Originally Prepared: February 2012
Revised: January 2018

SE 172nd Avenue/190th Drive

CORRIDOR MANAGEMENT PLAN

CLACKAMAS COUNTY

HAPPY VALLEY, OR
EST. 1965

KITTELSON & ASSOCIATES

Final Report

SE 172nd Avenue/190th Drive Corridor Management Plan

Clackamas County, Oregon

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January 2018 Revisions:

Revisions to the following pages were made to address updates to the City of Happy Valley's planned transportation system:

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- Figures 7-2A through 7-2D
- Figure 7-2E (new figure)
- Figure 7-3B (revised cross section)

May 2016 Revisions:

Revisions to the following pages were made to address the planned roadway alignment change at the SE 172nd Avenue/SE Troge Road intersection, as reviewed and approved by the City of Happy Valley and Clackamas County.

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- Page 7-3 (Figure 7-1B)
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Preface

The development of this plan was guided by the Project Management Team (PMT) and Project Advisory Committee (PAC). The PMT and PAC members are identified below, along with members of the consultant team. The PMT was responsible for reviewing all work products and providing overall project direction and final recommendations to the decision making bodies that held public hearings on the plan. The PMT included representation from Clackamas County, Damascus, Gresham, Happy Valley and Metro. The PAC was responsible for reviewing all work products and providing input and local knowledge as well as recommendations to the PMT. The PAC was made up of local citizens, business owners and local officials. Their participation was instrumental in the development of the overall Corridor Management Plan that is presented in this report.

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Section 1
Introduction

1. INTRODUCTION

This Corridor Management Plan was prepared for the SE 172nd Avenue/190th Drive roadway network in Clackamas County, Oregon. The following sections summarize the project study area, purpose and need, the goals, objectives, and evaluation criteria, and other long-term implementation considerations. These elements were defined through a collaborative effort between the Project Management Team (PMT) and the Project Advisory Committee (PAC) based on feedback from the project stakeholders and public.

PROJECT STUDY AREA

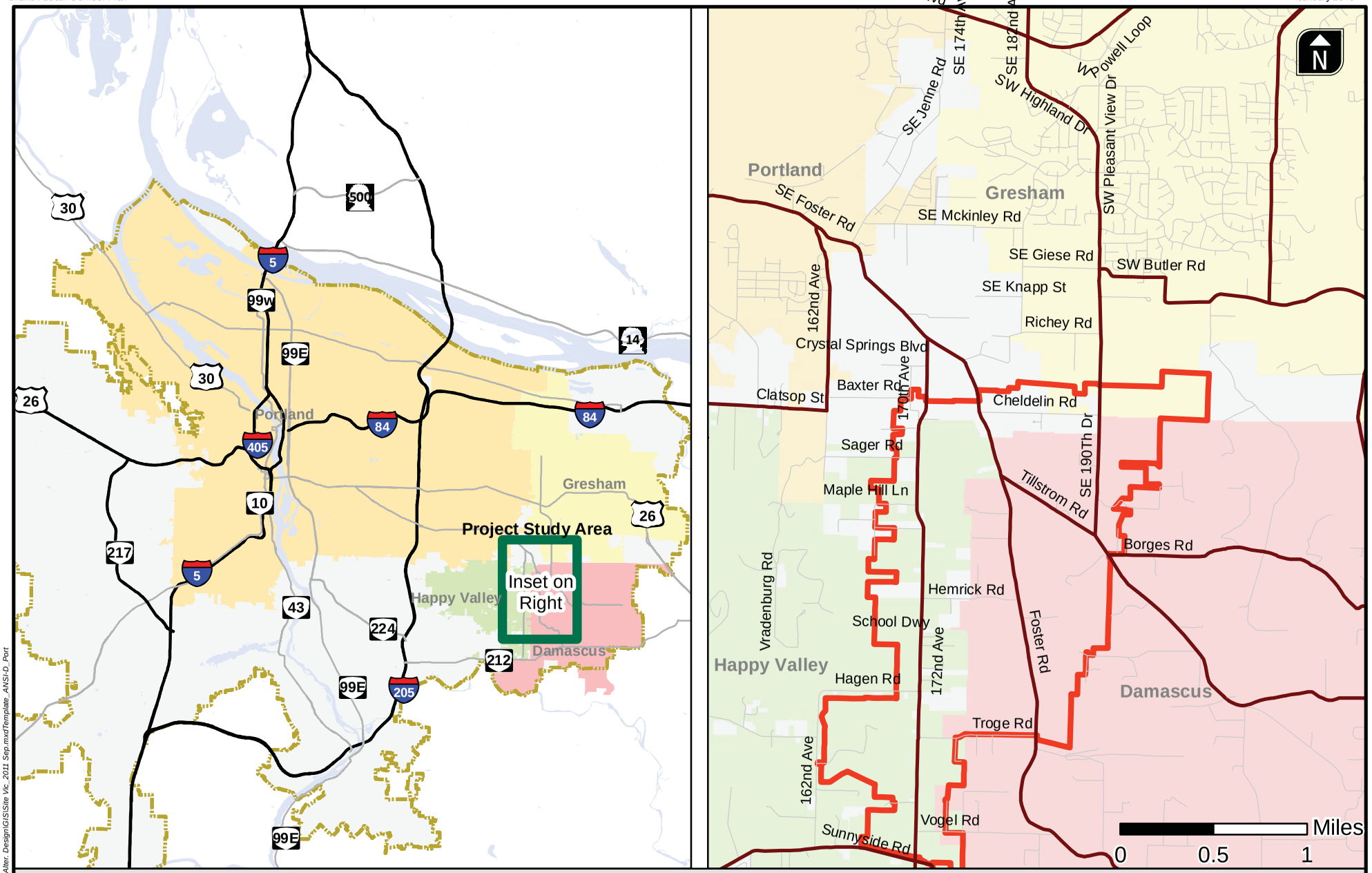
Figure 1-1 illustrates project study area (PSA) and the study vicinity. The PSA is focused along the SE 172nd Avenue and SE 190th Drive corridors and is largely within Clackamas County. The traffic operations study area goes beyond the PSA, and includes portions of Multnomah County as well as the cities of Damascus, Gresham, Happy Valley, and Portland. To better understand the impact on Gresham's street system, the operations study included intersections immediately north of the PSA that could be influenced as part of the ultimate Corridor Management Plan.

PURPOSE AND NEED

The purpose of this project was to effectively address the SE 172nd Avenue/190th Drive Corridor congestion and safety problems, serve future north-south traffic, serve expected population growth in Damascus, Happy Valley, the Pleasant Valley Plan Area and Gresham, and to serve the growing demand for regional travel.

The project purpose is demonstrated with the following Statement of Need:

- Regional and local plans for urbanization of Damascus, Happy Valley, the Pleasant Valley Plan area, and the western Clackamas County sub-region project population growth of over 15,000 new households and 9,800 jobs by 2035, which cannot be achieved without improvement to transportation facilities in the corridor and connection of SE 172nd Avenue with SE 190th Drive.
- The lack of a local street network, enhanced transit facilities and services, and a fully interconnected network of pedestrian and bicycle facilities within the SE 172nd Avenue/190th Drive Corridor prohibits the density, form, and character of development anticipated in regional and local plans.



Supplementary Study Intersection

Project Study Area

Metro Urban Growth Boundary

Site Vicinity Map and Project Study Area

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR

Figure

1-1

- Without a continuous north-south sub-regional corridor to connect OR 212/224 with I-84, north-south travel demand will continue to depend on the I-205 as well as other north-south arterial corridors in the east Portland region. The Metro travel demand model indicates that a continuous SE 172nd Avenue/SE 190th Drive corridor will attract approximately 22,000 daily trips in 2035.
- The existing SE 172nd Avenue/SE Foster Road, SE Tillstrom Road/SE Foster Road, and SE 190th Drive/SE Tillstrom Road intersections have inadequate capacity to accommodate projected 2035 peak period travel demands.
- Development along and between the SE 172nd Avenue and SE 190th Drive corridors is imminent. Identification of the future footprint of these two roadways and their potential connection is necessary to preserve and obtain right-of-way and avoid the preclusion of this connection in the future.
- There is a need to develop a well-connected, multimodal transportation system that meets the land use needs that arise from planned growth in Damascus, Happy Valley, the Pleasant Valley Plan Area and Gresham, and growth of other sub-regional north-south travel demands between I-205 and US 26 to the year 2035.

GOALS AND OBJECTIVES

The goals and objectives identified below were derived from input received from the PMT, PAC, project stakeholders, and participants in Open House #1, as well as from transportation-related goals in applicable comprehensive and transportation system plans for the project area.

A qualitative process was used to evaluate the design alternatives with respect to the criteria. The Evaluation Criteria were used to ensure that each concept and alternative was evaluated for consistency with the overall intent of the community and the project.

Goals, objectives and evaluation criteria are organized around key plan elements.

Corridor Alignment

1. Improve mobility by accommodating through traffic and freight movement, as well as serve local community/commercial/multi-family nodes.

a. Protect the function and operation of the corridor as a transportation facility of regional significance.

b. Provide for freight mobility without creating a primary north-south freight route.

c. Protect the function and operation of the existing local street network within the study area and maintain or improve local circulation.

d. Connect 2040 Growth Concept Centers.

e. Connect existing and planned parks, open space and trails.

2. Ensure that the planning and design of transportation system improvements minimize environmental, cultural and social impacts to the greatest extent possible.

a. Avoid geographic constraints and sensitive environmental resources, especially wetlands/riparian areas and stream crossings, to the greatest extent possible.

b. Preserve, improve, or create connectivity of existing habitat and tree canopy (upland and waterway) within and beyond the project area for wildlife/fish passage.

c. Identify ways to reduce carbon impacts through facility design, changes to land use patterns, and traffic flow patterns.

d. Minimize impacts to community facilities and institutions and minimize property takings and displacement of existing businesses and residences.

3. Provide flexibility to respond to changing socio-economic conditions, concurrency of development and the opportunities and constraints represented by the various plans of the jurisdictions within and adjacent to the corridor.

a. Coordinate with future land use and transportation plans for the area.

b. Consider phased development as well as projected ultimate build-out.

c. Avoid pre-empting future choices by limiting the corridor alignment.

Streetscape Features

4. Provide a unique and aesthetically pleasing design that is integrated with the place-making of each community and with sustainability goals.

a. Provide for streetscape features to integrate a relevant sense of place to various locations within the corridor while maintaining an overall appearance of consistency throughout the corridor.

b. Promote compatible land uses and help reach the jurisdictions' visions of the community.

c. Provide reasonable access to a variety of land uses.

d. Balance streetscape features with maintenance considerations.

5. Integrate environmental/Green Streets design with the natural features.

a. Enhance semi-urban streetscape place-making while preserving the historic rural character.

b. Minimize future maintenance with native or other low-maintenance vegetation.

c. Provide for an improved rainwater management that minimizes impervious surfaces.

d. Design project to avoid/minimize short and long-term erosion potential; design with the existing topography to the greatest extent possible.

6. Improve traffic safety for all users.

a. Provide for appropriate access for emergency vehicles.

b. Provide appropriate speed management measures among other improvements to enhance safety.

c. Provide for an access management plan that minimizes the number and frequency of driveway accesses.

7. Support healthy and walkable communities.

a. Plan for public transportation with appropriate access points and frequency and linkages to pedestrian, bicycle and motor vehicle travel modes.

b. Ensure that all intersections provide pedestrian/cyclist compatibility.

c. Provide boulevard-style treatments to new roadways, including medians and sidewalks buffered by planting strips with trees.

d. In commercial districts, provide urban street features to encourage lower speeds in these districts.

Land Use/Transportation Integration

8. Protect the long-term function of the corridor.

a. Ensure integration and coordination with plans and standards of Clackamas County, Damascus, Happy Valley, Gresham, Metro and special districts.

b. Provide clearly defined separation of land uses from transportation corridors (i.e. separation of residential land use frontage from arterial Right-of-way).

c. Minimize displacement of community facilities and institutions as well as existing businesses and residences.

9. Ensure that the corridor plan supports local economic development.

a. Locate roadways with consideration of how existing development is impacted, supported or leveraged for future development.

b. Encourage quality development.

c. Focus on employment that supports family wage jobs.

Project Implementation

10. Ensure effective project implementation over time.

a. Employ "least cost planning" and "backcasting" techniques to help evaluate costs and benefits and to ensure that proposed improvements are correctly sized to maximize benefits.

b. Develop state, regional and local partnerships to fund and implement the corridor plan.

c. Identify phased potential funding options.

d. Consider staged and/or development-related construction if full funding is not available.

e. Develop an ongoing monitoring program to assess plan implementation and to identify needed adjustments.

EVALUATION CRITERIA

Evaluation criteria were used to compare the various SE 172nd Avenue/190th Drive Corridor concepts and alternatives for the purpose of screening design alternatives that do not achieve the community goals, and for identifying the most viable concepts for further development. These criteria reflect the project goals and objectives as well as practical considerations such as cost and constructability. Table 1-1 lists the evaluation criteria.

Table 1-1 Evaluation Criteria

CRITERIA	CONSIDERATIONS
Vehicular Mobility	Provide an efficient north-south connection Accommodate vehicles entering from the east and west
Multi-Modal Mobility	Enhance travel distance and comfort of pedestrians and bicyclists Provide connections to trails and other multi-modal facilities Minimize grade increases and decreases Provide for future transit potential
Local Access	Maintain or enhance access to neighborhoods, businesses, and public facilities Provide efficient access for future development
Multi-Modal Safety	Improve safety and comfort for all users, especially non-auto travelers Improve emergency response time Provide flat terrain and intersections without skewed angles
Impacts to Natural Environment	Minimize impacts to streams, wetlands, riparian areas, wildlife habitats, open spaces, and other natural resources Minimize stream crossings Minimize new pavement and encroachments on area buttes
Impacts to Built Environment	Minimize right-of-way impacts on existing and future development Minimize socio-economic and cultural resource impacts Minimize noise/air impacts Minimize hazardous waste sites
Land Use Compatibility	Provide consistency with plans and standards of Clackamas County, Damascus, Happy Valley, Gresham, Metro, and special districts Provide connections to proposed future retail and residential developments
Flexibility of Implementation	Accommodate phased construction Accommodate expansion concurrent with development needs
Cost	Provide positive economic benefits compared to costs Provide high overall value
Aesthetic Character	Enhance potential visual character of the corridor Provide aesthetic elements such as landscaping Preserve the rural character of the corridor
Environmental Enhancement	Minimize environmental impact of street footprint Provide green street features
Maintenance	Minimize on-going maintenance and upkeep, including drainage systems, pavement, and landscaping
Functionality	Effectively serve role as a major arterial Provide efficient movements for all travel modes

Further details about the project purpose and need, goals and objectives, and evaluation criteria can be found in *Tech Memo #3.2 -Purpose and Need* in the *Technical Appendix*.

LONG-TERM IMPLEMENTATION CONSIDERATIONS

A goal of project implementation is to not only create a preferred build alternative that meets the long-term needs of the surrounding communities, but also to establish a clear plan by which it can be implemented. With no identified funding source and no definitive timeline for improvements, the Corridor Management Plan must be adaptable such that it can be readily implemented through design and construction in a variety of manners. For this reason, the plan has given consideration to the following questions throughout the alternative development and selection management refinement process:

Is the NEPA process applicable to this project and, if so, are we prepared to move forward in that way?

Given the physical size and potential impact of the proposed corridor improvement plan, the National Environmental Policy Act (NEPA) process may be applicable if the project were to receive federal funding for construction. The plan was coordinated with Federal Highway Administration (FHWA) representatives to ensure that the necessary analysis has been completed and documented in this report so that the NEPA process, if needed, can be efficiently navigated once initiated.

Will the project be privately or publicly funded?

Given the large development potential within project area, portions of the corridor may be funded and constructed privately as development occurs. A discussion of options for potentially developing the corridor through development fees and frontage improvements is described in *Chapter 8 – Implementation Plan*. This chapter also discusses considerations for establishing of inter-governmental agreements.

Can the project be staged to address timing and funding uncertainties?

Given the high cost of constructing the entire SE 172nd Avenue/190th Drive Corridor Management Plan, it is likely that improvements will be implemented in phases, as funding allows and as development occurs. Throughout the alternative development process, concepts were evaluated with respect to their "Flexibility of Implementation", or the ability to accommodate phased development. *Chapter 7 – Corridor Management Plan* – includes considerations for how the Preferred Build Alternative could be implemented in phases.

How is Right-of-Way (ROW) acquired under a staged and/or development –related approach?

The preferred corridor alignment alternative will require significant ROW acquisition along both the existing and proposed roadways. The method of acquiring the ROW will vary depending on whether the ROW is dedicated on a parcel basis through development, or acquired in larger segments. Chapters 7 and 8 address the needed right-of-way and mechanisms for acquiring it through land use actions or capital improvement programs.

Are wetland impacts mitigated through on-site mitigation or the Foster Creek mitigation bank? Should mitigation impacts be pre-purchased?

A thorough assessment of wetland impacts has been accomplished through the project environmental assessment. All roadway alignment alternatives involve impacts to wetlands and a strategy for mitigating the impacts will be essential before construction can occur.

Will future development be conditioned to construct segments or pay cash in lieu of physical improvements?

Metro projections show much of the study area growing significantly in coming years. In order to ensure that development contributes to establishment of the corridor, a plan must be established clearly defining whether construction or cash in lieu payments will be preferred by the local municipalities.

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Section 2 Public Involvement Process

2. PUBLIC INVOLVEMENT PROCESS

As part of the SE 172nd Avenue/190th Drive Corridor Management Plan, public involvement occurred through: stakeholder interviews conducted with business owners and citizens, a Project Advisory Committee (PAC), five public Workshops/Open Houses involving local citizens, property owners, and business owners, and public comments posted on the project website. In addition, project briefings were held throughout the project with the Clackamas County Board of Commissioners, Clackamas Transportation Advisory Committee (CTAC), the Damascus Planning Commission and City Council, Gresham Planning Commission and City Council, and the Happy Valley Planning Commission and City Council. In addition, joint pre-adoption work sessions were held with the City of Happy Valley Planning Commission and City Council and the Clackamas County Planning Commission and Board of Commissioners. Finally, public adoption hearings were held at the City of Happy Valley, Clackamas County and Metro. An overview of the meetings and stakeholder interviews are summarized below.

PURPOSE

The project team spent a significant effort on public involvement with the intent of answering four primary questions:

- What should be the theme or character of the corridor?
- How do we engage and address the needs of the three affected cities and two counties?
- How do we gain public acceptance of the preferred plan?
- How do we maintain the viability of existing land uses while developing a vision for future urbanization?

More detailed information on the public involvement process can be found in *Tech Memo #2.1 - Public Involvement* in the *Technical Appendix*.

PUBLIC AND AGENCY INVOLVEMENT

The PAC was responsible for reviewing all work products, providing input on all project documents, including the goals and objectives, technical analysis, and the proposed alternatives. A group of stakeholders were also interviewed for feedback on the proposed roadway alternatives and to assess the interests of local citizens and business owners. The Project Management Team (PMT) was the project decision-making body, reviewing feedback from the public, stakeholders and PAC. The PMT was made up of representatives from Oregon Department of Transportation (ODOT), Clackamas County, Metro and the Cities of Happy Valley and Damascus. The PMT members were selected in order to provide representation from the planning and engineering departments for each agency involved. An outline of all of the PMT, PAC, public and stakeholder meetings is included in the next section.

PAC membership was established through an application process to the Clackamas County Board of Commission. The project stakeholder group was established through input from PMT. A complete list of PAC and PMT members is included in the preface.

The project team also provided project updates periodically to the City of Damascus, City of Gresham, City of Happy Valley, the Clackamas Board of Commissioners and the Clackamas Transportation Advisory Committee (CTAC), a group of local planning officials from local agencies. These entities provided feedback on the project alternatives.

PUBLIC INVOLVEMENT PLAN

To ensure that adequate project coordination and public participation occurred throughout the development of the SE 172nd Avenue/190th Drive Corridor Management Plan, a series of PMT and PAC meetings, public workshops, and stakeholder interviews were held over the course of the project. Virtual Public Workshops were also conducted on the project website (http://172nd.com) to gather feedback from those unable to attend the public workshops. A summary of all of the meetings associated with the project, as well as the meeting objectives, are summarized in Table 2-1. A detailed account of the Public Involvement Plan is included in *Tech Memo #2.1 – Public Involvement Plan* in the *Technical Appendix,* while stakeholder feedback and public feedback are included in *Tech Memo #2.2 – Stakeholder Interview Summary* and *Tech Memo #2.3 – Public Involvement Summary* in the *Technical Appendix, respectively*.

