-8 ft.
- Bicycle lane, 5-6 ft.
- Travel lane, 9-12 ft.[3]
- Shared travel lane, 14-16 ft.

In addition to vehicle and bicycle traffic, the street zone also contains pedestrian traffic at street intersections and midblock pedestrian crossings. To enhance pedestrian safety at intersection crosswalks and midblock locations, crossing locations should be visible and clearly understood by both drivers and pedestrians. The street zone may also contain green street treatments or traffic management devices to slow traffic or deter cut-through traffic. (See Chapter 11 for additional discussion of neighborhood traffic management.)

[3] A typical travel lane is between 10 and 11 feet wide. Narrower lane widths are appropriate on lower-volume streets; wider lane widths are appropriate on higher-volume streets and on freight and transit routes.

STREET DESIGN CROSS SECTIONS

Figure 10-1 contains cross sections for four of the City's street functional classifications. This figure lays the foundation for more flexible design standards. Street design elements marked with asterisks are optional when right-of-way width is insufficient to include all elements. Elements not marked with asterisks are required under all circumstances. The local and neighborhood street cross section, for example, indicates that, at a minimum, one travel lane and one pedestrian facility is required if there is truly insufficient right-of-way width to accommodate any other elements.

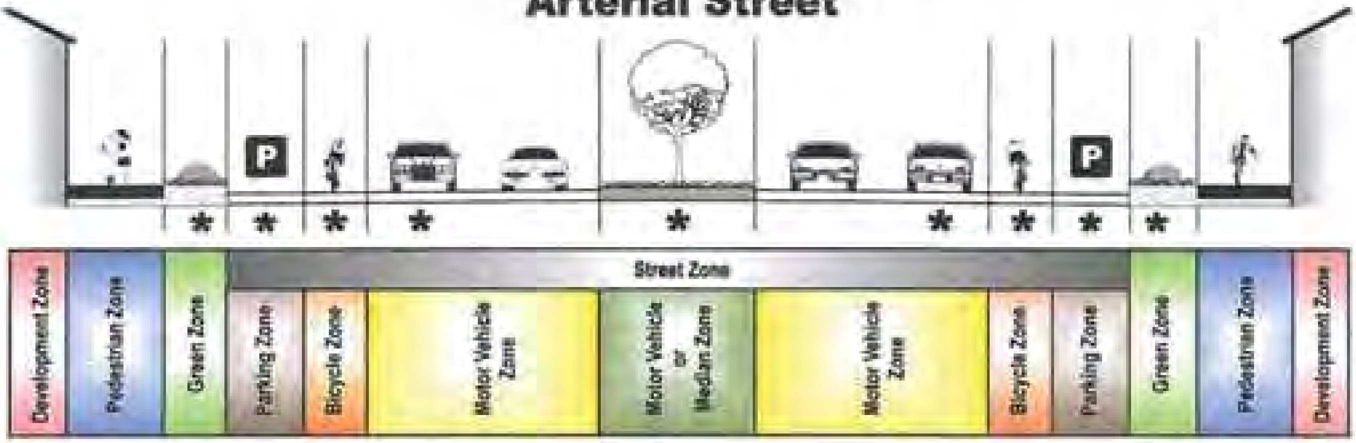
The local and neighborhood cross section also includes a skinny street option since a skinny street can contain all of the same elements as a local or neighborhood street. The difference between a skinny street and a local or neighborhood street is that a skinny street typically has narrower elements and/or overlapping parking and mixed travel zones.

Variations to these cross sections may also be welcomed and/or required by the City when:

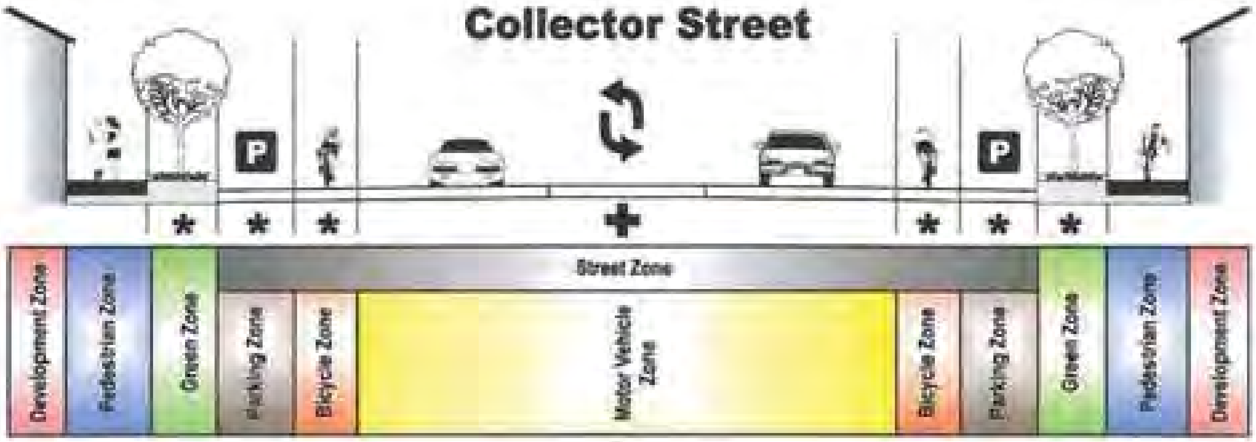
- Environmentally beneficial or green street treatments are proposed or needed.
- A street is an identified bikeway or pedestrian walkway in the TSP master plan.
- Existing structures are unusually close to the right-of-way.

The cross sections in Figure 10-1 are shown without dimensions, as the intent is to provide a policy framework—not specific design details—for more flexible street design standards.

Arterial Street



Collector Street



Local and Neighborhood Streets
(Includes Skinny Street Option)

DKS Associates

LEGEND

* -Constrained Right-of-Way Optional Element
✚ -Where Warranted

Information Sources: DKS Associates

STREET DESIGN CROSS SECTIONS BY FUNCTIONAL CLASSIFICATION

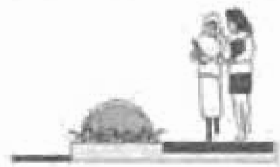
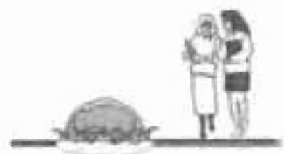
FIGURE 10-1

STREET DESIGN ALTERNATIVES

Pedestrian Facilities

Three pedestrian facility design alternatives are shown in Table 10-1.

Table 10-1 Pedestrian Facility Design Alternatives

Design Alternative	Description
Vertical and Horizontal Separation	Separation from the street zone both vertically by a curb and horizontally by a green zone. This design alternative can incorporate green street treatments as outlined in the following section on green street design. 
Horizontal Separation	Separation from the street zone horizontally by a green zone or other horizontal element or barrier. The pedestrian zone is at the same grade as the street zone. This design alternative can incorporate green street treatments as outlined in the following section on green street design. 
Vertical Separation	Separation from the street zone vertically by a curb. The pedestrian zone is located "curb tight" against the street zone with no horizontal separation. Pedestrians could still be buffered from vehicular traffic in the street zone by on-street parking and/or bicycle lanes. If wide enough, this design alternative could incorporate tree wells for street trees. 

Source: DKS Associates

Vertical and horizontal separation is the community preferred pedestrian facility design in most situations and especially on streets with higher traffic volumes and speeds. Where traffic volumes and speeds are low, horizontal separation is preferred by the community over vertical separation, especially in neighborhoods that desire a less traditional sidewalk design. Two-sided pedestrian facilities are preferred, but one-sided pedestrian facilities are acceptable and even desirable under certain circumstances. When utilizing pedestrian facility design standards, it will be essential that the City identify the circumstances and the process by which one design alternative is chosen or required over another.

It is worth noting that the two preferred pedestrian facility designs include a green zone. In addition to horizontally separating pedestrians from the street zone, the pedestrian facilities that include a green zone are preferred because of the additional aesthetic and environmental benefits the green zone provides pedestrians and the street as a whole.

Green Streets

A traditional stormwater management system for a street uses a curb and gutter to capture and convey stormwater runoff to a catch basin and then a pipe. Piped runoff is then discharged offsite into a stream or river. A green street uses a different stormwater management approach. Instead of discharging stormwater offsite, a green street incorporates a stormwater management system into the right-of-way that allows most stormwater runoff to remain onsite, where it is absorbed and cleansed through natural biological processes. Green street treatments capture and treat stormwater runoff locally, thereby protecting streams, groundwater, and wildlife habitat. Additionally, since Milwaukie's water supply comes from local wells, it is in the city's best interest to incorporate green zones and green street treatments into its streets as much as possible to protect and maintain the local groundwater supply—a vital city resource.

Most green street treatments have all of the benefits associated with the green zone but require regular maintenance to maintain their functionality and appearance. However, unlike traditional piped stormwater systems, maintenance usually does not require specialized equipment or training. Since some treatments can easily be incorporated into green zones, center medians, or the area usually occupied by parking lanes, streets can often be retrofitted with green street treatments without having to substantially alter any existing street elements or the right-of-way width.

Green street treatments are not dependent upon functional classification and can be incorporated into all street types. Table 10-2 below shows the different green street treatments and the zones in which they may be applicable.

Table 10-2 Green Street Design Treatments[4]

Treatment	Application	How It Works	Application Zone		
			Pedestrian	Green	Street
			■ Recommended ⊡ Optional □ Not Recommended		
Rainwater Harvesting	Aboveground or subgrade containers that capture and reuse stormwater runoff for landscape irrigation.	Stormwater is conveyed to storage facilities during the wet season for use during the dry season.	■	■	⊡
Permeable Paving	Replacement of impermeable surfaces with permeable materials, such as permeable pavement, concrete, or paving blocks.	Permeable materials allow water infiltration through the surface to the subgrade.	■	■	■
Bio-retention (Raingardens)	Aboveground or subgrade containers that promote infiltration and evapotranspiration of stormwater.	Engineered or amended soils and vegetation are used to promote these processes.	□	■	□
Bio-swales	Subgrade channels with vegetation that convey and treat stormwater.	Vegetation is used to control flow velocities and settle pollutants.	□	■	□[5]

When utilizing green street design standards, it will be essential that the City identify the circumstances under which green street treatments would be required or recommended.

[4] The soils within an area where green street treatments could be implemented need to be tested to determine the rate of infiltration they can sustain. In addition to green street treatments, traditional stormwater management facilities need to be designed to control overflow if the capacities of the green street treatments are exceeded.
[5] With the exception of medians.

Additionally, the City should ensure that green street treatments receive ongoing maintenance to preserve their functionality and appearance.

Skinny Streets

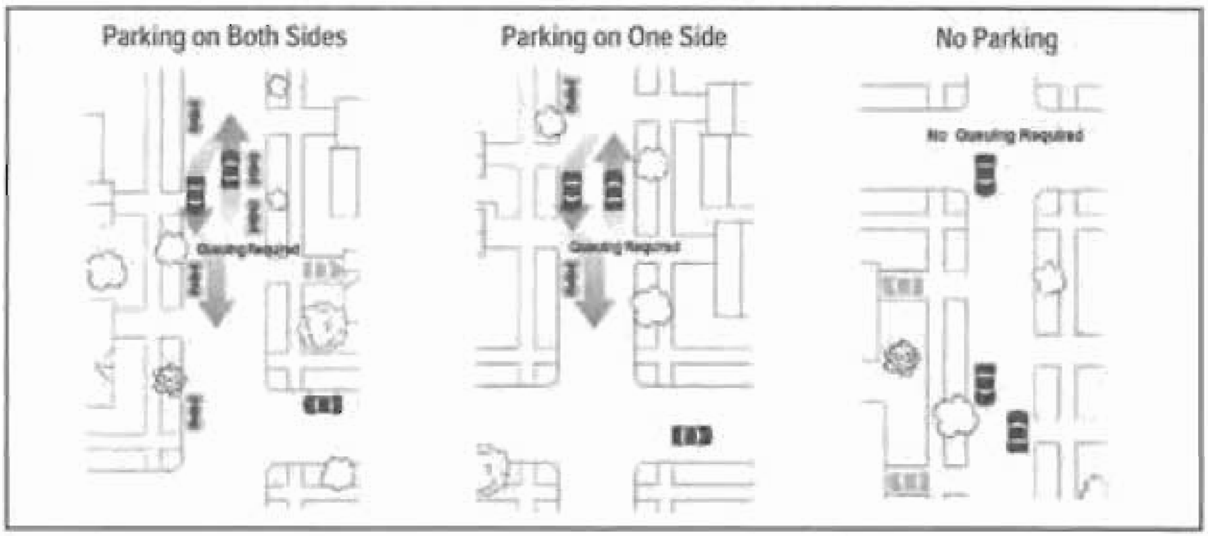
A skinny street is narrower than a normal street and is typically constructed when less paved surface area is desired or in areas with limited rights-of-way or physical constraints. Skinny street designs are typically only considered for streets that have lower traffic volumes and speeds, such as local or neighborhood streets, or in one-way couplet situations. Skinny streets function like regular streets and often have the following additional benefits:

- Slower vehicle speeds.
- Enhanced bicycle and pedestrian safety due to slower vehicle speeds.
- Reduced right-of-way impacts on adjacent properties.
- Reduced stormwater runoff and other environmental impacts due to reduced impervious surface area.

For emergency service personnel to be able to respond to emergencies in a timely manner, the Fire Code recommends that street zones have a minimum width of 20 feet to allow for passage and equipment set up.[6] Solid waste collectors and delivery trucks have similar needs.

Figure 10-2 illustrates three possible skinny street design options. These design options include parking on both sides of the street, parking on one side of the street, or parking on neither side of the street. The design option with parking on both sides of the street requires the widest paved street zone, and the design option with no parking requires the narrowest paved street zone. The design options with parking have overlapping travel and parking lanes. As a result, queuing may be required, which is where one vehicle waits in an open parking area or driveway for the other vehicle to pass.

Figure 10-2 Skinny Street Design Options



When utilizing skinny street design standards, it will be essential that the City identify under what circumstances skinny street designs would be required or recommended.

[6] *Neighborhood Street Design Guidelines, An Oregon Guide for Reducing Street Widths.* State of Oregon. November 2000.

RECOMMENDATIONS

In summary, the recommended actions and policy directions listed below call for the City to utilize balanced and flexible street design standards that reflect the community's vision and that include new and innovative design options, including green streets, skinny streets, and alternative pedestrian facility designs.

Design Standards

Recommended Action

Maintain a baseline cross section for each street functional classification (with preferred dimensions for all street elements) and a street design prioritization approach when the baseline elements do not fit. Maintain street design standards for green streets, skinny streets, and alternative pedestrian facilities and identify under what circumstances alternative designs would be required or recommended. Maintain a list of alternative materials, such as permeable pavers, and identify situations in which alternative materials would be suitable and desirable.

Policy Direction

- Maintain flexibility in street design standards to allow for local design preferences and to avoid costly and time-consuming variance process requirements.
- Balance citywide needs, local design preferences, and best practices when utilizing street design standards.
- Provide for public involvement in the utilization of street design standards and during the design phase of street-related Capital Improvement Projects.
- Consider maintenance costs and issues when utilizing design standards.
- Utilize design standards, including alternative designs, which accommodate emergency response routes and needs.
- Require a minimum of one-sided pedestrian facilities on all streets.
- Require green zones and green street treatments where appropriate and practical.
- Maintain design consistency along a street's length where appropriate.

Green Zone and Green Street Plantings

Recommended Action

Develop a list of appropriate, low-maintenance plant species for use in green zones and green street treatments. Develop street tree replacement policies and regulations.

Policy Direction

- Ensure green zones and green street treatments are planted with appropriate, low-maintenance species.
- Preserve and expand the city's tree canopy.

Maintenance

Policy Direction

- Ensure that green street treatments receive ongoing maintenance to preserve their functionality and appearance.
- Ensure that landscaping in green zones and medians is properly maintained.
- Ensure that street design elements and treatments function as intended.

11 Neighborhood Traffic Management

Neighborhood traffic management is a term used to describe the many and varied traffic management approaches used to reduce the impacts of traffic volumes and speeds on residential neighborhoods and improve safety for pedestrians and bicyclists. This chapter describes the need for neighborhood traffic management, identifies tools that the City can use to slow and/or divert traffic, and outlines a process for implementing neighborhood traffic management measures. It is not the purpose of this chapter to identify streets in need of traffic management or to propose projects at specific locations.

GOALS AND POLICIES

Milwaukie has developed a set of goals to guide the development of its transportation system (see Chapter 2). Listed below are the specific TSP Goals that guide the City's policies on neighborhood traffic management:

- **Goal 1 Livability** guides the City to protect residential neighborhoods from excessive through traffic and travel speeds while providing reasonable access to and from residential areas.
- **Goal 2 Safety** guides the City to maintain a safe transportation system.
- **Goal 4 Quality Design** guides the City to design streets to support their intended users and respond to the surrounding natural and built environments.

The main benefits of effective neighborhood traffic management are improved livability and safety. Reduced vehicle speeds are a safety benefit for all modes of travel. Reduced cut-through traffic improves livability through the reduction of vehicular noise, pollutants, and traffic volumes. Additionally, streets that are used in ways for which they weren't designed lead to congestion and safety hazards.

NEEDS

Most of the land within Milwaukie consists of residential neighborhoods. The city, with just over 20,000 citizens, has a relatively small population compared to the surrounding Portland metropolitan area. Because of Milwaukie's proximity to the city of Portland, its employment centers, and the two major regional routes through the city (Hwys 99E and 224), cut-through traffic and speeding is an ongoing concern for citizens. Cut-through traffic most often occurs when congestion occurs on regional routes and major streets and nonlocal traffic goes in search of less congested or more direct routes. Speeding can occur under many different circumstances; however, the city has a number of streets that are relatively straight with few intersections or traffic control devices. These types of streets often invite speeding violations.

Neighborhood traffic management is a means to address the negative impacts of unchecked traffic speed and volume on neighborhood streets. Effective use of neighborhood traffic management can address neighborhood needs and concerns, including, but not limited to, the following:

- Speeding.
- Cut-through traffic, especially by heavy freight trucks.
- Bicycle and pedestrian safety.
- Student safety around school zones.

Student safety around school zones has been and continues to be a concern in Milwaukie neighborhoods. In 1995, the Milwaukie Traffic Safety Commission was charged with identifying and implementing school trip safety improvements in collaboration with schools, parent teacher organizations, neighborhood district associations, residents, and staff. The now defunct commission enacted many safety improvements, but not all recommended projects were pursued or implemented. This chapter does not recommend specific traffic management measures at specific locations, such as schools; however, Chapter 5 Pedestrian Element and Chapter 6 Bicycle Element recommend projects that directly address student safety. In addition, the various Neighborhood District Associations can choose to develop neighborhood traffic management plans that identify more specific issues to be addressed.

TOOLS

There are many different measures available in the neighborhood traffic management "tool box," but not all of these measures are appropriate for all streets or in all situations. As with street design, traffic management measures need to take street functional classification, surrounding land uses, existing street design, emergency service provider access needs, and neighborhood preferences into account.

Table 11-1 groups neighborhood traffic management measures into four categories and shows the recommended application based on street functional classification. The four categories are as follows:

- Horizontal deflection (reduces traffic speeds).
- Vertical deflection (reduces traffic speeds).
- Volume control measures (reduces or diverts traffic volumes).
- Other measures.

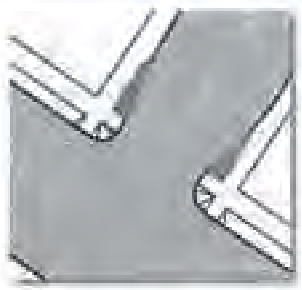
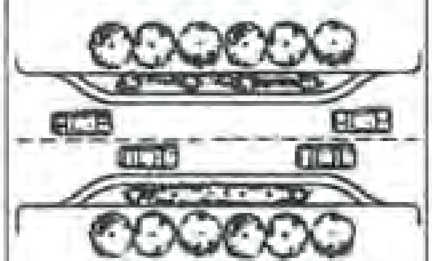
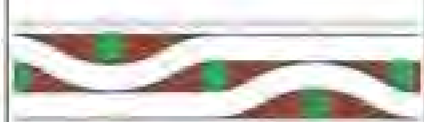
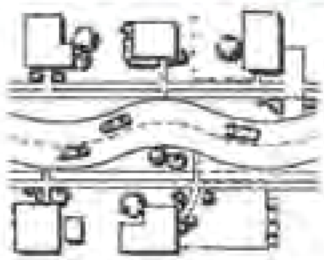
Most of the measures in the first three categories require physical changes to the street; whereas, most of the measures in the last category involve nonphysical changes such as signage, education, enforcement, speed monitoring trailers, and signal timing.

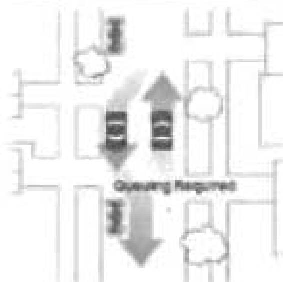
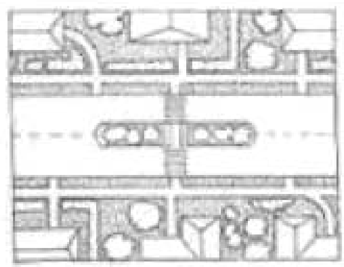
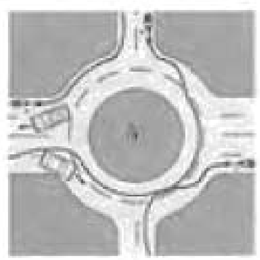
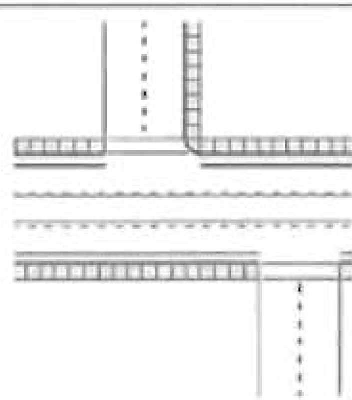
Additionally, State law provides the City with the authority to lower the speed limit of a residential street to 5 miles per hour below the the statutory speed required by the Oregon Department of Transportation.[1] The statutory speed for local streets is 25 miles per hour; therefore, the City can lower the speed limit on local streets to 20 miles per hour. Three criteria must be met to establish the ordinance, in addition to posting new speed limit signs:

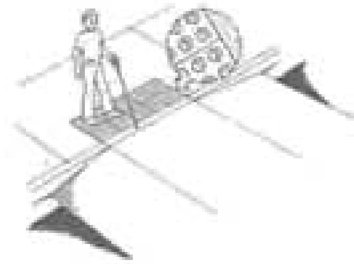
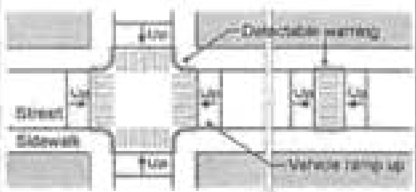
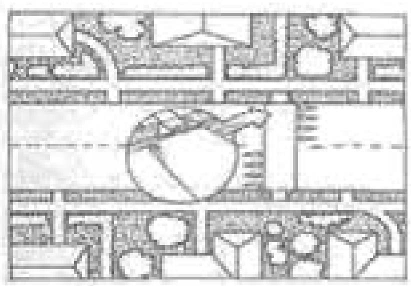
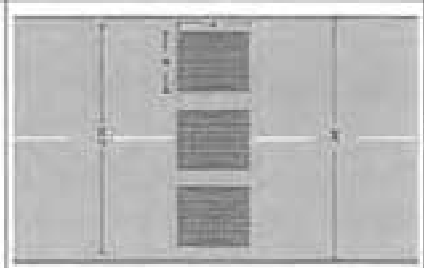
[1] ORS 810.180(10)

1. The street is located in a residential district.
2. The street has an average volume of fewer than 2,000 motor vehicles per day, more than 85% of which are traveling less than 30 miles per hour.
3. A traffic control device is used to indicate the presence of pedestrians and bicyclists.