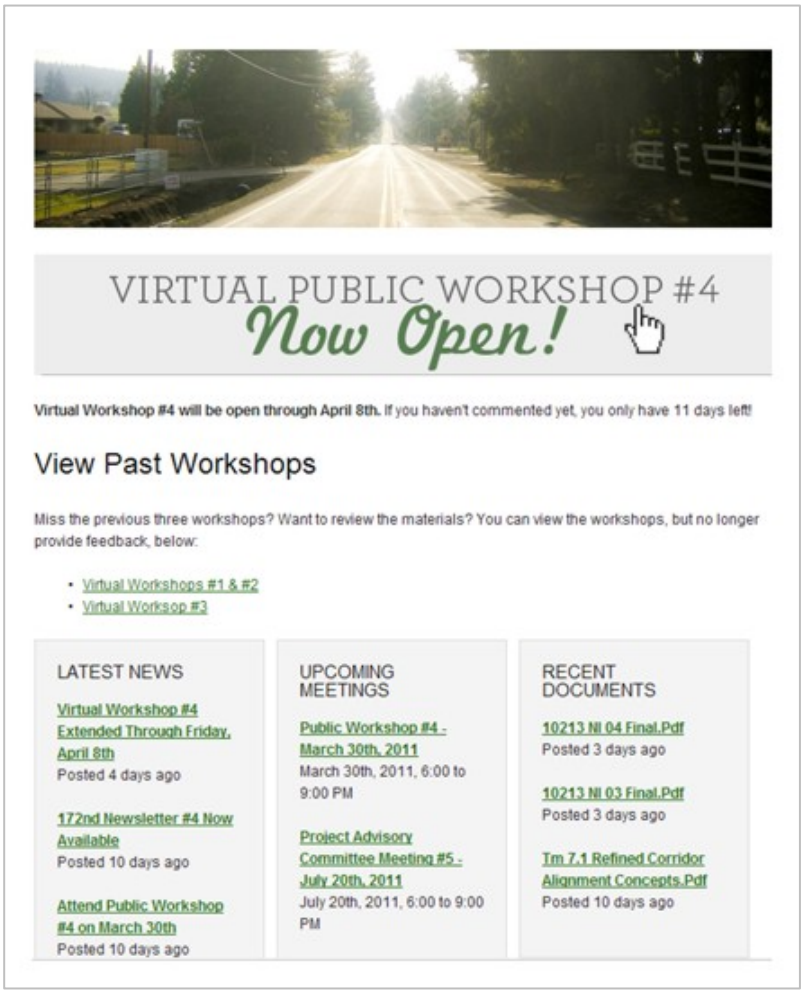


Table 2-1: Meeting Summary

Meeting Event	Date/Location	Meeting Purpose/Objectives
Kick-off Meeting	June 3rd, 2010/ Clackamas County Development Services Building	- Review Project Background and Known Issues - Review Project Schedule - Review Staff Roles - Review Draft Public Involvement Program The kick-off meeting included the PMT, representatives from Clackamas County and the project team. The meeting included discussion of the project background, schedule, team member roles and a discussion of the public involvement process.
PMT Meeting #1	July 1st, 2010/ Happy Valley City Hall	- Review Project Reference Materials - Review Project Program and Public Involvement Plan - Work Session on Agency Desires - Review Project Schedule The purpose of PMT Meeting #1 was to become familiar with the project materials; review the project schedule; discuss potential PAC members and review the project's policy framework. The project team explained the least cost planning and the 5-D Planning Methods. Potential construction schedule and current status of the Regional Transportation Plan projections were also discussed.
CTAC Meeting #1	July 27th, 2010/ Clackamas County Development Services Building	- Introduce Project Team - Project Introductory Video - Key Project Elements - Public Involvement Plan The purpose of Meeting #1 was to provide an overview of the project process and team members. The group was introduced to some of the key project elements (roadway alignment, streetscape, land use, implementation) and was given an overview of how the project team will be engaging the public throughout the project.
PAC Meeting #1	August 9th, 2010 Scouters Mountain Elementary School	- Project Background - Roles and Responsibilities - Project Timeline and Meeting Schedule - Purpose and Need - Project Elements The purpose of the first PAC meeting was to review the project background and roles and responsibilities and schedule. The group discussed potential future transit needs along the corridor. A work session was held to refine the draft "Purpose and Need" statement and the PAC was introduced to the project elements (roadway alignment, streetscape, land use, implementation)
Public Workshop #1	August 18th, 2010 Scouters Mountain Elementary School	- Project Overview - Development of the Corridor Plan Story - Work Session #1 on Purpose & Need - Work Session #2 on Community Desires/Values for Corridor The purpose of the first public workshop was to educate the public on the project process and engage the participants to help develop a "Purpose and Need" statement and to discuss the community's desires and values for the corridor.
Stakeholder Interviews – Round 1	Summer 2010	- Corridor Use and Function - Desires for Corridor - Stakeholder Involvement in Process The purpose of Interview Round 1 was to get a sense for how stakeholders are using the corridor today and what issues they hope

Meeting Event	Date/Location	Meeting Purpose/Objectives
		the future corridor alignment and streetscape will address. Stakeholders were also asked if there were certain areas that should be avoided by the future alignment and how they would like to be involved in the project process.
PMT Meeting #2	September 1, 2010/ Happy Valley City Hall	- Metro Modeling - PAC Membership - Technical Memorandum Review - Finalize PSA and Purpose and Need The PMT discussed the timing of Metro's current traffic forecasting model and its impact on future traffic analysis. The group also finalized the PAC roster and reviewed Technical Memorandums summarizing stakeholder feedback; Policy and Plan; Purpose and Need; Existing and Future Traffic Conditions; and existing environmental conditions.
PAC Meeting #2	September 15th, 2010 Scouters Mountain Elementary School	- Bus Tour of Study Area - Review of Public Workshop #2 - Review Technical Memorandums - Work Session to Finalize Purpose and Need (*Technical Memorandum 3.2*) PAC Meeting #2 began with a bus tour of some of the key sections of the existing roadways in the study area to identify constraints. The group then reviewed feedback provided by the public at Workshop #1 and by the stakeholders. The group also commented on the existing traffic analysis summarized in *Tech Memo #4.1 – Existing Transportation Conditions Analysis* in the *Technical Appendix*.
Public Workshop #2	October 6th, 2010 Scouters Mountain Elementary School	- Opportunities/Constraints - Streetscape Design - Corridor Alignment Design The project team presented the public with their findings on the existing environmental constraints within the study area and future proposed land uses. Attendees used this information to draw their preferred roadway alignments on maps depicting environmental constraints and future land use zoning. Participants also used large-scale roadway models to create their preferred roadway cross-sections for the future corridor.
PMT Meeting #3	October 14th, 2010/ Happy Valley City Hall	- Review Goals and Objectives and Design Criteria - Review Design Standards - Review Concepts from Public Workshop #2 The PMT gave their final input on the "Goals and Objectives" and "Design Standards" documents. The group also discussed the proposed speed limit for the future corridor and reviewed the roadway design and roadway alignment sketches from Public Workshop #2.
PAC Meeting #3	December 1st, 2010 Scouters Mountain Elementary School	- Review Goals and Objectives - Updated Existing/Future Traffic Projections - Review Design Criteria - Work Session to Choose Roadway Alignments/Streetscapes After a review of the project goals and objectives and existing/future traffic analysis findings, the PAC was presented with a summary of the local design standards. The 18 remaining roadway alignments and streetscape designs were then presented in poster form and participants provided feedback on which concepts they thought should be further considered and which should be eliminated.
Public Workshop #3	December 8th, 2010 Scouters Mountain	- Updates to Technical Memorandums - Review of Local Design Standards

Meeting Event	Date/Location	Meeting Purpose/Objectives
	Elementary School	- Review PAC Feedback After a review of the project goals and objectives and existing/future traffic analysis findings, participants were presented with a summary of the local design standards. The 18 remaining roadway alignments and streetscape designs were then presented in poster form, along with PAC feedback, and participants provided feedback on which concepts they thought should be further considered and which should be eliminated.
Damascus City Council	December 16th, 2010 City of Damascus City Hall	- Project Background - Project Process/Schedule The project team briefed the City Council on the project background, process and schedule as well as the purpose and current roadway alignment and streetscape concepts.
PMT Meeting #4	December 16th, 2010/ Happy Valley City Hall	- Review PAC and Public Feedback - Roadway Alignments on 3-D model - Work Session on Roadway Alignments and Streetscapes The PMT reviewed feedback received from the public and PMT on the roadway alignments and streetscapes. The project team displayed a projection of the 18 roadway alignment on a 3-D model of the study area. The PMT decided on the 5 alignments and 11 streetscapes that should be carried forward for further analysis.
Stakeholder Interviews – Round 2	Winter 2010	- Concept Input - Streetscape Input The purpose of Interview Round 2 was to give stakeholders the opportunity to review the 5 roadway alignment concepts and streetscape concepts and decide what elements they thought would best meet the project goals and objectives.
CTAC Meeting #2	February 22, 2011/ Clackamas County Development Services Building	- Current Alignments - Next Steps The project team briefed the CTAC on the public involvement process since the last CTAC presentation in July. The team also presented the current alignments and streetscapes being considered for implementation.
PAC Meeting #4	March 16th, 2011 Scouters Mountain Elementary School	- Review of Public Involvement - Traffic Projections - Evaluation Criteria - Concept Evaluation The project team presented a recap of public involvement to date and the results of the traffic analysis for the 5 roadway alignments currently under consideration. The team also presented the project evaluation criteria and then conducted a work session where participants could review the project team's evaluation of the 5 remaining concepts and choose the 3 that they desired to have further evaluated.
Public Workshop #4	March 30th, 2011 Scouters Mountain Elementary School	- Review of Public Involvement - Traffic Projections - Evaluation Criteria - Concept Evaluation The project team presented a recap of public involvement to date and the results of the traffic analysis for the 5 roadway alignments currently under consideration. The team also presented the project evaluation criteria and then conducted a work session where participants could review the project team's evaluation of the 5

Meeting Event	Date/Location	Meeting Purpose/Objectives
		remaining concepts and choose the 3 that they desired to have further evaluated.
PMT Meeting #5	April 11th, 2011/ Happy Valley City Hall	- Review of Public Involvement - Traffic Projections - Evaluation Criteria - Concept Evaluation The project team presented the results of the traffic analysis for the 5 roadway alignments currently under consideration. The team also presented the project evaluation criteria and then conducted a work session where the PMT members could review the project team's evaluation of the 5 remaining concepts, as well as the public and PAC feedback, and choose the 3 that they desired to have further evaluated (AT2, AT6, AS10A).
Federal Highway Administration (FHWA) Meeting #1	April 21, 2011 Kittelson & Associates	- Project Background - FHWA Process The project team provided FHWA officials with a project background and discussed what steps the team can take to ensure that the final documentation can readily be moved forward through the NEPA process, if funding becomes available in the future.
Damascus City Planning Commission	April 26th, 2011 City of Damascus City Hall	- Current Alignments - Next Steps The project team briefed the City Council on the public involvement process. The team also presented the current alignments and streetscapes being considered for implementation and the next steps in the project.
City of Portland Bureau of Transportation (PBOT)	April 27th, 2011 City of Portland	- Coordination with Outer Powell Project - Briefing on 172nd Status Larry Conrad briefed representatives from PBOT on the scope and status of the 172nd Avenue project and discussed coordination efforts with the outer Powell Boulevard project.
City Council	May 3, 2011 Happy Valley City Hall	- Current Alignments - Next Steps The project team briefed the City Council on the public involvement process. The team also presented the current alignments and streetscapes being considered for implementation and the next steps in the project.
FHWA Meeting #2	May 18, 2011 Kittelson & Associates	- Current Status - Next Steps The project team provided an update on the project status and discussed final project documentation.
City Council	June 14th, 2011 Gresham City Hall	- Projected Traffic Volumes in Gresham - Current Alignments - Next Steps The project team briefed the City Council on the public involvement process to date and provided traffic volume projections and operations at intersections north of the study area in the City of Gresham. The team also presented the current alignments and streetscapes being considered for implementation and the next steps in the project.
Clackamas County Board of Commissioners	June 14th, 2011 Clackamas County	- Current Alignments - Next Steps The project team briefed the County Commissioners on the public

Meeting Event	Date/Location	Meeting Purpose/Objectives
	Development Services Building	involvement process. The team also presented the current alignments and streetscapes being considered for implementation and the next steps in the project.
PMT Meeting #6	June 27th, 2011/ Happy Valley City Hall	- Recent Meetings - Updated/New Technical Memorandums - Recent Concept Development - Concept Evaluation The project team briefed the group on recent meetings with the FHWA, Clackamas County and the Cities of Happy Valley, Gresham, Damascus and Portland. The team then presented the results of the existing environmental conditions study transportation analysis. The PMT then reviewed the recent updates to the Three Most Promising Roadway Alignments and decided that any of the three would adequately meet the project goals and that, though AS10A scored highest based on the evaluation criteria, it relies heavily on a future connection from Foster Road south to 212, which is uncertain.
Planning Commission	June 27th, 2011 Gresham City Hall	- Projected Traffic Volumes in Gresham - Current Alignments - Next Steps The project team briefed the City Council on the public involvement process to date and provided traffic volume projections and operations at intersections north of the study area in the City of Gresham. The team also presented the current alignments and streetscapes being considered for implementation and the next steps in the project.
Stakeholder Interviews – Round 3	Summer 2011	- Concept Input - Streetscape Input The purpose of Interview Round 3 was to give stakeholders the opportunity to review the 3 roadway alignment concepts and streetscape concepts and indicate their preference as to what should be chosen as the Build Alternative.
Public Open House	July 20th, 2011 Scouters Mountain Elementary School	- Review of Public Involvement - Updated Traffic Projections - Evaluation Criteria - Concept Evaluation/Preferred Alternative The project team presented a recap of public involvement to date and the results of the traffic analysis for the 3 roadway alignments currently under consideration. The team also presented the project evaluation criteria and then conducted a work session where participants could review the project team's evaluation of the 3 remaining concepts and choose the 1 that they desired to have further evaluated.
PAC Meeting #4	July 27th, 2011 Scouters Mountain Elementary School	- Review of Public Involvement - Updated Traffic Projections - Evaluation Criteria - Concept Evaluation/Preferred Alternative The project team presented a recap of public input to date and the results of the traffic analysis for the 3 roadway alignments currently under consideration. The team also presented the project evaluation criteria and then conducted a work session where participants could review the project team's evaluation of the 3 remaining concepts and indicate the 1 that they desired to have further evaluated.
PMT Meeting #7	August 4th, 2011/ Happy Valley City Hall	- Review of Stakeholder/PAC/Public Feedback - Work Sessions on Roadway Alignment and Streetscape - Discussion of Implementation Plan

Meeting Event	Date/Location	Meeting Purpose/Objectives
		The project team presented a summary of the feedback received from the stakeholders, PAC and Public along with a preliminary recommendation the Concept AT2 be chosen as the Preferred Build Roadway Alignment Alternative. The group then discussed the three remaining Alternatives and agreed that AT2 should be the Build Alternative. The group also discussed the 3-lane and 5-lane typical streetscapes that were developed by the project team and agreed on a few modifications. The group then discussed implementation and funding strategies for the corridor and agreed to address this further at the next meeting.
CTAC Meeting #3	August 23rd, 2011/ Clackamas County Development Services Building	- Current Alignments - Next Steps The project team briefed the CTAC on the public involvement process since the last CTAC presentation in February. The team also presented the preferred roadway alignment and streetscape and discussed the upcoming adoption process.
FHWA Meeting #3	September 14th, 2011	- Current Status - Next Steps The project team provided an update on the project status and discussed final project documentation.
PMT Meeting #8	September 22nd, 2011 Happy Valley City Hall	Reviewed the draft Corridor Management Plan, Design Drawings and Environmental Baseline Report.
Happy Valley Planning Commission/City Council Joint Work Session	October 18th, 2011 Happy Valley City Hall	-Project History -Impact to Happy Valley TSP The project team presented a brief summary of the project history and public involvement summary, as well as an overview of the impacts of the plan on the Happy valley Transportation System Plan.
Clackamas County Planning Commission Work Session	October 24th, 2011 Clackamas County Development Services Building	-Project History -Impact to County Roadway Network The project team presented a brief summary of the project history and public involvement summary, as well as an overview of the impacts of the plan on the County Roadway system.
FHWA Meeting #4	October 26th, 2011	- Current Status - Next Steps The project team provided an update on the project status and discussed final project documentation.
FHWA Meeting #5	December 30th, 2011	- Current Status - Next Steps The project team reviewed the CMP and Environmental Baseline with representatives from ODOT and FHWA.
Clackamas County Planning Commission Hearing	December 12th, 2011 Clackamas County Development Services Building	Project team presented project documentation to Planning Commission for approval. Commission voted 4:1 in favor of recommending approval. Did not receive 5 votes and; therefore, did not have formal recommendation.
Clackamas County Board of Commissioners Work Session	January 10th, 2012 Board of County Commissioners	-Project History -Impact to County Roadway Network The project team presented a brief summary of the project history and public involvement summary, as well as an overview of the impacts of the plan on the County Roadway system.

Meeting Event	Date/Location	Meeting Purpose/Objectives
Clackamas County Board of Commissioners Hearing	January 19th, 2012 Board of County Commissioners	Project team presented project documentation to Board of Commissioners for approval. Board voted to adopt the Corridor Management Plan.
Happy Valley Planning Commission Hearing	January 24th, 2012 Happy Valley City Hall	City staff presented project documentation to Planning Commission for approval. Planning Commission voted to adopt the Corridor Management Plan.
Happy Valley City Council Hearing	February 21st, 2012 Happy Valley City Hall	City staff presented project documentation to City Council for approval. Council voted to adopt the Corridor Management Plan.

Section 3 Review of Adopted Plans and Policies

3. REVIEW OF ADOPTED PLANS AND POLICIES

INTRODUCTION

This chapter provides an overview of the plan and policy documents that affect the land use and transportation systems in the vicinity of the SE 172nd Avenue/190th Drive Corridor. The regulatory context involves state, regional, county, and local levels of governance that directly impact transportation planning in the area. A policy framework for the corridor planning process is provided which identifies any policy or regulatory amendments that may need to be made to implement the SE 172nd Avenue/190th Drive Corridor Management Plan. Details of the technical analysis can be found in *Tech Memo #3.1 - Purpose and Need* in the *Technical Appendix*.

BACKGROUND

The land surrounding the SE 172nd Avenue/190th Drive Corridor was recently added to the Portland Metropolitan Urban Growth Boundary (part in 1998 and the remainder in 2002) and is planned for urban development at an average residential density of at least 10 units per net buildable acre[1]. There also are planned commercial and employment areas within the cities of Damascus and Happy Valley. Today, SE 172nd Avenue and SE 190th Drive lack the needed continuity and capacity to serve future traffic demand created by this anticipated urban growth. Thus, the purpose of this SE 172nd Avenue/190th Drive Corridor Management Plan is to identify and assess transportation system improvements needed to serve future north-south traffic demand that will result from the build-out of developable land in Happy Valley, Damascus, and Gresham, and to accommodate regional growth.

There are two jurisdictions within which lands in the study area lie: the cities of Happy Valley and Damascus. In addition, lands just outside the study area are within the jurisdiction of Clackamas County, Multnomah County and the City of Gresham. Figure 1-1 shows these jurisdictional boundaries.

[1] In Damascus, residential densities were assumed to be eight units per acre.

REGULATORY FRAMEWORK

The planning documents that provide the regulatory framework for this plan are described below.

Statewide Plan and Policies

The Statewide Planning Goals express the state's policies on land use and related topics such as economic development, public facilities, and transportation. Oregon's statewide goals are achieved through local comprehensive planning. State law requires each city and county to adopt a comprehensive plan and the zoning and land-division ordinances needed to put the plan into effect. These local comprehensive plans must be consistent with the Statewide Planning Goals. Plans are reviewed for such consistency by the state's Land Conservation and Development Commission (LCDC). When LCDC officially approves a local government's plan, it becomes the controlling document for land use in the area covered by that plan.

The Transportation Planning Rule (TPR) Statewide Goal #12 requires that land use plans and the transportation system plan are consistent with one another. It requires cities, counties, and the state to adopt transportation system plans that integrate land use and transportation planning.