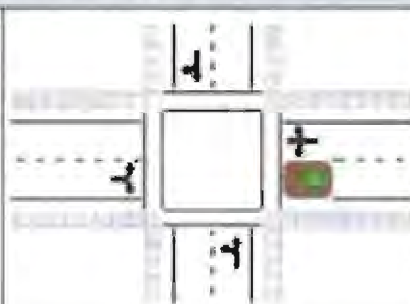
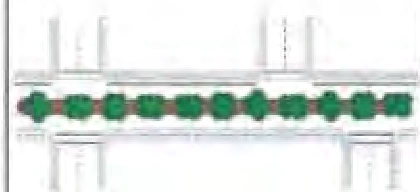
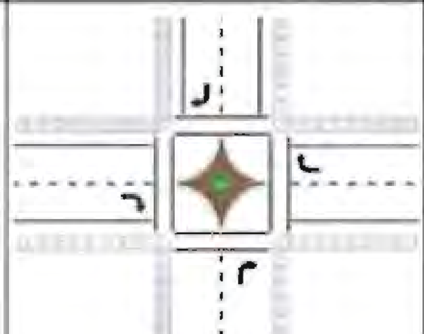
Table 11-1 Neighborhood Traffic Management (NTM) "Tool Box"

			■ Recommended ⊡ Optional □ Not Recommended Functional Classification				
NTM Measure	Description	Example	Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
Horizontal Deflection							
Bulbout	Curb extension at an intersection that reduces the pedestrian crossing distance by bringing the curb out into the parking lane. Reduces speeds and increases pedestrian safety by reducing crossing distance.		□	⊡	■	■	□
Choker	Midblock pedestrian or landscaped curb extension that narrows the roadway. Reduces speeds and, if designed for pedestrians, increases pedestrian safety by reducing crossing distance.		□	□	■	■	□
Chicane	Curb extensions or offsets along a portion of a roadway. Prevents drivers from taking a "straight shot" down the street, thereby reducing speeds.		□	⊡	■	■	□
Curvilinear Street	Similar to a chicane. A street with a series of 25 MPH reverse curves along its length. Prevents drivers from taking a "straight shot" down the street, thereby reducing speeds.		□	⊡	■	■	■

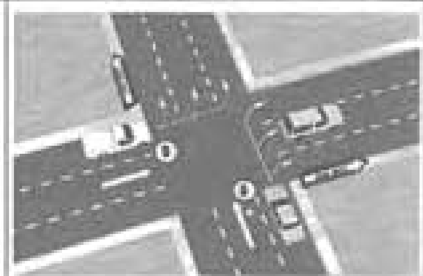
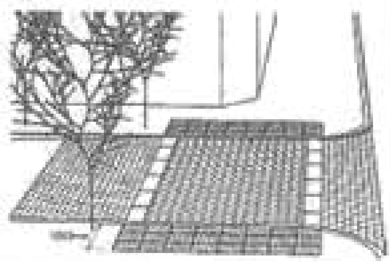
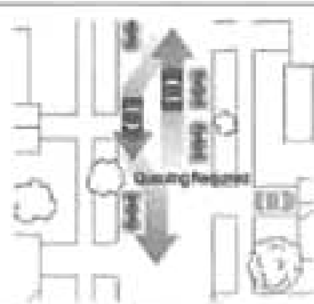
NTM Measure	Description	Example	Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
			■ Recommended ⊡ Optional ☐ Not Recommended — Functional Classification				
Skinny Street	Street with narrower than normal travel lane widths. May involve overlap of parking and travel lanes. Reduces speeds and increases pedestrian safety by reducing crossing distance.		⊡	⊡	■	■	☐
Center Median	Median in the middle of the roadway that narrows the adjacent travel lanes. Reduces speeds and increases pedestrian safety by providing a pedestrian refuge.		☐	⊡	■	⊡	☐
Traffic Circle	A round island in the middle of an intersection. Reduces vehicle speeds and collisions at intersections.		☐	⊡	■	■	■
Offset Intersection Alignment	Intersection alignment that requires through traffic to jog left or right. Reduces speeds and cut-through traffic by providing a less direct path.		☐	☐	⊡	■	■

NTM Measure	Description	Example	Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
			■ Recommended ⊡ Optional □ Not Recommended Functional Classification				
Vertical Deflection							
Raised Crosswalk	Raised pavement surface at a crosswalk location. Reduces speeds and increases pedestrian safety by emphasizing the pedestrian crossing and eliminating the need for pedestrians to step down into the roadway.		□	□	■	■	■
Raised Intersection	Raised pavement surface throughout entire intersection area. Reduces speeds and increases pedestrian safety by emphasizing pedestrian crossings and eliminating the need for pedestrians to step down into the roadway.		□	□	■	■	■
Speed Hump/Table	Raised pavement surface across the entire width of a roadway. Humps are designed so that a vehicle's front and rear wheels travel over the hump at different times. Tables are longer than humps and accommodate a vehicle's front and rear wheels at the same time. Reduces vehicle speeds.		□	□	■	■	■
Speed Cushion	Similar to speed humps but not raised across the entire width of the roadway. Reduces vehicle speeds while allowing emergency vehicles to travel unimpeded due to their wider axles.		□	⊡	■	■	■

■ Recommended
⊡ Optional
☐ Not Recommended

NTM Measure	Description	Example	Functional Classification: Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
Volume Control Measures							
Full/Partial Closure	The complete or partial closure of a roadway to all through traffic by means of a physical barrier. Pedestrian and emergency access usually allowed. Reduces cut-through traffic.		☐	☐	⊡	■	■
Center Median Barrier	Median in the middle of the roadway that separates vehicles traveling in opposite directions and restricts left-turn movements. Median may extend through an intersection so as to block through movements on cross streets. Prevents cut-through traffic and increases vehicular safety by reducing turning conflicts.		■	■	■	⊡	☐
Diverter	A median or other barrier, such as a curb extension, that forces traffic to turn in a particular direction. Reduces cut-through traffic and decreases vehicular conflicts.		☐	☐	⊡	■	■

■ Recommended
⊡ Optional
☐ Not Recommended

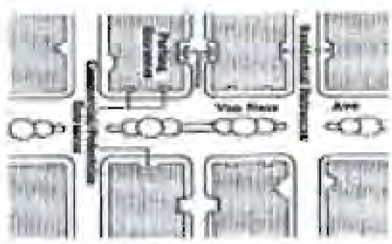
NTM Measure	Description	Example	Functional Classification: Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
One-way Street	A street that accommodates vehicular travel in only one direction. Reduces the number of available travel routes.		☐	☐	⊡	■	■
Other Elements							
Pavement Alternatives	Use of bricks or colored pavement to emphasize pedestrian crossing locations.		⊡	⊡	■	■	■
Entry Treatments	Use of landscaping to delineate and enhance a neighborhood entrance.		☐	☐	⊡	■	■
On-Street Parking	Use of parked cars to buffer pedestrians from moving vehicles and to reduce speeds, particularly on skinny streets where travel lanes and parking lanes overlap and must be shared by moving and parked vehicles.		☐	☐	⊡	■	■

			■ Recommended ⊡ Optional □ Not Recommended Functional Classification				
NTM Measure	**Description**	**Example**	Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
Informational Sign	Use of signs to alert drivers to various hazards.		□	⊡	■	■	■
Stop Sign	Use of stop signs to increase safety and interrupt traffic flow making routes less desirable for cut-through traffic. Typically placed at intersections. Warrants determined by the Manual on Uniform Traffic Control Devices (MUTCD). Not a speed control measure per MUTCD.		□	□	⊡	■	■
Truck Restrictions	Use of "No Truck" signs at key intersections to restrict through truck trips but not local truck trips.		□	□	⊡	■	■
Part Time Restrictions	Use of signs to limit through and/or turn movements during key times, typically during peak hours. Reduces cut-through traffic and facilitates traffic flow during peak hours.		■	■	■	⊡	⊡

■ Recommended
⊡ Optional
☐ Not Recommended

NTM Measure	Description	Example	Functional Classification: Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
Signal Timing	Coordination of signals to reduce stops along corridors and delays at intersections. Reduced green time on side streets discourages cut-through travel.		■	■	☐	☐	☐
Police Enforcement	Use of regulatory authority to cite violators for speeding and other traffic infractions, such as illegal turning movements, to reduce such violations in the future.		■	■	■	■	■
Education	Education of the public regarding the hazards of speeding and the impacts of cut-through traffic through public service announcements, direct mailings, and driver education courses.		■	■	■	■	■
Speed Reader Board	Use of speed reader board to measure and display a driver's speed.		■	■	■	■	■
Photo Radar Van	Use of photo radar van to measure a driver's speed and issue speeding tickets for violations.		■	■	■	■	■

■ Recommended
⊡ Optional
□ Not Recommended

NTM Measure	Description	Example	Functional Classification: Arterial	Collector	Neighborhood Route	Local Street	Skinny Street
Neighborhood Speed Watch	Citizen-based traffic management program that allows citizens to identify speeders with speed measuring devices and send them a standardized letter regarding the hazards of speeding.		□	□	■	■	■
Shared Street	A street without curbs where bollards, chokers, and/or landscape elements define vehicle and pedestrian areas. Reduces speeds through shared use of roadway by all travel modes. Originated in Europe.		□	□	⊡	■	■
Short Blocks	Use of shorter blocks to create more intersections and more streets to distribute traffic. Closely spaced intersections reduce speeds and provide more potential locations for stop signs and signals.		□	□	⊡	■	■
Enhanced Major Street Performance	Provision of adequate capacity and connectivity on arterials and collectors to encourage longer trips on these facilities and to discourage cut-through trips on local streets and neighborhood routes.		■	■	□	□	□

IMPLEMENTATION

Successful neighborhood traffic management requires the following:

- A process that identifies, evaluates, and prioritizes traffic management needs.
- Citizen involvement in traffic management measure selection.
- Professional design that considers the safety of all users.
- Funding and implementation of prioritized needs.

The Milwaukie Public Safety Advisory Committee is responsible for administering the City's neighborhood traffic management program. This committee meets once a month and has addressed the enforcement and education aspects of neighborhood traffic management through both the Traffic Safety Program and the Walk Safely Milwaukie Program. Engineering staff assist this committee to improve neighborhood traffic management program coordination and to provide the technical expertise needed for evaluation and implementation of deflection and volume control traffic management measures.

The neighborhood traffic management program relies on citizens to identify neighborhood traffic concerns. This identification process, by its very nature, is reactive. However, the funding level and evaluation process will be deliberate and methodical to allow for equitable and efficient use of limited funds. Any Neighborhood District Association can develop a traffic management plan that identifies more specific issues or needs. The City will endeavor to allocate money each year to undertake selected neighborhood traffic management measures (see Table 11-2).

RECOMMENDATIONS

Figure 11-1 outlines the proposed neighborhood traffic management process for the City of Milwaukie. As shown in this figure, there are multiple points in the process for public input and involvement and a feedback loop at the end to monitor the success of neighborhood traffic management measures that have been implemented.

It is recommended that the City annually fund the neighborhood traffic management program so that prioritized needs are implemented over time. The Neighborhood Traffic Management Action Plan (see Table 11-2) does not identify specific projects, but it does show the level of funding the City aspires to commit to the neighborhood traffic management program for the duration of this plan. With regard to this funding, it is recommended that the City develop a process that ensures neighborhood traffic management funding is equitably distributed throughout the city.

Many of the policy recommendations contained in the Street Design chapter are applicable to neighborhood traffic management as well, the most relevant of which are summarized below.

- **Variety:** Allow for a wide variety of traffic management measures, as identified in this chapter's neighborhood traffic management "tool box."
- **Effectiveness:** Ensure that the chosen measure addresses the identified problem.
- **Landscaping:** Provide for landscaping wherever feasible and practicable.
- **Maintenance:** Consider maintenance needs and issues when designing traffic management measures and ensure long-term maintenance needs can be met.
- **Neighborhood Input:** Provide for neighborhood input when designing traffic management measures.

Figure 11-1 Neighborhood Traffic Management Process

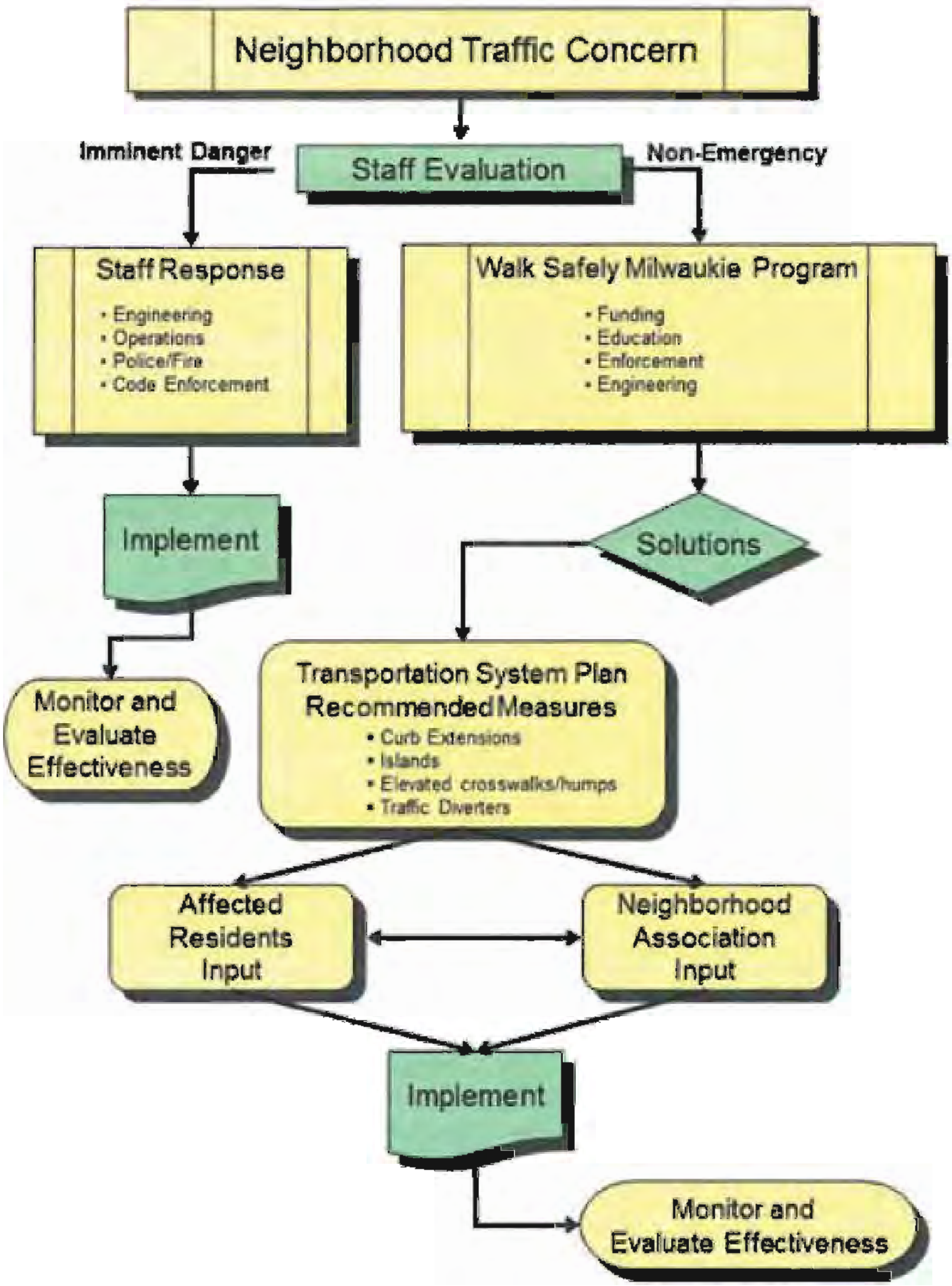


Table 11-2 Neighborhood Traffic Management Action Plan

Project Name	Project Description	From	To	Project Cost ($1,000s[2])	Direct Funding or Grant Match
Walk Safely Milwaukie Program	Complete a few small traffic-calming and pedestrian safety projects throughout the city each year.	Citywide	Citywide	$300 ($13 annually)[3]	Direct

[2] Project costs are order-of-magnitude estimates and are in 2012 dollars. Future costs may be more due to inflation.
[3] Historically, the Neighborhood Pedestrian and Traffic Safety Program received $13,000 annually. In more recent years, the program name changed to Walk Safely Milwaukie and funding was raised to $100,000 annually. Future funding for the program will be evaluated on a biennial basis with the budget.

12 Downtown Parking

The purpose of this chapter is to describe the unique parking needs in Milwaukie, outline some strategies for improving how the City manages and regulates parking, and the policies by which the City will manage and develop parking. It also recommends specific actions the City and downtown businesses can take to both manage parking demand and transition downtown to a less auto-dependent environment. The focus of this chapter is downtown Milwaukie, which is defined as the area covered by the Downtown Zones, and is a subset of the regionally-designated Town Center. But the guiding principles and policies are also directly applicable to the Tacoma St and Park Ave areas, where stations for the new Portland-Milwaukie Light Rail (PMLR) will be constructed. Commuter parking at those station areas could impact the adjacent neighborhoods.

The role of parking in downtown is to support the realization of the *Downtown and Riverfront Land Use Framework Plan*, which envisions a lively downtown area that is a cultural and commercial center for the community, comprised of an exciting and attractive mix of uses and amenities. Additionally, downtown is projected to be the location of significant employment growth (see Chapter 4). People will come downtown to work and to experience an environment that is unique, active and diverse. As a general principle, people do not come downtown to park.

This chapter addresses the needs and strategies associated with several distinct types of parking users:

- Employees
- Commuters (or park-and-riders)
- Downtown residents
- Visitors/customers

TSP GOAL AND POLICY FRAMEWORK

As part of this TSP update, the community developed a set of goals to guide the development of the transportation system in Milwaukie (see Chapter 2). Several of these TSP Goals guide the City's policies on parking in downtown Milwaukie:

- **Goal 1 Livability** guides the City to address spillover parking into residential neighborhoods.

- **Goal 9 Economic Vitality** speaks to the importance of downtown as a hub of commerce and employment.
- **Goal 3 Travel Choices** directs the City to support travel options that allow individuals to reduce single-occupant vehicle trips.
- **Goal 6 Sustainability** calls for the City to decrease reliance on automobile transportation and increase the use of other modes to minimize transportation system impacts on the environment.
- **Goal 7 Efficient and Innovative Funding** directs the City to identify and develop diverse and stable funding sources to implement recommended projects in a timely fashion.

NEEDS

Parking needs in downtown Milwaukie can be divided into four categories: (1) improving enforcement and permitting practices, (2) managing parking supply as downtown surface lots redevelop and in light of the on-street spaces displaced by the new PMLR, (3) modifying code requirements for parking associated with new development, (4) and improving the parking facilities themselves.

Enforcement and Permitting Practices

Though the City has managed parking in downtown for many years, the projected growth of residential and mixed use redevelopment along the PMLR extension through downtown has revealed some distinct needs related to how the City allocates, permits, and enforces public parking.

It is common practice for many downtown employees to park in short-term on-street spaces and move their car from space to space throughout the day to avoid getting a parking ticket. The City's policy (in the Milwaukie Municipal Code) is to enforce against this type of activity (known as "moving-to-evade"), and, in 2009, revisions were made to the "Move-to-Evade" or "Block Rule" ordinance (Milwaukie Municipal Code Section 10.20.080) that allow the City's Code Compliance staff more latitude to cite people who move their cars between short-term spaces during the day.

In 2006, the City mapped all of the parking spaces in downtown Milwaukie and began a regular practice of monitoring parking inventory and permit use. Prior to 2006, without such data, the staff could not identify problems; therefore, for a long time there was no adjusting of time-limit spaces to meet adjacent purposes.

In 2008, the City created information for the public and downtown employees about location, cost, availability, and the purpose of downtown parking lot locations, as well means for utilizing the permit program. This information has been distributed through targeted outreach and direct mailings to downtown businesses, brochures, maps, and website development. In February 2013, the City's Finance Department took over administration of the parking permit program. This shift brings enhancements to the permit program, including selling permits in more than one location (e.g., at City Hall, by mail, on-line), offering flexible payment options (e.g. credit card, automatic deduction), and offering customized permit packages (e.g. monthly, semiannually, annual renewals).

The City has a Residential Parking Permit program, primarily designed for neighborhoods adjacent to the downtown core. An existing traffic regulation (No. 237, adopted in May 1993) provides a straightforward blueprint for defining area eligibility and the process to establish a residential parking permit area. Within Traffic Regulation No. 237, Section 2 (Area Eligibility) sets forth the criteria to initiate the process of establishing a residential parking permit area.

To implement the Residential Parking Permit program, there are three areas that need further clarification from City Council: (1) establishing a fee structure, (2) determining which City department or division will enforce the residential parking permit area (e.g., police or code enforcement), and (3) establishing a penalty structure for violations within the permit area. Further policy development is needed to address the potential parking impacts of mixed use redevelopment in the downtown core. This includes guidance on how to address the parking needs of downtown residents and businesses, as well as what mechanisms need to be in place to address parking spillover.

Management of Future Parking Supply

With most of downtown's buildable land already in use as surface parking, future development will inevitably impact net parking resources. PMLR construction will result in the loss of approximately 50 on-street parking spaces near the new light rail station downtown. While the overall amount of public and private parking is generally abundant today, it will become less so over time.[1]

One of the first needs addressed in this TSP update is the sorting out of who is responsible for providing future parking in downtown Milwaukie. The answer depends on several factors: whether the parking is public or private; is replacing existing parking or serving new uses; is intended for downtown employees, residents, or visitors; and is part of a structure or surface lot. This chapter attempts to clarify how these factors should be considered as the City determines its parking-related responsibilities associated with Downtown Plan implementation.

As evidenced by the North Main Village project, which was built on a former Safeway site near the corner of Main St and Harrison St, new development and infill in downtown Milwaukie will cause existing surface parking facilities to transition to new and denser land uses. The City should take a role as a developer or facilitator of new parking supply if it hopes to accomplish the urban vision outlined in the Downtown Plan. The private sector must also participate in the provision of new parking, and the City should understand how and when it could support businesses in this regard.

Development Code Modifications

The City Zoning Ordinance regulates not only building form and use; but also the amount of parking that can and should be built on a site. With the exception of the Downtown Storefront Zone, the City's parking requirements for downtown development are currently the same as for other sites outside of downtown that are zoned for commercial or office development. The City's current parking standards for new development within the downtown zones are exceedingly variant and in many cases, overly burdensome. The parking requirements can be summarized as follows:

- In the Downtown Storefront Zone (and in the part of the Downtown Office Zone that is north of Washington St and east of McLoughlin Blvd), no off-street parking is required. Parking is allowed, but the applicant determines how much to provide.

[1] As described in Chapter 3, the City's December 2012 downtown parking inventory found 1,828 parking spaces (385 on-street and 1,443 off-street). Of these, 1,221 are private parking spaces. During the peak hour (11:00 a.m.-12:00 p.m.), the public spaces are generally 50% full and the private spaces are 42% full. See Figure 3-18 in Chapter 3 for a map of parking in downtown.

- In the other Downtown zones, off-street parking is required. The type of use determines the amount required.[2] Applicants are required to provide between 1 and 4 spaces per 1000 sq ft of retail, restaurant, or office area; and between 1 and 1.25 spaces per unit of multifamily residential development.

Currently, the actual demand for downtown parking is fairly evenly distributed between different land uses (e.g. retail, office, and restaurants).[3] This pattern of parking demand does reflect the multiple parking standards currently in place in the City Zoning Ordinance, which suggests that specific uses demand specific allocations of parking. A parking utilization study conducted in 2012 indicated that the demand for parking in downtown Milwaukie averaged 2.3 spaces per 1,000 gross sq ft.

The parking requirements that are currently in place may in fact require that a new development provide more parking than is needed by the development. On the relatively small building sites in downtown, such excessive requirements may preclude development altogether due to the high cost of building structured parking.

Parking Facility Improvements

Most of the downtown parking supply is located on private surface lots outside of the downtown core (Main St between Scott St and Washington St). In many cases, the lots have inadequate signage, lighting, landscaping, and surface treatments. This is equally true for many of the public lots as well. The poor quality of the existing parking lots limits the ability of the City and the private sector to maximize the use of the existing inventory. Without high quality lighting, attractive physical appearance (i.e., paving, signage, landscaping), and pedestrian connectivity, the underutilization of existing spaces will continue to fuel the perception that there is a shortage of downtown parking.[4]

The issue of pedestrian connectivity should be emphasized. The decision to park in a lot is comprised both of the assessment of the lot condition and the experience of walking to and from that lot. Without a safe, attractive, and convenient sidewalk system that connects all lots to all downtown destinations, the City will miss serving a certain percentage of would-be permit parkers who elect not to participate because of perceived safety issues. In Milwaukie, which has a complete sidewalk system downtown (see Figure 3-2 in Chapter 3), the need leans more toward safety than convenience. For example, many downtown sidewalks are not well lit, and many lack pedestrian amenities like street trees, benches, and trash cans.

STRATEGIES

There are two strategies for addressing the needs described above. The first is to adopt and implement a set of Downtown Parking Guiding Principles or Parking Management Principles, which establish a policy framework for the City's decision-making on downtown parking-related issues. The second strategy is to adopt and implement a set of Parking Operating Principles, which will direct City staff or its representatives in the day-to-day operation of the parking system.

As the City is not yet prepared to abide by these principles, a set of recommendations is included in the next section of this chapter. These recommendations will enable the City to effectively transition from its current practices to those described in the two sets of principles.

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[2] The parking requirements vary across approximately 59 use categories. See Milwaukie Municipal Code 19.600.
[3] See Table 3-11 in Chapter 3.
[4] Private lots are not currently utilized for public parking, but shared use arrangements are recommended and the physical state of the private lot will affect its marketability to potential users.

Downtown Parking Guiding Principles (Parking Management Principles)

"Guiding Principles for Managing Downtown Parking" were initially developed in 2003 as part of the *Downtown Milwaukie Downtown Parking and Traffic Management Plan*, and were confirmed and updated during the 2007 TSP update process. Although the 2003 set of Guiding Principles provides a relatively comprehensive framework for managing downtown parking, the 2007 TSP update refined the Principles and filled in a few gaps. For example, the 2003 version did not address downtown residential parking, nor were the principles regarding downtown park-and-rides sufficiently refined. The following 23 principles describe a complete and state-of-the-industry set of principles for managing parking in downtown Milwaukie:

Customer/Client/Vendor/Visitor Parking

1. The most convenient parking spaces should be reserved to support customer/client/ vendor/visitor access to downtown. Management of the on-street parking system should promote customer/visitor accessibility by prioritizing the parking of short-term patrons in downtown Milwaukie.

2. The City of Milwaukie should take the lead role in providing sufficient short-term parking to support the retail environment described in the *Downtown Plan*. The on-street system is therefore not intended for employee, resident, or commuter parking during normal business hours.

3. On-street parking in the downtown core should support street level activities. The provision of on-street parking on Main St should not be sacrificed for street capacity enhancement or vehicular through-put.

4. The City should enforce against long-term parkers (typically employees) who move their vehicles during the day to evade being cited for parking in short-term spaces.

Multimodal Access

5. The City should strive to implement downtown travel options to provide a balanced system that includes public transit, automobile, bicycle, and pedestrian facilities and services for all downtown users.

6. Parking management strategies and programs should support, complement, and consider the availability and use of all access modes.

Employee Parking

7. City-controlled off-street lots should be managed to meet use demand using the 85 Percent Full Standard (85 PFS).[5] All parking lot management strategies should be coordinated with transportation demand management objectives to ensure that employees and customers have reasonable options for access.

8. Whether in on-street subareas or in off-street lots, wherever parking exceeds the 85 PFS, employee parking should be eliminated/phased out first. This is so the City can accommodate visitors and customers at all times. Businesses that have designated private employee parking lots should be encouraged to do the same, wherever possible. The City should help businesses understand and utilize demand management strategies to help employees transition to alternative modes of travel over time.

[5] Refer to page 12-7 for an explanation of the 85 Percent Full Standard.

9. The City should provide clear and consistent information about downtown parking to optimize utility and convenience for all users.

10. The City should support downtown business efforts in transitioning more downtown employees into alternative modes (i.e., transit, bike, walk, ride-share) through business-based programs and incentives.

Park-and-Ride/Public Transit

11. Providing parking for downtown customers, visitors, and employees is a higher priority than providing parking for commuters destined for other cities.

12. Park-and-ride lots should be located outside the downtown core.

13. Bus staging in the downtown should have minimal impact to on-street visitor parking. Buses should serve downtown, but should not stage on downtown streets. The purpose and priority for transit stops in the downtown area is to provide safe, convenient, business-friendly access for downtown users, customers, and employees.

14. While transit park-and-ride structures are discouraged downtown, the City may allow for the provision of such a structure should it dedicate some spaces for downtown parking and lead to future control/ownership of the facility by the City for public parking exclusively or predominantly.

Quality of Parking

15. All downtown parking, whether public or private, should be safe, secure, well lit, and maintained to enhance the users' sense of safety and security.

Residential Parking

16. The downtown parking supply should be managed to minimize parking impacts on adjacent residential neighborhoods.

17. Downtown residential development should be responsible for providing on-site parking, or negotiating parking availability in off-street lots, for new residential units.