The Oregon Highway Plan and the Oregon Transportation Plan are not directly relevant because the SE 172nd Avenue/190th Drive corridors do not connect to an ODOT facility. Thus, these two documents were not reviewed.

Regional Plans and Policies

All transportation plans developed within the Portland metropolitan area are required to be consistent with the Regional Transportation Plan (RTP), developed by the Metro Regional Government (Metro). The RTP includes goals and policies that integrate land use and transportation planning, identifies needed improvements to the transportation system, and defines a cost-feasible set of improvements the region intends to fund and implement over the next 20+ years.

Local Plans and Policies

For local governments, the comprehensive plan documents contain objectives and policies that are intended to guide growth and development over a 20-year planning horizon. They are based on the specific qualities and characteristics of the community and reflect local plans and needs for future improvements. The comprehensive plans are intended to be consistent with the Statewide Planning Goals and the RTP. The city and county Transportation System Plans (TSPs), the transportation element

of the local comprehensive plans, contain policies relating to the multimodal transportation system and outline planned transportation improvements, regardless of jurisdiction or funding source.

The transportation and land use plans reviewed for policies and regulations applicable to the SE 172nd Avenue/190th Drive Corridor Management Plan, are shown in Table 3-1.

Table 3-1: Applicable Plans and Policy Documents

Plan / Policy Document
Oregon Statewide Planning Goals (2010)
– Goal 1: Public Involvement
– Goal 2: Land Use Planning
– Goal 5: Natural Resources, Scenic and Historical Areas, and Open Spaces
– Goal 6: Air, Water and Land Resources Quality
– Goal 7: Areas Subject to Natural Hazards
– Goal 8: Recreational Needs
– Goal 9: Economic Development
– Goal 12: Transportation and Oregon Administrative Rule 660, Division 12 (TPR)
Metro Plans
– Metro Regional 2040 Growth Concept (Metro, December 1995)
– Metro Regional Transportation Plan Update (Metro, March 2010)
– Metro Powell/Foster Corridor Transportation Plan (Metro November 2003)
– Wildlife Crossings
– Creating Livable Streets
Clackamas County Plans
– Clackamas County Comprehensive Plan (Land Use Element)
– Clackamas County Transportation System Plan
– Sunrise Corridor EIS (draft)
City Plans
– City of Happy Valley Comprehensive Plan (Land Use Element)
– City of Happy Valley Transportation System Plan
– City of Damascus Comprehensive Plan (draft) (Land Use Element)
– City of Gresham Transportation System Plan
– City of Gresham Community Development Plan, Vol. 1.1, Vol. 1.2 (Pleasant Valley Plan), Vol. 3 (Pleasant Valley Plan District)

COORDINATION WITH NEPA PROCESS

This planning effort has been conducted to provide information and coordination necessary for future National Environmental Policy Act (NEPA) efforts. This would allow Federal Highway Administration (FHWA) to make findings that they are in agreement with the assumptions, and processes used to develop the Preferred Build Alternative that could eventually be relied upon in a future NEPA action that evaluates potential impacts of build and no-build alternatives.

SUMMARY

There is substantial consistency across the relevant planning and policy documents related to land use and transportation in the SE 172nd Avenue/190th Drive Corridor planning area. The plans that provide direction to the ultimate development of this area lead to a balanced land use-transportation system. The elements of this system are described below. Urban levels of development are anticipated by all jurisdictions with land use authority. A mix of land uses is anticipated that provides housing, services, and employment, along with parks, recreation facilities, and other urban amenities. The mix, density, and arrangement of land uses are expected to be walkable, transit-oriented, and transit-supportive. Industrial and other employment areas are planned that will provide jobs at a sub-regional scale and generate and/or attract freight movements to/from the area. A network of arterials and collectors is planned that includes parallel facilities on both sides of 172nd Avenue, along with an interconnected set of pedestrian and bicycle facilities that link neighborhoods to transit facilities and all pedestrian and bicycle generators. Transit service is expected on 172nd Avenue and to other transit-supportive places in the planning area. Freight movements are also anticipated on the corridor. Finally, a plan is in place to provide a typical four-lane roadway with left-turn opportunities, along with attractive pedestrian, bicycle, and transit facilities and services.

The fact that the Damascus Comprehensive Plan is not yet adopted creates a coordination issue for Clackamas County to develop this corridor plan, due to the uncertainty of the mix and density of future land uses in Damascus. The boundary between Happy Valley and Damascus/Clackamas County crisscrosses the SE 172nd Avenue/190th Drive Corridor. Lacking an adopted Damascus Comprehensive Plan, this area falls under the County's jurisdiction and Comprehensive Plan. The County's Plan does not provide the opportunity for urban densities within the City. Thus, agreements among the decision makers must be reached as to the appropriate land use assumptions to be made for the Damascus urban growth boundary. This planning effort has included careful coordination with City of Damascus officials, and consideration of preliminary land use and transportation plans, goals and objectives, with the intent to maintain consistency with their planning efforts.

Section 4 Existing Conditions

4. EXISTING CONDITIONS

This chapter provides a summary overview of the existing transportation operations and safety conditions, existing infrastructure, and existing environmental conditions.

EXISTING TRANSPORTATION

This section identifies the current transportation system, traffic operations, and access conditions within the SE 172nd Avenue and SE 190th Drive Project Study Area (PSA). Traffic counts used in this analysis were collected in October 2010, after the completion of the roadway construction project on SE 172nd Avenue between Sunnyside Road and Clackamas Highway (OR 212). The PSA is focused along the SE 172nd Avenue and SE 190th Drive corridors and is largely within Clackamas County; however, six intersections immediately north of the PSA in Pleasant Valley and Gresham are also included in the operational analysis. Details of existing transportation conditions can be found in *Tech Memo #4.1 - Existing Transportation Conditions Analysis* in the *Technical Appendix.*

The existing transportation system in the PSA includes a skeleton-level of arterials and collectors with very minimal pedestrian and bicycle facilities. No transit or other transportation related facilities (except for pipeline and transmission lines discussed in Section 4C) exist within the PSA. The remainder of this subsection discusses the roadway, pedestrian, bicycle, and nearby transit facilities.

Transportation Facilities

Figure 4-1 identifies the existing lane configurations and traffic control devices at the study intersections. Table 4-1 provides a summary of the key roadway facilities within the PSA.

Table 4-1: Existing Transportation Facilities within the PSA and Roadway Designations

Roadway	Classification (Ownership)[1]	Cross-Section (lanes)	Speed-Limit	Side-walks	Bicycle-Lanes	On-Street-Parking
SE 172nd Avenue	Minor Arterial (Clackamas Co.) Rural Collector (Multnomah Co.) Major Arterial[5] (Happy Valley)	2 / 3[2]	45[3]	No	No	No
SE 190th Drive	Collector (Clackamas Co.) Rural Arterial (Multnomah Co.) Minor Arterial (Gresham)	2	40	No	No	No
SE Sunnyside Road	Major Arterial (Clackamas Co., Happy Valley[5])	5[2]	45	Yes	Yes	No
SE Foster Road	Minor Arterial (Clackamas Co.) Rural Arterial (Multnomah Co.) District Collector (Portland)	2	45[4]	No	No	No
SE Tillstrom Road	Minor Arterial (Clackamas Co.)	2	Not Posted[3]	No	No	No
Scouters Mountain School Driveway	Local (Clackamas Co.)	2	Not Posted[3,4]	Yes	Yes	No
Other Clackamas County Local Roadways	Local (Clackamas Co.)	2	40 / 45 / Not Posted[3,7]	No	No	No

[1] Roadway ownership and classification designation is based upon the Clackamas County TSP, Multnomah County TSP, Happy Valley TSP, Gresham TSP, and Portland TSP.

[2] Roadway cross section expands to 6+ lanes at the intersection of SE 172nd Avenue and SE Sunnyside Road

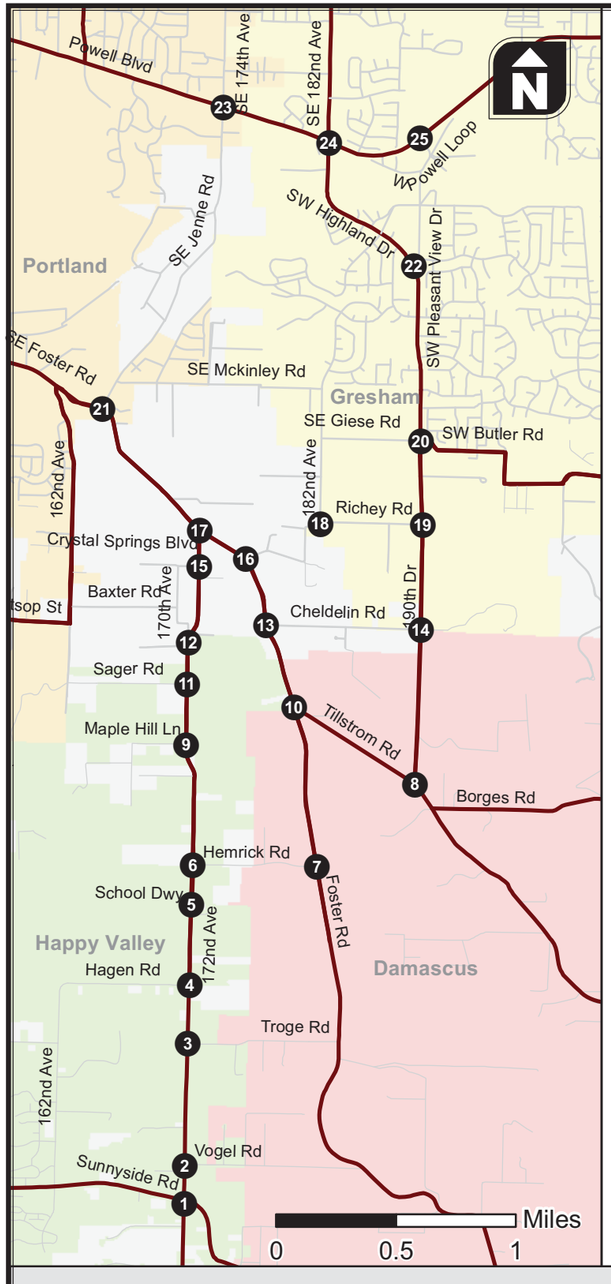
[3] Unposted speed defaults to 55 miles per hour, according to Oregon Vehicle Code, 811.105 (e).

[4] School zone near Scouters Mountain Elementary School of 20 mph when children are present.

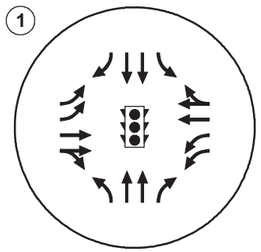
[5] Per City of Happy Valley TSP, Happy Valley does not own or maintain roadway.

[6] Roadway cross section expands to four or five lanes between study intersections.

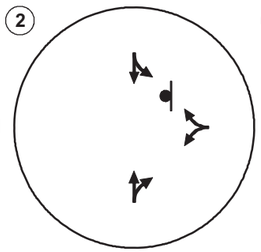
[7] SE Vogel Road and SE Hagen Road are posted at 40 mph; SE Cheldelin Road is posted at 45 mph.



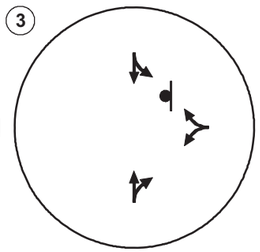
SE Sunnyside Rd & SE 172nd Ave



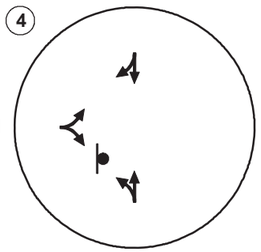
SE Vogel Rd & SE 172nd Ave



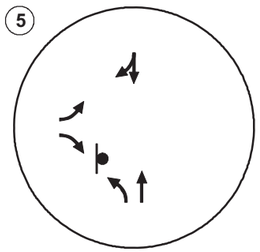
SE Troge Road & SE 172nd Ave



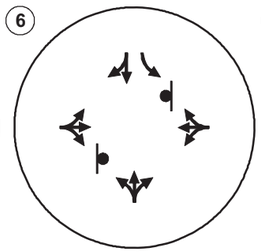
SE Hagen Rd & SE 172nd Ave



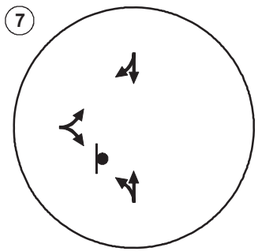
School Driveway & SE 172nd Ave



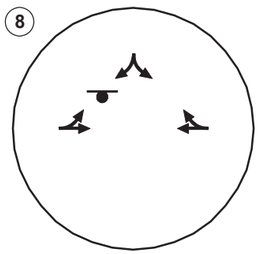
Tony's Garden Access & SE 172nd Ave



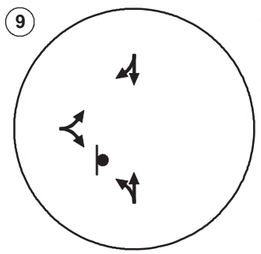
SE Hemrick Rd & SE Foster Rd



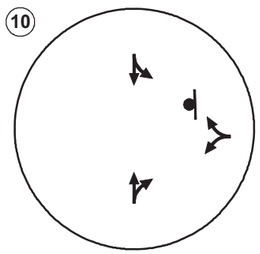
SE Tillstrom Rd & SE 190th Dr



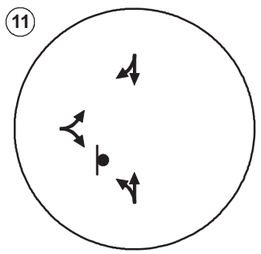
SE Maple Hill Ln & SE 172nd Ave



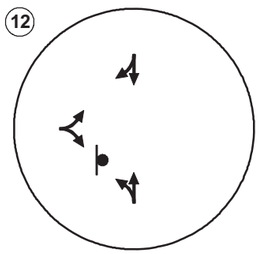
SE Foster Rd & SE Tillstrom Rd



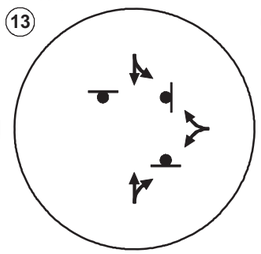
SE Sager Rd & SE 172nd Ave



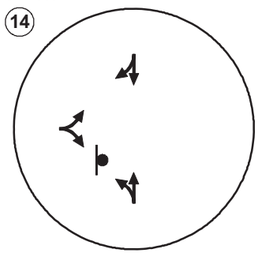
SE 170th Ave & SE 172nd Ave



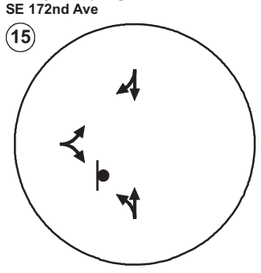
SE Cheldelin Rd & SE Foster Rd



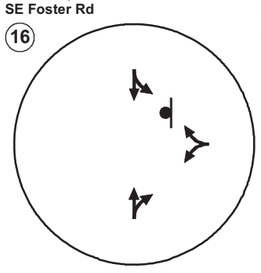
SE Cheldelin Rd & SE 190th Dr



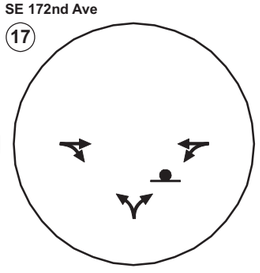
SE Crystal Springs Blvd & SE 172nd Ave



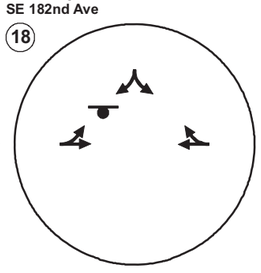
SE Richey Rd & SE Foster Rd



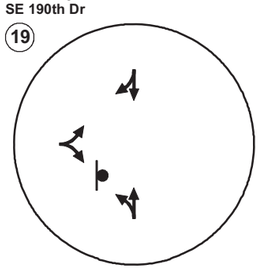
SE Foster Rd & SE 172nd Ave



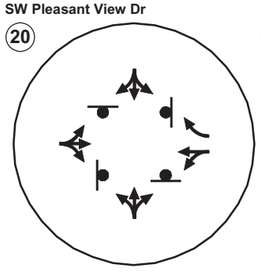
SE Richey Rd & SE 182nd Ave



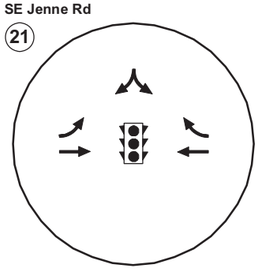
SE Richey Rd & SE 190th Dr



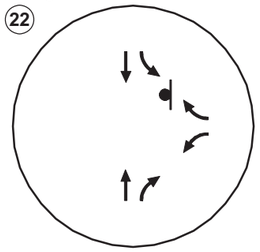
SW Butler Rd & SW Pleasant View Dr



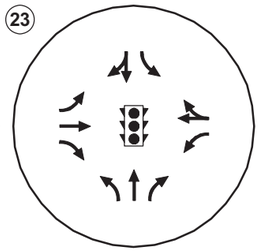
SE Foster Rd & SE Jenne Rd



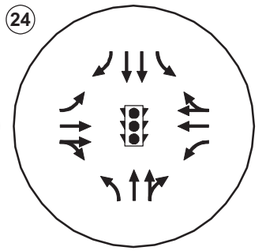
SW Pleasant View Dr & SW Highland Dr



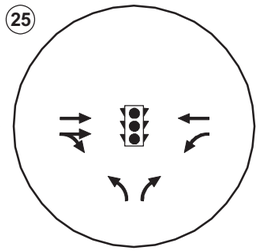
SE Powell Blvd & SE 174th Ave



SE Powell Blvd & SE 182nd Ave



SE Powell Blvd & W Powell Loop



StudyIntersections
Arterial/Collector Streets
Local Street
Traffic Signal
Stop Sign

Existing Lane Configurations & Traffic Control Devices

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure

4-1

K:\H_Portland\proj\file\10213 - 172nd Ave Sunnyside Rd Alter. Design\existing conditions\LaneConfig.mxd February

As shown in Figure 4-1, the majority of the project study area includes two-lane rural roadways, with two-way stop controlled intersections for minor approaches. The exceptions are SE Sunnyside Road, a major arterial, recently widened to five lanes, which has an existing traffic signal in the study area at the recently reconstructed intersection of SE Sunnyside Road and SE 172nd Avenue. The four other traffic signals at study intersections are located along SE Powell Boulevard at 174th Avenue, 182nd Avenue, and W Powell Loop (east end), and one at the SE Foster Road/SE Jenne Road intersection.

A summary of the key arterial roadway facilities is provided below.

SE 172ND AVENUE

SE 172nd Avenue, north of SE Sunnyside Road is currently a two-lane rural road with limited or no shoulders and open drainage treatments on each side of the roadway. SE 172nd Avenue terminates on the north at SE Foster Road as a stop-controlled approach. The SE 172nd Avenue corridor terminates to the south outside the PSA at Highway 212. Within the PSA, SE 172nd carries about 6,000 to 9,000 vehicles per day at the north end (Foster) and south end (Sunnyside), respectively. It's worth noting that the recently completed widening and modernization project along SE 172nd Avenue immediately south of the PSA to Highway 212 converted the roadway from a rural two-lane roadway to a suburban 5-lane cross-section.

SE 190TH DRIVE

SE 190th Drive is currently a two-lane rural road with no shoulders, and drainage ditches on each side. All intersections within the PSA are two-way stop controlled from the side streets. SE 190th Drive terminates on the south end at Tillstrom Road/Borges Road at a stop-controlled approach. SE 190th Drive contains relatively steep terrain up and over a forested butte in the southern portion (south of Cheldelin Road). SE 190th Drive transitions to a suburban character roadway in Gresham, and carries about 2,000 to 7,000 vehicles per day at the south and north end, respectively. This key north-south roadway offers a strategic corridor for mobility and access into the PSA in Clackamas and Multnomah Counties.

SE SUNNYSIDE ROAD

SE Sunnyside Road was recently widened and upgraded in the PSA to a suburban 5-lane section, with bike lanes and sidewalks. The intersection of SE Sunnyside Road with SE 172nd Avenue was built out to support long-term future growth as shown in Figure 4-1. SE Sunnyside Road is a key east-west connection (major arterial per Clackamas County and Happy Valley) between the PSA and Interstate 205 to the west.

OTHER KEY FACILITIES

Other key arterial and collector streets in the study area include:

- SE Foster Road – a rural, minor arterial 2-3 lane roadway with no shoulders, and drainage ditches, which serves as a continuous connection through the PSA, oriented northwest-to-southeast directionally and terminating from the City of Portland to Damascus.
- SE Tillstrom Road – a rural, minor arterial 2-3 lane with no shoulders, and drainage ditches which is oriented northwest-to-southeast directionally in the PSA.

Pedestrian and Bicycle Facilities

Sidewalks and bicycle lanes are not provided throughout most of the PSA. The one exception is Sunnyside Road, which has both bike lanes and sidewalks. The major pedestrian and bicycle trip generators within the PSA include the Pleasant Valley Elementary School, Scouters Mountain Elementary School, and the Abundant Life Church. Planned land uses will likely increase the number of pedestrian and bicycle generators.

There are no current trail or greenway connections identified within the PSA, although there are numerous trail corridors planned.

Public Transportation Facilities

Fixed route transit service does not currently exist within the PSA, although there are two transit routes (#155 and #82) with service within one mile the PSA. :

- Route 155: Sunnyside runs east and west along Sunnyside Road between the Clackamas Town Center Transit Center and Happy Valley (at 157th Avenue).
- Route 82: Eastman/182nd provides weekday service between Gresham and Rockwood, running on SE 190th Drive on the north end of the study area.

Tri-Met's LIFT program for the disabled does operate in the PSA.

Safety

This section summarizes the crash history and existing physical elements that may affect corridor safety.

CRASH HISTORY

Crash histories between years 2005 and 2009 of each of the study intersections were reviewed to identify potential safety issues. The following observations are made based on a review of the crash data:

- Intersection crash rates are all well below 1.0 (crashes per million entering vehicles), which is generally considered a threshold that may trigger further investigation. A crash trend is noticed at Tillstrom Road/Foster Road (turning-type), 182nd Avenue/Richey Road (turning-type), Richey Road/Foster Road (rear-end), 172nd Avenue/Foster Road (fixed object and turning-type), Powell Boulevard/174th Avenue (turning-type, rear-end and fixed object), Powell Boulevard/182nd Avenue (turning-type, rear-end and fixed object), Powell Boulevard/West Powell Loop (turning-type and rear-end), and 190th Drive/Giese Road-Butler Road (angle crashes).
- In the five years of crash data analyzed, there were two fatalities reported. One fatality occurred along Richey Road, which was a fixed object crash on a rainy night, where the driver (48 year old male) was speeding and ran off the road at the horizontal curve just west of the 182nd Avenue intersection, not following the curve warning sign. Another fatality occurred at the 190th Drive/Giese Road-Butler Road intersection where drivers of both vehicles violated traffic controls (stop signs).

These crash trends and reported fatalities were taken into consideration as project roadway concepts and alternatives were developed.

PHYSICAL ELEMENTS THAT MAY AFFECT SAFETY

There are numerous physical characteristics of transportation facilities that may affect safety, including:

- Passing zones – as the area has become more suburban, these passing zones may promote higher speeds where these speeds may be undesirable;
- Fences and obstructions that obstruct sight distance;
- Inconsistent street signs that increase drivers confusion, and;
- Poorly aligned intersections.

Existing Traffic Volumes and Operations

This section describes the existing traffic volumes and resultant peak hour traffic operations within the PSA. In recognition that the weekday p.m. peak hour is typically the most critical time period with respect to vehicle traffic volume demand on the street system, traffic operations were only evaluated during this critical time period. Careful examination of local traffic volumes revealed that weekday p.m. peak hour volumes are approximately 30-40% greater than the equivalent weekday a.m. peak hour volumes. Figure 4-2 shows the average weekday daily volume profile on 172nd Avenue.

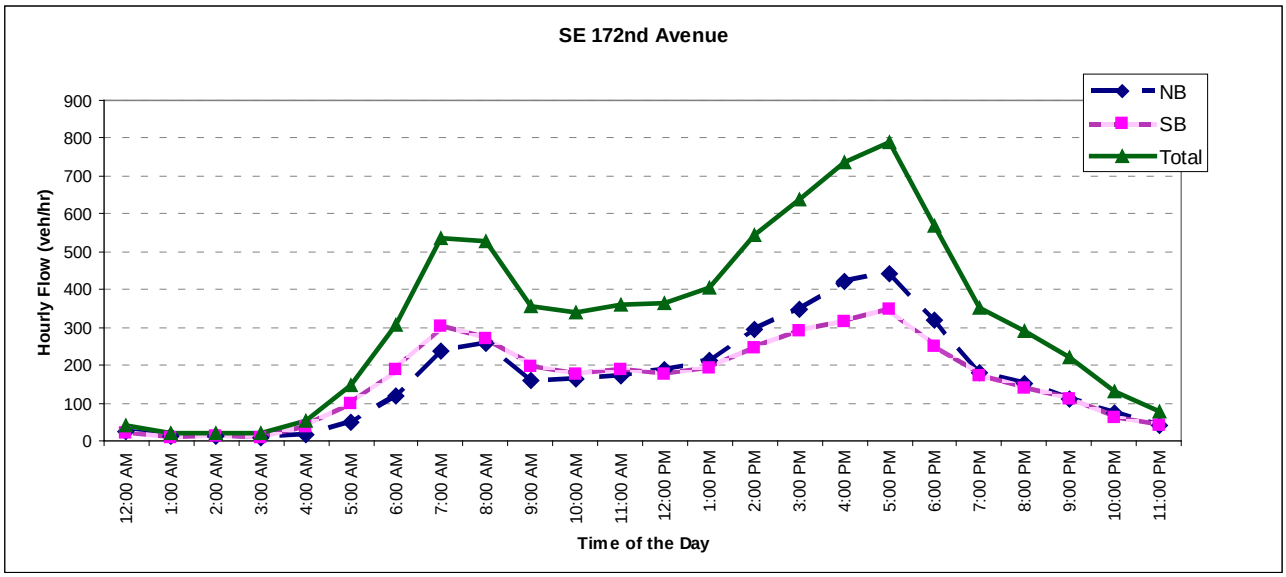
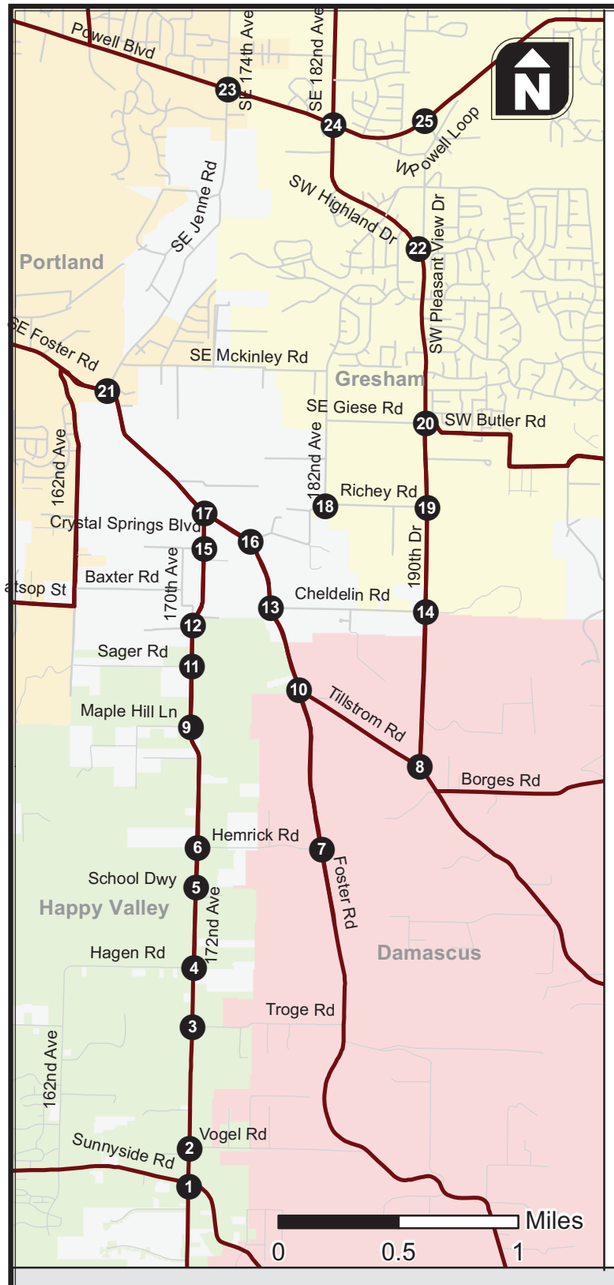


Figure 4-2: Average Weekday Daily Volume Profile on 172nd Avenue

The two-way average weekday daily traffic (ADT) volume at the link count location for 172nd Avenue (north of Hagen Road) was 8,000, with average daily truck percentage of approximately six percent. The 85th-percentile speed along 172nd Avenue is approximately 47 mph, which is close to the speed limit of 45 mph on this roadway.

The weekday p.m. peak hour volumes and operational indicators are shown in Figure 4-3. As shown in this figure, all of the study intersections meet the County and Metro standards (i.e. level-of-service (LOS) "D" or better and 0.99 volume-to-capacity ratio (v/c ratio) or better), with the exception of the stop-controlled Foster Road/172nd Avenue and SW Highland Drive/SW Pleasant View Drive



Sunnyside Rd & SE 172nd Ave (1)
411, 258, 139 → LOS=C, Del=21.6, V/C=0.33 ← 12, 209, 5
91, 137, 6 ↑ 220, 86, 17

SE Vogel Rd & SE 172nd Ave (2)
CM=WB, LOS=C, Del=17.1, V/C=0.11
441, 109 ↑ 309, 9 ↓ 7, 27

Troge Road & SE 172nd Ave (3)
CM=WB, LOS=C, Del=15.3, V/C=0.07
402, 37 ↑ 289, 11 ↓ 5, 17

Hagen Rd & SE 172nd Ave (4)
54, 8 → CM=EB, LOS=C, Del=17.1, V/C=0.19
6, 402 ↑ 27, 295

School Driveway & SE 172nd Ave (5)
3, 4 → CM=EB, LOS=B, Del=12.9, V/C=0.01
3, 446 ↑ 3, 323

Hemrick Rd & SE 172nd Ave (6)
CM=WB, LOS=C, Del=16.8, V/C=0.17
285, 166 ↑ 1, 282, 9 ↓ 14, 41

Hemrick Rd & SE Foster Rd (7)
168, 5 → CM=EB, LOS=C, Del=15.6, V/C=0.37
11, 201 ↑ 42, 185

SE Tillstrom Rd & SE 190th Dr (8)
44, 197 → CM=SB, LOS=B, Del=13.2, V/C=0.20 ← 66, 100
18, 74 ↓

Maple Hill Ln & SE 172nd Ave (9)
2 → CM=EB, LOS=B, Del=10, V/C=0.00
4, 303 ↑ 5, 295

SE Tillstrom Rd & SE Foster Rd (10)
CM=WB, LOS=C, Del=15.8, V/C=0.30
256, 105 ↑ 208, 148 ↓ 92, 29

Sager Rd & SE 172nd Ave (11)
2, 9 → CM=EB, LOS=B, Del=11.3, V/C=0.02
18, 285 ↑ 3, 290

170th Ave & SE 172nd Ave (12)
1, 4 → CM=EB, LOS=B, Del=10.6, V/C=0.01
6, 283 ↑ 2, 293

Cheldelin Rd & SE Foster Rd (13)
CM=NB, LOS=B, Del=11.2
266, 89 ↑ 315, 8 ↓ 6, 40

Cheldelin Rd & 190th Dr (14)
91, 7 → CM=EB, LOS=B, Del=11.1, V/C=0.16
4, 117 ↑ 44, 105

Crystal Springs Blvd & SE 172nd Ave (15)
6 → CM=EB, LOS=B, Del=13.6, V/C=0.02
288 ↑ 23, 302

Richey Rd & SE Foster Rd (16)
CM=WB, LOS=B, Del=14.4, V/C=0.38
234, 57 ↑ 319, 260 ↓ 203, 13

SE Foster Rd & SE 172nd Ave (17)
CM=NB, LOS=F, Del=>80, V/C>1.00*
421, 173 → 279, 155
132, 156 ↑

Richey Rd & 182nd Ave (18)
54, 221 → CM=SB, LOS=A, Del=9.8, V/C=0.05 ← 2, 157
35, 4 ↓

Richey Rd & 190th Dr (19)
239, 8 → CM=EB, LOS=C, Del=19.6, V/C=0.54
7, 203 ↑ 164, 135

SW Butler Rd & SW Pleasant View Dr (20)
62, 67, 3 → CM=NB, LOS=D, Del=25.1 ← 39, 41, 31
348, 96 ↑ 30, 276, 50

SE Foster Rd & SE Jenne Rd (21)
551, 416 → LOS=D, Del=42.3, V/C=0.91 ← 142, 255
353, 175 ↓

SW Pleasant View Dr & SW Highland Dr (22)
CM=WBLT, LOS=F, Del=57.2, V/C=0.69
332, 200 ↑ 451, 129 ↓ 70, 123

SE Powell Blvd & SE 174th Ave (23)
76, 702, 170 → LOS=D, Del=47.5, V/C=0.83 ← 44, 594, 189
107, 238, 296 ↑ 78, 192, 74 ↓

SE Powell Blvd & SE 182nd Ave (24)
195, 648, 145 → LOS=D, Del=45.9, V/C=0.71 ← 114, 517, 116
202, 438, 55 ↑ 190, 670, 202 ↓

SE Powell Blvd & W Powell Loop (25)
884, 6 → LOS=A, Del=6.8, V/C=0.55 ← 784, 214
19, 224 ↑

* Operational analysis indicates v/c ratio >1.00; however, volume cannot exceed capacity.

- StudyIntersections
- Arterial/Collector Streets
- Local Street

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

Existing Weekday PM Peak Hour Traffic Conditions

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure 4-3

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intersections. Most jurisdictions in the PSA adhere to a LOS "D" for intersection operations.[2] Chapter 6 summarizes the alternatives analysis that led to the preferred mitigation treatments at these two intersections to address existing and future operational deficiencies.

Roadway Access

The existing number of existing accesses along key roadways within the PSA is summarized below.

- SE 172nd Avenue – has a total of 122 accesses (10 public, 112 private) within the PSA, resulting in an average access density of approximately 1 access per 120 feet (1 public per 1,500 feet) over approximately 2.5 miles. Based on the assessment of existing cross street locations, Clackamas County's public street spacing of 300 feet is met, while Happy Valley's public street spacing standard (of 1,000 feet) is not met in many cases, and its 500-foot spacing for private accesses is not met in most cases.
- SE 190th Drive – has a total of 43 accesses (4 public, 39 private) within the PSA, resulting in an average access density of approximately 1 access per 130 feet (1 public per 1,400 feet) over approximately one mile. Based on the assessment of existing cross street locations, it appears the 300 foot County standard for public roadway street spacing along SE 190th Drive is met, although the County's driveway spacing standard is not met in many cases. The City of Gresham has not established formal street standards yet. However, the SE 190th Drive corridor complies with City's policy to provide connecting streets for traffic flow, safety, and turning movements. Gresham's driveway access guidelines are not met at multiple locations along SE 190th Drive with respect to 100 foot spacing standard.

Summary of Existing Transportation Conditions

Key findings for existing transportation conditions analysis are summarized below:

- All of the study area intersections operate acceptably during the critical weekday p.m. peak hour per applicable intersection standards, with the exception of Foster Road/172nd Avenue and SW Highland Drive/SW Pleasant View Drive.

[2] Damascus has not yet defined operational standards, and Happy Valley and Portland allow unsignalized intersections to operate at LOS "E". Gresham allows all intersections to operate at LOS "E".

- Fixed route transit service does not currently exist within the PSA, although there are two transit routes (#82 and #155) with service within one mile the PSA. Tri-Met's LIFT program for the disabled does operate in the PSA.
- Intersection crash rates are all well within acceptable standards in the PSA. As traffic volumes grow, motorists turning from the many unsignalized accesses onto higher speed rural roadways will likely have greater difficulties, resulting in a potential increase in crashes. Crash trends identified in the study area were taken into consideration as project roadway concepts and alternatives were developed.
- Signal and public street spacing does meet Clackamas County guidelines under existing conditions along the SE 172nd Avenue. A total of 122 accesses exist along SE 172nd Avenue (10 public, 112 private) within the PSA. This results in an average access density of approximately 1 access per120 feet (1 public per 1,500 feet) in the PSA; and
- A total of 43 accesses exist along SE 190th Drive (4 public, 39 private) within the PSA. This results in an average access density of approximately 1 access per 130 feet (1 public per 1,400 feet) in the PSA. Driveway access spacing on SE 172nd and 190th Avenues does not meet Clackamas County, Multnomah County, City of Gresham or City of Happy Valley guidelines/standards.
- Table 4-2 summarizes the ADT approximated based on historical and recent traffic counts.

Table 4-2: Existing Year Average Daily Traffic

Roadway	Location	ADT
SE 172nd Avenue	north of SE Hagen Road	8,000
SE 190th Drive	north of SE Richey Road	7,250
SE Foster Road	south of SE Cheldelin Road	7,000
SE Sunnyside Road	west of SE 172nd Avenue	13,250
SE Tillstrom Road	east of SE 190th Drive	4,250
SE Richey Road	east of SE 182nd Avenue	3,750
SE 182nd Avenue	north of SE Richey Road	1,000

EXISTING INFRASTRUCTURE

The existing infrastructure elements are clustered in the southern and western portion of the PSA, along SE 172nd Avenue. Utility infrastructure, for the most part, aligns with the existing roadway rights-of-way, with the exception of the large gas and transmission powerline in the extreme northwest corner of the PSA. Details of existing infrastructure can be found in *Tech Memo #4.2 – Existing Infrastructure* in the *Technical Appendix*. Figure 4-4 displays a composite of the existing infrastructure.

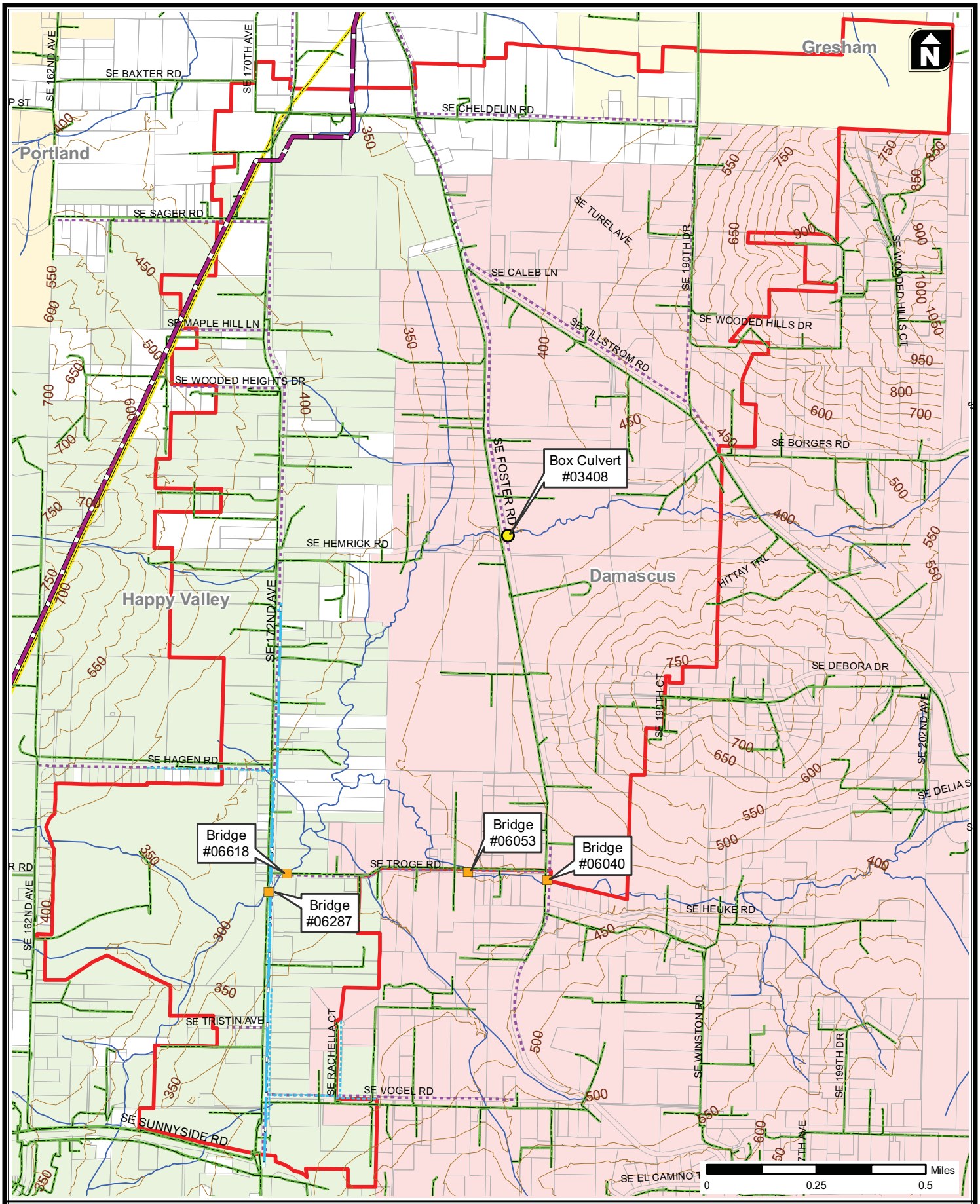
Topographic constraints, however, are more prevalent in the eastern portion of the PSA, near SE 190th Drive. The PSA is centered within a localized valley; thus, the extents of Rock Creek will be significant when siting new roadway infrastructure. All roadways in the PSA are eligible for rehabilitation, with the exception of SE Foster Road. The following narrative provides a general conclusion regarding the individual infrastructure elements.