Publicly Managed Parking

18. Over time, the City anticipates that its off-street lots will redevelop and City-owned or -leased surface parking lots will gradually disappear. The City will attempt to continue to accommodate the commercial and residential buildings whose tenants are, as of November 2013, making use of City off-street lots. The City will continue this practice as long as public off-street spaces are available.[6]

19. Downtown Milwaukie employees are the highest priority customers in the City's parking permit program. As the permit system approaches capacity (i.e., spaces become unavailable for new applicants), the City should revoke parking permits issued to commuters as necessary, and refrain from issuing new permits to commuters.

20. The City supports the provision of a structured public parking facility for visitor and employee parking. Due to the expense of structured parking and the benefit structured parking would provide to downtown businesses, the City should commence planning for

[6] The term "City lots" in this recommendation excludes the lots adjacent to the Ledding Library and City Hall.

structured parking only in collaboration with the downtown business community and only after a viable funding strategy is identified.

21. The City supports shared use of parking areas, including public lots, when there is no conflict in operating hours.

Parking Requirements for New Development

22. Parking requirements for new development should contain needed parking on-site or through shared parking agreements.

23. New parking supply should be located within structures that contribute to the design and activity of downtown whenever possible.

Parking Operating Principles

Parking Operating Principles define the day-to-day operating priorities for managing parking in the Downtown Zones. The Operating Principles provide specific direction for addressing issues that will occur in the system, which should assist the City in following the Guiding Principles.

85 Percent Full Standard (85 PFS)

The first and most important piece of the Operating Principles is the 85 Percent Full Standard (85 PFS), and is therefore discussed separately here. The 85 PFS is an industry-based management standard for understanding the sufficiency of parking supply in a specified and limited area. The standard establishes a rule for when to make on-the-ground adjustments: when parking spaces in specified and limited areas are routinely 85% full during the peak hour, the City should implement a more aggressive strategy to assist priority users in finding parking.[7]

Because downtown Milwaukie is relatively small, the 85 PFS should be applied beyond a "hot-spot" basis. That is, as small areas of downtown redevelop or become more popular, consideration should be given to parking utilization beyond the immediate parking impact area. Nearby parking utilization should also be considered, due to the compactness of downtown and the Downtown Plan's emphasis on high quality pedestrian amenities and walkability.

However, when the 85 PFS is reached, there are many Operating Principles the City can apply in electing how to respond. These are described below, and are followed by the rest of the Operating Principles.

- **At 85 PFS:** Work with downtown employers to advertise and inform employees about how to use the City permit system and where parking is available.
- **At 85 PFS:** Enforce against employees or TriMet patrons who use spaces intended for visitors to downtown businesses.
- **At 85 PFS:** Modify the availability of on-street parking for short-term visitors or long-term permit holders, depending on the need of the adjacent building occupants.
- **At 85 PFS:** Increase permit prices.

[7] One possible consequence could be that no strategies need to be implemented if the utilization level is deemed acceptable. However, the trigger provides a proactive system of review and provides time to implement parking management strategies before overly constrained conditions occur.

- **At 85 PFS:** Invest in lighting, landscaping, and other amenities to make other parking areas, and the walk to them, more attractive.
- **At 85 PFS:** Acquire or construct new parking supply.
- **At 85 PFS:** Work with employers and TriMet to decrease the need for downtown employees' and patrons' need to drive to and park in downtown (implement Transportation Demand Management measures).

Additional Operating Principles are as follows:

- Short-term parking is defined as parking with time-stays less than or equal to four hours.
- Parking management may include strategies for modified pricing levels for short- and long-term parking, user types, or lot locations.
- The City will manage on-street parking spaces to primarily serve the ground-floor use of adjacent properties.
- There will be no unregulated on-street parking in downtown zones.
- As long as spaces are available, off-street parking in downtown will be operated for the benefit of visitors, employees, and residents of downtown Milwaukie.
- Residential use of public off-street parking lots will be limited to nonbusiness hours (nights and weekends in some locations).
- Over time, public off-street parking will be transitioned to serve a higher mix of short-term visitor parking demand. Alternative mode options will be developed to support this transition.
- Except where residential parking permit zones are established, on-street parking outside of the downtown zones (i.e., in adjacent residential areas) will be unregulated but enforced by complaint only.
- If parking spillover from the downtown zones, or from the future light rail station areas (at Tacoma St and Park Ave), results in inadequate parking availability in the neighborhoods adjacent to these areas, the City will facilitate the establishment of residential parking permit zone programs upon the request and support of the affected neighborhood(s).[8]

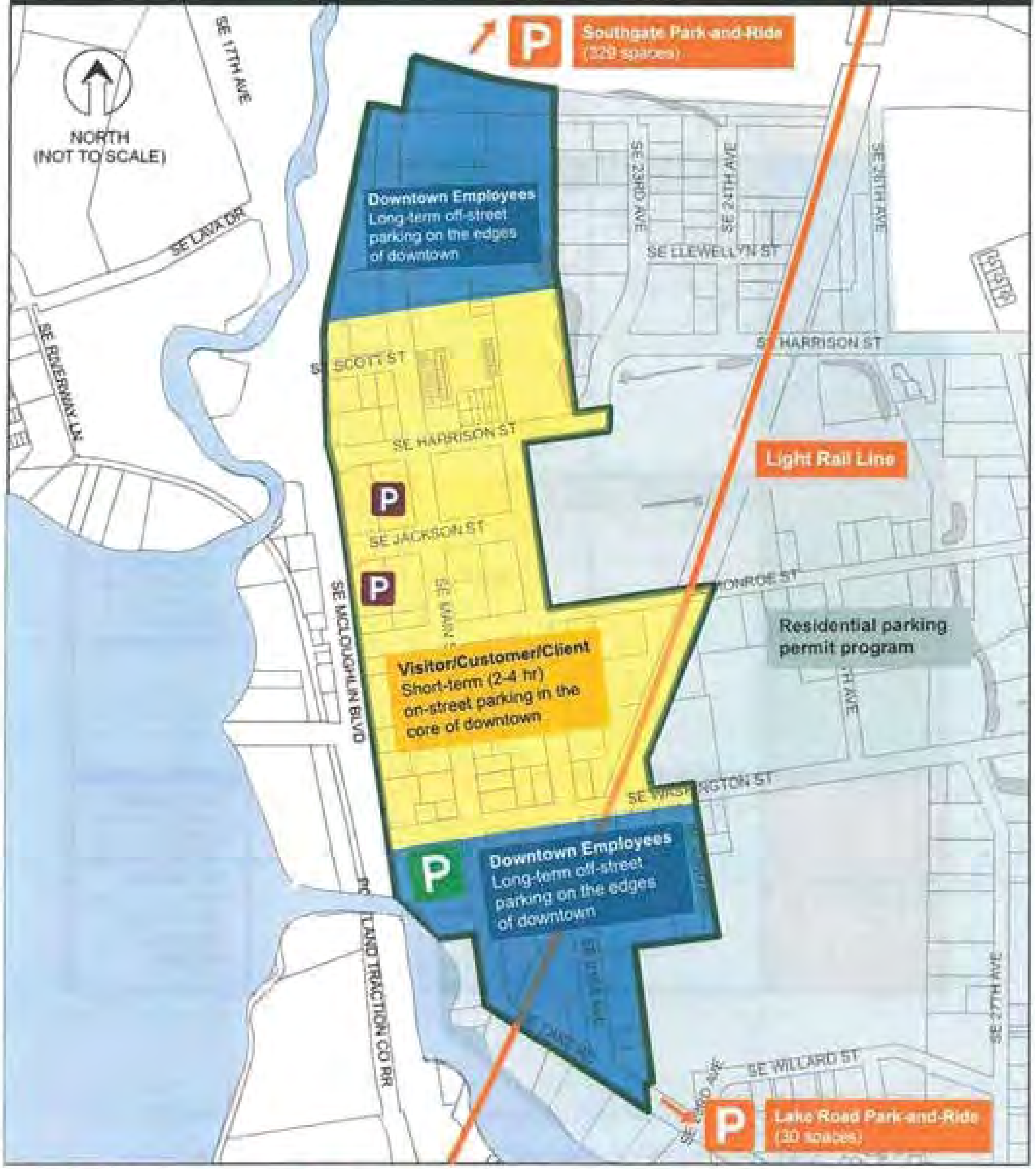
The application of both the Guiding Principles (Management Principles) and the Operating Principles will result in a parking distribution pattern that places each parking user in the location that best supports the goals of the Downtown Plan. As illustrated in Figure 12-1, visitor parking is provided in the retail core, employees are directed to public lots, park-and-ride commuters are moved to the downtown fringe, and residential neighborhoods are protected from spillover effects.

The goal is a clear and predictable downtown parking system, as summarized in Table 12-1. The Guiding Principles account for each of the different types of parking users and the three types of parking spaces potentially available to them. Additionally, Transportation Demand Management Tools are diligently designed into the parking management system, varying slightly depending on the user type.

[8] See recommendation on page 12-12 for detail.

Figure 12-1 | Diagram of Parking Type Locations

Downtown Milwaukie
November 2013



Existing Park-and-Ride

Potential Future Parking Structure

Existing long-term parking by permit
Subject to land and funding availability

Table 12-1 Parking Facility Priorities by Parking User Type

Parking User Types	Parking Facility Type: On-Street Parking	Parking Facility Type: Off-Street Public Parking	Parking Facility Type: Off-Street Private Parking	Transportation Demand Management Tools
Visitor/Customer/ Client	**Priority** 2-hr and 4-hr parking	**Allowed** Subject to land and funding availability	**Allowed** On-site parking controlled by property owner	• Transit • Bike parking • Pedestrian access and amenities
Downtown Employees	**Limited** • When not needed for adjacent retail/ restaurant • By permit only • Subject to 85% rule	**Priority** • Subject to land and funding availability • Priority to occupants of buildings existing in 2007 • Locations may shift over time as downtown develops • Subject to 85% rule	**Allowed** • On-site parking controlled by property owner • Shared parking arrangements encouraged • Private paid parking lots are allowed • New office/ commercial development required to supply 0-2.5 spaces/1,000 sf[9]	• Transit passes • Bike parking • Encourage carpooling • Flexible parking permit options
Downtown Residents	**Limited** • After hours only	**Limited** • After hours only	**Allowed** • On-site parking controlled by property owner • Shared parking arrangements encouraged • Private paid parking lots are allowed • New residential development required to supply parking	• Transit passes • Bike parking • Car-sharing • More services in downtown, requiring fewer trips to destinations outside downtown
Park-and-Ride (to Portland)	**Not Allowed**	**Limited** • Restricted in the core downtown area • Conditionally allowed in a parking structure • Must support downtown activity over the long term	**Allowed** • On-site parking controlled by property owner	• Southgate park-and-ride (opened 2010)[10] • Lake Rd park-and-ride (existing) • Improve E-W bus connections to downtown Milwaukie

[9] Downtown parking required for new development will be analyzed and potentially revised during the 2013-14 "Moving Forward Milwaukie" project.
[10] The future of the Southgate park-and-ride is unclear once the PMLR opens in 2015. The City prefers that the Southgate site transition into operation as a parking lot for local employees.

RECOMMENDATIONS

The City should move to apply the Guiding Principles and Operating Principles. This will be easier to do with the implementation of certain policy recommendations, operational improvements, and capital projects.

Policy Recommendations

Adopt new parking development standards for commercial development in the downtown zones.

Amendments should create a unified parking standard for downtown commercial and office uses that does not require more parking spaces than are needed. The revised code should encourage shared parking agreements and acknowledge on-street parking as a resource for downtown businesses.[11]

- Amend the Code to eliminate minimum parking ratios for commercial/retail uses in Downtown zones. This will enable the market to determine minimum parking levels for new commercial development, meaning that the City will allow new office and retail to be built in downtown Milwaukie without attendant parking (which supports the Downtown Plan's emphasis on the use of precious urban space for people and activity and not parking lots).

- Amend the Code to establish maximum surface lot parking ratios of 2.5 spaces per 1,000 sq ft for all commercial uses within the downtown zones (which would cover office, retail, personal service, restaurant, auto, government, bowling, church, fraternal organization, gym, and funeral home uses, which are each listed separately in the current code). This will prohibit development that requires large surface parking lots, supporting the Downtown Plan's emphasis on a compact and interesting urban environment.

  Maximum parking ratios for parking provided in structured spaces are not recommended if they meet the City's development standards and design guidelines.

Adopt new parking development standards for residential development in the downtown zones.[12]

Given that the on-street system in downtown is prioritized for customer/visitor use, the vision to bring greater levels of new residential development (over retail) to downtown will create potential conflicts for access to on-street parking. To mitigate this and assure that residential parking is available in downtown and on-street parking remains available to customers and visitors, the City should amend the Code as follows:

- Require no maximum parking allotment within structured parking facilities.

- To accommodate residential development that cannot incorporate parking into development sites (i.e., for reasons of site size, geometries, etc.), allow for requirement exceptions through approval of a transportation management and trip reduction plan.

- Prohibit the creation of residential on-street parking permit programs within the Downtown Zones.

[11] Downtown parking required for new development will be analyzed and potentially revised during the 2013-14 Moving Forward Milwaukie: Enhancing Our Commercial Districts project.

Adopt an action plan to fully implement the Residential Parking Permit program by 2015.

- As the new PMLR begins to affect the City's core and the neighborhoods near PMLR station areas at Tacoma St and Park Ave, and as land uses intensify, conflicts for parking in adjacent residential neighborhoods will likely occur as downtown users begin to spill over in the residential areas. In response, it is recommended that the City develop and enact an action plan to fully implement a Residential Parking Permit Zone program.

Operational Projects

Public Information and Marketing

- Continue to distribute information to the public and downtown employees about location, cost, availability, and the purpose of downtown parking lot locations, as well means for utilizing the permit program. This can be accomplished through such efforts as targeted outreach to downtown businesses, mailings, brochures, maps, and website development.
- Create a transportation information package for downtown employees, to include public parking, transit, and biking information.
- Promote Metro's online tool, "Drive less. *Connect*," (through the Regional Travel Options program) that promotes a ride-matching service connecting carpoolers and bike buddies. Since its launch in 2011, commuters have avoided using approximately 50,000 gallons of gasoline and saved roughly $308,000 collectively by joining carpools, biking, and riding transit.

Active Parking Management

The City should dedicate appropriate resources for actively managing downtown and station-area parking and the ripple effects into adjacent neighborhoods. This will include tools and staffing to enforce on-street parking time limits, maintain the downtown parking inventory map, and continue coordination between City departments. Active management further entails working with constituent groups (e.g. business owners, residents, and employees) to educate them about City policies and build their capacity to utilize alternative delivery models and modes, such as the formation of a Transportation Management Association and use of regional ride-share modalities.

Improve Parking Permit Program

Improvements to the City's Parking Permit Program can increase the use of off-street spaces that are currently underutilized. By moving employees who currently park on-street into off-street lots, valuable on-street spaces can be freed up for customer or visitor use.

Implement "Tiered Pricing"

Currently the City charges the same amount for all parking lots. As such, parking is not priced according to demand or proximity to "premier" destinations. Tiered pricing would set rates based on lot popularity. For example, a lot with occupancies over 85% would be priced higher than lots with significantly lower rates of utilization. Lots on the fringe of the downtown would be priced lower than more popular lots located in the core retail area.

Parking Utilization Monitoring Program

No less than every two years, City staff should count the parking supply and peak-hour parking utilization. With the results of this information, the Parking Manager or designated staff should convene a meeting of stakeholders to review the results, check areas against the 85 PFS, and evaluate the need for any actions (e.g., redesignating short-term or long-term parking, modifying short-term parking durations, or adjusting the allotment of permits for Portland-bound commuters).

Identify Locations for Future Public Supply

As City-owned parking lots transition to more dense land uses, the City should continually consider the prospects for new parking supply for downtown employees.

Engage Owners of Private Parking Facilities to Provide Shared Parking

City staff should initiate a program to develop shared use agreements with owners of off-street private parking. The agreements should be developed for both employee parking and special event parking. The City or a downtown business association can take the lead in contacting property owners or developing incentives such as facility upgrades (e.g., lighting, striping, pavement, landscaping), leasing arrangements, revenue sharing, or public purchasing. Shared parking arrangements could be arranged between two private parties, or between private parties and the City.

Evaluate Funding Strategies for New Supply

The City should begin to discuss and evaluate potential funding sources for future public parking supply. These discussions with downtown stakeholders should assure that the final recommendations have broad support within the downtown community. Most public parking facilities developed in other jurisdictions are funded with multiple sources that include urban renewal/tax increment financing, parking fees and charges, meter districts, local improvement districts, capital fund allocations, and bonding.

Capital Implementation Projects

Signage Changes

Over time, distinctive, friendly, and clear customer/visitor parking signs should be designed and installed at all short-term public parking lots. The signs should be "blade" signs with information on both sides so that downtown patrons can read the signs from either direction.

Upgrade Public Parking Lots

The City should maintain the pavement, lighting, and landscaping of its off-street public parking facilities to ensure a safe and attractive appearance.

Implement the Public Area Requirements

Implementing the Public Area Requirements of the Downtown Plan will result in wider, continuous sidewalks with appropriate lighting. These improvements will help address concerns about walking several blocks between a parking lot and a destination.

Master Plan

Table 12-2, the Downtown Parking Master Plan Projects, summarizes the key projects needed to implement the recommendations in this chapter. Many of the projects related to the operation and maintenance of the City's parking program may be self-funding through parking permit fees and parking fines.[12]

Table 12-2 Downtown Parking Master Plan Projects

Priority	Type	Project Name	Project Description	Cost(s) $1,000s[13]
High	O	Downtown Parking Management	Implement a downtown parking management system, including a dedicated parking manager.	$40
High	C	Downtown Parking Signage	Install wayfinding and identification signage at McLoughlin Blvd intersections and around public parking lots.	$10
High	C	Public Parking Structure	Construct 3- to 4-story public parking structure with retail at ground floor for visitor/employee parking.	$11,000
Med	C	Downtown Streetscape Improvements	Install sidewalk bulbouts, lighting, and pedestrian amenities.	$7,300
Med	C	Downtown Public Parking Lot Improvements	Upgrade and maintain off-street public parking facilities with improved landscaping and lighting.	$60

Notes:

C = Capital Project High = High priority
O = Operational Project Med = Medium priority
P = Policy Project Low = Low priority

Action Plan

The Downtown Parking Action Plan (Table 12-3) identifies the highest priority projects that are reasonably expected to be funded with local funds by 2035, which meets the requirements of the State's Transportation Planning Rule.14 The action plan project list is based upon a 2007 citywide project ranking process. In 2007, all of the modal master plan projects were ranked by the TSP Advisory Committee after consideration of the Working Groups' priorities, other public support for the project, and how well each project implements the TSP goals and policies. For the 2013 TSP Update, City staff reassessed the prioritization of all projects, incorporating public comments gathered at and around a public meeting in June 2013. Action plan projects that were completed since 2007 were removed from the action plan and new projects identified as top priorities were added.

Table 12-3 Downtown Parking Action Plan

Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Downtown Parking Management	Implement a downtown parking management system, including a dedicated parking manager.	Downtown	Downtown	$40	Direct

[12] This source of funding is not included in the TSP transportation funding forecast (Chapter 13).
[13] Project costs are order-of-magnitude estimates and are in 2012 dollars. Future costs may be more due to inflation. In the case of operational projects, estimated costs are for the entire 22-year planning period.
[14] *OAR Chapter 660*, Department of Land Conservation and Development, Division 012, Transportation Planning, adopted on March 15, 2005, effective April 2005.

Downtown Parking Signage	Install wayfinding and identification signage at McLoughlin Blvd intersections and around public parking lots.	Downtown	Downtown	$10	Direct

13 Funding and Implementation Plan

The purpose of this chapter is to describe the funding framework for considering City of Milwaukie transportation improvements between 2013 and 2035. This chapter outlines the foreseeable funding sources—and their restrictions—for both capital improvements and transportation maintenance projects. This chapter also provides a brief overview of additional funding sources.

CURRENT FUNDING SOURCES

The City of Milwaukie relies on a variety of funding sources for maintaining and improving its transportation infrastructure. Most of these sources are constrained, meaning that they can only be used for a specific function like expanding the system's capacity, paving the streets, or building bicycle facilities. The funds also flow into Milwaukie from a variety of sources, most of which are tax-based and administered through different levels of government and through different mechanisms.

Types of Transportation Funding Sources

The City has identified 10 transportation funding sources that are currently available:[1]

Grant/Competitive Programs

- **Metropolitan Transportation Improvement Program (MTIP)** identifies how all federal transportation money is to be spent in the region in two-year increments. Each time the MTIP is developed, Milwaukie competes with other jurisdictions in the region for federal "regional flexible funds" that can be used for most aspects of the local transportation system.
- **Statewide Transportation Improvement Program (STIP)** is ODOT's project funding and scheduling document. The STIP makes funds available to cities, through a highly competitive process, for expansion, preservation, safety, and other system enhancements. The STIP makes expenditures from both State revenues and some federal programs.

City Share of State Highway Trust Fund

A portion of the taxes and fees assessed on Oregon motorists and freight haulers is paid to the City annually on a per capita basis. The primary sources are the State motor vehicle fuel tax, a

[1] This list includes federal funds that are not part of the City's regular revenue stream for transportation improvements.

weight-mile charge on heavy trucks, and vehicle registration fees. ODOT requires that cities set aside 1.0% of the local share of Highway Trust Fund proceeds for the construction and maintenance of bicycle facilities.

Local Funds—Fees and Taxes

- **Franchise Fees** are paid by each of the City-owned facilities—water, wastewater, and stormwater—to the City's Street Fund for their use of the public right-of-way. The utilities are able to pay the franchise fee with some of the revenue they collect from Milwaukie utility rate-payers.
- **PGE Privilege Tax** is similar to the franchise fees, in that Portland General Electric pays the City for its use of the public right-of-way. As part of the City's Street Surface Maintenance Program, a portion of this fee is dedicated to surface maintenance for the city's most important streets.
- **Local Gas Tax** is separate and apart from the State gasoline tax. Milwaukie gas stations pay a tax on fuel sold in Milwaukie, which is sent to the City for street maintenance use only.
- **Street Surface Maintenance Fee** is similar to a utility bill, in that all Milwaukie properties are charged a monthly fee for use of the street system. These fees are dedicated for street maintenance use only.
- **Local Improvement Districts (LIDs)** are special assessment districts in which property owners benefiting from a transportation improvement pay for that improvement. These have not been frequently used by the City, but are available to interested property owners.

Local Funds—Development Contributions

- **System Development Charges** are collected from developers when new construction is expected to place heightened demand on the transportation system. The vast majority of these monies can only be used by the City for adding capacity to the system.
- **Fee In Lieu of Construction** is collected when required street frontage improvements, typically associated with residential construction, are impractical to build. These funds are limited in both how and where they can be spent.

Details About Specific Funding Sources

The following section provides additional detail about most of these sources, particularly those that the City can rely on regularly. The regular revenue stream projection provides the baseline for the Funding and Implementation Plan in this TSP.

Most of these funding sources can be (and have been) used by the City to leverage one another and additional sources. As transportation improvements are expensive and the competition for transportation dollars is fierce, the City must utilize the funds it regularly receives as "match" for larger awards, which are typically available through federal grant programs. The complete transportation funding picture for the City therefore requires that regular revenues cover maintenance, operations, small projects, and matches for larger capital projects that the City cannot accomplish without an infusion of funds for the specified project. The Funding and Implementation Plan follows this premise throughout.

System Development Charges and Fee in Lieu of Construction

A transportation System Development Charge (SDC) is collected from developers when new construction or redevelopment is expected to place new demands on the transportation system.

The SDC charge is based on a study-based rate and the number of new vehicle trips the development is expected to generate. The City's current SDC rate is $1,676 per new p.m.-peak-hour trip. The transportation SDC consists of a reimbursement charge and an improvement charge. The improvement charge portion is roughly 95% of the total SDC and can only be used to construct transportation projects that add capacity.

Fee in Lieu of Construction (FILOC) is collected from developers in lieu of construction when required frontage improvements would not be practical, efficient, or beneficial to construct. For example, constructing an isolated sidewalk in the middle of a residential block where no sidewalks currently exist has minimal impact. However, pooling fees collected in lieu of required frontage construction enables the City to build improvements where they are most needed in the neighborhood in which they were collected, such as along identified bikeways, walkways, or school routes.

SDC and FILOC revenue varies based on the level of new development, so it is difficult to accurately forecast the amount of money that will be available from these sources. For example, over the past three fiscal years, SDC and FILOC revenue has been lower than in previous periods, averaging only approximately $11,100 per year (in 2012 dollars). Based on an assumption that the easing of the recent national recession and the opening of the new light rail line in 2015 will result in at least a slight increase in development activity in the future, the projected revenue from SDCs and FILOC over the next 22 years is estimated to be $745,600, with $444,500 already in hand from past FILOC collections, for a total of nearly $1.2 million.

Franchise Fees

Each of the three City-owned public utilities—water, wastewater, and stormwater—pays 8% of its net revenue to the Street Fund for the use of the public right-of-way. For the fiscal year 2011/2012, the Street Fund received $448,000 from such franchise fees. Franchise Fee projected revenue is expected to provide $23.7 million over the next 22 years and is not restricted to either capital or maintenance projects.

State Gas Tax and Vehicle License Fees

The State of Oregon collects taxes and fees on motor vehicle fuel, licenses, and permits and then deposits the proceeds into the Highway Trust Fund. A portion of this fund is paid to cities annually on a per capita basis. By statute, the money may be used only for road-related purposes. Like most Oregon cities, Milwaukie uses its share primarily for street department operations and associated maintenance activities. Road maintenance includes a variety of activities such as striping, signage, sweeping, and shoulder maintenance.

Oregon motor vehicle fuel taxes are collected as a fixed amount per gallon of gasoline sold. The Oregon gas tax is currently 30 cents per gallon, increased from 24 cents per gallon on January 1, 2011. Because it is levied on a per gallon basis, the revenue does not vary with changes in gasoline prices. Since increases do not keep up with inflation, the value of this revenue has eroded over time as maintenance materials and repair costs have increased. Additionally, increased fuel efficiency in new vehicles has further reduced the total dollars collected relative to total miles driven.

Oregon vehicle registration fees are collected as a fixed amount at the time a vehicle is registered with the Department of Motor Vehicles. Vehicle registration fees in Oregon have recently increased to about $43 per year per vehicle. Vehicle registration fees are not adjusted for inflation.