Utility Infrastructure

Properties within the PSA are well served by electricity and communication utilities. Services are primarily aerial connections with some undergrounding to individual properties. Natural gas services are available to a portion of the properties, and future expansion is planned for the area. Two large utilities, a 30" underground natural gas line and overhead electrical transmission lines, are located in the northwest corner of the PSA and will likely influence future development. Public utilities, including water and sanitary sewer services, are present along a one-mile stretch of SE 172nd Avenue near the southern PSA boundary. The remaining properties rely on groundwater wells and individual septic systems.

Drainage

The primary watershed in the PSA is Rock Creek, draining approximately 80 percent of the land within the study area. Drainage in the northern portion of the PSA drains to Kelley Creek, part of the Johnson Creek Watershed. The size of drainage system elements appears to match the runoff for existing land uses. Drainage infrastructure elements are maintained by Clackamas County and appear to be in adequate condition to pass storm events and carry existing flow volumes. While the existing infrastructure is satisfactory for managing existing flows, the level of treatment and detention falls below current County standards.



Project Study Area
Stream
30" Williams Gas Line
NW Natural Gas Line
PGE Powerlines
Transmission Powerline
4"-6" Water Line
18" Water Line
Damascus
Gresham
Happy Valley
Portland

Existing Infrastructure

172nd / 190th Corridor Plan

Figure 4-4

Structures

There are five existing structures serving the transportation network within the PSA – four bridges and one concrete box culvert. Specific elements of the existing bridge structures fall below current standards. Some bridge railing, approach guardrail, roadway width and indications of scour devalue the overall condition of the structures. However, the structures are adequate for the existing hydraulic and traffic conditions. The concrete box culvert along SE Foster Road continues to perform, but exhibits concrete deterioration.

Summary of Existing Infrastructure

The existing physical infrastructure is adequate to serve the relatively low density rural-suburban uses in the area. As urbanization occurs, the infrastructure will need updating to meet the greater associated needs.

EXISTING ENVIRONMENTAL CONDITIONS

The following sections provide a brief summary of the existing environmental conditions identified within the PSA during an office-based records review and field reconnaissance for this project. Details of the existing environmental conditions can be found in the following technical memorandums in the *Technical Appendix* and also in the *Environmental Baseline Report* found in *Appendix A*.

- *Tech Memo #5.1 – Preliminary Natural Resources*
- *Tech Memo #5.2 – Preliminary Historical and Cultural Resources*
- *Tech Memo #5.3 – Preliminary Hazardous Materials Reconnaissance*
- *Tech Memo #5.4 – Socio Economic and Land Use Reconnaissance*
- *Tech Memo #5.5 – Biological Resources*
- *Tech Memo #5.6 – Wetlands and Water Resources*
- *Tech Memo #5.7 – Historical and Cultural Resources*
- *Tech Memo #5.8 – Hazardous Materials Reconnaissance*
- *Tech Memo #5.9 – Soils and Geological Resources*
- *Tech Memo #5.10 – Air Quality Analysis*
- *Tech Memo #5.11 – Noise Analysis*

Land Use and Socioeconomics

Although there are a variety of land uses within the PSA, the majority of land use is primarily rural residential uses. Land use within the PSA has been relatively stable for the last 30 years. The inclusion of the PSA in the Regional Urban Growth Boundary (UGB) in 2002 started a transition process that will eventually result in the land use in this area shifting from rural residential uses to urban uses. The adoption of the East Happy Valley Land Use Plan in 2009 and the SE 172nd Avenue/190th Drive Corridor Management Plan is further evidence of this transition from rural to urban land uses.

The population within the PSA has been relatively stable for the last 30 years and has a high percentage of long-term residents. Forecast development of the PSA into an urban area is expected to substantially increase the population over the next 20 years. It is anticipated to continue to change as a new urban infrastructure, community, and social systems evolve along with a new land development pattern.

The PSA is currently split between five local governments: Damascus, Gresham, Happy Valley, Clackamas County, and Multnomah County. The population within the PSA has been estimated at approximately 950 people living in 323 housing units, with a vacancy rate of 4.6 percent. There are no identified concentrations of environmental justice populations within the PSA.

The PSA retains land uses developed under the two counties' rural plans and zones. During the past century, these lands have existed as farmland. Recent development, since the area has been brought into the UGB include construction of a fire station, elementary school, and community church; improvements to SE Sunnyside Road; minor commercial property upgrades; and several individual residential developments. The majority of the local businesses within the PSA are either small business or rural business. This is anticipated to change as the land designated for future commercial uses and employment uses are developed over the next 20 years.

Historic and Cultural Resources

A review of the best available published resources and databases and subsequent field reconnaissance for the project resulted in the identification of previously-recorded historical resources within the PSA. There are six historic resources that appear to meet the eligibility criteria for listing on the National Register of Historic Places in the PSA. The historic resources are dispersed throughout the PSA, and there does not appear to be potential for a historic district within the PSA boundaries. There are eight additional historic resources within the PSA that remain unevaluated, but they should be considered potentially eligible until they can be assessed.

Very little archaeological research has been conducted in the immediate vicinity of the PSA. No archaeological sites have been recorded within the PSA. No prehistoric or demonstrably-historical archaeological artifacts, features or sites were identified during a field reconnaissance survey.

Biological Resources

A review of the best available published resources and databases and subsequent field reconnaissance resulted in the identification of biological resources potentially within the PSA. Ten sensitive botanical species have potential habitat within the PSA: cold-water corydalis (*Corydalis aquae-gelidae*), Howell's daisy (*Erigeron howelli*), Nelson's checkermallow (*Sidalcea nelsoniana*), pale blue-eyed grass (*Sisyrinchium sarmentosum*), peacock larkspur (*Delphinium pavonaceum*), tall bugbane (*Cimicifuga elata* var. *elata*), thin-leaved peavine (*Lathyrus holochlorus*), water howellia (*Howellia aquatilis*), white rock larkspur (*D. leucophaeum*), and Willamette Valley larkspur (*D. oreganum*); however, field reconnaissance was conducted outside of the flowering period for all but one of the sensitive botanical species and biologists were unable to determine if sensitive botanical species are actually present within the PSA. Several noxious weeds were identified within the PSA, with Himalayan blackberry (*Rubus armeniacus*) and English ivy (*Hedera helix*) most prevalent throughout the PSA.

The PSA contains five wildlife-habitat communities based on O'Neal and Johnson (2001): Urban and Mixed Environs, Low-Density Zone (46%); Agriculture, Pastures, and Mixed Environs (35%); Westside Lowlands Conifer-Hardwood Forest (8%); Herbaceous Wetlands (7%); and Westside Riparian-Wetlands (4%). Fourteen sensitive wildlife species have potential habitat within the PSA. No sensitive species were directly observed during the field reconnaissance; however, anecdotal evidence from property owners has identified northern red-legged frogs (*Rana aurora aurora*) being present in the SE Hemrick Road tributary to Rock Creek. An existing records review of data sources revealed that the PSA supplies a potential habitat for five identified sensitive fish species. No fish surveys were conducted during the field reconnaissance.

Wetland and Waters Resources

A review of the best available published resources and subsequent field reconnaissance resulted in the identification of approximately 36 acres of wetlands within the PSA. Forty-nine total wetlands were identified and consisted of Palustrine Emergent/Scrub-Shrub, Palustrine Forested, and Palustrine Emergent wetlands. Palustrine emergent wetlands were the most common with 39 wetlands totaling approximately 23 acres. Six streams and 131 ditches were also identified throughout the PSA during the field reconnaissance.

Water quality is documented as being degraded within Rock Creek (the primary waterway in the PSA) due to E. coli and temperature-related water quality standards. There are also 100-year floodplains and floodways within the PSA along Rock Creek and the SE Hemrick Road Tributary to Rock Creek.

Air Quality

A records-based review of existing documentation and discussions with local experts was conducted to document existing air quality within the PSA that may be affected by the proposed project alternatives. Preliminary analysis indicates that the region, including the PSA, is now within attainment and should be able to continue to attain air quality standards.

Noise

A records-based review of existing documentation, discussions with local experts, and field reconnaissance were undertaken to document potential noise impacts within the PSA by the proposed project alternatives. The exiting noise environment along the PSA is dominated by traffic noise on arterial and local roadways, and by residential and commercial activities. Maximum noise levels are due to truck traffic, construction and commercial and industrial activities, and are expected to reach 75 to 85 A-weighted decibels maximum sound level (dBA Lmax) at 50 feet from major roadways. During field reconnaissance, noise levels ranged from 55 to 66 dBA Leq (equivalent sound level) which is within FHWA's noise abatement criteria.

Hazardous Materials

A hazardous materials assessment was conducted to summarize the potential environmental conditions (sources of hazardous materials or contaminated media) that may affect future development associated with regional traffic growth within the PSA. The potential presence of hazardous waste or other environmental contamination within the PSA was identified during an office-based review and subsequent field reconnaissance.

Two properties were identified in federal and Oregon Department of Environmental Quality (DEQ) databases as suspected to generate, store, and/or transport hazardous waste. Eighty-one properties within or adjacent to the PSA were identified in state and tribal databases as having recognized environmental conditions, as per the American Society for Testing and Materials (ASTM) E 1527-00 (2006).

During the review of historical records and field reconnaissance, over 50 properties were identified as having potential environmental conditions. Aboveground heating oil tanks and other aboveground storage tanks with unknown contents were observed at 11 properties in the PSA. Other hazardous substance containers (e.g., 55-gallon drums) were also observed at properties within the PSA. In addition, heating oil underground storage tanks and septic systems are also anticipated throughout the PSA. Solid waste, refuse and debris were observed at three properties within the PSA during field reconnaissance. An in-depth site inspection of the various debris piles was not conducted to determine if they contained hazardous materials such as asbestos or lead-paint materials. There were no indications of large surficial spills or releases of petroleum products or hazardous materials. Potential PCB-containing equipment, florescent or mercury vapor lighting and treated timbers were also observed within the PSA.

Summary of Environmental Conditions

Existing environmental resources and concerns within the PSA were identified for several proposed roadway improvement alternatives associated with the SE 172nd Avenue/190th Drive Corridor Management Plan. The PSA is comprised of mostly rural residential properties (a few of which meet eligibility criteria for listing on the National Register for Historic Places) surrounded by farmland and second-growth forests. Land uses and population within the PSA have been relatively stable for the past 30 years, but are transitioning from a rural to a more urban environment as new development enters the region. Natural resources including multiple wetlands, wildlife-habitat communities and riparian areas are prevalent throughout the PSA. Hazardous materials are also potentially located throughout the PSA. These existing environmental conditions may have implications for future planned development within the PSA.

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Section 5 2035 No-Build Transportation Conditions Analysis

5. 2035 NO-BUILD TRANSPORTATION CONDITIONS ANALYSIS

INTRODUCTION

This chapter summarizes the future year 2035 "No-Build" conditions for the 172nd Avenue/190th Drive Corridor. Forecast traffic volumes were developed based on a modified version of Metro's 2035 financially constrained model network. The purpose of conducting the No-Build analysis is to determine the need for corridor improvements to meet forecast travel demand in the PSA. The remainder of this chapter discusses the background transportation and land use assumptions used, the 2035 No-Build intersection operational analysis, and the initially identified intersection operational mitigation for 2035 No-Build conditions. The detailed explanation of assumptions, methodology, findings and conclusions for the future No-Build transportation conditions can be found in *Tech Memo #4.3 - Future No-Build Transportation Conditions* in the *Technical Appendix*.

BACKGROUND ASSUMPTIONS

The 2035 No-Build forecast was assigned on Metro's 2035 Regional Transportation Plan (RTP) financially constrained model network. The Metro model provides consistency with the updated 2035 RTP and all of the related assumptions for growth and planned transportation improvements in the region and the study area. This also represents a regionally agreed upon set of transportation improvements as being fundable and constructible by the planning horizon of year 2035. The following summarizes the constraints and assumptions of the volume forecast effort:

- Metro prepared a subarea model, using the 2035 RTP model as its basis, to support the 172nd Avenue/190th Drive Corridor Management Plan project. The model included a connection from SE 172nd Avenue to SE 190th Drive.
- The Metro 2035 RTP financially constrained model network includes projects contained in Metro's 2035 RTP: Appendix 1.3, Modeling Assumptions. The recently completed Sunnyside Road project and widening of SE 172nd Avenue between Sunnyside Road and OR 212 are also reflected in the model.
- The Comprehensive Plans of Gresham, Happy Valley, and Damascus (not yet adopted) have the greatest impacts on this corridor, as each anticipates continued urbanization. Households in the PSA are forecast to grow by more than 300 percent (growth of

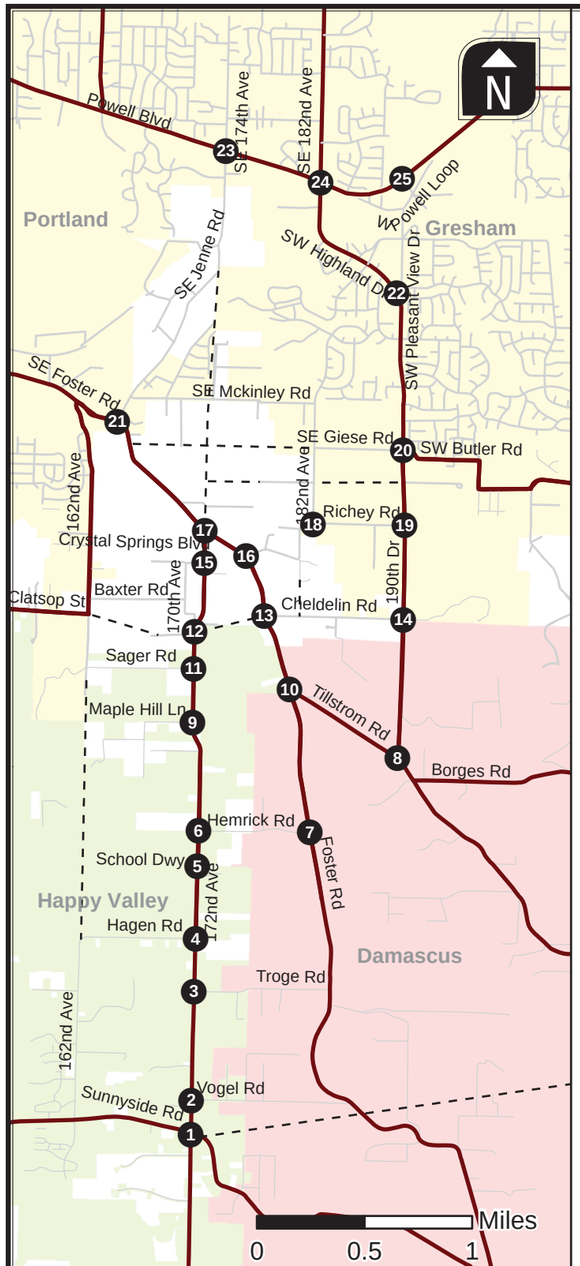
approximately 15,000 households) between 2005 and 2035. Jobs in the same area are forecast to grow by more than 1,200 percent (growth of approximately 9,800 jobs).

- The analysis period focuses on typical weekday p.m. peak hour. A factor of 0.52 was applied to the model weekday p.m. 2-hour peak volumes to estimate the single weekday p.m. peak hour volumes.
- The 2035 Financially Constrained (FC) model was modified to represent a 2035 No-Build scenario within the PSA. To accomplish this, the following adjustments to the model were carried out to reestablish a No-Build network geometry within the PSA:
  - SE 172nd Avenue was reduced from five lanes to the current 2-lane cross-section from SE Foster Road to SE Sunnyside Road;
  - The SE 172nd Avenue to SE 190th Drive new east-west roadway was removed from the model to reflect No-Build conditions; and,
  - The east-west connector between SE 172nd Avenue and SE Foster Road, north of Tillstrom Road, acting as an extension of Sager Road, was removed.

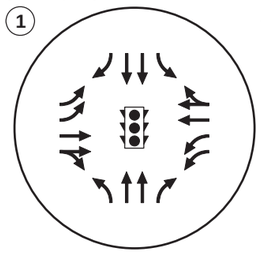
2035 PSA NO-BUILD INTERSECTION ANALYSIS

This analysis includes review of the 2035 traffic volumes assuming a No-Build transportation network within the PSA. Metro's financially constrained projects outside of the PSA are included in this analysis. Metro's model volumes were post-processed using NCHRP 255 methodology to obtain year 2035 forecast volumes under No-Build conditions. Potential mitigations in the PSA intersections were reviewed to address operational deficiencies. Figure 5-1 shows the PSA 2035 No-Build lane configurations and traffic control. Figure 5-2 shows the 2035 post-processed PSA No-Build traffic volumes and weekday p.m. peak hour operational results.

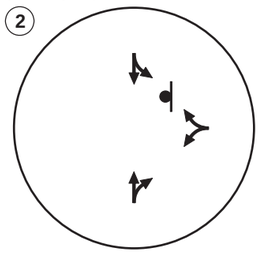
As shown in Figure 5-2, 19 out of 25 study intersections will not meet the applicable level of service and volume-to-capacity standards under the current traffic control and lane geometry. The congested conditions can be attributed to the 300+ percent increase in households and 1,200+ percent increase in jobs projected within the PSA. As a result, the current roadway infrastructure cannot support the projected increase in traffic demand in 2035 during the weekday p.m. peak hour.