In fiscal year 2011/2012, the City received roughly $1,110,000 from the Oregon Highway Trust Fund. The City's projected share of this fund is approximately $27.1 million over the next 22 years.

These funds are flexible and are available for either capital or maintenance projects.

Bike Path Fund

One percent (1.0%) of the payments from the Highway Trust Fund must be reserved for the maintenance and construction of bicycle facilities. In fiscal year 2011/2012, the City received $11,110 from this revenue source and expects to receive $271,600 over the next 22 years. Although these monies may only be spent on bicycle facilities, they are classified as unrestricted because they can contribute to capital or maintenance projects.

Street Surface Maintenance Fee

The street maintenance fee is paid by all City of Milwaukie utility customers (residents, businesses, government units, etc.) through their utility bill and is based on an estimate of daily trips generated by each customer. In fiscal year 2011/2012, revenues were approximately $609,000, and the fee is expected to generate $13.4 million over the next 22 years. Monies collected from this fee are dedicated to the Street Surface Maintenance Program (SSMP) for roadway surface preservation, including maintenance, rehabilitation, and reconstruction. They cannot be used to construct capital projects.

Portland General Electric (PGE) Privilege Tax

Similar to franchise fees, the PGE Privilege Tax is paid by a utility (in this case PGE) in exchange for the use of the public right-of-way. The rate approved by the Milwaukie City Council is 1.5% of Milwaukie customers' bills. In fiscal year 2011/2012, the City received revenue of $324,400 from this source. Revenues for the next 22 years are projected to total nearly $7.7 million. Monies collected from this tax are dedicated to the Street Surface Maintenance Program (SSMP) for roadway surface preservation, including maintenance, rehabilitation, and reconstruction. They cannot be used to construct capital projects.

Local Gas Tax

The City of Milwaukie local gas tax of two cents per gallon went into effect in April 2007. Revenue generated in fiscal year 2011/2012 was approximately $179,000. Over the next 22 years, the total revenue from this source is expected to be approximately $4.4 million. Monies collected from this tax are dedicated to the Street Surface Maintenance Program (SSMP) for roadway surface preservation, including maintenance, rehabilitation, and reconstruction. They cannot be used to construct capital projects.

Projected Transportation Revenue

Table 13-1 summarizes the current, anticipated, and approved funding sources and the estimated revenue available to the City of Milwaukie for transportation-related projects over the next 22 years. Total projected revenues over the next 22 years are approximately $1.2 million restricted for capital projects, $25.5 million restricted for maintenance projects, and $50.9 million for either capital or maintenance projects (unrestricted).

Table 13-1 Projected Transportation Revenue
for the 22-Year Planning Period (in 2012 dollars)

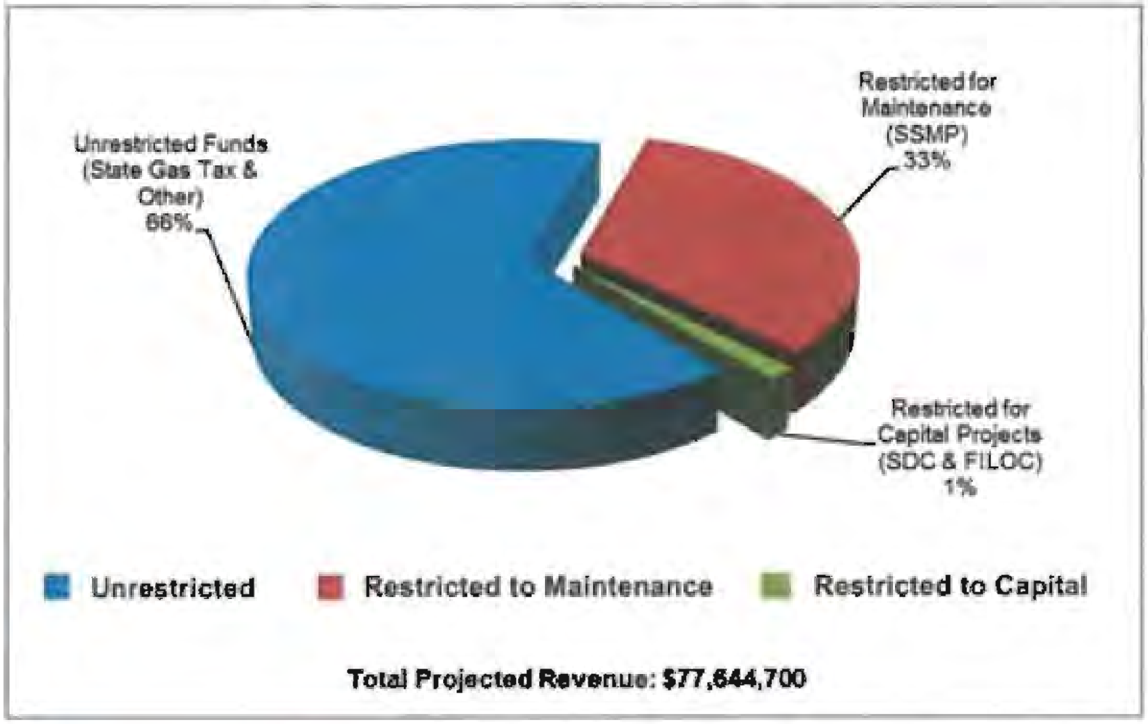
Funding Source	Capital	Unrestricted	Maintenance	TOTAL
SDC and FILOC[2]	$1,190,100			**$1,190,100**
Franchise Fees		$23,716,000		**23,716,000**
State Gas Tax		26,887,000		**26,887,000**
Bike Path Fund		271,600		**271,600**
Street Maintenance Fee			$13,420,000	**13,420,000**
PGE Privilege Tax			7,744,000	**7,744,000**
Local Gas Tax			4,356,000	**4,356,000**
Other Revenue		$60,000		**$60,000**
Projected Revenue (2014 to 2035)[3]	**$1,190,100**	**$50,934,600**	**$25,520,000**	**$77,644,700**

The three line items in Table 13-1 that are specifically restricted to funding maintenance projects (street maintenance fee, PGE privilege tax, and local gas tax) have been designated by City Council as the exclusive funding sources for the City's Street Surface Maintenance Program (SSMP). Projects eligible for SSMP funding include major rehabilitation and reconstruction of roadways. Routine street maintenance (e.g., filling potholes or patching asphalt) must be funded from the "unrestricted" sources in Table 13-1.

Figure 13-1 provides a graphic depiction of the information presented in Table 13-1, showing the makeup of anticipated revenue for the 22-year planning period.

[2] Figure includes $444,500 of FILOC money currently in City coffers (unspent to date) in addition to $280,000 of projected FILOC revenue as estimated over the 22-year planning period.
[3] Projections for these funding sources were made based on the most recent year, with the exception of FILOC and SDC revenue. Because FILOC and SDC revenue is more variable, the projection is based on an average involving three years of actual revenues with an estimated small annual increase.

Figure 13-1 Projected Transportation Revenue for the 22-Year Planning Period (in 2012 dollars)



CAPITAL AND MAINTENANCE PROJECTS

Based on current figures, projected costs for operations and maintenance over the 22-year planning period total approximately $77.2 million. Table 13-2 provides a detailed breakdown of these costs. As noted in Table 13-1, estimated revenues for the same time frame are approximately $77.6 million. However, some of those funds (approximately $1.2 million) are specifically restricted to capital projects, so there is some projected shortfall for operations and maintenance over the 22-year planning period. Not only does this mean that additional funds will be necessary simply to cover projected operational and maintenance costs, but also that the unrestricted revenues will be effectively unavailable for capital projects.

A minimum of approximately $272,000 must be spent on bicycle projects (capital or maintenance), or the City must forego expending the 1% of Highway Trust Fund revenues that must be devoted to bicycle facilities. But given that the regular sweeping of streets with bike lanes accounts for an annual Operations and Maintenance expenditure of approximately $50,000 (or $1.2 million over the 22-year planning period), this requirement is met 4 times over by that one operational project.

Table 13-2 Operations, Maintenance, and Capital Costs for the 22-Year Planning Period (in 2012 dollars)

Projects	Cost*
Operations	
Indirect, Overhead, and Administrative Support Costs	$20,307,000
Street Lighting	7,956,000
Subtotal	**$28,263,000**
Maintenance	
Street Surface Maintenance Program	$25,520,000
Traditional Maintenance Activities (sweeping, striping, signage, etc.)	22,170,000
Other Maintenance (from Consolidated Action Plan)[4]	1,206,000
Subtotal	**$48,896,000**
Capital	
Capital Projects (from Consolidated Action Plan)[5]	$3,839,200
Subtotal	**$3,839,200**
Total Approximate Costs (2014 to 2035)	**$80,998,200**

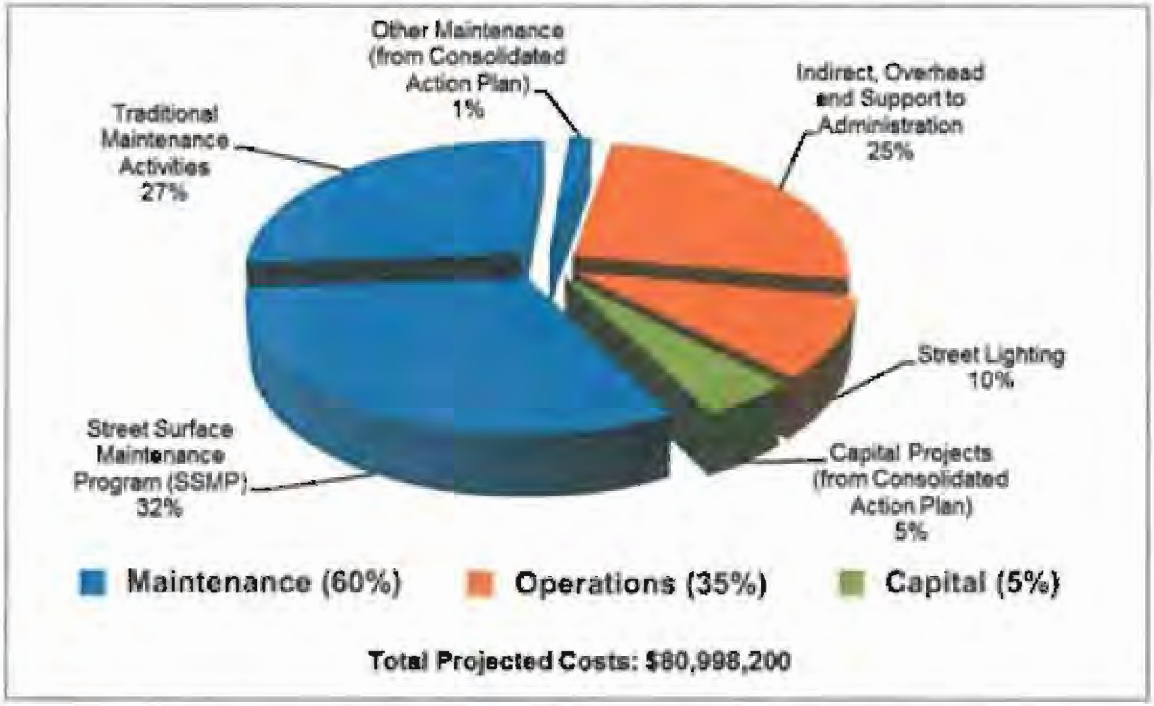
*Approximate Costs

Table 13-2 demonstrates how the City can allocate available funds given their restrictions. Figure 13-2 provides a graphic depiction of the information presented in Table 13-2, showing the breakdown of anticipated costs for the 22-year planning period.

[4] Represents that portion of the cost of regular street sweeping that is spent on designated bike routes.

[5] Costs include all projects on the Consolidated Action Plan (Table 13-3). An 11% local match share was used for estimation purposes, except for directly funded projects

Figure 13-2 Projected Transportation Costs for the 22-Year Planning Period (in 2012 dollars) [6]



With limited local funding and many needs, the City will continually strive to allocate investments for projects that best meet the goals as outlined in Chapter 2. The action plans—in Chapters 5, 6, 7, 8, 9, 11, and 12—contain those projects that the City has prioritized most highly and intends to find funding for within the 22-year planning period.

In the past 7 to 8 years, the City has allocated transportation expenditures in the following manner.

Maintenance-related expenses account for about 55% of spending and include:

- Approximately 35% to traditional maintenance (personnel, materials, and services for general operations and maintenance).
- Approximately 20% to the Street Surface Maintenance Program.

Operations-related expenses account for about 40% of spending and include:

- Approximately 25% for indirect, overhead, and administrative support costs.
- Approximately 15% for street lighting.

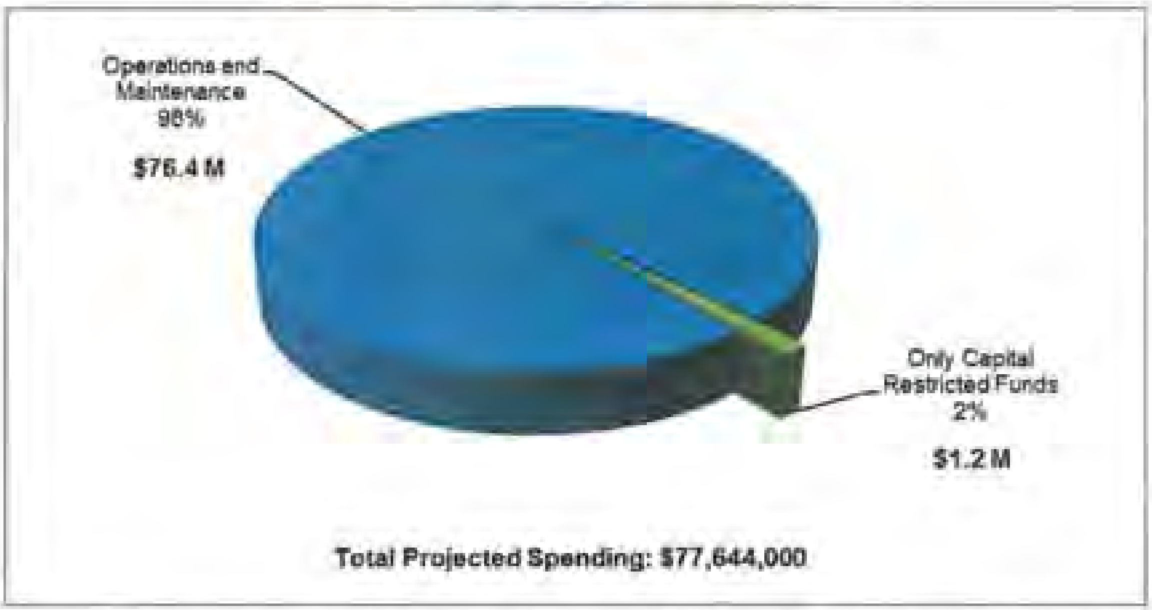
Approximately 5% of annual spending has been directed to capital projects to improve the transportation system.

Projected costs over the 22-year planning period are greater than projected revenues by $3.5 million, or about 4%. If the City chooses not to reduce operations and maintenance expenses, and if no additional revenue sources are identified, the only revenues available for capital projects will be the SDC and FILOC funds. Over the 22-year planning period, these revenues

[6] Costs include all projects on the Consolidated Action Plan (Table 13-3). An 11% local match share was used for estimation purposes, except for directly funded projects

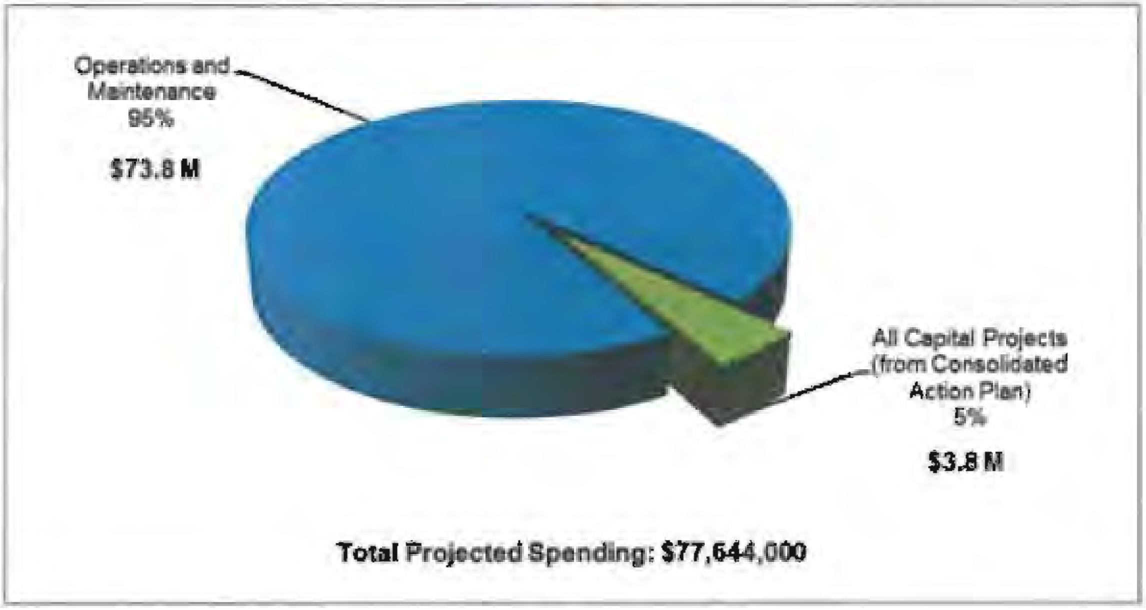
are projected to be about $1.2 million and will cover only 31% of the approximately $3.8 million needed to fund all projects on the Consolidated Action Plan. This scenario represents spending approximately 2% of transportation revenues on capital projects and is depicted in Figure 13-3.

Figure 13-3 Spending Scenario 1: Funding Limited to Capital-Restricted Revenue over the 22-Year Planning Period (in 2012 dollars)



Alternately, in order to implement all the capital projects listed in the Consolidated Action Plan (Table 13-3), the City will need to reduce operations and maintenance expenses by about 6%, assuming no additional revenue sources are identified. This scenario represents spending approximately 5% of transportation revenues on capital projects and is depicted in Figure 13-4.

Figure 13-4 Spending Scenario 2: Funding All Capital Projects on Consolidated Action Plan over the 22-Year Planning Period (in 2012 dollars)



Project Cost Estimates

Order-of-magnitude cost estimates were developed for all projects identified in the modal master plans using general unit costs for transportation improvements. However, these estimates do not reflect unique project elements that can significantly add to project costs. More detailed project cost estimates will be developed as projects move closer to implementation, including detailed right-of-way requirements and costs associated with special designs. Because multiple modal improvements may occur on the same facility, costs were developed at a project level incorporating all modes, as appropriate. It may be desirable to break project mode elements out separately. However, in most cases, there are greater cost efficiencies in undertaking multiple modal improvements at the same time.

The Consolidated Action Plan project list (Table 13-3) presents the projects from all of the mode-specific action plans in a single table. The Prioritized Master Plan project list in Table 13-4 (at the end of this chapter) lists all of the proposed TSP projects that have been generated through the TSP planning process, grouping them by priority (High, Medium, Low).

Table 13-3 Consolidated Action Plan

On Action Plan List from TSP Chapter(s)	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Pedestrian & Bicycle	17th Ave Improvements	Fill in sidewalk gaps on both sides of street, fill in gaps in existing bicycle network with bike lanes, and/or provide multiuse path. Improve intersection safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.	Ochoco St	McLoughlin Blvd	$1,000	Match
Pedestrian, Bicycle, Public Transit	Railroad Ave Capacity Improvements	Pedestrian aspect: Fill in sidewalk gaps on both sides of street or construct multiuse path on one side.	37th Ave	Harmony Rd	$1,800	Match
		Bicycle aspect: Fill in gaps in existing bicycle network with bike lanes, cycle track, multiuse path, or other facilities.	37th Ave	Linwood Ave	$4,800	Match
		Public transit aspect: Provide bus service to extend to Clackamas Town Center and points east.	Harrison St	Eastern city limits	TBD	Direct (TriMet)
Pedestrian & Bicycle	Monroe St Neighborhood Greenway	Pedestrian aspect: Fill in sidewalk gaps on both sides of street.	42nd Ave	City limits	$1,800	Match
		Bicycle aspect (downtown): Designate as a "neighborhood greenway" and install traffic-calming improvements.	21st Ave	Hwy 224	$85	Match
		Bicycle aspect (central): Designate as a "neighborhood greenway" and install traffic-calming improvements.	Hwy 224	42nd Ave	$80	Match
		Bicycle aspect (east): Designate as a "neighborhood greenway" and install traffic-calming improvements.	42nd Ave	Linwood Ave	$165	Match
Pedestrian & Bicycle	Kellogg Creek Dam Removal and Hwy 99E Underpass	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/ped undercrossing between downtown Milwaukie and Riverfront Park.	Location-specific	Location-specific	$9,900	Match
Pedestrian & Street	Intersection Improvements at McLoughlin Blvd and 22nd Ave	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200	Match

On Action Plan List from TSP Chapter(s)	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Pedestrian & Bicycle	Stanley Ave Neighborhood Greenway (north)	Pedestrian aspect: Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	King Rd	$1,900	Match
		Bicycle aspect: Designate as a "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	King Rd	$135	Match
Pedestrian & Bicycle	Stanley Ave Neighborhood Greenway (south)	Pedestrian aspect: Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,600	Match
		Bicycle aspect: Designate as a "neighborhood greenway" and install traffic-calming improvements.	King Rd	Railroad Ave	$195	Match
Pedestrian & Bicycle	Kronberg Park Trail	Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E	Kellogg Creek Bridge	River Rd at Hwy 99E	$300	Match
Pedestrian & Bicycle	Kellogg Creek Bike/Ped Bridge	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500	Match
Pedestrian & Street	Intersection Improvements at Hwy 224 Crossings	Pedestrian aspect: Improve pedestrian crossings at Freeman Way, 37th Ave, Oak St, Monroe St, and Harrison St	Location-specific	Location-specific	$100 ($20 each)	Match
		Street aspect: Add left-turn lanes and protected signal phasing on Oak St approaches.	Location-specific	Location-specific	$20	Match
Pedestrian	Study of Pedestrian Crossings on Hwy 224	Examine alternatives for improving pedestrian crossings at five intersections along Hwy 224 (Harrison St, Monroe St, Oak St, 37th Ave, Freeman Way)	Harrison St	Freeman Way	$50	Match
Pedestrian	Adams St Connector	Construct pedestrian- and bicycle-only facility on Adams St between 21st Ave and Main St	21st Ave	Main St	$450	Match
Pedestrian	Linwood Ave Sidewalks (south)	Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,150	Match
Bicycle	29th/Harvey/40th Neighborhood Greenway	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	Monroe St	$220	Match
Public Transit	Downtown Transit Center Improvements	Construct new bus layover facility outside of the downtown core.	Location-specific	Location-specific	$1,250	Match
Public Transit	Downtown Loop Bus	Establish bus service from downtown to Tacoma and Park Ave stations.	Downtown	Tacoma station, Park Ave station	TBD	Direct (TriMet)
Public Transit	Neighborhood Loop Bus	Establish bus service between eastern neighborhoods and downtown.	Eastern city limits	Downtown	TBD	Direct (TriMet)

On Action Plan List from TSP Chapter(s)	Project Name	Project Description	From	To	Project Cost ($1,000s)	Direct Funding or Grant Match
Parking	Downtown Parking Management	Implement a downtown parking management system, including a dedicated parking manager.	Downtown	Downtown	$40	Direct
Parking	Downtown Parking Signage	Install wayfinding and identification signage at McLoughlin Blvd intersections and around public parking lots.	Downtown	Downtown	$10	Direct
Nhbrhd Traffic Mgmnt.	Walk Safely Milwaukie Program	Complete a few small traffic-calming and pedestrian safety projects throughout the city each year.	Citywide	Citywide	$300 ($13 annually)[7]	Direct
Street & Freight	Hwy 224 & Hwy 99E Refinement Plan	Conduct refinement study to establish alternative mobility targets for Hwy 224 and McLoughlin Blvd for locations not meeting applicable state targets, and explore ways to minimize barrier effect and improve auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to River Rd	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	$270	Match
Bicycle	Bike Lane Maintenance	Sweep bike lanes to remove debris.	Citywide	Citywide	$1,200	Direct

POTENTIAL NEW FUNDING SOURCES

The master plan project lists in Chapters 5-9, 11, and 12 include a large number of unfunded, but nonetheless high-priority, projects and programs. Absent an increase in funding, the City will be unable to address operational deficiencies identified in Chapter 4. The City may wish to consider new revenue sources to ensure that funding is available for proposed capital projects and other transportation programs.

In addition, the City is contributing $5 million in match to the regional share of the Portland-Milwaukie Light Rail (PMLR) project. The vast majority of the City's transportation revenues are restricted in ways that do not allow the City to expend them on a light rail "match." SDC revenues, the only significant transportation revenue stream that could contribute to the project, are not projected to be adequate to cover the local match over the next 22 years.

The Milwaukie share of the PMLR project is not included on the Public Transit Action Plan list because it will require revenues above and beyond those included in the baseline revenue projection.

Many cities use some combination of the following funding sources to supplement their capital and/or maintenance budgets.

General Fund Revenues

At the discretion of the City Council, the City can contribute General Fund revenues to transportation projects and programs. General Fund revenues primarily include property taxes, use taxes, and other miscellaneous taxes and fees imposed by the City. Competing community

[7] Historically, the Neighborhood Pedestrian and Traffic Safety Program received $13,000 annually. In more recent years, the program name changed to Walk Safely Milwaukie and funding was raised to $100,000 annually. Future funding for the program will be evaluated on a biennial basis with the budget.

priorities set by the City Council limit the funding potential of this approach. General Fund resources can fund any aspect of the system, from capital improvements to operations, maintenance, and administration. Additional revenues available from this source are only available to the extent that either General Fund revenues are increased or City Council diverts funding from other City programs.

Expanded SDC Rate for Transportation

The City's transportation SDC rate is $1,676 per p.m.-peak-hour trip generated. A more typical transportation SDC in the Portland metro area is approximately $2,000 per single-family residence (or p.m.-peak-hour trip generated). A regional examination of combined SDC and development fee costs conducted by the City of Portland found that the City of Milwaukie charges less than the majority of other jurisdictions (17^{th} out of 21 overall) and has particularly low rates for residential uses.

Given that a large number of needs have been identified, a higher transportation SDC rate is warranted. The projects identified in this TSP will help the City maintain quality of life for its residents and businesses as the City experiences continued growth. It is appropriate to ensure that growth pays a fair and commensurate share of the costs of these new facilities.

In addition to reevaluating the SDC rate, the City may wish to consider tightening its policy on SDC credits. The City currently allows a credit against SDCs due for any privately funded transportation development that increases capacity. However, the City may wish to change this policy to allow SDC credits for only those privately funded projects that are identified in the City's adopted TSP, i.e., those improvements which have been identified as most important to the overall system. A modification of the City's municipal code would be required to implement this change.

Urban Renewal District

An Urban Renewal District (URD) is a mechanism by which the growth of tax revenues for a specific period of time is "captured" to pay for projects within the district. Typically, the sponsoring agency seeks bond financing of such projects and then repays those bonds with the "tax increment" generated in the area. The "tax increment" is the growth in tax revenue; the "frozen base," i.e., the property tax revenue already being generated, continues to flow to the appropriate taxing jurisdictions. All of the "tax increment" (the amount above the frozen base) goes towards retiring the urban renewal debt. This type of "tax increment" financing has been used in Oregon since 1960 to fund a wide variety of projects including transportation improvements. Recent public discussions about this funding mechanism have demonstrated some opposition to the concept; however, it remains in the TSP as an option to be revisited over the 22-year planning period.

Local Improvement District Assessment Revenue

The City may set up Local Improvement Districts (LIDs) to fund specific capital improvement projects within defined geographic areas, or zones of benefit. LIDs impose assessments on properties within its boundaries. LIDs cannot fund ongoing maintenance costs. They require separate accounting processes, and the assessments collected can only be spent on capital projects within the geographic area. Citizens representing 67% of the assessment can terminate an LID and overturn the planned projects, except in cases of emergency or sidewalk projects.

Direct Appropriations

The City can seek direct appropriations from the State Legislature and/or U.S. Congress for transportation capital improvements. In 2006, the City received this kind of funding for Lake Rd improvements and will likely continue to pursue these special, one-time appropriations for major City projects.

Special Assessments

Special assessments allow local jurisdictions, with the agreement of property owners, to put into place additional property taxes to pay for specific capital projects or ongoing costs. A variety of special assessments are available in Oregon to fund a range of improvements, including sidewalks, curbs, gutters, street lighting, parking structures, and downtown or commercial zone transportation improvements. For example, the local share of funding for TriMet's Westside light rail project was paid for by a special assessment with voter approval. These assessments are commonly counted as revenue towards the limitations established by Measure 50.

Debt Financing

While not a direct funding source, debt financing can be used to 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 can also be a more 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 be identified to fulfill annual repayment obligations.

Voter-Approved General Obligation Bonds

Subject to voter approval, the City can issue General Obligation (GO) bonds to debt finance capital improvement projects. GO bonds are backed by the "full faith and credit" of the jurisdiction and provide increased taxing authority with which the City can generate revenues to make principal and interest repayments. For critical projects, the electorate may be willing to accept increased taxation. Proceeds may not be used for ongoing maintenance.

Revenue Bonds

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

Oregon Transportation Infrastructure Bank Loans

The Oregon Transportation Infrastructure Bank Loan program is a statewide revolving loan fund designed to promote innovative transportation funding solutions. The Financial Services Branch of ODOT provides State support for the program. In general, eligible projects include highway, transit, bikeway, and pedestrian access projects. Projects are rated on established criteria and recommended based on the rankings. Repayment of loans must begin within 5 years of project completion and must be complete within 30 years or at the end of the useful life of the project.

TSP IMPLEMENTATION AND UPDATE STEPS

The primary function of the TSP is to provide guidance for long-range policy and investment decisions about needed improvements to the transportation system over the next 22 years. The Consolidated Action Plan in Table 13-3 provides a list of the highest-priority projects for the community. This list is utilized to build the "Transportation Priority Project—Unfunded" section of the City's Capital Improvement Plan (CIP). The CIP is a list of projects for the City's water, wastewater, stormwater, and transportation systems that are scheduled to be funded in the short term. As funding becomes available, projects are moved from the unfunded section of the CIP to the section recommended for funding. Projects in the CIP section recommended for funding are reviewed for funding every 2 years through the City's budgeting process. In essence, the CIP is the primary implementation mechanism for TSP projects.

This document requires a series of implementing and on-going update steps to retain its usefulness over the next 22 years. Such steps include refining and updating the affected design standards for streets and trails, implementing the suggested development code and Comprehensive Plan text changes, and periodically updating and reviewing traffic forecasts and project priorities. The State suggests that cities should update local TSPs every 5 years to keep current on the latest land development trends, capital project funding conditions, and priorities of the community. These activities would typically be funded through a combination of grants, engineering funds, and planning funds, and are not, therefore, included in the financial projections for the modal action plans.

Table 13-4 Prioritized Master Plan Project List

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[4]	Priority Ranking[5]	Is Project in Action Plan?	Project Type
HIGH PRIORITY PROJECTS								
17th Ave Improvements	Pedestrian & Bicycle	Fill in sidewalk gaps on both sides of street, fill in gaps in existing bicycle network with bike lanes, and/or provide multiuse path. Improve intersection safety at Milport Rd, McBrod Ave, Hwy 224, Lava Dr, and Hwy 99E.	Ochoco St	McLoughlin Blvd	$1,000	High	Yes	Capital
Railroad Ave Capacity Improvements	Pedestrian, Bicycle & Transit	Pedestrian aspect: Fill in sidewalk gaps on both sides of street or construct multiuse path on one side.	37th Ave	Harmony Rd	$1,600	High	Yes	Capital
		Bicycle aspect: Fill in gaps in existing bicycle network with bike lanes, cycle track, multiuse path, or other facilities.	37th Ave	Linwood Ave	$4,600	High	Yes	Capital
		Transit aspect: Provide bus service to extend to Clackamas Town Center and points east.	Harrison St	Eastern city limits	TBD	High	Yes	Service Enhancements
Monroe St Neighborhood Greenway (downtown)	Bicycle	Designate as a "neighborhood greenway" and install traffic-calming improvements.	21st Ave	Hwy 224	$85	High	Yes	Capital
Monroe St Neighborhood Greenway (central)	Bicycle	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Hwy 224	42nd Ave	$80	High	Yes	Capital
Monroe St Neighborhood Greenway (east)	Bicycle & Pedestrian	Bicycle aspect: Designate as a "neighborhood greenway" and install traffic-calming improvements.	42nd Ave	Linwood Ave	$165	High	Yes	Capital
		Pedestrian aspect: Fill in sidewalk gaps on both sides of street.	42nd Ave	City limits	$1,800	High	Yes	Capital
Stanley Ave Neighborhood Greenway (north)	Bicycle & Pedestrian	Bicycle aspect: Designate as a "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	King Rd	$135	High	Yes	Capital
		Pedestrian aspect: Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	King Rd	$1,900	High	Yes	Capital
Stanley Ave Neighborhood Greenway (south)	Bicycle & Pedestrian	Bicycle aspect: Designate as a "neighborhood greenway" and install traffic-calming improvements.	King Rd	Railroad Ave	$195	High	Yes	Capital
		Pedestrian aspect: Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,600	High	Yes	Capital
Downtown Transit Center Improvements	Transit	Construct new bus layover facility outside of the downtown core.	Location-specific	Location-specific	$1,250	High	Yes	Capital
Kellogg Creek Dam Removal and Hwy 99E Underpass	Pedestrian & Bicycle	Replace Hwy 99E bridge over Kellogg Creek, remove dam, restore habitat. Construct bike/ped undercrossing between downtown Milwaukie and Riverfront Park.	Location-Specific	Location-Specific	$5,900	High	Yes	Capital
29th/Harvey/40th Neighborhood Greenway	Bicycle	Designate as a "neighborhood greenway" and install traffic-calming improvements.	Springwater Trail	Monroe St	$220	High	Yes	Capital
Bike Lane Maintenance	Bicycle	Sweep bike lanes to remove debris.	Citywide	Citywide	$1,200	High	Yes	Operational

[4] Project costs are order-of-magnitude estimates and are in 2012 dollars. Future costs may be more due to inflation. In the case of operational projects, estimated costs are for the entire 22-year planning period.

[5] Projects are ranked as either high, medium, or low. They are in no particular order within their ranking.

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[a]	Priority Ranking[b]	Is Project in Action Plan?	Project Type
Study of Pedestrian Crossings on Hwy 224	Pedestrian	Examine alternatives for improving pedestrian crossings at five intersections along Hwy 224 (Harrison St, Monroe St, Oak St, 37th Ave, Freeman Way)	Harrison St	Freeman Way	$50	High	Yes	Policy
Intersection Improvements at Hwy 224 and Oak St	Street	Add left-turn lanes and protected signal phasing on Oak St approaches.	Location-specific	Location-specific	$20	High	Yes	Capital
Walk Safely Milwaukie Program	Nbrhd Traffic Manage-ment	Complete a few small traffic-calming and pedestrian safety projects throughout the city each year.	Citywide	Citywide	$300 ($13 annually)	High	Yes	Capital
Hwy 224 & Hwy 99E Refinement Plan	Street & Freight	Conduct refinement study to establish alternative mobility targets for Hwy 224 and McLoughlin Blvd for locations not meeting applicable state targets, and explore ways to minimize barrier effect and improve auto and freight mobility.	Hwy 99E Project Limits: Tacoma St to River Rd	Hwy 224 Project Limits: Hwy 99E to Lake Rd Interchange	$270	High	Yes	Capital
Harrison St Railroad Crossing Separation	Freight	Upgrade Harrison crossing of Union Pacific Railroad tracks to grade-separated facility. Assess as part of Hwy 224 & Hwy 99E Refinement Plan.	Location-specific	Location-specific	$30,700	High	No	Capital
Intersection Improvements at Hwy 224 and 37th Ave	Street & Freight	Consolidate the two northern legs of 37th Ave and International Way into one leg at Hwy 224.	Location-specific	Location-specific	$2,100	High	No	Capital
Linwood Ave Capacity Improvements (north)	Street	Widen to standard three lane cross section. Widen bridge over Johnson Creek.	Johnson Creek Blvd	King Rd	$9,300	High	No	Capital
Linwood Ave Capacity Improvements (south)	Street	Widen to standard three lane cross section.	King Rd	Harmony Rd	$12,500	High	No	Capital
Hwy 224 Crossing Improvements at Oak and Washington Sts	Bicycle	Improve intersection crossing safety for bicyclists at Washington St and Oak St.	Location-specific	Location-specific	$10	High	No	Capital
Downtown Parking Management	Parking	Implement a downtown parking management system, including a dedicated parking manager.	Downtown	Downtown	$40	High	Yes	Operational
Kellogg Creek Bike/Ped Bridge	Pedestrian & Bicycle	Construct bike/ped overpass over Kellogg Creek in conjunction with light rail bridge.	Lake Rd	Kronberg Park	$2,500	High	Yes	Capital
Kronberg Park Trail	Pedestrian & Bicycle	Construct multiuse path to connect bike/ped bridge to safe crossing of Hwy 99E.	Kellogg Creek Bridge	River Rd	$300	High	Yes	Capital
Adams St Connector	Pedestrian	Construct pedestrian- and bicycle-only facility on Adams St between 21st Ave and Main St.	21st Ave	Main St	$450	High	Yes	Capital
43rd Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Howe St/ 42nd Ave	King Rd/ 43rd Ave	$600	High	No	Capital
Harmony Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Linwood Ave	City limits	$40	High	No	Capital
International Way Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Criterion Ct	Lake Rd	$840	High	No	Capital
River Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	McLoughlin Blvd	City limits	$690	High	No	Capital
Intersection Curb Ramp Improvements	Pedestrian	Install curb ramps at all intersections with sidewalks (approximately 700 intersections).	Citywide	Citywide	$3,500	High	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[1]	Priority Ranking[1]	Is Project in Action Plan?	Project Type
Intersection Improvements at Hwy 224 and 37th Ave	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	High	Yes	Capital
Intersection Improvements at Hwy 224 and Freeman Way	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	High	Yes	Capital
Intersection Improvements at Hwy 224 and Harrison St	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	High	Yes	Capital
Intersection Improvements at Hwy 224 and Monroe St	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	High	Yes	Capital
Intersection Improvements at Hwy 224 and Oak St	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	High	Yes	Capital
Linwood Ave Sidewalks (south)	Pedestrian	Fill in sidewalk gaps on both sides of street.	King Rd	Railroad Ave	$2,150	High	Yes	Capital
Bicycle-friendly Street Grates	Bicycle	Install bicycle-friendly street grates.	Citywide	Citywide	$80	High	No	Operational
Intersection Improvements at Linwood Ave and Monroe St	Bicycle	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10	High	No	Capital
Lake Rd Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Main St	Guilford Dr	$3,400	High	No	Capital
Stanley Ave Connectivity at King Rd	Street	Enhance connection along Stanley Ave at King Rd.	Location-specific	Location-specific	$60	High	No	Capital
Stanley Ave Connectivity at Monroe St	Street	Enhance connection along Stanley Ave at Monroe St.	Location-specific	Location-specific	$60	High	No	Capital
Intersection Improvements at McLoughlin Blvd and 22nd Ave	Pedestrian, Bicycle, & Street	Improve safety of Trolley Trail crossing at 22nd Ave.	Location-specific	Location-specific	$200	High	Yes	Capital
Improved Connection to Springwater Trail at 29th Ave and Sherrett St	Pedestrian & Bicycle	Pave the connection to Springwater Trail at 29th Ave and Sherrett St. (TSAP)	Location-specific	Location-specific	$20	High	No	Capital
Downtown Loop Bus	Transit	Establish bus service from downtown to Tacoma and Park Ave stations.	Downtown	Tacoma station, Park Ave station	TBD	High	Yes	Service Enhancement
Neighborhood Loop Bus	Transit	Establish bus service between eastern neighborhoods and downtown.	Eastern city limits	Downtown	TBD	High	Yes	Service Enhancement
Milwaukie Transportation Management Association Program	Transit	Implement a transportation management association for downtown employers.	Milwaukie Town Center	Milwaukie Town Center	$250	High	No	Operational
Improved Connection from Springwater Trail to Pendleton Site (Ramps)	Pedestrian & Bicycle	Construct ramps to improve existing connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$630	High	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[b]	Priority Ranking[a]	Is Project in Action Plan?	Project Type
Improved Connection from Springwater Trail to Pendleton Site (Widened Undercrossing)	Pedestrian & Bicycle	Widen existing undercrossing to improve connection of Springwater Trail to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$100	High	No	Capital
Improved Connection from Springwater Trail to Tacoma Station	Pedestrian	Construct stairs to connect Springwater Trail to Tacoma station. (TSAP)	Location-specific	Location-specific	$80	High	No	Capital
Signage and Intersection Improvements at McLoughlin Blvd and Ochoco St	Freight	Establish signage for trucks and improve intersection. (TSAP)	Location-specific	Location-specific	$1,500	High	No	Capital
Downtown Parking Signage	Parking	Install wayfinding and identification signage at McLoughlin Blvd intersections and around public parking lots.	Downtown	Downtown	$10	High	Yes	Capital
Public Parking Structure	Parking	Construct 3- to 4-story public parking structure with retail at ground floor for visitor/employee parking.	Location-specific	Location-specific	$11,000	High	No	Capital
MEDIUM PRIORITY PROJECTS								
Lake Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Where Else Ln	Hwy 224	$2,200	Medium	No	Capital
19th Ave and Sparrow St Neighborhood Greenway	Bicycle	Designate as a "neighborhood greenway" and install traffic-calming improvements. This would connect the south end of Kellogg Creek Trail to River Rd.	Eagle St	River Rd	$800	Medium	No	Capital
Intersection Improvements at Main St and Mailwell Dr	Freight	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	$60	Medium	No	Capital
McLoughlin Blvd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Washington St	Southern city limits	$650	Medium	No	Capital
Pedestrian Walkway Amenities	Pedestrian	Install amenities, such as benches, along key walking routes.	Citywide	Citywide	$80	Medium	No	Capital
Intersection Improvements at McLoughlin Blvd and 17th Ave	Street	Prohibit left-turn movement from 17th Ave to northbound McLoughlin Blvd and include in Hwy 224 & Hwy 99E Refinement Plan.	Location-specific	Location-specific	$20	Medium	No	Capital
Intersection Improvements at McLoughlin Blvd and River Rd	Street	Consolidate a single access point for the area at Bluebird St with full intersection treatment and signalization or add second northbound left-turn lane at River Rd.	Location-specific	Location-specific	$980	Medium	No	Capital
Harrison St and King Rd Connection	Street	Enhance connection between King Rd and Harrison St at 42nd Ave.	Location-specific	Location-specific	$60	Medium	No	Capital
37th Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Lake Rd	Harrison St	$870	Medium	No	Capital
Intersection Improvements at 42nd Ave and King Rd	Pedestrian	Enhance intersection function.	Location-specific	Location-specific	$20	Medium	No	Capital
Downtown Public Parking Lot Improvements	Parking	Upgrade and maintain off-street public parking facilities with improved landscaping and lighting.	Downtown	Downtown	$60	Medium	No	Capital
Community Bicycle Rides	Bicycle	Support community bike rides to encourage bike use.	Citywide	Citywide	$5	Medium	No	Operational

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[a]	Priority Ranking[b]	Is Project in Action Plan?	Project Type
Intersection Improvements at Harrison St and Hwy 224	Street	Add left-turn lanes and protected signal phasing on Harrison St approaches.	Location-specific	Location-specific	$20	Medium	No	Capital
Cyclist Education	Bicycle	Promote bicycling through bike use and route selection education.	Citywide	Citywide	$10	Medium	No	Operational
Harrison St Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes (cost included with Harrison St road widening project).	Hwy 99E	21st Ave	$300	Medium	No	Capital
Intersection Improvements at Linwood Ave and King Rd	Street	Implement protected/permissive left-turn phasing for northbound and southbound approaches.	Location-specific	Location-specific	$20	Medium	No	Capital
Brookside Dr Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	Regents Dr	$20	Medium	No	Capital
Harrison St Capacity Improvements	Street	Widen to standard three lane cross section.	32nd Ave	42nd Ave	$2,800	Medium	No	Capital
Intersection Improvements at Johnson Creek Blvd and Linwood Ave	Street	Add eastbound right-turn lane and westbound right-turn lane.	Location-specific	Location-specific	$880	Medium	No	Capital
Logus Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	43rd Ave	49th Ave	$850	Medium	No	Capital
Springwater Trail Completion	Pedestrian & Bicycle	Contribute to regional project to complete Springwater Trail ("Sellwood Gap") along Ochoco St.	17th Ave	19th Ave	$90	Medium	No	Capital
Downtown Streetscape Improvements	Parking & Pedestrian	Install sidewalk bulbouts, lighting, and pedestrian amenities.	Downtown	Downtown	$7,300	Medium	No	Capital
King Rd Boulevard Treatments	Pedestrian	Install street boulevard treatments: widen sidewalks and improve crossings.	43rd Ave	Linwood	$550	Medium	No	Capital
Bicycle and Pedestrian Overpass over Railroad Ave	Pedestrian & Bicycle	Establish a dedicated bicycle and pedestrian connection across Railroad Ave and the railroad tracks.	Railroad Ave	International Way	$2,200	Medium	No	Capital
Oatfield Rd Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Guilford Ct	Lake Rd	$380	Medium	No	Capital
International Way Bicycle Facilities	Bicycle	Construct bike lanes or other bike facilities.	37th Ave	Lake Rd	$400	Medium	No	Capital
Traffic-Calming Improvements on River Rd at Lark St	Nbrhd Traffic Management	Install traffic-calming measures such as a permanent speed-warning sign and/or roundabout.	Location-specific	Location-specific	$310	Medium	No	Capital
Bicycle/ Pedestrian Improvements to Main St	Pedestrian & Bicycle	Construct multiuse path or other improved bike/ped facilities on Main St to provide safer connection between downtown and Tacoma station. (TSAP)	Hanna Harvester Dr	Tacoma station	$2,900	Medium	No	Capital
Bicycle/ Pedestrian Connection from Eastern Neighborhoods to Tacoma Station Area	Pedestrian & Bicycle	Establish bike/ped connection over existing railroad tracks and light rail to Tacoma station area. (TSAP)	Olsen St & Kelvin St	Mailwell Dr	$4,000	Medium	No	Capital
Improved Connection from Springwater Trail to McLoughlin Blvd	Pedestrian & Bicycle	Construct stairs or other facility to connect Springwater Trail to west side of McLoughlin Blvd. (TSAP)	Location-specific	Location-specific	$500	Medium	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[a]	Priority Ranking[1]	Is Project in Action Plan?	Project Type
Bicycle/ Pedestrian Connection over Johnson Creek	Pedestrian & Bicycle	Construct bike/ped bridge over Johnson Creek along Clatsop St at 23rd Ave to connect Tacoma station area with adjacent neighborhood. (TSAP)	Location-specific	Location-specific	$400	Medium	No	Capital
Improved Bicycle/ Pedestrian Connections on West Side of Tacoma Station Area	Pedestrian & Bicycle	Improve bike/ped connections to adjacent neighborhood to west of Tacoma station area at Ochoco St and Milport Rd. (TSAP)	Location-specific	Location-specific	$500	Medium	No	Capital
LOW PRIORITY PROJECTS								
Railroad Ave Capacity Improvements	Street	Widen Railroad Ave to standard three lane cross section.	37th Ave	Linwood Ave	$14,200	Low	No	Capital
Ochoco St Sidewalks	Pedestrian	Construct sidewalks on Ochoco St to connect bus stops to Goodwill.	19th Ave	McLoughlin Blvd	$1,300	Low	No	Capital
Springwater Trail Intersection Improvements at 45th Ave	Bicycle	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10	Low	No	Capital
Johnson Creek Blvd and 42nd Ave Signalization	Street	Replace 3-way stop with signal when warranted.	Location-specific	Location-specific	$270	Low	No	Capital
19th Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Kellogg Creek Trail	Sparrow St	$330	Low	No	Capital
22nd Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	McLoughlin Blvd	Sparrow St	$360	Low	No	Capital
Edison St Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	35th Ave	37th Ave	$130	Low	No	Capital
Harvey St Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	32nd Ave	42nd Ave	$590	Low	No	Capital
Home Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Railroad Ave	King Rd	$830	Low	No	Capital
Johnson Creek Blvd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Harvey St	City limits	$410	Low	No	Capital
Linwood Ave Sidewalks (north)	Pedestrian	Fill in sidewalk gaps on both sides of street.	Johnson Creek Blvd	King Rd	$1,050	Low	No	Capital
Mason Lane Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	42nd Ave	Regents Dr	$740	Low	No	Capital
Oatfield Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Guilford Ct	City limits	$150	Low	No	Capital
Regents Dr Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Brookside Dr	Winsor Dr	$540	Low	No	Capital
Roswell St Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	32nd Ave	36th Ave	$210	Low	No	Capital
Rusk Rd Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Lake Rd	North Clackamas Park	$730	Low	No	Capital
Olsen St Sidewalks	Pedestrian	Fill in sidewalk gaps on north side of street.	32nd Ave	42nd Ave	$470	Low	No	Capital
49th Ave Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Logus Rd	King Rd	$270	Low	No	Capital
Hwy 224 Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	Oak St	37th Ave	$450	Low	No	Capital
Intersection Improvements at Olsen St and 42nd Ave	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	Low	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[1]	Priority Ranking[2]	Is Project in Action Plan?	Project Type
Intersection Improvements at Railroad and 37th Aves	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$10	Low	No	Capital
Intersection Improvements at Stanley Ave and Logus Rd	Pedestrian	Improve pedestrian crossing.	Location-specific	Location-specific	$20	Low	No	Capital
Pedestrian Connection to North Clackamas Park	Pedestrian	Create pedestrian connection between the school and the park.	Rowe Middle School	North Clackamas Park	$1,400	Low	No	Capital
Intersection Improvements at Hwy 224 and 17th Ave	Freight	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	$50	Low	No	Capital
Intersection Improvements at Mailwell and Omark Drs	Freight	Upgrade intersection turning radii to better accommodate freight movements.	Location-specific	Location-specific	$60	Low	No	Capital
Milwaukie Bike Map	Bicycle	Produce a Milwaukie Bike Map.	Citywide	Citywide	$60	Low	No	Operational
Springwater Trail Signage	Bicycle	Install wayfinding signage for Springwater Trail.	Citywide	Citywide	$20	Low	No	Capital
Intersection Improvements at Johnson Creek Blvd and Linwood Ave	Bicycle	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10	Low	No	Capital
Intersection Improvements at Linwood Ave and King Rd	Bicycle	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10	Low	No	Capital
Intersection Improvements at International Way and Lake Rd	Bicycle	Improve safety of crossing at intersection.	Location-specific	Location-specific	$10	Low	No	Capital
Harrison St Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Hwy 224	42nd Ave	$10	Low	No	Capital
37th Ave Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Harrison St	Hwy 224	$3,200	Low	No	Capital
43rd Ave Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	King Rd	Filbert St	$1,100	Low	No	Capital
Linwood Ave Bike Lanes (north)	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Queen Rd	Johnson Creek Blvd	$1,500	Low	No	Capital
Linwood Ave Bike Lanes (south)	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Juniper St	Harmony Rd	$320	Low	No	Capital
Rusk Rd Bike Lanes	Bicycle	Fill in gaps in existing bicycle network with bike lanes.	Lake Rd	North Clackamas Park	$1,000	Low	No	Capital
Police Enforcement on Drivers	Bicycle	Enforce laws related to bike lanes and bicycle safety.	Citywide	Citywide	$10	Low	No	Operational
Bike Lane Striping	Bicycle & Transit	Restripe existing bike lanes and stripe bike lanes on streets where buses and bicyclists share the road.	Citywide	Citywide	$20	Low	No	Operational
Kellogg Creek Trail Improvements	Bicycle	Resurface trail and provide wayfinding signage to/from trail.	Milwaukie Riverfront	Treatment Plant	$680	Low	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[2]	Priority Ranking[1]	Is Project in Action Plan?	Project Type
Hwy 224 Access Modifications at Freeman Way	Street	Modify access at Freeman Way to improve intersection functioning.	Location-specific	Location-specific	$1,400	Low	No	Capital
Washington St Sidewalks	Pedestrian	Fill in sidewalk gaps on both sides of street.	32nd Ave	35th Ave	$130	Low	No	Capital
Franklin St Sidewalks	Pedestrian	Install sidewalks on both sides of street to connect to Campbell Elementary School.	42nd Ave	45th Ave	$220	Low	No	Capital
Intersection Improvements at 42nd Ave and Harrison St	Street	Signalize intersection to facilitate dominant traffic flow.	Location-specific	Location-specific	$280	Low	No	Capital
Pedestrian Walkway Signage	Pedestrian	Provide maps and wayfinding signage on streets that identify ways to get around the city.	Citywide	Citywide	$10	Low	No	Operational
Lake Rd Capacity Improvements	Street	Widen to standard three lane cross section.	21st Ave	Oatfield Rd	$8,100	Low	No	Capital
Intersection Improvements at all Crossings of McLoughlin Blvd	Pedestrian	Improve all existing crossings of McLoughlin Blvd (e.g., extended time for crossing, signage). (ODOT to do.)	Location-specific	Location-specific	—	Low	No	Capital
Bike/Ped Path on Sparrow St	Pedestrian & Bicycle	Establish a dedicated bicycle and pedestrian connection on Sparrow St, connecting River Rd to Trolley Trail	River Rd	Trolley Trail	$350	Low	No	Capital
Bike/Ped Overpass over McLoughlin Blvd at River Rd	Pedestrian & Bicycle	Establish a dedicated bicycle and pedestrian connection across McLoughlin Blvd.	Kronberg Park	River Rd	$2,500	Low	No	Capital
Intersection Improvements at 42nd Ave and King Rd	Street	Realignment of intersection to improve traffic movements between 42nd Ave and King Rd east of 42nd Ave.	Location-specific	Location-specific	$200	Low	No	Capital
Traffic-Calming on lower King Rd	Nbrhd Traffic Manage-ment	Install traffic-calming measures on King Rd.	36th Ave	42nd Ave	$300	Low	No	Capital
Improved Connection from Springwater Trail to Pendleton Site (Tunnel)	Pedestrian & Bicycle	Construct tunnel under Springwater Trail to improve connection to Pendleton site at Clatsop St. (TSAP)	Location-specific	Location-specific	$1,200	Low	No	Capital
Crossing Improvements for McLoughlin Blvd at Ochoco St and Milport Rd	Pedestrian & Bicycle	Construct improvements at Ochoco St and Milport Rd to improve bike/ped crossing of McLoughlin Blvd (per ODOT, this will require full intersection improvements). (TSAP)	Location-specific	Location-specific	$8,320	Low	No	Capital
Local Street Connections in Tacoma Station Area	Street	Connect local streets within Tacoma station area: 24th Ave between Ochoco St/Moores St & Clatsop St; Omark St between Mailwell Dr & Beta St (w/ midblock connection from Main St); and Mailwell Dr to Harrison St via 26th Ave. (TSAP)	Location-specific	Location-specific	$8,120	Low	No	Capital
Local Street Improvements in Tacoma Station Area	Street	Construct street improvements on Stubb St, Beta St, Ochoco St, Hanna Harvester Dr, and Mailwell Dr. (TSAP)	Location-specific	Location-specific	$5,280	Low	No	Capital