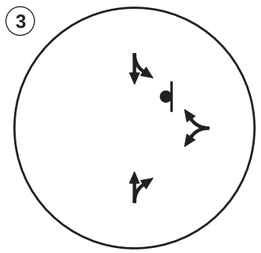
SE Sunnyside Rd & SE 172nd Ave (1)



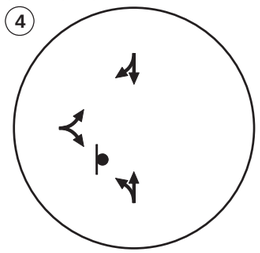
SE Vogel Rd & SE 172nd Ave (2)



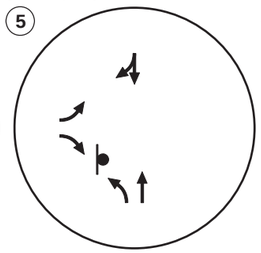
SE Troge Road & SE 172nd Ave (3)



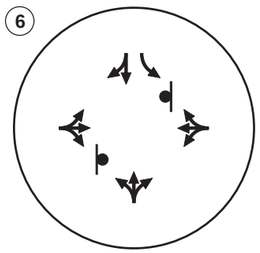
SE Hagen Rd & SE 172nd Ave (4)



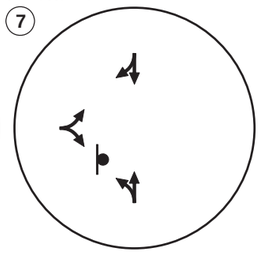
School Driveway & SE 172nd Ave (5)



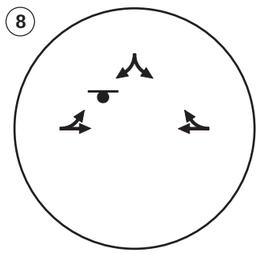
SE Hemrick Rd & SE 172nd Ave (6)



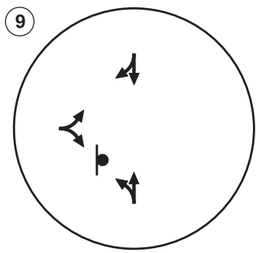
SE Hemrick Rd & SE Foster Rd (7)



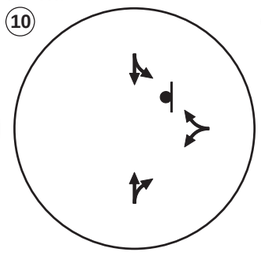
SE Tillstrom Rd & SE 190th Dr (8)



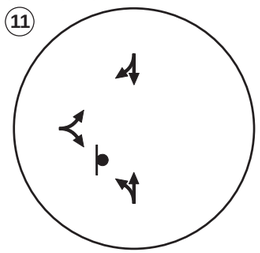
SE Maple Hill Ln & SE 172nd Ave (9)



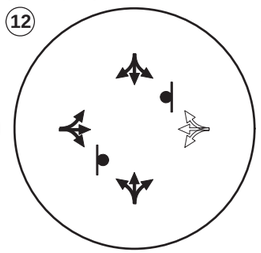
SE Tillstrom Rd & SE Foster Rd (10)



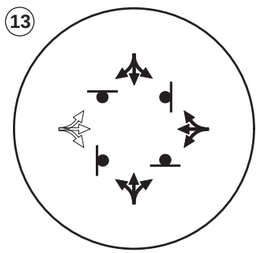
SE Sager Rd & SE 172nd Ave (11)



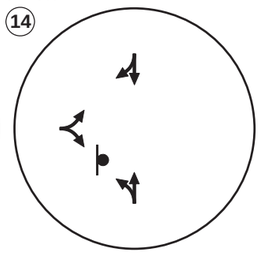
SE 170th Ave & SE 172nd Ave (12)



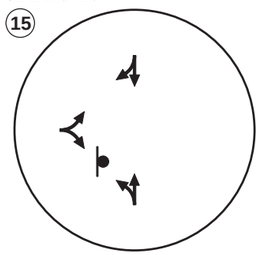
SE Cheldelin Rd & SE Foster Rd (13)



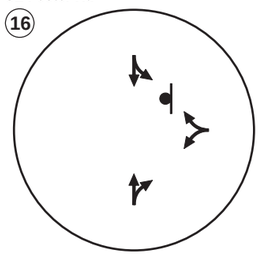
SE Cheldelin Rd & SE 190th Dr (14)



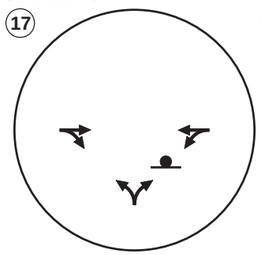
SE Crystal Springs Blvd & SE 172nd Ave (15)



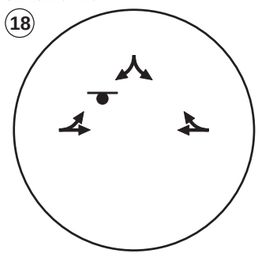
SE Richey Rd & SE Foster Rd (16)



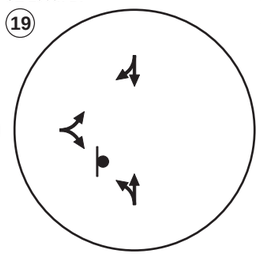
SE Foster Rd & SE 172nd Ave (17)



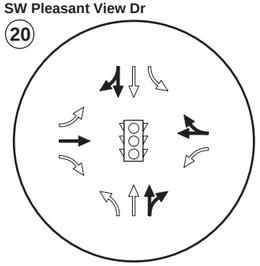
SE Richey Rd & SE 182nd Ave (18)



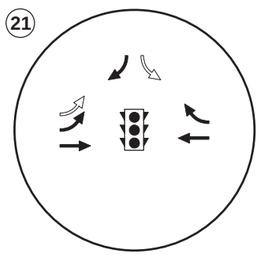
SE Richey Rd & SE 190th Dr (19)



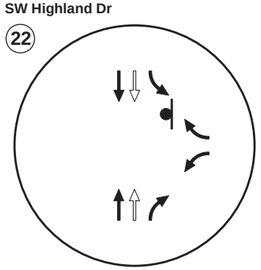
SW Butler Rd & SW Pleasant View Dr (20)



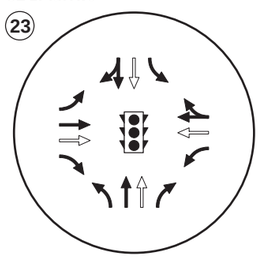
SE Foster Rd & SE Jenne Rd (21)



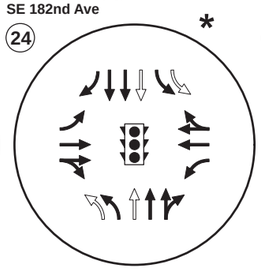
SW Pleasant View Dr & SW Highland Dr (22)



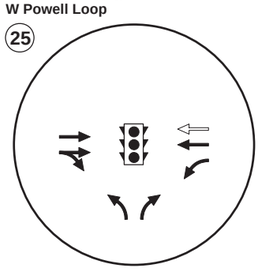
SE Powell Blvd & SE 174th Ave (23)



SE Powell Blvd & SE 182nd Ave (24) *



SE Powell Blvd & W Powell Loop (25)



* Metro's 2035 RTP financially constrained project list defines improvement as "add SB and NB lanes". Accordingly, the analysis presented herein includes an additional through lane at the southbound and northbound approaches. Subsequently, City of Gresham indicated that additional through lanes are not planned. This is consistent with Metro's policy limiting arterial widths to five lanes. The final preferred alternative analysis presented in Chapter 6 assumes two through lanes southbound and northbound.

StudyIntersections
Arterial/Collector Streets
Local Street
2035 FC Project
Traffic Signal
Stop Sign
New Traffic Signal under FC Projects
New Lane under FC Projects

Year 2035 No-Build Lane Configurations & Traffic Control Devices

172nd / 190th Corridor Plan

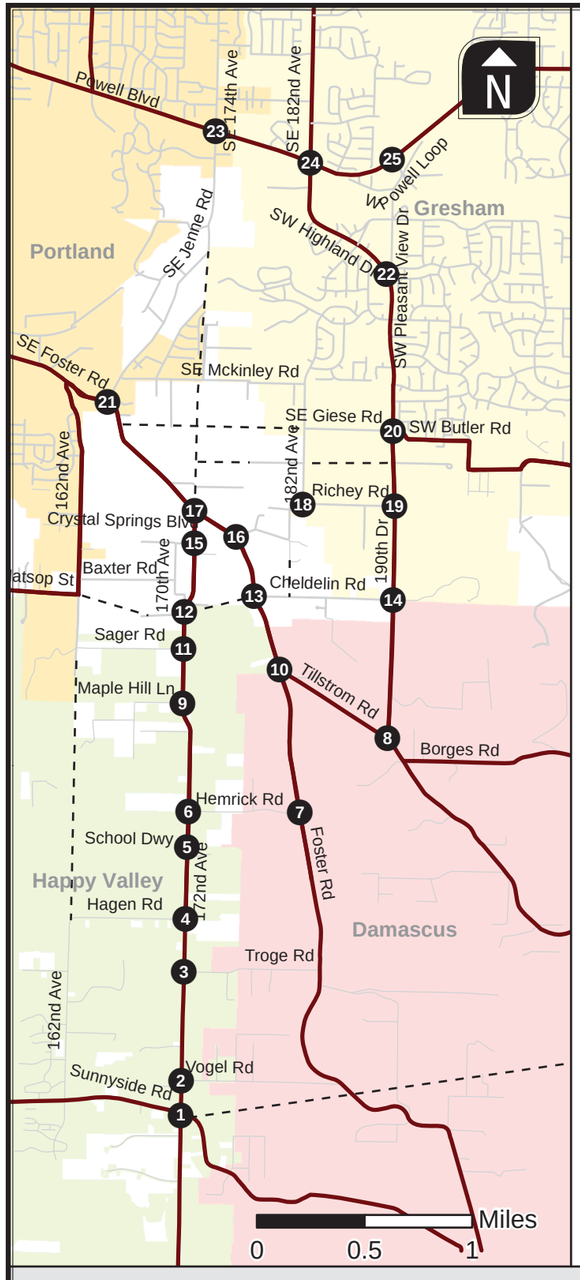
CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure

5-1

H:\profile\10213 - 172nd Ave Sunnyside Rd Alter. Design\Future Conditions\2010 Nov Update\Figure4_3-3_2010 Nov.mxd



Sunnyside Rd & SE 172nd Ave (1)
CM=EB
LOS=E
Del=70.6
V/C=0.98
590 290 215 | 270 675 395 | 310 745 770 | 720 950 110

SE Vogel Rd & SE 172nd Ave (2)
CM=WB
LOS=F
Del=>50
V/C=>1.2
1035 30 | 20 85 | 1285 540

Troge Road & SE 172nd Ave (3)
CM=WB
LOS=F
Del=>50
V/C=>1.2
1080 30 | 15 45 | 1190 100

Hagen Rd & SE 172nd Ave (4)
CM=EB
LOS=F
Del=>50
V/C=>1.2
15 965 | 65 280 | 215 970

School Driveway & SE 172nd Ave (5)
CM=EB
LOS=E
Del=37.2
V/C=0.11
5 885 | 5 10 | 5 1000

Hemrick Rd & SE 172nd Ave (6)
CM=WB
LOS=F
Del=>50
V/C=>1.2
50 770 20 | <5 <5 <5 | 30 <5 90 | <5 640 365

Hemrick Rd & SE Foster Rd (7)
CM=EB
LOS=F
Del=>50
V/C=>1.2
90 565 | 370 10 | 25 405

SE Tillstrom Rd & SE 190th Dr (8)
CM=SB
LOS=F
Del=>50
V/C=>1.2
10 450 | 20 265 | 230 180

Maple Hill Ln & SE 172nd Ave (9)
CM=EB
LOS=F
Del=>50
V/C=0.65
60 980 | 50 5 | 10 715

SE Tillstrom Rd & SE Foster Rd (10)
CM=WB
LOS=F
Del=>50
V/C=>1.2
785 150 | 105 45 | 595 150

Sager Rd & SE 172nd Ave (11)
CM=EB
LOS=F
Del=>50
V/C=>1.2
125 1195 | 60 45 | 105 735

170th Ave & SE 172nd Ave (12)
CM=WB
LOS=F
Del=>50
V/C=>1.2
<5 1020 40 | 20 420 310 | 45 430 120 | 10 565 275

Cheldelin Rd & SE Foster Rd (13)
CM=EB
LOS=F
Del=>50
V/C=>1.2
90 500 20 | 15 455 100 | <5 490 255 | 205 210 220

Cheldelin Rd & 190th Dr (14)
CM=EB
LOS=D
Del=31
V/C=0.66
105 410 | 220 15 | 10 240

Crystal Springs Blvd & SE 172nd Ave (15)
CM=EB
LOS=F
Del=>50
V/C=0.87
95 930 | 75 35 | 5 580

Richey Rd & SE Foster Rd (16)
CM=WB
LOS=C
Del=21.9
V/C=0.53
635 375 | 210 10 | 305 75

SE Foster Rd & SE 172nd Ave (17)
CM=NB
LOS=F
Del=>50
V/C=>1.2
700 790 | 345 170 | 255 320

Richey Rd & 182nd Ave (18)
CM=SB
LOS=B
Del=12.1
V/C=0.11
55 5 | 85 220 | <5 390

Richey Rd & 190th Dr (19)
CM=EB
LOS=F
Del=>50
V/C=>1.2
400 850 | 225 25 | 25 955

SW Butler Rd & SW Pleasant View Dr (20)
LOS=B
Del=16.6
V/C=0.81
30 1655 70 | 45 225 120 | 140 265 255 | 70 985 160

SE Foster Rd & SE Jenne Rd (21)
LOS=E
Del=57.1
V/C=0.98
475 595 | 110 560 | 615 1000

SW Pleasant View Dr & SW Highland Dr (22)
CM=WBLT
LOS=F
Del=>50
V/C=>1.2
1590 345 | 140 625 | 575 710

SE Powell Blvd & SE 174th Ave (23)
LOS=E
Del=60.6
V/C=0.92
95 705 125 | 80 1135 345 | 135 1080 605 | 160 405 280

SE Powell Blvd & SE 182nd Ave (24) *
LOS=E
Del=64.3
V/C=0.98
360 1585 215 | 120 985 125 | 245 1015 135 | 290 680 110

SE Powell Blvd & W Powell Loop (25)
LOS=C
Del=27.1
V/C=0.93
1395 670 | 1195 10 | 35 700

* Metro's 2035 RTP financially constrained project list defines improvement as "add SB and NB lanes". Accordingly, the analysis presented herein includes an additional through lane at the southbound and northbound approaches. Subsequently, City of Gresham indicated that additional through lanes are not planned. This is consistent with Metro's policy limiting arterial widths to five lanes. The final preferred alternative analysis presented in Chapter 6 assumes two through lanes southbound and northbound.

StudyIntersections
Arterial/Collector Streets
Local Street
2035 FC Project

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

Year 2035 No-Build Weekday PM Peak Hour Traffic Conditions

172nd / 190th Corridor Plan
CLACKAMAS COUNTY
HAPPY VALLEY, OR EST. 1965

Figure
5-2

INITIAL 2035 INTERSECTION OPERATIONAL MITIGATION

The vast majority of the failing intersections under 2035 No-Build conditions are currently unsignalized, two-way stop-controlled intersections. Thus, changes to intersection traffic control, such as signalization, and increased lane capacity at the following intersections were considered in the initial 2035 No-Build mitigation analysis to meet the applicable standards for each jurisdiction.

Increased Lane Capacity (Additional Turn Lanes and/or Through Lanes) Only:

- SE 172nd Avenue/SE Sunnyside Road
- SE 172nd Avenue / SE Troge Road:
- SE 172nd Avenue / Scouters Mountain School Driveway
- SE 172nd Avenue / SE Sager Road
- SE 172nd Avenue / SE Crystal Springs Boulevard
- SE Foster Road / SE Jenne Road
- SE Powell Boulevard / SE 174th Avenue

Changes to Intersection Traffic Control (Potential for Signal or Roundabout) and Increased Lane Capacity as Needed:

- SE 172nd Avenue / SE Vogel Road
- SE 172nd Avenue / SE Hagen Road
- SE 172nd Avenue / SE Hemrick Road
- SE Foster Road / SE Hemrick Road
- SE Tillstrom Road / SE 190th Drive
- SE Tillstrom Road / SE Foster Road
- SE Foster Road / SE Cheldelin Road
- SE 172nd Avenue / SE 170th Avenue
- SE Foster Road / SE Richey Road
- SE 172nd Avenue / SE Foster Road
- SE 190th Drive / SE Richey Road
- SW Pleasant View Drive / SW Highland Drive

These intersections are not recommended for improvement; rather, mitigations would be necessary to meet jurisdictional operational standards assuming no other transportation network changes in the corridor. Given the preliminary nature of this analysis, any operational effects associated with the interaction of the additional traffic signals (or roundabouts) at these intersections was not evaluated as part of the 2035 No-Build conditions.

In many locations within the PSA, it appears a three-lane roadway cross-section may be sufficient to accommodate traffic demands. The two exceptions are on SE 172nd Avenue between SE 170th Avenue and SE Sager Road, and at the SE 172nd Avenue/SE Hagen Road intersection. Both of these sections of SE 172nd Avenue would require additional through lanes to meet current operational standards.

SUMMARY OF FUTURE 2035 NO-BUILD CONDITIONS

The results of the 2035 No-Build analysis are summarized below.

- Table 5-1 summarizes the ADT approximated based on year 2035 forecast volume for No-Build conditions.

Table 5-1: Future Year 2035 No-Build Conditions Average Daily Traffic

Roadway	Location	ADT
SE 172nd Avenue	north of SE Hagen Road	20,250
SE 190th Drive	north of SE Richey Road	24,250
SE Foster Road	south of SE Cheldelin Road	15,000
SE Sunnyside Road	west of SE 172nd Avenue	33,500
SE Tillstrom Road	east of SE 190th Drive	11,250
SE Richey Road	east of SE 182nd Avenue	6,250
SE 182nd Avenue	north of SE Richey Road	1,500

- Households in the primary study area are forecast to grow by more than 300 percent between 2005 and 2035. Jobs in the same area are forecast to grow by more than 1,200 percent.
- Growth in the expanded study area, which includes additional lands in Portland, Gresham, Damascus, Happy Valley, and the Pleasant Valley Town Center area, is expected to result in an increase of approximately 200 percent in households and 170 percent in jobs.

- Under year 2035 post-processed weekday p.m. peak hour traffic demand, the No-Build PSA intersections generally do not meet applicable intersection standards. The only exceptions are:
  - SE Richey Road/SE 182nd Avenue,
  - SE 190th Drive/Cheldelin Road, and
  - SE Foster Road/Richey Road.
- Of the six study intersections outside the PSA, three of them meet the applicable intersection standards. These include:
  - SW Pleasant View Drive/SW Butler Road,
  - SW Powell Boulevard/SE 182nd Avenue (subject to further analysis), and
  - SW Powell Boulevard/W Powell Loop.
- Initial mitigation solutions were identified for intersections not meeting applicable standards under the year 2035 conditions to provide context to the alternative development phase of the project (see Chapter 6). The following is a general summary:
  - At the majority of study intersections, a three-lane major roadway cross-section is sufficient to accommodate year 2035 traffic demands. The two exceptions are SE 172nd Avenue between SE 170th Avenue and SE Sager Road, and SE 172nd Avenue at Hagen Road, both requiring new through lanes (five lane section).
  - Twelve study intersections will require a new form of intersection control, such as a roundabout or traffic signal.

The initial mitigation analysis does not address other critical considerations, such as safety, land use compatibility, or environmental impacts. These factors as well as many of the identified goals and objectives for the project may require substantially different mitigation solutions and/or alignments. As such, the mitigation information provided above provided context for the concept development phase.

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Section 6 Alternative Development and Selection Process

6. ALTERNATIVE DEVELOPMENT AND SELECTION PROCESS

This chapter provides a summary overview of the process through which the Preferred Build Alternative was chosen.

CONCEPT DEVELOPMENT PROCESS OVERVIEW

The alternative development process used a bottom-up approach, and began in Fall 2010 with several educational workshops. As shown in Figure 6-1, the Project Advisory Committee (PAC) and the public were involved in the entire process of alternative development, from overview of the project process, to understanding various design elements, and finally participating in the concept development. These workshops were used to solicit various corridor alignment and streetscape concepts. These workshops resulted in over 60 corridor alignment sketches and 3D-model based photos and 28 streetscape cross-section photos for consideration. The developed concepts formed the basis for developing, refining, and ultimately selecting the preferred corridor alignment and streetscape cross-sections. Figure 6-2 illustrates the alternative development and public process used to support these preferred elements of the project.