Project Name	TSP Chapter	Project Description	From	To	Estimated Cost ($1,000s)[2]	Priority Ranking[3]	Is Project in Action Plan?	Project Type
Bicycle/ Pedestrian Connection between McLoughlin Blvd and Stubb St	Pedestrian & Bicycle	Establish bike/ped connection to McLoughlin Blvd sidewalk at west end of Stubb St. (TSAP)	Location-specific	Location-specific	$20	Low	No	Capital
REGIONAL PROJECTS WITHIN OR THROUGH THE CITY OF MILWAUKIE[11]								
Oregon City Light Rail Extension or High Capacity Transit Improvements	—	Construct light rail or high capacity transit improvements between Milwaukie and Oregon City.	Milwaukie Town Center	Oregon City	$577,500	—	No	Capital
North Clackamas Greenway Corridor Study	—	Study feasibility of corridor for multiuse path construction (possibly along Kellogg Creek).	Milwaukie	Clackamas Regional Center	—	—	No	Capital
Linwood/Harmony /Lake Rd Intersection Improvements	Freight & Street	Add northbound right-turn lane and eastbound right-turn lane. AND/OR Grade separate Harmony Rd from Union Pacific Railroad and align as a through east-west movement.	Location-specific	Location-specific	$30,700	—	No	Capital
McLoughlin Blvd Improvements	—	Complete boulevard design improvements.	Scott St	Harrison St	$3,300	—	No	Capital
Tillamook Branch Trestle Trail Study	—	Study feasibility of east-west multiuse trail construction.	Milwaukie Town Center	Lake Oswego Town Center	—	—	No	Capital
Railroad Junction Improvements	—	Implement track and signal improvements to allow for increased track speeds between UP Willsburg Junction and UP Albina Yards.	Milwaukie	UP Railroad Albina Yards	$6,600	—	No	Capital
Railroad Track Extension	—	Extend two tracks from Willsburg Junction to Clackamas.	Milwaukie	I-205	$19,000	—	No	Capital
Tualatin-Portland Commuter Rail Extension Study	—	Study feasibility of adding peak-hour-only service on existing tracks.	Tualatin	Union Station via Lake Oswebo & Milwaukie	TBD	—	No	Operational
Pedestrian Overcrossing of McLoughlin Blvd at Umatilla St	—	Construct bike/ped overcrossing of McLoughlin Blvd at Umatilla St. (TSAP)	Location Specific	Location Specific	$2,200	—	No	Capital
Portland Bike-Share Station and Car Share Spaces at Tacoma Station	—	Establish a Portland Bike-Share station and car-share spaces at Tacoma station. (TSAP)	Location Specific	Location Specific	$70	—	No	Capital

Key:
NDA = Neighborhood District Association
NTMP = Neighborhood Traffic Management Program
CIP = Capital Improvement Program
STSP = Safe Trips to School Program
RTP = Regional Transportation Plan
TSAP = Tacoma Station Area Plan

[11] 2004 Regional Transportation Plan (RTP) projects in the Milwaukie area that may or may not be shown on mode-specific master plans or project lists.

14 Transportation Planning Rule Implementation

The purpose of this chapter is to provide an overview of recommended changes to the Milwaukie Municipal Code with the objective of complying with Oregon's Transportation Planning Rule (TPR) and Metro's Regional Transportation Plan (RTP).

OREGON TRANSPORTATION PLANNING RULE OVERVIEW

The Oregon Transportation Planning Rule ("TPR", or Oregon Administrative Rule Chapter 660, Division 12) requires local governments to implement a transportation system plan that is supported by local land use regulations. The rule sets requirements to protect transportation facilities and enhance pedestrian and bicycle travel.

TPR requirements are fairly broad and allow local governments flexibility in how they comply with the rule. For example, OAR 660-012-0045(2)(b) requires local governments to "protect transportation facilities . . . for their identified functions." The TPR does not define a standard to protect a facility or restrict local governments from self-identifying the function of their facilities.

TPR rules for ODOT-regulated facilities, such as Oregon State Highways 99E and 224, are more restrictive and are regulated by the State in coordination with the City. State, regional, and County facilities within the city are regulated by the respective owner of the facility but are also subject to City regulations.

The Milwaukie Municipal Code has been periodically updated to comply with the TPR, with the most recent updates occurring in 1994, 2002, and 2007. No comprehensive plan or Zoning Ordinance amendments are recommended as part of the 2013 TSP update.

Appendix A

Neighborhood Information

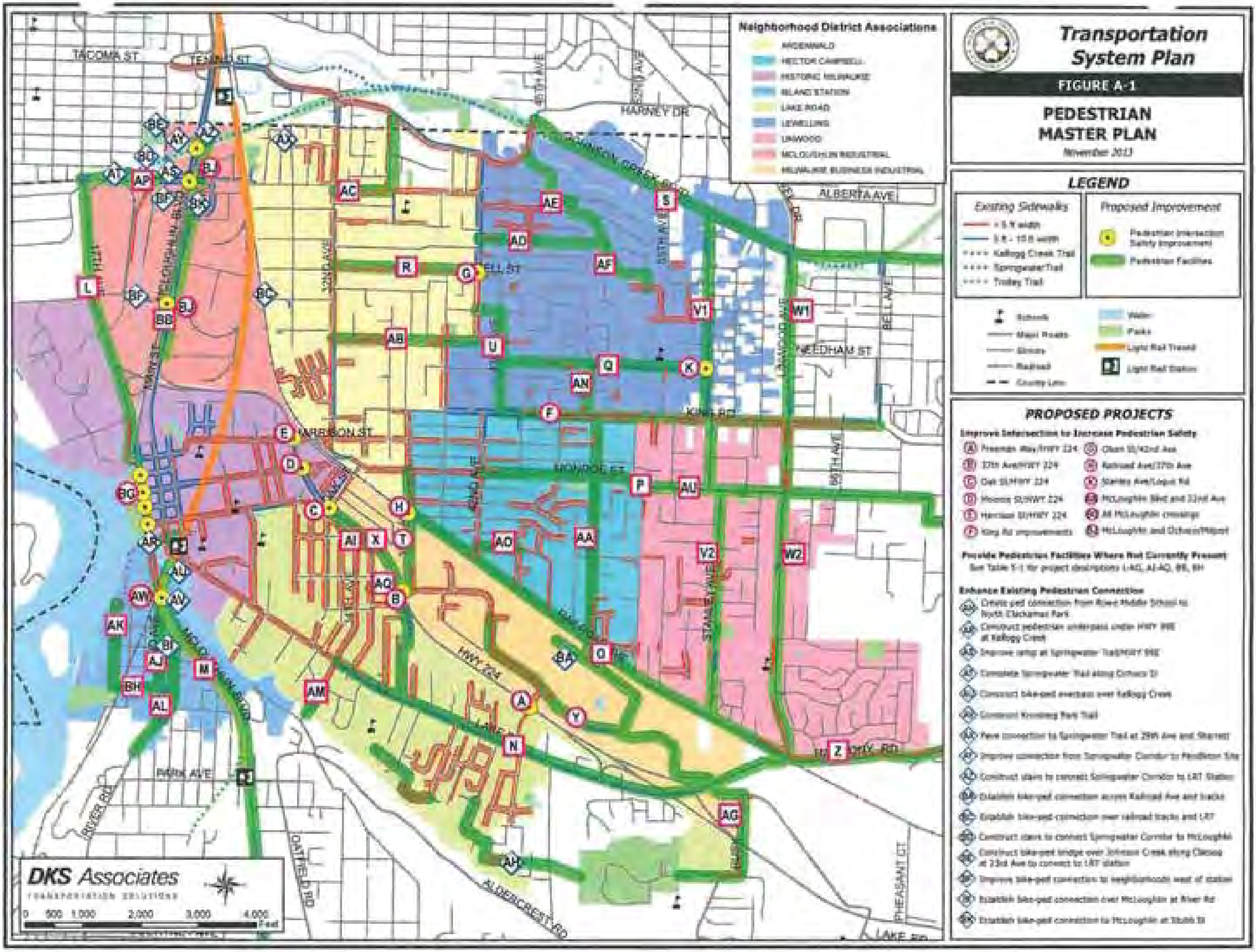
PURPOSE

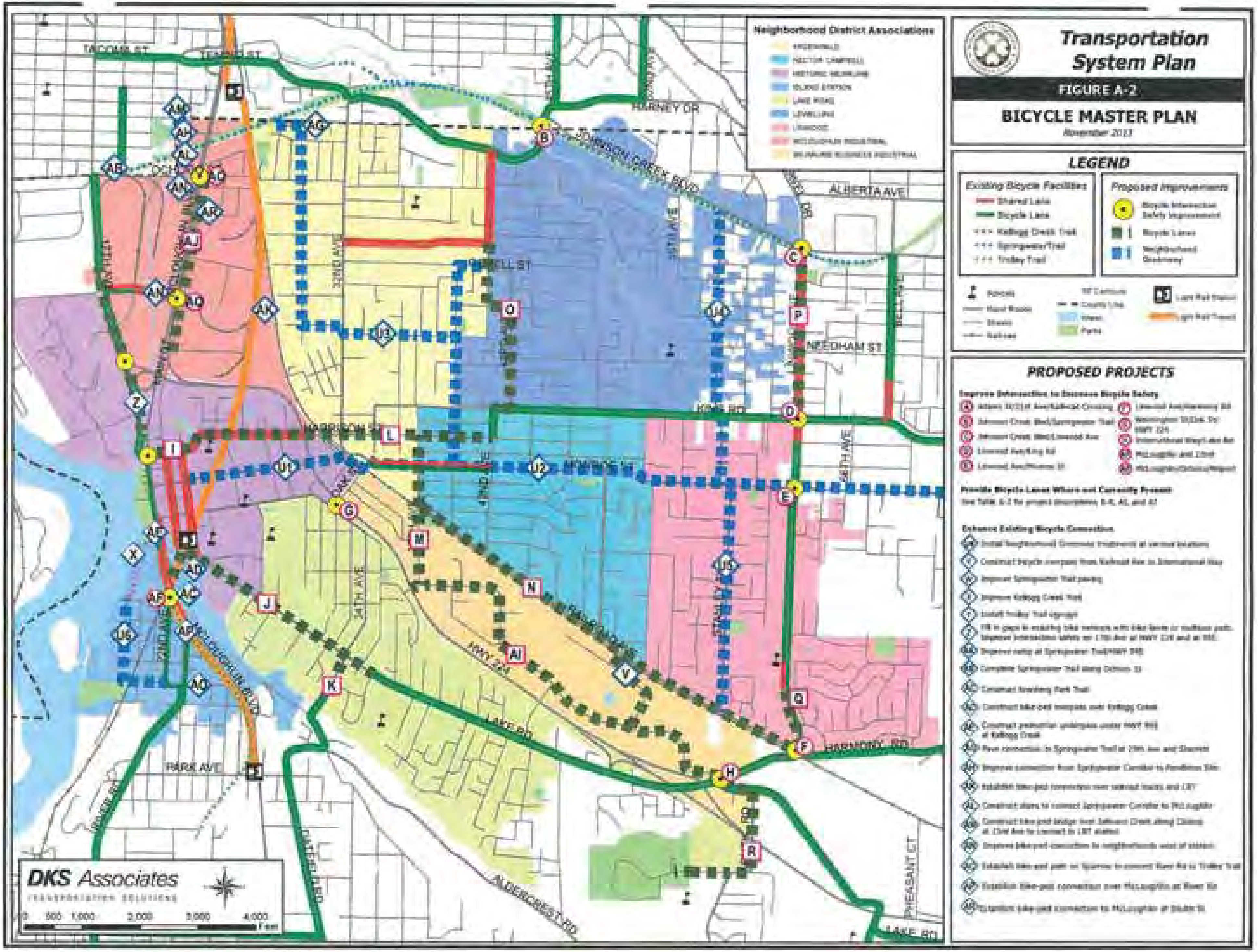
Per public request for transportation information tailored to each Neighborhood District Association (NDA), all of the master plan figures were modified to include NDA boundaries in addition to the transportation conditions and proposed improvements.

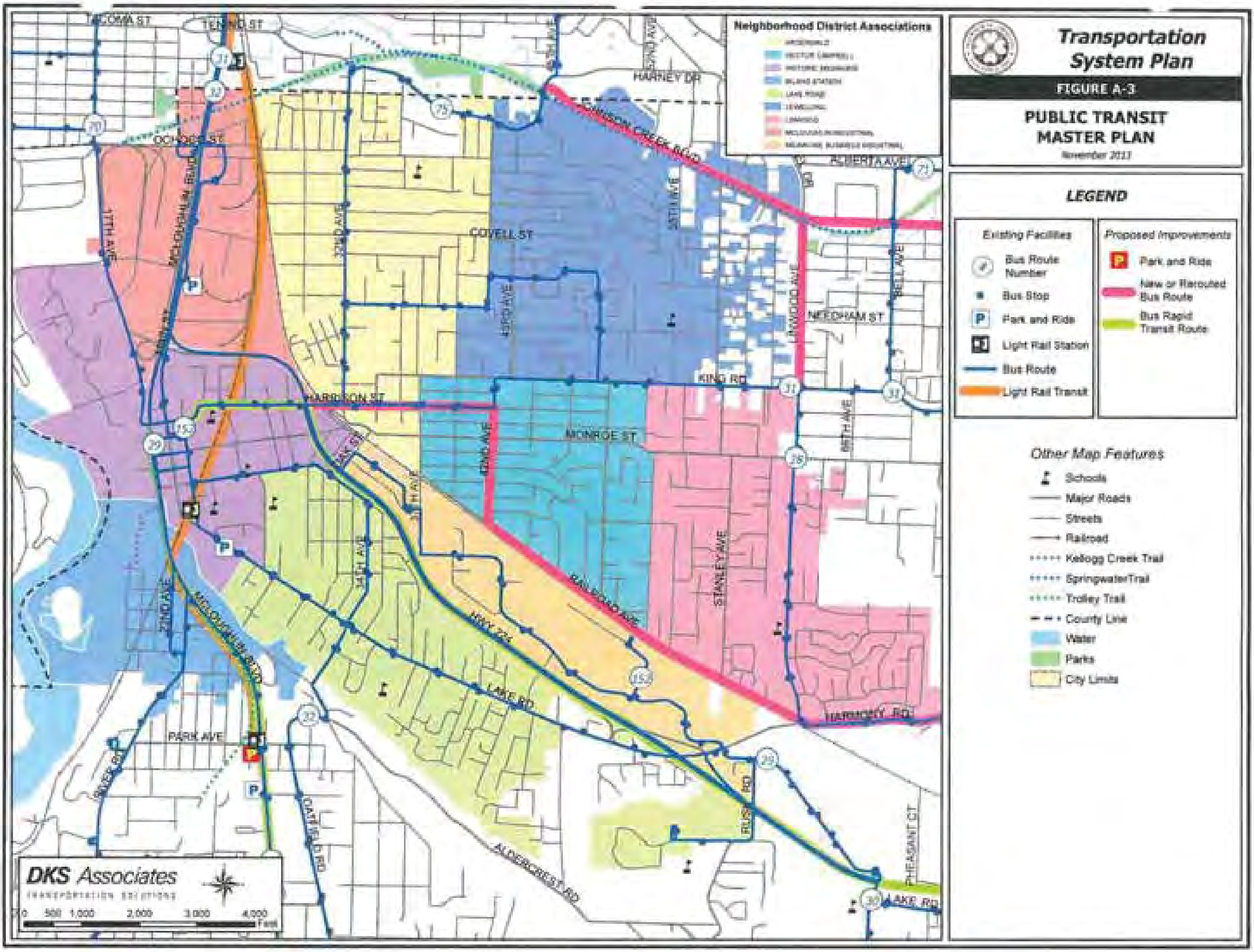
The following maps are included in this appendix:

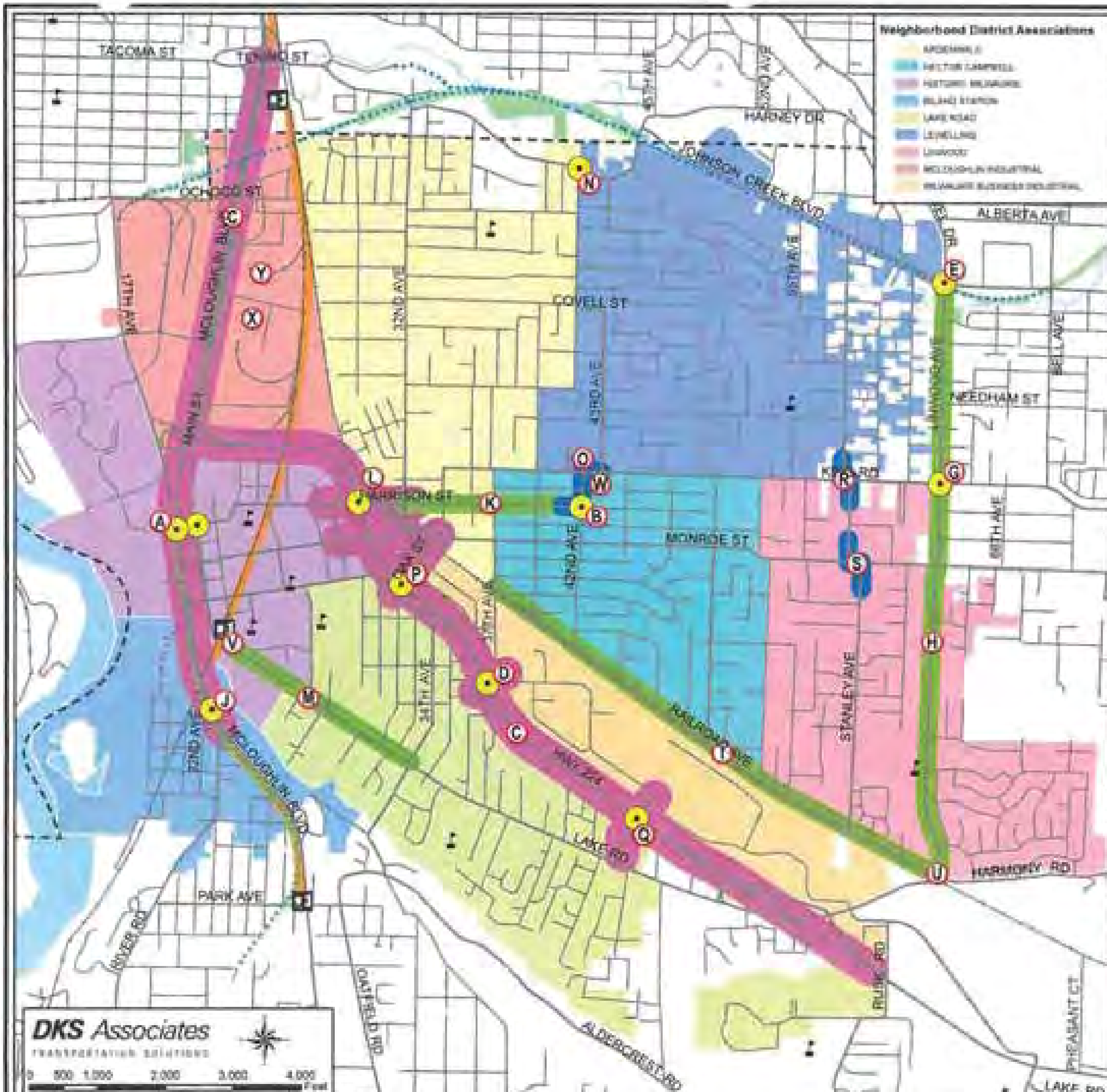
- Figure A-1: Pedestrian Master Plan with Neighborhood Boundaries
- Figure A-2: Bicycle Master Plan with Neighborhood Boundaries
- Figure A-3: Public Transit Master Plan with Neighborhood Boundaries
- Figure A-4: Street Network Master Plan with Neighborhood Boundaries
- Figure A-5: Freight Master Plan with Neighborhood Boundaries

These specific figures were selected because they depict both existing facilities and proposed improvements for each element, so they provide a comprehensive picture of the transportation environment of each neighborhood. These maps can be used to identify projects that impact a specific neighborhood and facilitate discussion about neighborhood transportation priorities.


Transportation System Plan
FIGURE A-1
PEDESTRIAN MASTER PLAN
November 2013
LEGEND
Existing Sidewalks
Proposed Improvement
Pedestrian Facilities
PROPOSED PROJECTS
Neighborhood District Associations
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet
HWY 224
KING RD
MONROE ST
HARRISON ST
HARVEY DR
ALBERTA AVE
NEEDHAM ST
BELL AVE
PARK AVE
OATFIELD RD
ALDERCREST RD
PHEASANT CT
TACOMA ST


Transportation System Plan
FIGURE A-2
BICYCLE MASTER PLAN
November 2013
LEGEND
Existing Bicycle Facilities
Shared Lane
Bicycle Lane
Kellogg Creek Trail
Springwater Trail
Trolley Trail
Proposed Improvements
Bicycle Intersection Safety Improvement
Bicycle Lanes
Neighborhood Greenway
Light Rail Station
Light Rail Transit
Neighborhood District Associations
PROPOSED PROJECTS
Improve Intersection to Increase Bicycle Safety
Provide Bicycle Lanes Where not Currently Present
Enhance Existing Bicycle Connection
TACOMA ST
HARNEY DR
JOHNSON CREEK BLVD
ALBERTA AVE
NEEDHAM ST
KING RD
MONROE ST
HARRISON ST
32ND AVE
42ND AVE
LAKE RD
HWY 224
HARMONY RD
PARK AVE
ALDERCREST RD
PHEASANT CT
DKS Associates
TRANSPORTATION SOLUTIONS


Transportation System Plan
FIGURE A-3
PUBLIC TRANSIT MASTER PLAN
November 2013
LEGEND
Existing Facilities
Bus Route Number
Bus Stop
Park and Ride
Light Rail Station
Bus Route
Light Rail Transit
Proposed Improvements
Park and Ride
New or Rerouted Bus Route
Bus Rapid Transit Route
Other Map Features
Schools
Major Roads
Streets
Railroad
Kellogg Creek Trail
SpringwaterTrail
Trolley Trail
County Line
Water
Parks
City Limits
Neighborhood District Associations
DKS Associates
TRANSPORTATION SOLUTIONS
0 500 1,000 2,000 3,000 4,000 Feet
TACOMA ST
TENINO ST
HARNEY DR
OCHOCO ST
17TH AVE
MCLOUGHLIN BLVD
32ND AVE
COVELL ST
43RD AVE
55TH AVE
ALBERTA AVE
LINWOOD AVE
NEEDHAM ST
BELL AVE
KING RD
HARRISON ST
MONROE ST
42ND AVE
68TH AVE
STANLEY AVE
RAILROAD AVE
HWY 224
LAKE RD
HARMONY RD
22ND AVE
34TH AVE
PARK AVE
OATFIELD RD
ALDERCREST RD
RUSK RD
PHEASANT CT



Transportation System Plan

FIGURE A-4

STREET NETWORK MASTER PLAN

November 2013

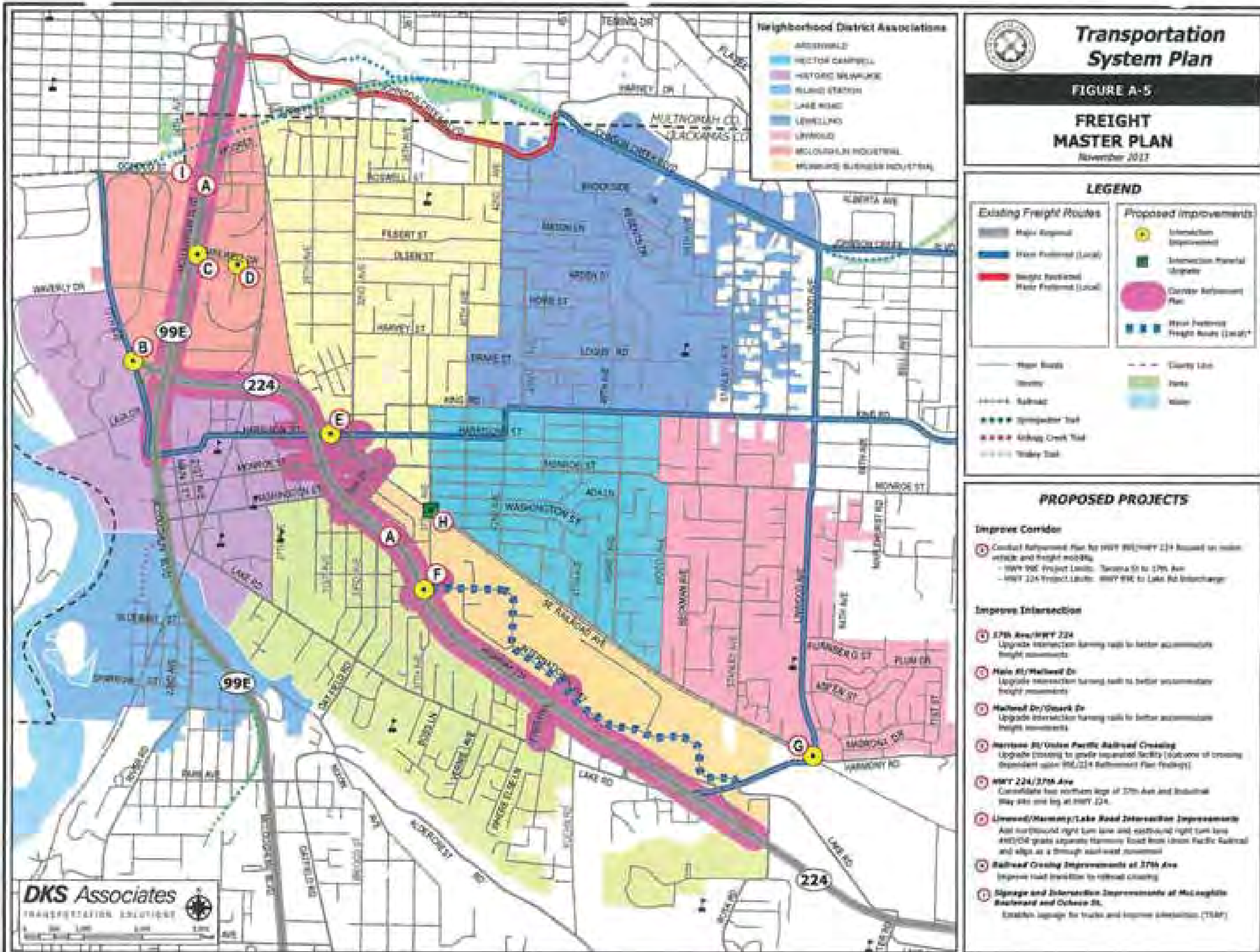
LEGEND

Proposed Street Network Improvements

- Travel Route Improvement
- Corridor Refinement Plan
- Roadway Widening Project
- Intersection Improvement
- Schools
- Light Rail Station
- Light Rail Rapid Transit
- Kellogg Creek Trail
- Springwater Trail
- Trolley Trail
- Major Roads
- Streets
- Railroad
- County Line
- Water
- Parks

PROPOSED PROJECTS

- Prohibit left turn movement at 17th Ave/McLoughlin Blvd and include in Refinement Plan
- Signalize Harrison St/42nd Ave
- Conduct Refinement Plan for HWY 99E/HWY 224 focused on motor vehicle and freight mobility
  - HWY 99E Project Limits: Tacoma St to 17th Ave
  - HWY 224 Project Limits: HWY 99E to Lake Rd Interchange
- Reconfigure intersection to consolidate 37th Ave/ Industrial Way
- Add eastbound/westbound right turn lanes and integrate the trail crossing
- Create westbound shared through/right lane, or Add eastbound right-turn pocket
- Implement protected/permitted phasing for northbound and southbound left turns
- Widen Linwood Ave to standard three lane cross section
- Widen Railroad Ave to standard three lane cross section
- Redesign intersections of River Rd and 22nd Ave to consolidate intersections, or Add northbound left turn pocket on River Rd
- Widen Harrison St to standard three-lane cross section
- Add left turn lanes and protected signal phasing on Harrison St approaches
- Widen Lake Rd to standard three-lane cross section
- Replace 3-way stop with signal when warranted and appropriate (Coordinate with the City of Portland)
- Enhance connection between King Rd and Harrison St
- Add protected signal phasing on Oak St approaches
- Improve intersection/modify access at HWY 224 and Freeman Way
- Enhance connection along Stanley Ave at King Rd
- Enhance connection along Stanley Ave at Monroe St
- Improve safety of Trolley Trail crossing at 22nd Ave
- Realign intersection to improve traffic between 42nd Ave and King Rd east of 42nd Ave
- Connect local streets within Tacoma Station Area (see Fig 8-4)
- Construct street improvements on Ochoco St, Beta St, Ochoco St, Hanna Harvester Dr and Railroad Dr (TSAP)



Transportation System Plan
FIGURE A-5
FREIGHT MASTER PLAN
November 2017
LEGEND
Existing Freight Routes
Proposed Improvements
PROPOSED PROJECTS
Improve Corridor
Improve Intersection
Neighborhood District Associations
MULTNOMAH CO.
CLACKAMAS CO.
99E
224
DKS Associates
TRANSPORTATION SOLUTIONS

Appendix B

Public Involvement Summary

Archival Note: *Appendix B was created as part of the 2007 TSP update—it does not reflect the update process that was conducted in 2013.*

INTRODUCTION

Milwaukie has some of the most organized and active communities, neighborhoods and citizen activists in the Portland Metro area. Residents have a high expectation to be involved in City business. Recognizing this, the City developed a public involvement program that was likely the most extensive public outreach and involvement process-to-date in the State of Oregon for a Transportation System Plan (TSP). The program included opportunities for citizens to participate at both a mode-specific and broad policy level, resulting in a TSP that reflects the needs and priorities of the community.

POLICY REQUIREMENTS

State, regional, and City policies require that citizen input be part of the transportation system planning process. Oregon's Statewide Planning Goal #1 mandates the following:

- Provide widespread citizen involvement, including the establishment of a citizen advisory committee (CAC) broadly representative of geographic areas and interests.
- Assure effective two-way communication with citizens.
- Assure technical information is available in an understandable form.
- Assure that citizens receive a response from policymakers.
- Ensure adequate funding for citizen involvement in a planning budget.

As outlined in the Comprehensive Plan Chapter 1, City policy requires the following:

- **Objective #1:** "The City will promote citizen participation in the planning process primarily through the nine Milwaukie Neighborhood Areas..."
- **Objective #2:** "To encourage broadly based public participation involving a cross section of citizens from a variety of geographic and interest areas, solicited through an open, well-publicized process."
- **Objective #3:** "Promote informed public participation in planning decisions by providing readily available publications and printed materials regarding current issues and proposed policies and providing for two-way communication between policy-makers and citizens."

OUTREACH AND INVOLVEMENT PROGRAM

At the beginning of the TSP Update Project the City set the following goal:

The public involvement process for the Milwaukie TSP update will encourage and provide opportunities for citizens to participate in all phases of the planning process and keep

Appendix C

Prioritized Master Plan Project List

***Archival Note:** Appendix C was created as part of the 2007 TSP update—it does not reflect the update process that was conducted in 2013.*

The Prioritized Master Plan Project List contains all projects identified in the TSP update process. Projects came from many sources including, but not limited to, the following: 2007 TSP Working Groups, Milwaukie's Downtown Plan, Milwaukie's Capital Improvement Plan, 1997 TSP, and Metro's Regional Transportation Plan. All projects were vetted by staff, Working Group members, and Advisory Committee members.

The following process was used to prioritize the TSP projects.

- Working Group participants ranked projects as high, medium, or low.
- Staff evaluated each project against the TSP Goals using the Project Evaluation Questions. The idea behind the project evaluation questions is that, given the limited funds available, the City should prioritize funding of transportation projects that 1) effectively address identified problems, and 2) best meet the City's transportation goals. Projects that were ranked as low priority by the working groups were not evaluated unless other public involvement efforts (e.g. TSP Community Briefings or Open Houses), citizen groups (e.g. Neighborhood District Associations), or programs (e.g. Safe Trips to Schools Program or Capital Improvement Program) identified them as a priority.
- Staff also took other information into consideration before grouping the projects into high, medium, and low categories such as dependence on other projects or neighborhood support.
- Advisory Committee members reviewed staff's proposed project ranking and recommended some minor changes to the ranking of individual projects.

In addition to identifying the projects that are most important to the City, the Advisory Committee advised staff on which funding strategy to pursue in the development of the City's Action Plan. The Action Plan is the City's financially constrained project list that contains only those high priority projects that are likely to be funded with limited City funds within the 22-year planning period. The projects on the City's Action Plan are divided up by mode and appear in Chapters 5, 6, 7, 8, 9, 11, and 12 respectively. Action Plan projects are identified on the Prioritized Master Plan Project List by a "Yes" response in the column entitled "Is Project Funded?"

The Advisory Committee considered the following funding strategies.

- **Emphasis on direct City funding of projects.** This approach would encourage the City to fund projects itself and not use local funds to leverage outside funding. Taking this approach would require the City to save up for years to construct one or two projects (like widening Railroad Avenue) to the exclusion of many other projects.
- **Emphasis on leveraging City funds.** This approach would encourage the City to fund less expensive projects with local funds and to leverage state or federal funds with local match dollars for more expensive high priority projects. Taking this approach would theoretically enable the City to fund more projects than it could otherwise do on its own.

Appendix D

Conceptual Design Options

***Archival Note:** Appendix D was created as part of the 2007 TSP update—it does not reflect the update process that was conducted in 2013.*

The Street Auto Network Working Group discussed the following design options during the TSP update process. These design options were developed to address current and/or future operational deficiencies at TSP study intersections.

Appendix E

Glossary of Technical Terms

Access Management: 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) to reduce impacts of approach traffic on the main facility.

Accessway: A facility that provides pedestrian and/or bicycle passage between streets, from a street to a building, or to other destinations such as schools, parks, or transit stops.

Average Daily Traffic (ADT): Measurement of the average number of vehicles passing a certain point each day on a highway, road, or street.

Alternative Modes: Transportation alternatives other than single-occupant automobiles. Alternative travel modes include travel by rail, transit, bicycle, and walking.

Arterial Street: High-volume, moderate-speed streets that carry vehicles within a city and between adjacent cities in surrounding metropolitan area. Arterials link major commercial, residential, industrial, and institutional areas. They are typically spaced about one mile apart to assure mobility and reduce the incidence of cut-through traffic on neighborhood routes and local streets.

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: A portion of the roadway that has been designated by striping and pavement markings for the preferential or exclusive use of bicyclists.

Capacity: The maximum number of vehicles or individuals that can traverse a given segment of a transportation facility with prevailing roadway and traffic conditions.

Central Business District (CBD): Traditional downtown area. Usually characterized by slow traffic speeds, on-street parking, and a compact street grid system.

Collector Street: Moderate-volume, moderate-speed streets that provide access and circulation within and between residential neighborhoods, commercial areas, and industrial areas. They serve a citywide function of connectivity and are typically spaced about one-half mile apart. They distribute trips between a neighborhood street system and an arterial street system, linking a wide range of land uses.

Congestion Mitigation/Air Quality (CMAQ) Program: Jointly administered by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA), was reauthorized in 2005 under the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The SAFETEA-LU CMAQ program provides over $8.6 billion in funds to state and transit agencies to invest in projects that reduce criteria air pollutants regulated from transportation-related sources.

Appendix F

Levels of Service (LOS) Descriptions

TRAFFIC LEVELS OF SERVICE

Analysis of traffic volumes is useful to understand the general nature of traffic in an area, but, by itself, does not indicate the ability of the street network to carry additional traffic or the quality of service afforded by specific facilities. To this end, the concept of level of service (LOS) was developed to subjectively describe street and/or intersection performance. Bottlenecks are most often found at intersections, and the ability of the street network to carry traffic efficiently is generally diminished in their vicinities. As a result, LOS is most often evaluated at intersections, but key corridors can be evaluated as well.

LOS categories are similar to report card ratings. Levels of Service A, B, and C indicate conditions where traffic moves without significant delays over periods of peak travel demand. Levels of service D, E, and F represent progressively worse peak hour operating conditions. Most urban communities set level of service D as the minimum acceptable level of service for peak hour operation and plan for level of service C or better for all other times of the day. The Highway Capacity Manual provides LOS calculation methodologies for both intersections and arterials.[1]

[1] *Highway Capacity Manual 2000*, Transportation Research Board, Washington D.C., 2000, Chapters 16 and 17.

Appendix G
Traffic Data

CONTENTS

This appendix includes background and input data for the various traffic forecasting and analyses found throughout the TSP. See below for the location of the data for each type of analysis.

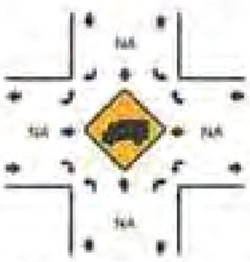
Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: Linwood Ave -- King Rd
CITY/STATE: Milwaukie, OR

QC JOB #: 10776902
DATE: Tue, Jun 12 2012

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:30 PM -- 5:45 PM



5-Min Count Period Beginning At	Linwood Ave (Northbound) Left	Thru	Right	U	Linwood Ave (Southbound) Left	Thru	Right	U	King Rd (Eastbound) Left	Thru	Right	U	King Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	6	27	10	0	4	13	4	0	4	37	6	0	8	21	5	0	145	
4:05 PM	8	12	6	0	5	18	3	0	8	35	7	0	12	19	3	0	132	
4:10 PM	5	19	5	0	7	7	6	0	3	53	11	0	4	29	3	0	152	
4:15 PM	10	18	5	0	1	18	4	0	16	34	6	0	9	24	3	0	148	
4:20 PM	5	14	10	0	3	21	6	0	11	42	6	0	2	23	7	0	150	
4:25 PM	4	7	6	0	4	7	3	0	9	43	9	0	5	34	1	0	134	
4:30 PM	13	24	6	0	3	19	3	0	7	36	6	0	5	16	4	0	144	
4:35 PM	8	19	5	0	4	23	14	0	11	32	6	0	16	23	3	0	164	
4:40 PM	6	15	9	0	4	29	8	0	13	28	7	0	10	24	3	0	156	
4:45 PM	3	17	10	0	5	17	8	0	8	47	5	0	11	32	2	0	163	
4:50 PM	13	11	3	0	2	18	7	0	2	38	4	0	6	28	4	0	132	
4:55 PM	3	9	7	0	6	13	6	0	10	37	10	0	8	24	1	0	134	1754
5:00 PM	12	19	5	0	6	19	3	0	6	37	7	0	12	38	3	0	162	1771
5:05 PM	6	21	4	0	3	24	11	0	13	43	0	0	7	26	1	0	169	1808
5:10 PM	5	16	6	0	2	8	7	0	11	43	8	0	6	31	4	0	148	1804
5:15 PM	11	23	0	0	3	25	1	0	9	41	8	0	7	31	3	0	177	1833
5:20 PM	5	19	4	0	0	19	7	0	5	42	0	0	5	42	3	0	166	1849
5:25 PM	10	30	7	0	1	20	11	0	10	47	7	0	8	39	2	0	165	1869
5:30 PM	8	20	10	0	0	14	9	0	14	49	5	0	10	29	2	0	161	1886
5:35 PM	6	15	3	0	3	26	0	0	5	36	10	0	10	30	8	0	175	1897
5:40 PM	7	18	6	0	0	25	3	0	0	41	7	0	12	35	4	0	171	1912
5:45 PM	10	8	12	0	2	27	6	0	5	42	6	0	6	29	6	0	159	1909
5:50 PM	0	15	1	0	4	18	13	0	8	40	7	0	5	33	6	0	157	1933
5:55 PM	6	12	4	0	0	19	4	0	12	53	5	0	2	31	5	0	137	1936

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	92	208	76	0	52	260	76	0	108	524	88	0	128	372	44	0	2028
Heavy Trucks	0	0	0		0	12	0		4	20	0		0	0	0		36
Pedestrians		4				32				8				8			52
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

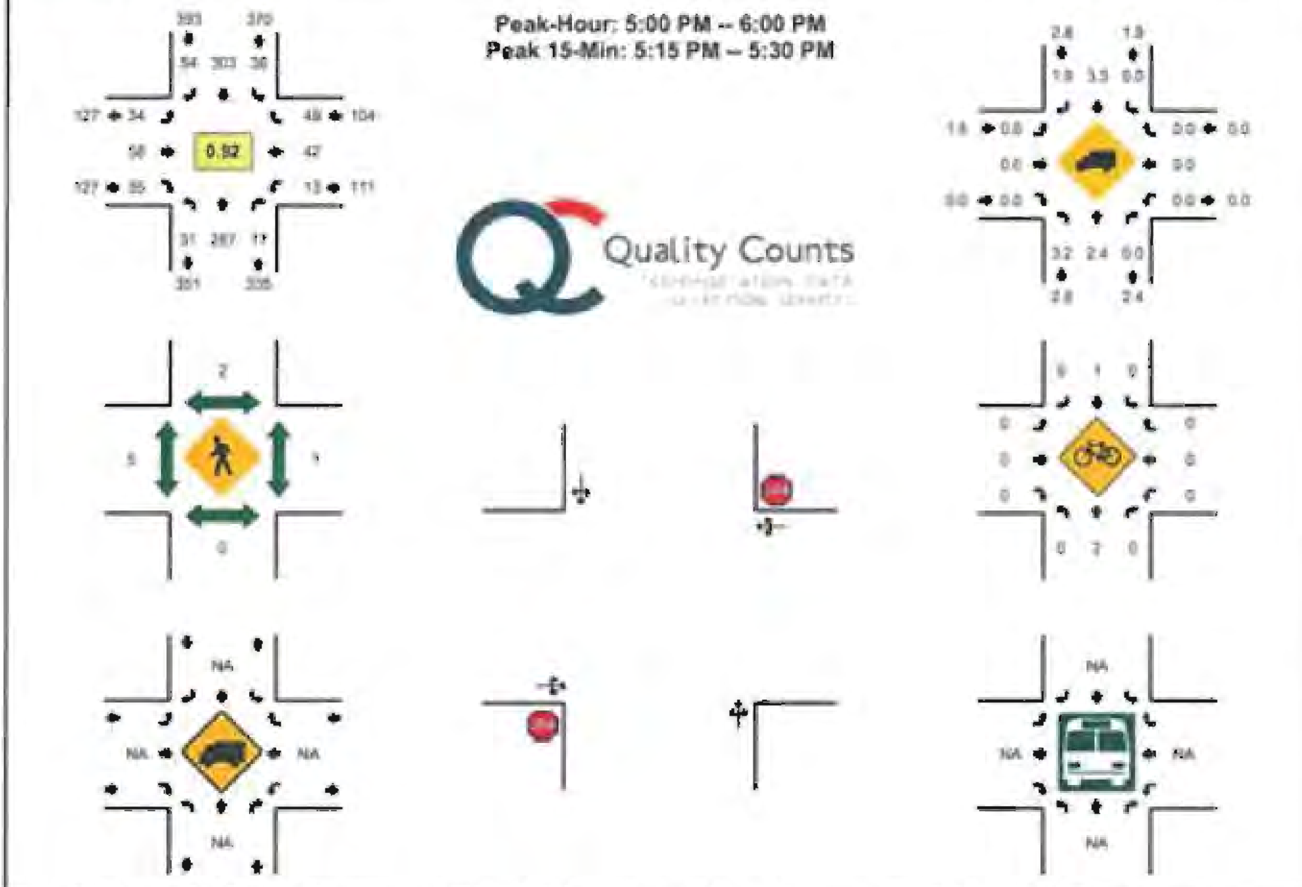
Comments:

Report generated on 6/18/2012 11:28 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

LOCATION: Linwood Ave -- Monroe St | **QC JOB #:** 10776903

CITY/STATE: Milwaukie, OR | **DATE:** Tue, Jun 12 2012



5-Min Count Period Beginning At	Linwood Ave (Northbound)				Linwood Ave (Southbound)				Monroe St (Eastbound)				Monroe St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	25	2	0	3	15	4	0	4	4	2	0	1	3	3	0	68	
4:05 PM	2	25	1	0	5	19	7	0	3	3	4	0	2	1	1	0	73	
4:10 PM	3	28	2	0	2	17	3	0	1	1	4	0	3	5	4	0	72	
4:15 PM	4	26	5	0	4	26	3	0	4	6	3	0	1	2	3	0	87	
4:20 PM	2	21	4	0	3	16	8	0	4	3	2	0	1	2	6	0	72	
4:25 PM	4	19	2	0	3	16	2	0	4	3	3	0	0	2	3	0	61	
4:30 PM	3	37	3	0	3	30	6	0	1	5	5	0	2	6	8	0	109	
4:35 PM	1	16	1	0	4	34	4	0	4	2	5	0	2	5	1	0	79	
4:40 PM	2	23	2	0	5	36	2	0	1	2	5	0	2	2	1	0	83	
4:45 PM	1	28	0	0	2	21	4	0	5	1	4	0	4	2	1	0	73	
4:50 PM	0	26	2	0	2	25	5	0	0	2	2	0	0	2	2	0	68	
4:55 PM	2	16	3	0	2	18	5	0	1	3	4	0	0	0	0	0	54	899
5:00 PM	1	27	1	0	1	20	5	0	4	8	2	0	0	1	8	0	77	908
5:05 PM	4	23	4	0	3	30	7	0	2	6	3	0	1	1	2	0	86	921
5:10 PM	1	22	1	0	0	17	2	0	1	3	6	0	2	8	3	0	67	916
5:15 PM	1	28	1	0	2	29	5	0	2	4	9	0	3	3	12	0	90	919
5:20 PM	3	30	1	0	4	25	2	0	1	3	2	0	1	4	4	0	87	934
5:25 PM	3	29	2	0	3	31	4	0	4	5	3	0	2	2	5	0	83	956
5:30 PM	4	25	3	0	6	17	7	0	4	9	2	0	0	4	3	0	83	930
5:35 PM	1	29	0	0	2	35	4	0	8	3	1	0	1	3	2	0	89	940
5:40 PM	2	12	2	0	4	33	5	0	2	3	3	0	0	2	4	0	72	929
5:45 PM	7	21	0	0	5	28	4	0	3	10	5	0	3	1	2	0	87	943
5:50 PM	1	17	2	0	2	27	5	0	1	3	0	0	2	5	3	0	68	943
5:55 PM	3	23	0	0	1	14	4	0	2	4	5	0	1	9	4	0	70	959

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	28	332	16	0	36	336	44	0	28	48	32	0	12	44	84	0	1040
Heavy Trucks	4	12	0		0	20	0		0	0	0		0	0	0		36
Pedestrians		0				8				4				0			12
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/18/2012 11:28 AM

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: 42nd Ave -- King Rd — **QC JOB #:** 10776001

CITY/STATE: Milwaukie, OR — **DATE:** Tue, Jun 12 2012

Peak-Hour: 4:55 PM -- 5:55 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

5-Min Count Period Beginning At	42nd Ave (Northbound)				42nd Ave (Southbound)				King Rd (Eastbound)				King Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	0	31	0	0	0	0	0	0	6	0	0	20	4	0	0	64	
4:05 PM	1	0	33	0	0	0	0	0	0	15	4	0	18	3	0	0	74	
4:10 PM	2	0	40	0	0	0	0	0	0	8	2	0	20	6	0	0	78	
4:15 PM	0	0	39	0	0	0	0	0	0	3	0	0	14	1	0	0	57	
4:20 PM	4	0	35	0	0	0	0	0	0	5	1	0	23	3	0	0	71	
4:25 PM	6	0	39	0	0	0	0	0	0	4	1	0	23	4	0	0	77	
4:30 PM	2	0	41	0	0	0	0	0	0	9	7	0	15	2	0	0	76	
4:35 PM	2	0	36	0	0	0	0	0	0	8	0	0	14	4	0	0	64	
4:40 PM	1	0	45	0	0	0	0	0	0	9	2	0	19	8	0	0	82	
4:45 PM	2	0	34	0	0	0	0	0	0	7	3	0	21	8	0	0	75	
4:50 PM	1	0	32	0	0	0	0	0	0	11	1	0	20	8	0	0	73	
4:55 PM	1	0	38	0	0	0	0	0	0	11	6	0	10	7	0	0	73	884
5:00 PM	4	0	27	0	0	0	0	0	0	8	3	0	16	14	0	0	70	870
5:05 PM	8	0	44	0	0	0	0	0	0	10	1	0	14	13	0	0	87	883
5:10 PM	2	0	65	0	0	0	0	0	0	7	4	0	15	5	0	0	98	893
5:15 PM	0	0	45	0	0	0	0	0	0	5	4	0	20	15	0	0	89	925
5:20 PM	4	0	38	0	0	0	0	0	0	9	0	0	30	6	0	0	87	939
5:25 PM	1	0	36	0	0	0	0	0	0	6	1	0	13	7	0	0	77	933
5:30 PM	2	0	45	0	0	0	0	0	0	7	4	0	17	9	0	0	84	941
5:35 PM	5	0	34	0	0	0	0	0	0	6	3	0	20	7	0	0	77	954
5:40 PM	5	0	36	0	0	0	0	0	0	7	1	0	22	7	0	0	80	952
5:45 PM	2	0	40	0	0	0	0	0	0	7	7	0	21	5	0	0	77	954
5:50 PM	1	0	44	0	0	0	0	0	0	11	0	0	20	13	0	0	92	973
5:55 PM	1	0	37	0	0	0	0	0	0	6	1	0	8	6	0	0	59	959

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	28	0	576	0	0	0	0	0	0	88	32	0	196	136	0	0	1056
Heavy Trucks	0	0	8		0	0	0		0	0	0		0	4	0		12
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	2	0		1	1	0		4
Railroad																	
Stopped Buses																	

Comments:

Report generated on 6/18/2012 11:28 AM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	515	90	90	365	45	100	205	75	40	235	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.96		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1808		1787	1839		1770	1777		1805	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1808		1787	1839		1770	1777		1805	1760	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	116	542	95	95	384	47	105	216	79	42	247	95
RTOR Reduction (vph)	0	7	0	0	5	0	0	13	0	0	15	0
Lane Group Flow (vph)	116	630	0	95	426	0	105	282	0	42	327	0
Confl. Peds. (#/hr)	17		7	7		17	5		5	5		5
Confl. Bikes (#/hr)						1						2
Heavy Vehicles (%)	2%	2%	3%	1%	1%	0%	2%	2%	1%	0%	3%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	8.5	31.2		8.3	31.0		6.0	29.0		2.9	25.9	
Effective Green, g (s)	8.5	31.2		8.3	31.0		6.0	29.0		2.9	25.9	
Actuated g/C Ratio	0.10	0.36		0.09	0.35		0.07	0.33		0.03	0.30	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	172	645		170	652		122	590		60	522	
v/s Ratio Prot	c0.07	c0.35		0.05	0.23		c0.06	c0.16		0.02	c0.19	
v/s Ratio Perm												
v/c Ratio	0.67	0.98		0.56	0.65		0.86	0.48		0.70	0.63	
Uniform Delay, d1	38.1	27.7		37.8	23.7		40.3	23.2		41.8	26.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.0	29.3		3.9	2.4		42.2	2.8		30.0	5.6	
Delay (s)	48.1	57.1		41.7	26.0		82.5	25.9		71.8	32.2	
Level of Service	D	E		D	C		F	C		E	C	
Approach Delay (s)		55.7			28.9			40.8			36.5	
Approach LOS		E			C			D			D	

Intersection Summary			
HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	87.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	95	30	35	485	225	115
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	33	38	527	245	125
Pedestrians	12				3	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	1				0	
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	925	319	382			
vC1, stage 1 conf vol	319					
vC2, stage 2 conf vol	606					
vCu, unblocked vol	925	319	382			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	78	95	97			
cM capacity (veh/h)	479	719	1160			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	136	38	527	370
Volume Left	103	38	0	0
Volume Right	33	0	0	125
cSH	521	1160	1700	1700
Volume to Capacity	0.26	0.03	0.31	0.22
Queue Length 95th (ft)	26	3	0	0
Control Delay (s)	14.3	8.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.3	0.6		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	60	35	15	45	55	35	290	20	40	315	60
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	65	38	16	49	60	38	315	22	43	342	65
Pedestrians		1			5						2	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		0			0						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1218	
pX, platoon unblocked												
vC, conflicting volume	951	881	376	940	903	333	409			342		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	951	881	376	940	903	333	409			342		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	76	94	91	81	92	97			96		
cM capacity (veh/h)	178	267	674	178	259	709	1144			1223		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	141	125	375	451
Volume Left	38	16	38	43
Volume Right	38	60	22	65
cSH	275	343	1144	1223
Volume to Capacity	0.51	0.36	0.03	0.04
Queue Length 95th (ft)	68	41	3	3
Control Delay (s)	31.2	21.4	1.1	1.1
Lane LOS	D	C	A	A
Approach Delay (s)	31.2	21.4	1.1	1.1
Approach LOS	D	C		

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

Milwaukie TSP Update

Future Volume Forecasts

Scenario: 2035 PM "Low Build" (Financially Commited)

Date 6/29/2012

N/S	E/W	#	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
McLoughlin Blvd	Ochoco St	1	0	2000	20	0	3290	220	120	40	200	10	270	160
McLoughlin Blvd	Milport Road	2	280	2020	100	0	3540	20	20	20	270	250	30	20
McLoughlin Blvd	Harrison St	3	20	1120	170	100	2290	20	20	20	20	190	20	10
42nd Avenue	Harrison St	4	20	20	20	10	20	50	240	10	20	10	20	10
McLoughlin Blvd	Washington St	5	10	1050	30	100	2200	10	0	10	10	20	10	140
Main Street	Harrison St	6	20	20	20	20	20	80	70	10	10	20	110	60
17th Avenue	Hwy 224	7	0	20	100	370	20	0	0	0	0	110	0	20
Hwy 224	Harrison St	8	60	1190	250	20	2250	180	90	200	20	310	210	20
Hwy 224	Monroae Street	9	60	1920	10	20	2770	10	20	20	160	20	30	20
Hwy 224	Oak Street	10	200	1470	20	260	2290	260	140	140	110	20	110	180
32nd Avenue	Harrison St	11	40	20	20	20	40	400	420	530	10	20	430	10
McLoughlin Blvd	22nd Ave	12	110	990	0	0	1400	780	0	0	10	0	0	0
McLoughlin Blvd	River Road	13	10	950	0	0	1680	0	310	0	130	0	0	0
Garfield Rd	Lake Road	14	70	190	180	140	320	10	20	20	90	180	30	70
Hwy 224	37th Ave	15	70	1240	20	220	1870	50	50	90	440	290	270	380
Freeman Way	Hwy 224	16	20	30	10	510	30	140	30	2420	30	10	1450	240
Hwy 224 off/on ramp	Lake Road	17	170	0	160	110	820	10	100	240	100	0	70	120
21st Ave	Harrison St	18	20	10	30	20	10	10	10	140	20	20	150	20
32nd Avenue	Johnson Creek Blvd	19	20	130	30	540	250	0	0	70	90	40	20	360
Linwood Ave	Johnson Creek Blvd	20	140	220	50	180	310	120	140	860	230	10	820	230
Linwood Ave	King Road	21	50	420	150	20	520	20	20	100	50	230	20	20
Linwood Ave	Harmony Rd	22	50	450	1660	270	570	20	40	270	70	1460	310	280

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
081	**PACIFIC HIGHWAY EAST**														
OR-99E	1	4.41	4.50	42,300	14			1	6	7		MULTNOMAH		70	29.50
OR-99E	1	4.42	4.51	42,300	13			1	6	6		MULTNOMAH		70	28.79
OR-99E	1	4.43	4.52	42,300	11			1	6	4		MULTNOMAH		65	27.27
OR-99E	1	4.44	4.53	42,300	11			1	6	4		MULTNOMAH	081BP CONN (TACOMA)	65	27.27
OR-99E	1	4.45	4.54	42,300	3				1	2		MULTNOMAH			9.66
OR-99E	1	4.66	4.75	42,300	3		1		2			CLACKAMAS		70	27.66
OR-99E	1	4.67	4.76	42,300	4		1		2	1		CLACKAMAS		70	29.19
OR-99E	1	4.68	4.77	42,300	6		1		3	2		CLACKAMAS		80	35.16
OR-99E	1	4.69	4.78	42,300	14		1	1	5	7		CLACKAMAS		90	44.50
OR-99E	1	4.70	4.79	42,300	14		1	1	4	8		CLACKAMAS		90	43.00
OR-99E	1	4.71	4.80	42,300	14		1	1	3	9		CLACKAMAS		85	41.50
OR-99E	1	4.72	4.81	42,300	14		1	1	3	9		CLACKAMAS		85	41.50
OR-99E	1	4.73	4.82	42,300	14		1	1	3	9		CLACKAMAS		85	41.50
OR-99E	1	4.74	4.83	42,300	15		1	1	3	10		CLACKAMAS		85	42.19
OR-99E	1	4.75	4.84	42,300	15		1	1	3	10		CLACKAMAS		85	42.19
OR-99E	1	4.76	4.85	42,300	14			1	3	10		CLACKAMAS		60	25.00
OR-99E	1	4.77	4.86	42,300	13			1	3	9		CLACKAMAS		60	24.29
OR-99E	1	4.78	4.87	42,300	11			1	2	8		CLACKAMAS	ACCESS (DEL'REASING R.	50	21.27
OR-99E	1	4.78	4.87	42,300	11			1	2	8		CLACKAMAS	OCHOCO ST.	50	21.27
OR-99E	1	4.79	4.88	51,100	4					4		CLACKAMAS			9.32
OR-99E	1	4.80	4.89	51,100	3					3		CLACKAMAS			8.04
OR-99E	1	4.91	5.00	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.92	5.01	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.93	5.02	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.94	5.03	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.95	5.04	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.96	5.05	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.97	5.06	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.98	5.07	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	4.99	5.08	51,100	3				1	2		CLACKAMAS			9.54
OR-99E	1	5.08	5.17	51,100	3			1	2			CLACKAMAS		15	12.54
OR-99E	1	5.09	5.18	51,100	3			1	3	1		CLACKAMAS		35	16.79
OR-99E	1	5.10	5.19	51,100	7			1	5	1		CLACKAMAS		55	21.93
OR-99E	1	5.11	5.20	51,100	20	1		2	10	7		CLACKAMAS		95	56.67
OR-99E	1	5.12	5.21	51,100	20	1		2	10	7		CLACKAMAS		95	56.67
OR-99E	1	5.13	5.22	51,100	22	1		2	11	8		CLACKAMAS		95	59.28
OR-99E	1	5.14	5.23	51,100	23	1		2	12	8		CLACKAMAS		95	61.51
OR-99E	1	5.15	5.24	51,100	23	1		2	12	8		CLACKAMAS		95	61.51
OR-99E	1	5.16	5.25	51,100	23	1		2	12	8		CLACKAMAS		95	61.51
OR-99E	1	5.17	5.26	51,100	22	1		2	11	8		CLACKAMAS		95	59.28

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
081	PACIFIC HIGHWAY EAST														
OR-99E	1	5.18	5.27	51,100	21	1		2	10	8		CLACKAMAS		95	57.23
OR-99E	1	5.19	5.28	51,100	19	1		2	9	7		CLACKAMAS		95	54.61
OR-99E	1	5.20	5.29	51,100	17	1		2	7	7		CLACKAMAS	ACCESS (DECREASING R	90	50.42
OR-99E	1	5.20	5.29	51,100	17	1		2	7	7		CLACKAMAS	SE MILPORT RD	90	50.42
OR-99E	1	5.21	5.30	39,200	3				2	1		CLACKAMAS		5	11.22
OR-99E	1	5.22	5.31	39,200	3				2	1		CLACKAMAS		5	11.22
OR-99E	1	5.62	5.71	25,100	4			1	2	1		CLACKAMAS		23	14.82
OR-99E	1	5.63	5.72	25,100	23			2	13	8		CLACKAMAS		90	49.48
OR-99E	1	5.64	5.73	25,100	25			3	13	9		CLACKAMAS		90	52.18
OR-99E	1	5.65	5.74	25,100	25			3	13	9		CLACKAMAS		90	52.18
OR-99E	1	5.66	5.75	25,100	25			3	13	9		CLACKAMAS		90	52.18
OR-99E	1	5.67	5.76	25,100	26			4	13	9		CLACKAMAS		95	54.25
OR-99E	1	5.68	5.77	25,100	27			4	13	10		CLACKAMAS		95	54.83
OR-99E	1	5.69	5.78	25,100	28			4	13	11		CLACKAMAS		95	55.40
OR-99E	1	5.70	5.79	25,100	28			4	13	11		CLACKAMAS		95	55.40
OR-99E	1	5.71	5.80	25,100	29			3	13	13		CLACKAMAS		95	54.44
OR-99E	1	5.72	5.81	32,500	27			3	11	13		CLACKAMAS	HWY 081 M.P. (2)5.72	90	48.89
OR-99E	1	5.72	5.81	32,500	27			3	11	13		CLACKAMAS	17TH AVE	90	48.89
OR-99E	1	5.73	5.82	32,500	8			2		6		CLACKAMAS		40	17.72
OR-99E	1	5.74	5.83	32,500	7			1		6		CLACKAMAS		30	15.19
OR-99E	1	5.75	5.84	32,500	7			1		6		CLACKAMAS		30	15.19
OR-99E	1	5.76	5.85	32,500	8			1		7		CLACKAMAS		35	16.22
OR-99E	1	5.77	5.86	32,500	7					7		CLACKAMAS	JACKSON ST	20	13.69
OR-99E	1	5.78	5.87	32,500	5					5		CLACKAMAS		5	11.34
OR-99E	1	5.79	5.88	32,500	4					4		CLACKAMAS			9.97
OR-99E	1	5.80	5.89	32,500	4					4		CLACKAMAS			9.97
OR-99E	1	5.81	5.90	32,500	5				2	3		CLACKAMAS		25	14.34
OR-99E	1	5.82	5.91	32,500	6				2	4		CLACKAMAS		30	15.57
OR-99E	1	5.83	5.92	32,500	6				2	4		CLACKAMAS	SE MONROE ST	30	15.57
OR-99E	1	5.84	5.93	32,500	9		1		4	4		CLACKAMAS		85	38.18
OR-99E	1	5.85	5.94	32,500	10		1	1	4	4		CLACKAMAS		85	40.60
OR-99E	1	5.86	5.95	32,500	9		1	1	4	3		CLACKAMAS		85	39.68
OR-99E	1	5.87	5.96	32,500	10		1	1	4	4		CLACKAMAS		85	40.60
OR-99E	1	5.88	5.97	32,500	11		1	1	4	5		CLACKAMAS	SE JEFFERSON ST	85	41.45
OR-99E	1	5.88	5.97	32,500	11		1	1	4	5		CLACKAMAS	ROAD (BOAT LANDING)	85	41.45
OR-99E	1	5.89	5.98	32,500	11		1	1	4	5		CLACKAMAS		85	41.45
OR-99E	1	5.90	5.99	32,500	11		1	1	4	5		CLACKAMAS		85	41.45
OR-99E	1	5.91	6.00	32,500	9		1	1	3	4		CLACKAMAS		85	38.18
OR-99E	1	5.92	6.01	32,500	9		1	1	4	3		CLACKAMAS		85	39.68
OR-99E	1	5.93	6.02	32,500	9		1	1	4	3		CLACKAMAS	WASHINGTON ST	85	39.68

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
081	**PACIFIC HIGHWAY EAST**														
OR-99E	1	5.94	6.03	32,500	5			1	2	2		CLACKAMAS		30	15.84
OR-99E	1	5.95	6.04	32,500	4				2	2		CLACKAMAS		15	12.97
OR-99E	1	5.96	6.05	32,500	4				2	2		CLACKAMAS		15	12.97
OR-99E	1	5.97	6.06	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.12	6.21	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.13	6.22	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.14	6.23	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.15	6.24	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.16	6.25	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.17	6.26	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.18	6.27	32,500	3				2	1		CLACKAMAS		5	11.38
OR-99E	1	6.21	6.30	32,500	4				3	1		CLACKAMAS	22ND AVE	25	14.47
OR-99E	1	6.22	6.31	32,500	6				5	1		CLACKAMAS		45	20.07
OR-99E	1	6.23	6.32	32,500	7				6	1		CLACKAMAS		55	22.69
OR-99E	1	6.24	6.33	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.25	6.34	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.26	6.35	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.27	6.36	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.28	6.37	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.29	6.38	32,500	8				6	2		CLACKAMAS		60	23.72
OR-99E	1	6.30	6.39	32,500	8				6	2		CLACKAMAS	BLUE BIRD ST.	60	23.72
OR-99E	1	6.30	6.39	32,500	8				6	2		CLACKAMAS	RIVER RD. (2ND RT.)	60	23.72
OR-99E	1	6.31	6.40	27,100	5				4	1		CLACKAMAS	LEG (FROM RIVER RD.)	40	17.63
OR-99E	1	6.45	6.54	27,100	3				2	1		CLACKAMAS		10	11.57
OR-99E	1	6.46	6.55	27,100	3				2	1		CLACKAMAS		10	11.57
OR-99E	1	6.66	6.75	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.67	6.76	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.68	6.77	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.69	6.78	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.70	6.79	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.71	6.80	27,100	3					3		CLACKAMAS			8.57
OR-99E	1	6.72	6.81	27,100	5				2	3		CLACKAMAS		25	14.63
OR-99E	1	6.73	6.82	27,100	5				3	2		CLACKAMAS		35	16.13
OR-99E	1	6.74	6.83	27,100	5				3	2		CLACKAMAS		35	16.13
OR-99E	1	6.75	6.84	27,100	5				3	2		CLACKAMAS		35	16.13
OR-99E	1	6.76	6.85	27,100	5				4	1		CLACKAMAS		40	17.63
OR-99E	1	6.77	6.86	27,100	5				4	1		CLACKAMAS		40	17.63
OR-99E	1	6.78	6.87	27,100	10				7	3		CLACKAMAS		70	27.61
OR-99E	1	6.79	6.88	27,100	12				8	4		CLACKAMAS		75	30.86

Rte.	Hdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
161	**WOODBURN-ESTACADA**														
OR-211	1	33.35	33.44	6,300	3				1	2		CLACKAMAS	S CADONAU RD	15	13.25
OR-211	1	33.36	33.45	6,300	3				1	2		CLACKAMAS		15	13.25
OR-211	1	33.37	33.46	6,300	3				1	2		CLACKAMAS		15	13.25
OR-211	1	33.39	33.48	6,300	3					3		CLACKAMAS		10	11.75
OR-211	1	33.40	33.49	6,300	9			2	3	4		CLACKAMAS		75	30.51
171	**CLACKAMAS**														
	1	0.02	0.11	7,800	3					3		CLACKAMAS	LEG (FROM 17TH AVE.)	5	11.03
	1	0.03	0.12	7,800	3					3		CLACKAMAS		5	11.03
	1	0.04	0.13	7,800	3					3		CLACKAMAS		5	11.03
	1	0.05	0.14	7,800	5				1	4		CLACKAMAS		35	16.80
	1	0.06	0.15	7,800	5				1	4		CLACKAMAS		35	16.80
	1	0.07	0.16	7,800	5				1	4		CLACKAMAS		35	16.80
	1	0.08	0.17	7,800	5				1	4		CLACKAMAS		35	16.80
OR-224	1	0.09	0.18	7,800	5				1	4		CLACKAMAS		35	16.80
OR-224	1	0.10	0.19	7,800	4				1	3		CLACKAMAS		25	14.81
OR-224	1	0.11	0.20	7,800	3				1	2		CLACKAMAS		15	12.53
OR-224	1	0.58	0.67	24,800	3				1	2		CLACKAMAS			10.17
OR-224	1	0.59	0.68	24,800	25			5	10	10		CLACKAMAS		90	50.75
OR-224	1	0.60	0.69	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.61	0.70	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.62	0.71	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.63	0.72	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.64	0.73	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.65	0.74	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.66	0.75	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.67	0.76	24,800	26			5	11	10		CLACKAMAS		90	52.82
OR-224	1	0.68	0.77	24,800	24			6	10	8		CLACKAMAS	171AB CONN. (SE HARRI	90	51.65
OR-224	1	0.69	0.78	24,500	10			2	6	2		CLACKAMAS		70	29.43
OR-224	1	0.70	0.79	24,500	9			2	5	2		CLACKAMAS		65	26.95
OR-224	1	0.71	0.80	24,500	9			2	5	2		CLACKAMAS		65	26.95
OR-224	1	0.72	0.81	24,500	9			2	5	2		CLACKAMAS		65	26.95
OR-224	1	0.73	0.82	24,500	9			2	5	2		CLACKAMAS		65	26.95
OR-224	1	0.74	0.83	24,500	10			3	5	2		CLACKAMAS		70	29.43
OR-224	1	0.75	0.84	24,500	10			3	5	2		CLACKAMAS		70	29.43
OR-224	1	0.76	0.85	24,500	10			3	5	2		CLACKAMAS		70	29.43
OR-224	1	0.77	0.86	24,500	10			3	5	2		CLACKAMAS		70	29.43
OR-224	1	0.78	0.87	24,500	9			2	5	2		CLACKAMAS	171AC CONN. (SE MONR)	65	26.95
OR-224	1	0.82	0.91	25,100	3			1	1	1		CLACKAMAS		10	11.66
OR-224	1	0.83	0.92	25,100	6			1	3	2		CLACKAMAS		45	19.07
OR-224	1	0.84	0.93	25,100	19			2	5	12		CLACKAMAS		80	34.92

Rte.	Rdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
171	**CLACKAMAS**														
OR-224	1	0.85	0.94	25,100	20			2	5	13		CLACKAMAS		80	35.37
OR-224	1	0.86	0.95	25,100	21			2	5	14		CLACKAMAS		80	36.22
OR-224	1	0.87	0.96	25,100	21			2	5	14		CLACKAMAS		80	36.22
OR-224	1	0.88	0.97	25,100	21			2	5	14		CLACKAMAS		80	36.22
OR-224	1	0.89	0.98	25,100	21			2	4	15		CLACKAMAS		80	34.72
OR-224	1	0.90	0.99	25,100	21			2	4	15		CLACKAMAS		80	34.72
OR-224	1	0.91	1.00	25,100	21			2	4	15		CLACKAMAS		80	34.72
OR-224	1	0.92	1.01	25,100	21			2	4	15		CLACKAMAS		80	34.72
OR-224	1	0.93	1.02	25,100	18			2	2	14		CLACKAMAS	(71AD CONN (OAK ST.))	70	29.73
OR-224	1	0.94	1.03	25,700	4					4		CLACKAMAS			10.29
OR-224	1	0.95	1.04	25,700	1					1		CLACKAMAS			8.63
OR-224	1	1.23	1.32	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.24	1.33	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.25	1.34	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.26	1.35	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.27	1.36	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.28	1.37	25,700	8			2	2	4		CLACKAMAS	LEG (FROM 171AE CONN	50	21.29
OR-224	1	1.29	1.38	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.30	1.39	25,700	8			2	2	4		CLACKAMAS		50	21.29
OR-224	1	1.31	1.40	25,700	7			2	2	3		CLACKAMAS		45	20.20
OR-224	1	1.32	1.41	25,700	7			2	2	3		CLACKAMAS	171AE CONN (SE EDISO)	45	20.20
OR-224	1	1.80	1.89	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.81	1.90	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.82	1.91	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.83	1.92	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.84	1.93	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.85	1.94	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.86	1.95	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.87	1.96	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.88	1.97	25,700	8			2	3	3		CLACKAMAS		55	22.79
OR-224	1	1.89	1.98	25,700	7			2	3	2		CLACKAMAS	SE FREEMAN WAY	55	21.70
OR-224	1	2.63	2.72	27,300	6				4	2		CLACKAMAS		45	18.90
OR-224	1	2.64	2.73	27,300	7				4	3		CLACKAMAS		45	20.06
OR-224	1	2.65	2.74	27,300	7				4	3		CLACKAMAS		45	20.06
OR-224	1	2.66	2.75	27,300	8		1		4	3		CLACKAMAS		85	37.63
OR-224	1	2.67	2.76	27,300	8		1		4	3		CLACKAMAS		85	37.63
OR-224	1	2.68	2.77	27,300	9		1		4	4		CLACKAMAS		85	38.63
OR-224	1	2.69	2.78	27,300	10		1		4	5		CLACKAMAS	171AI CONN M.P. 3C2.69	85	39.59
OR-224	1	2.70	2.79	26,900	9		1		4	4		CLACKAMAS		85	38.68
OR-224	1	2.71	2.80	26,900	9		1		4	4		CLACKAMAS		85	38.68

Rte.	Hdwy	BMP	EMP	ADT	Crsh	Fatal	A	B	C	PDO	City	County	Connection in Group	Percentile	SPIS
171	CLACKAMAS														
OR-224	1	2.72	2.81	26,900	9		1		4	4		CLACKAMAS	RUSK RD	85	38.68
OR-224	1	2.73	2.82	26,900	5		1			4		CLACKAMAS		70	28.14
OR-224	1	2.74	2.83	26,900	4		1			3		CLACKAMAS		65	26.72
OR-224	1	2.75	2.84	26,900	4		1			3		CLACKAMAS		65	26.72
OR-224	1	2.76	2.85	26,900	3					3		CLACKAMAS			8.58
OR-224	1	2.77	2.86	26,900	3					3		CLACKAMAS			8.58
OR-224	1	3.06	3.15	26,900	3				3			CLACKAMAS		15	13.08
OR-224	1	3.07	3.16	26,900	4				3	1		CLACKAMAS		25	14.72
OR-224	1	3.08	3.17	26,900	4				3	1		CLACKAMAS		25	14.72
OR-224	1	3.09	3.18	26,900	4				3	1		CLACKAMAS		25	14.72
OR-224	1	3.10	3.19	26,900	9				6	3		CLACKAMAS		65	25.18
OR-224	1	3.11	3.20	26,900	25		1	2	9	13		CLACKAMAS		95	60.79
OR-224	1	3.12	3.21	26,900	31		2	2	10	17		CLACKAMAS		95	75.91
OR-224	1	3.13	3.22	26,900	32		2	2	11	17		CLACKAMAS		95	76.26
OR-224	1	3.14	3.23	26,900	34		2	2	12	18		CLACKAMAS		95	76.95
OR-224	1	3.15	3.24	26,900	34		2	2	12	18		CLACKAMAS		95	76.95
OR-224	1	3.16	3.25	26,900	33		2	2	11	18		CLACKAMAS		95	76.61
OR-224	1	3.17	3.26	26,900	32		2	2	11	17		CLACKAMAS		95	76.26
OR-224	1	3.18	3.27	26,900	32		2	2	11	17		CLACKAMAS		95	76.26
OR-224	1	3.19	3.28	26,900	32		2	2	11	17		CLACKAMAS		95	76.26
OR-224	1	3.20	3.29	26,900	28		2	2	9	15		CLACKAMAS	LAKE RD	95	74.81
OR-224	1	3.21	3.30	29,200	11		1		5	5		CLACKAMAS		85	41.76
OR-224	1	3.22	3.31	29,200	5				4	1		CLACKAMAS		40	17.31
OR-224	1	3.23	3.32	29,200	6				4	2		CLACKAMAS		45	18.77
OR-224	1	3.24	3.33	29,200	9				7	2		CLACKAMAS		65	26.45
OR-224	1	3.25	3.34	29,200	9				7	2		CLACKAMAS		65	26.45
OR-224	1	3.26	3.35	29,200	10				7	3		CLACKAMAS		70	27.39
OR-224	1	3.27	3.36	29,200	10				7	3		CLACKAMAS		70	27.39
OR-224	1	3.28	3.37	29,200	10				7	3		CLACKAMAS		70	27.39
OR-224	1	3.29	3.38	29,200	10				7	3		CLACKAMAS		70	27.39
OR-224	1	3.30	3.39	29,200	8				5	3		CLACKAMAS		55	22.46
OR-224	1	3.31	3.40	29,200	8				5	3		CLACKAMAS		55	22.46
OR-224	1	3.32	3.41	29,200	8				5	3		CLACKAMAS		55	22.46
OR-224	1	3.33	3.42	29,200	6				4	2		CLACKAMAS	PHEASANT CT	45	18.77
OR-224	1	3.60	3.69	35,100	4		1		1	2		CLACKAMAS		70	27.88
OR-224	1	3.61	3.70	35,100	6		1		2	3		CLACKAMAS		75	33.94
OR-224	1	3.62	3.71	35,100	10		1	1	3	5		CLACKAMAS		85	38.90
OR-224	1	3.63	3.72	35,100	10		1	1	3	5		CLACKAMAS		85	38.90
OR-224	1	3.64	3.73	35,100	30		2	3	12	13		CLACKAMAS		95	74.05
OR-224	1	3.65	3.74	35,100	32		2	3	13	14		CLACKAMAS		95	74.70
OR-224	1	3.66	3.75	35,100	37		2	4	15	16		CLACKAMAS		95	76.24