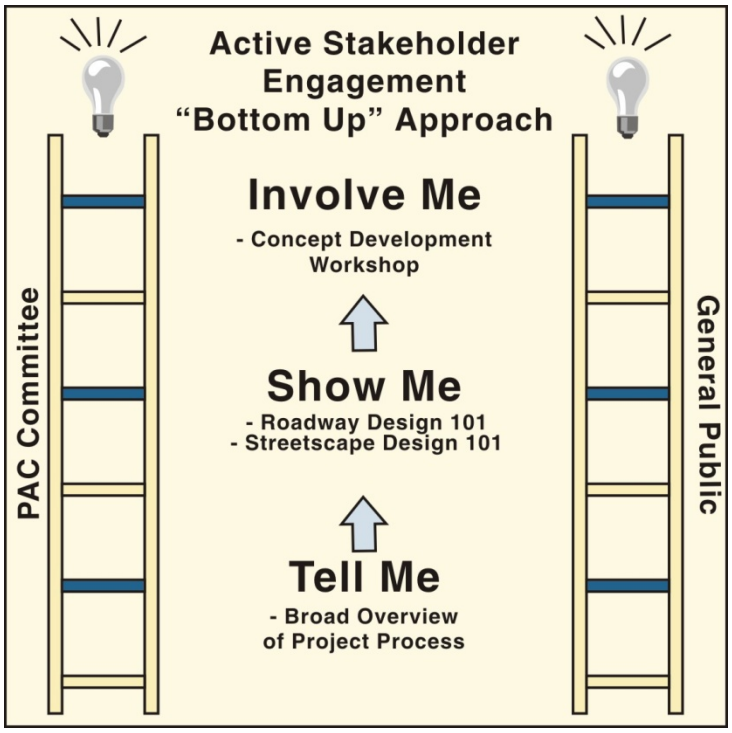


Figure 6-1: Bottom-Up Approach Alternative Development Process

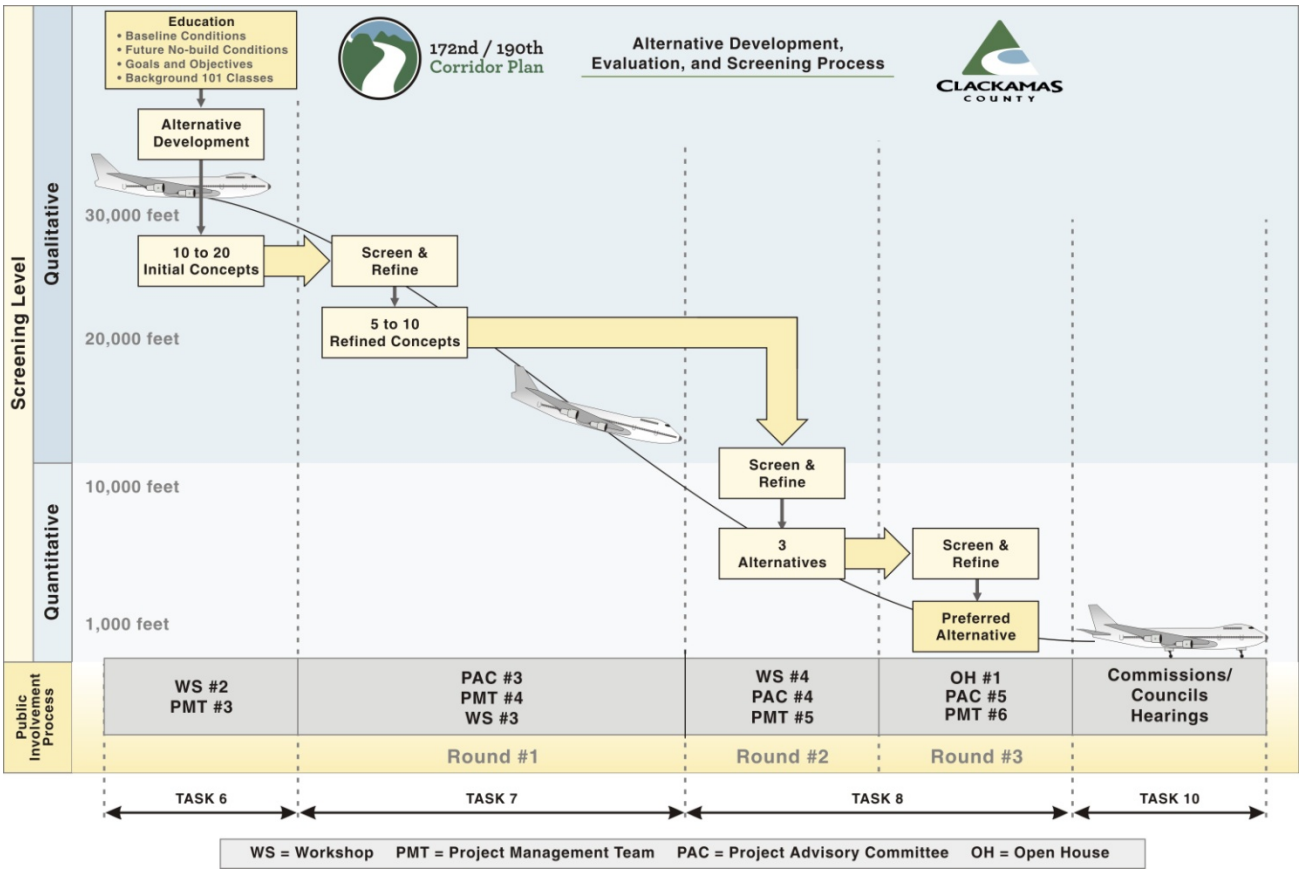


Figure 6-2: Alternative Development, Evaluation, and Screening Process

Based on the bottom up approach, the project team developed an initial range of 18 initial corridor alignment concepts and streetscape cross-sections for the SE 172nd Avenue/190th Drive Corridor. These concepts were based on input and ideas gathered from numerous stakeholders, public participants, and agency staff. The project team performed an initial, high-level assessment of all 18 corridor alignment concepts and streetscape cross-sections using the project evaluation criteria. In addition, these initial corridor alignment concepts were presented to and reviewed by the public and agency staff at a series of workshops and on the project web site through virtual workshops. Based on the technical evaluation of concepts and the input provided, the project team and the Project Management Team (PMT) screened the concepts to five selected concepts for further study. The initial

streetscape concepts were also evaluated. Seven streetscape concepts did not meet County's design criteria and were not carried forward for further evaluation, leaving eleven concepts for further evaluation.

The five remaining corridor alignment concepts were refined and further reviewed prior to presenting to the PAC and the public at a series of meetings and workshops during March and April 2011. Based on the evaluation results and the public feedback, the PMT screened two of the concepts (AT4 and AT5) and selected the three Most Promising Alternatives (AT2, AT6, and AS10A) for continued study. At the same time, the remaining 11 streetscape concepts and their respective elements were discussed between project stakeholders and the PMT to facilitate the development of the Preferred Streetscape Concept.

The three Most Promising Alternatives were further evaluated prior to presenting to the project stakeholders, public and PAC in a series of meetings and open houses in July 2011. The Preferred Streetscape Concept was also presented and discussed. Based on the evaluation and the feedback received, the PAC and PMT recommended Alternative AT2 as the Preferred Build Alternative. Alternative AT2 proposes a new roadway heading north-northeast between 172nd Avenue just south of the Wooded Heights Road and 190th Drive at Cheldelin Road, with a five-lane arterial proposed for the SE 172nd Avenue/190th Drive Corridor. Refinement of the Preferred Streetscape Concept was also made based on the public feedback and recommendation from the PMT.

The remainder of this chapter summarizes the corridor alignment and streetscape concepts developed in different stages throughout the process, and how and why certain concepts were selected or modified at the end of each stage.

DESIGN CRITERIA

Because there are a number of government agencies that own and maintain the different roadways within the PSA, the project design criteria considered applicable standards from Clackamas County, City of Happy Valley, and City of Gresham. The City of Damascus does not currently maintain any roadways within the PSA, and therefore County standards are used for those streets within the City limits.

Design criteria for the SE 172nd Avenue/190th Drive Corridor were established using Clackamas County's Roadway Standards as the primary basis. The PMT, which consists of staff from Clackamas County, City of Happy Valley, City of Damascus, City of Gresham, Metro, and the project team, provided further input and specific direction for the corridor design parameters. Design criteria for other PSA roadways were guided by the relevant plans and design standards of the applicable jurisdictions.

These design criteria were used as the basis to develop various corridor alignment and streetscape concepts. Details of these design criteria can be found in *Tech Memo #6.1 – Design Criteria* in the *Technical Appendix*.

CORRIDOR ALIGNMENT EVALUATION CRITERIA

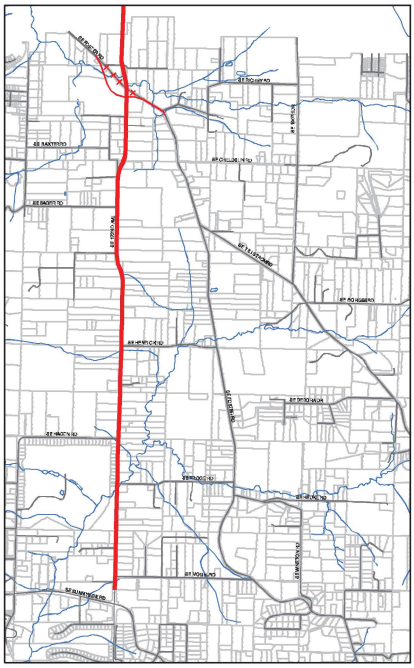
Various corridor alignment concepts were evaluated using the project evaluation criteria described in Chapter 1. The same evaluation criteria were applied in each stage of concept evaluation so that consistent results could be achieved. Each corridor alignment concept was assigned a negative score (poor), zero score (fair) or positive score (good) depending on how the concept does, or does not, meet each of the specific evaluation criteria. At each stage of the concept development process, the evaluation was performed through independent analyses and multiple meetings amongst the project team's environmental, transportation, land use, and civil engineering experts to assess each concept individually and relative to other concepts to determine its effectiveness in meeting the various project goals, objectives, and evaluation criteria. Some criteria (e.g. aesthetic character, environmental enhancement, multi-modal safety, maintenance and functionality) were only evaluated at later stages of the concept evaluation process when more in-depth analyses were warranted.

ROUND #1 – INITIAL SOLUTION CONCEPTS

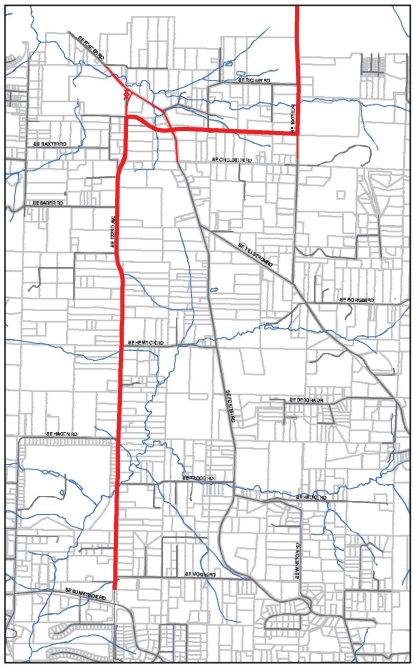
Eighteen (18) corridor alignment concepts and 18 streetscape concepts were initially developed based on the outcome of the public forums held in October 2010. These corridor alignment concepts were grouped into two distinct categories: "Transitional" and "System" concepts. The "Transitional" concepts generally feature direct diagonal, southwest to northeast connections between SE 172nd Avenue and SE 190th Drive, while the "System" concepts generally utilize new and existing east-west and north-south grid connections to connect these two roadways. The eight Transitional corridor alignment concepts, denoted by the "AT" prior to the concept number, and the ten System corridor alignment concepts, denoted by the "AS" prior to the concept number, are illustrated in Figures 6-3A, 6-3B and 6-3C.

The 18 streetscape concepts were also grouped into two categories: Symmetric (denoted by "S" prior to the concept number) and Offset/Asymmetric (denoted by "SO" prior to the concept number). There were 11 symmetric streetscape concepts and seven offset streetscape concepts. These 18 streetscape concepts vary by the number, dimensions, and arrangement of different streetscape elements and street furniture, including travel lanes, bike lanes, parking, center turn-lanes, landscape medians, landscape buffer, tree wells, sidewalks, and multi-use path.

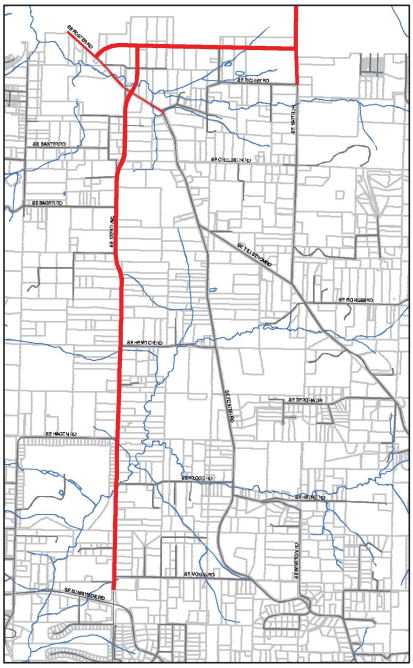
The 18 corridor alignment concepts were evaluated using the alignment evaluation criteria. Tables 6-1 and 6-2 summarize the evaluation results.



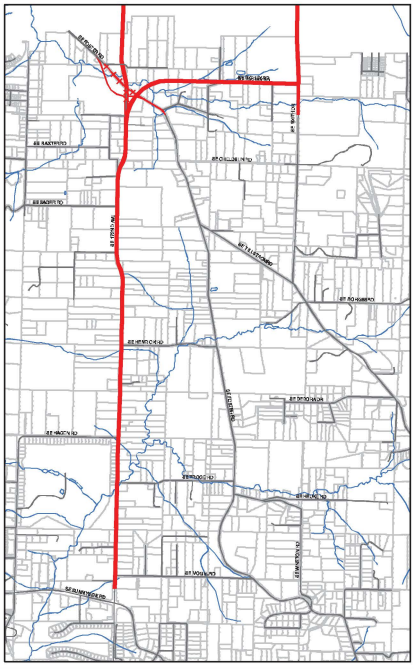
AS-01



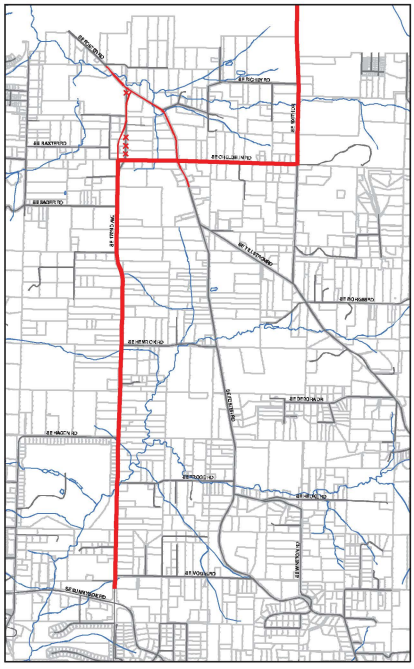
AS-02



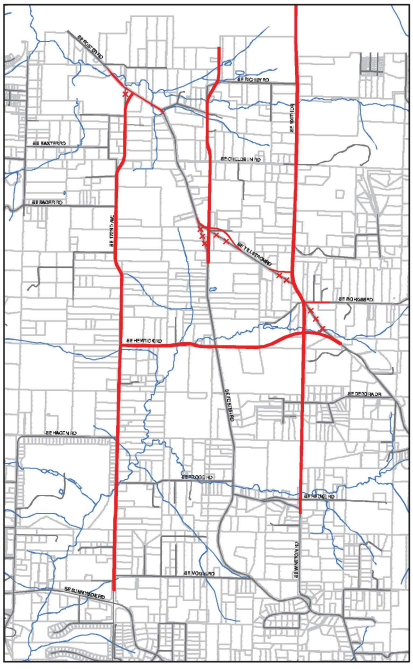
AS-03



AS-04



AS-05



AS-06

18 Initial Roadway Alignment Concepts (1-6)

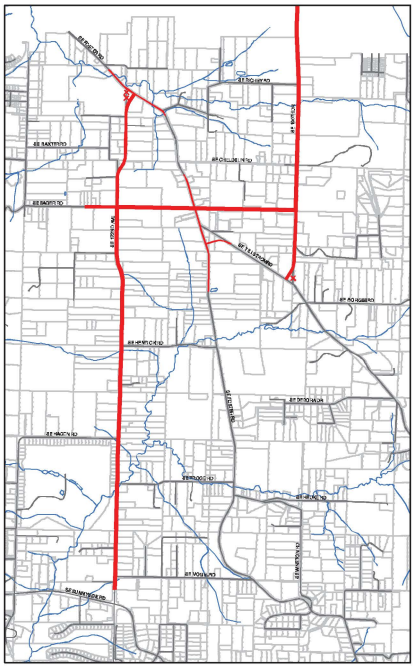
Proposed 172nd - 190th Corridor

172nd / 190th Corridor Plan

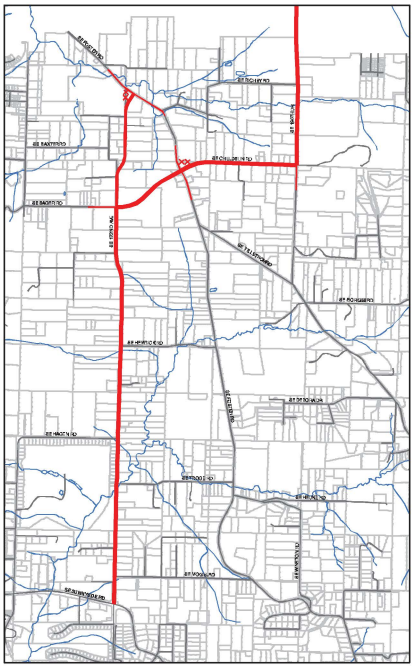
CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

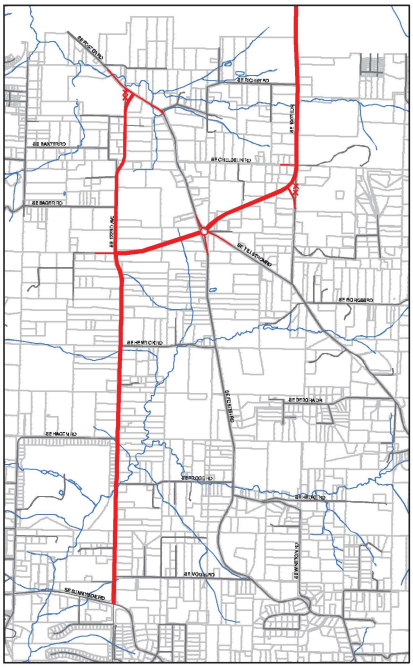
Figure 6-3A



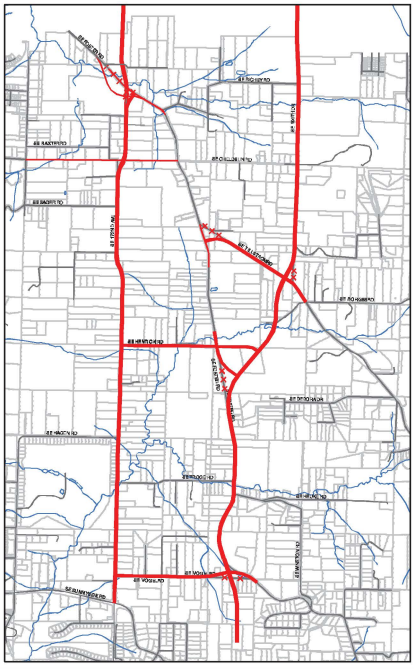
AS-07



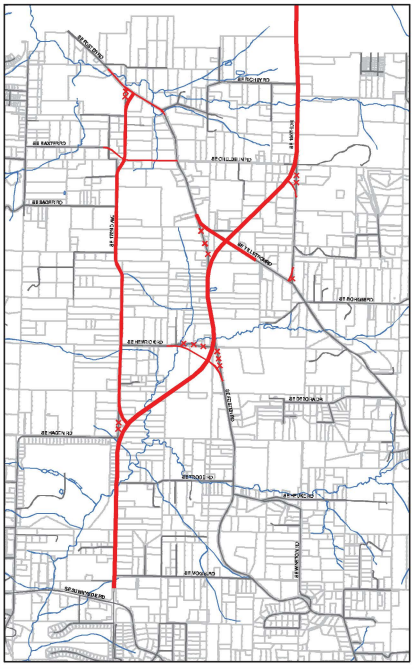
AS-08



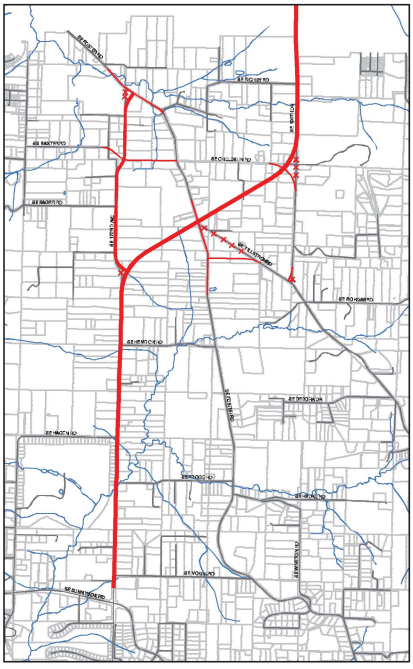
AS-09



AS-10



AT-01



AT-02

18 Initial Roadway Alignment Concepts (7-12)

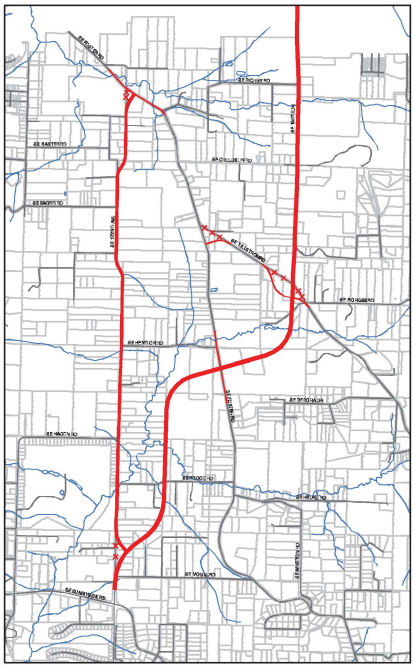
Proposed 172nd - 190th Corridor

172nd / 190th Corridor Plan

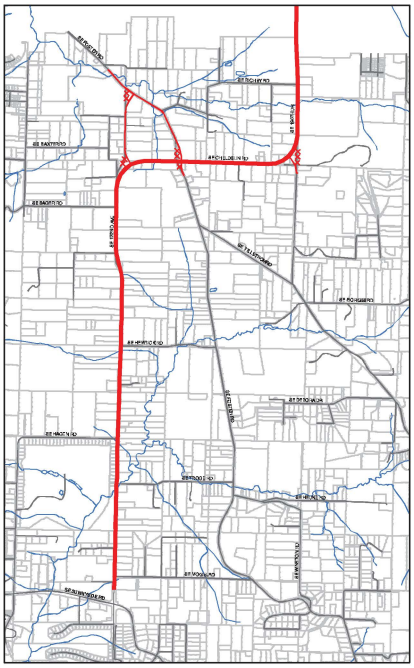
CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure 6-3B



AT-03



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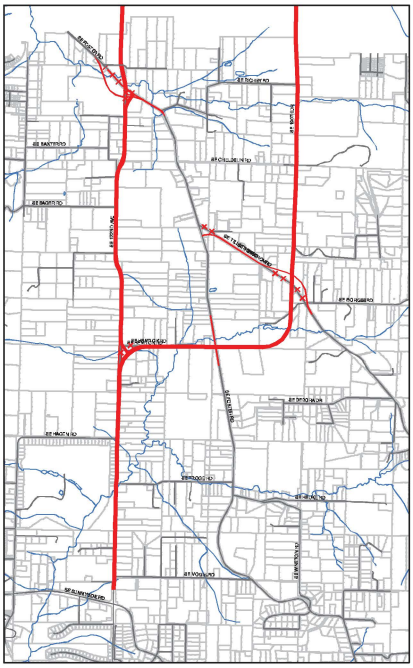
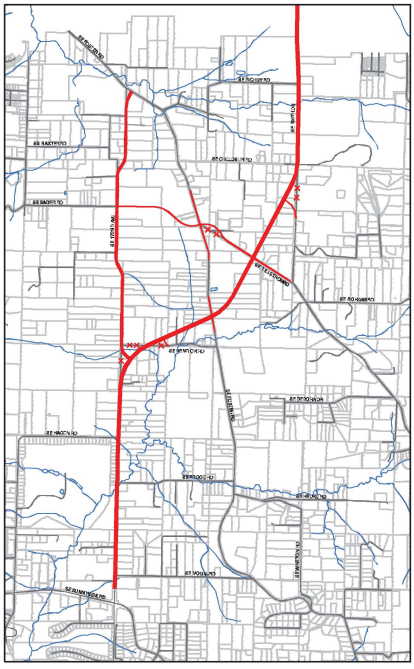
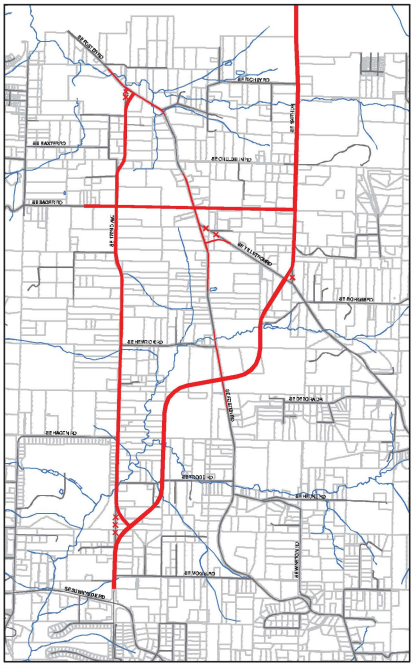


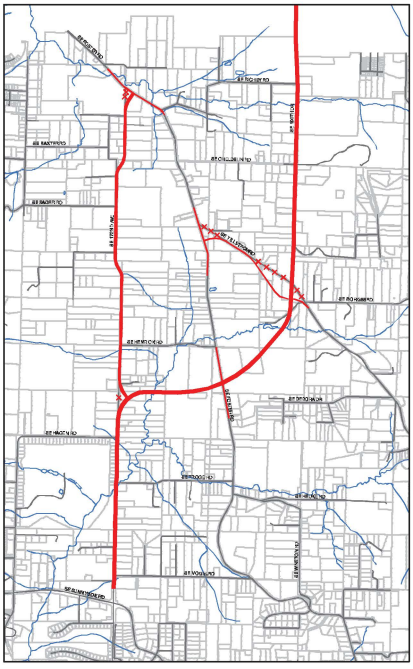
AT-05



AT-06



AT-07



AT-08

18 Initial Roadway Alignment Concepts (13-18)

Proposed 172nd - 190th Corridor

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure 6-3C

Table 6-1: Evaluation Matrix of "Transitional" Alignment Concepts

Criteria	Concept							
	AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8
Vehicular Mobility	1	1	1	1	1	1	1	1
Multimodal Mobility	0	0	-1	0	-1	0	0	-1
Local Access	0	0	1	-1	0	0	0	0
Safety	0	0	0	0	-1	0	0	0
Impacts to Natural Environment	0	1	-1	1	-1	0	0	0
Impacts to Built Environment	-1	0	-1	0	0	0	-1	0
Land Use Compatibility	0	1	-1	-1	1	1	1	0
Flexibility of Implementation	0	0	-1	1	1	-1	-1	-1
Cost Effectiveness	0	0	-1	1	0	0	-1	0
Total Score	**0**	**3**	**-4**	**2**	**0**	**1**	**-1**	**-1**

Table 6-2: Evaluation Matrix of "System" Alignment Concepts

Criteria	Concept									
	AS1	AS2	AS3	AS4	AS5	AS6	AS7	AS8	AS9	AS10
Vehicular Mobility	0	-1	-1	0	-1	-1	-1	-1	-1	1
Multimodal Mobility	0	0	0	0	0	0	-1	0	0	1
Local Access	0	0	0	1	-1	0	0	-1	0	0
Safety	0	0	0	0	0	0	-1	0	0	0
Impacts to Natural Environment	0	1	0	-1	1	-1	1	1	1	-1
Impacts to Built Environment	-1	0	0	0	0	-1	1	0	0	-1
Land Use Compatibility	-1	-1	-1	-1	-1	-1	-1	-1	1	1
Flexibility of Implementation	-1	-1	-1	1	1	-1	1	1	0	-1
Cost Effectiveness	-1	1	1	1	1	-1	1	1	1	-1
Total Score	**-4**	**-1**	**-2**	**1**	**0**	**-6**	**0**	**0**	**2**	**-1**

Based on the initial high level assessments, the project team assigned the 18 corridor alignments concepts into the following three categories according to each concept's score; "Recommended for Further Review", "Under Consideration for NO Further Review", and "Recommended for NO Further Review". Table 6-3 summarizes the initial project team recommendations for the 18 initial corridor concepts.

Table 6-3: Initial Project Team Corridor Alignment Concept Recommendations

Initial Project Team Recommendations	Corridor Alignment Concepts
Recommended for Further Review	AT2, AT4, AT6, AS4, and AS9
Under Consideration for NO Further Review	AT1, AT5, AT7, AT8, AS2, AS5, AS7, AS8, and AS10.
Recommended for NO Further Review	AT3, AS1, AS3, and AS6

The 18 streetscape cross-sectional concepts were qualitatively assessed against the proposed corridor needs and project goals. Streetscape Concepts SO2A, SO3A, SO4A, SO5A, SO5B, S5G and SO5C did not provide proper access for bicycle and/or pedestrian traffic per local roadway standards, and therefore, were not recommended for further consideration. The remaining eleven concepts were recommended for further consideration as the corridor alignment concepts continued to be evaluated and refined to meet the necessary future traffic capacity needs as well as meet the project's overall purpose and need. Table 6-4 summarizes the initial project team recommendations for the 18 initial streetscape concepts.

Table 6-4: Initial Project Team Streetscape Concept Recommendations

Initial Project Team Recommendations	Streetscape Alignment Concepts
Recommended for Further Review	S2A, S3A, S3B, S4A, S5A, S5B, S5C, S5D, S5E, S5F, S5H
Recommended for NO Further Review	SO2A, SO3A, SO4A, SO5A, SO5B, S5G and SO5C

These evaluation results were reviewed by the public and agency staff at a series of workshops and on the project web site. Feedback was solicited on each concept, and five corridor concepts were selected by the PMT for further study. Based on the feedback received by the public and project stakeholders, the Preferred Streetscape Concept was developed. Details of Round #1 Evaluation can be found in *Tech Memo #6.2 – Initial Design Concepts* in the *Technical Appendix.*

ROUND #2 – REFINED CONCEPTS

The project team identified the top eight scoring concepts (AS10A, AT6, AS9, AT2, AT7, AT5, AS4 and AT4) based on the PAC and public responses and focused the evaluation on these concepts. Concept AS10A was chosen to replace Concept AS10 to avoid the existing buttes and associated grading to the east. Upon review of the concepts, the project team noted that Concepts AS9 and AT2 have a similar diagonal connection between 172nd Avenue and 190th Drive and could be carried forward as one concept. Similarly, Concepts AT7 and AT5 were combined into one concept with northern and southern alignment variations for the east-west connection. The project team also found that Concept AS4 had

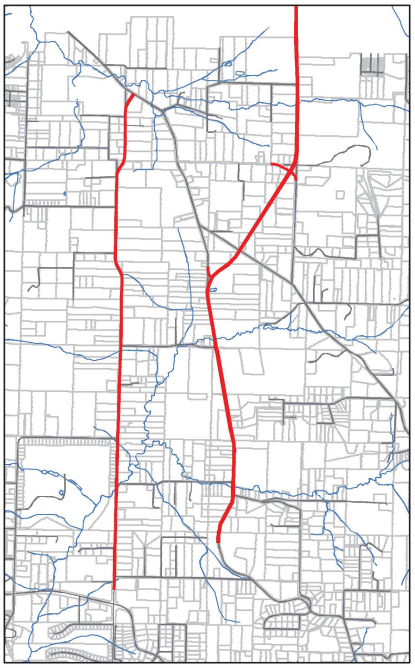
significant environmental impacts and does not conform with Pleasant Valley's future roadway plans. For this reason, the project team recommended Concept AS4 be eliminated. With these modifications, the project team recommended the following five refined concepts be considered for further evaluation:

- AT2 (AS9-AT2 hybrid)
- AT4
- AT5 (AT7-AT5 hybrid)
- AT6
- AS10A

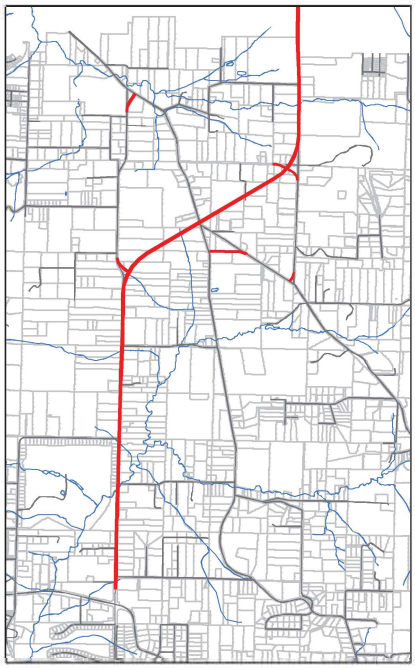
Figure 6-4 illustrates these five refined concepts. These five refined concepts were again evaluated using the alignment evaluation criteria. Table 6-5 summarizes the overall evaluation scoring results for each of the five refined alignment concepts. Compared to the evaluation scores in Round #1, these scores were based on a wider scale so that a higher resolution could be obtained to distinguish different concepts. The average scores for all the evaluation criteria are summed to provide a total score for each alignment concept.

Table 6-5: Summary of Alignment Evaluation Scores

Evaluation Criteria	AT2	AT4	AT5	AT6	AS10A
Vehicular Mobility	+2	+1	+1.5	+1.5	+2
Multi-Modal Mobility	+1	+0.33	-0.33	+0.33	+0.33
Local Access	+0.5	-0.5	+2	+1.5	+0.5
Multi-Modal Safety	+1	-0.67	+0.67	+1	+1
Impacts to Natural Environment	+0.67	+1.33	-2	-0.33	+1.33
Impacts to Built Environment	-0.33	-0.67	0	-0.33	0
Land Use Compatibility	+1	0	-2	-1	+2
Flexibility of Implementation	0	+1	-1	0	+1
Cost Effectiveness	-1	0	-1	0	+1
Aesthetic Character	-0.33	-1.67	+1	+2	-0.67
Total Score	**+4.51**	**+0.15**	**-1.16**	**+4.67**	**+8.5**



AS-10A



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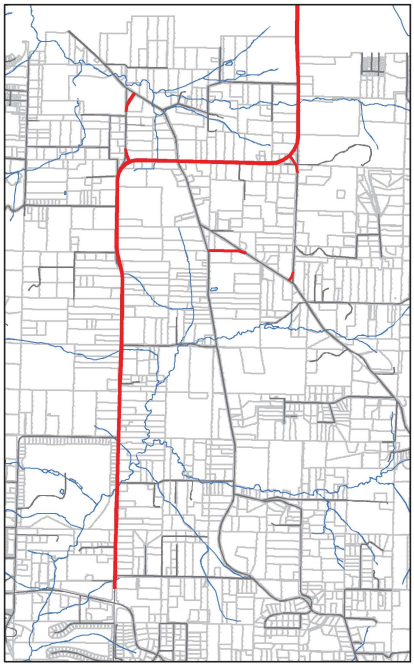

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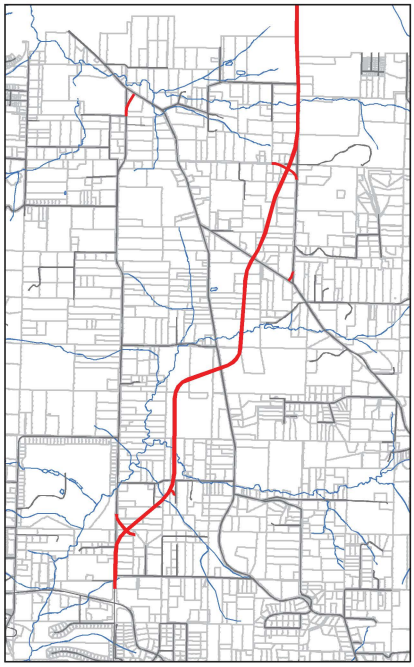

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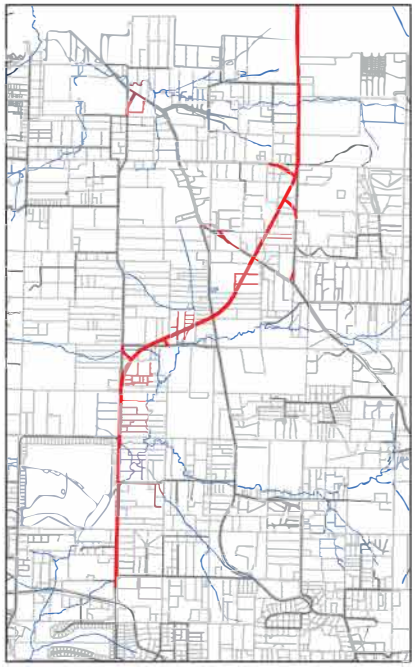


AT-06

5 Refined Roadway Alignment Alternatives

Proposed 172nd - 190th Corridor

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure 6-4

As can be seen in Table 6-5, Concept AS10A received the highest overall score and appeared to provide distinguishable overall advantages in comparison to the other concepts. This concept may have additional costs and impacts outside the project study area that were considered as the concepts were further developed. Concepts AT2 and AT6 had total scores very similar to each other and also appear to provide notable advantages in comparison to the remaining two concepts. Finally, Concepts AT4 and AT5 received the lowest total scores, with net scores substantially lower than the other three.

Based on the preliminary assessment of the five refined design concepts, the project team initially recommended Concepts AT2, AT6, and AS10A be carried forward for more detailed design and analysis. Concepts AT4 and AT5 were initially recommended for dismissal.

These five refined concepts were again presented to project stakeholders, the PAC and the public through a series of meetings and public workshops. The public feedback confirmed the project team's initial recommendations to further develop Concepts AT2, AT6, and AS10A and eliminate Concepts AT4 and AT5. The PMT also concurred with these recommendations. Details of the Round #2 Evaluation can be found in *Tech Memo #7.1 - Refined Corridor Alignment Concepts* in the *Technical Appendix.*

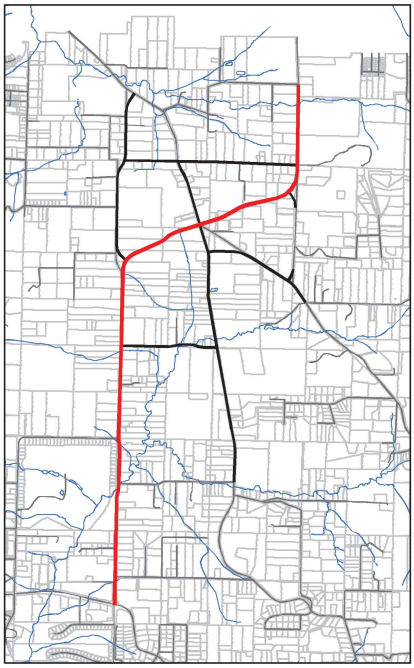
ROUND #3 – MOST PROMISING ALTERNATIVES

During this phase of the project, the three Most Promising Alternatives, AT2, AT6 and AS10A, were modified slightly from their initial conceptual alignment. These alignment designs took into account the existing conditions of the project study area including topography, land uses, environmental considerations and existing right-of-way. Consideration was also given to future conditions such as adopted zoning classifications, intersection spacing, travel speeds, and potential green street treatments. Each alignment was further refined to include intersection types, such as roundabouts and/or signals at major arterial and minor arterial-collector intersections. Where streams and roadways intersect, the alignments were shifted to minimize the number of crossings or length of crossing when possible.

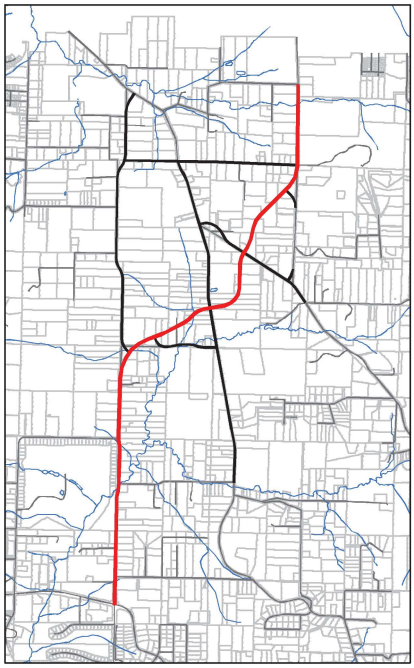
Figure 6-5 illustrates the three Most Promising Alternatives. The alternatives highlight a combination of major and minor arterial improvements. The major arterials consist of a five-lane section that includes four travel lanes and landscaped medians/turn lanes. The three-lane section consists of two travel lanes and a center turn lane with the option of a landscaped median. Both sections include an 8-foot raised cycle track on each side to accommodate bicyclists, as well as 8-foot sidewalks for pedestrians.

The Preferred Streetscape Alternative was also developed based on feedback from the public, project stakeholders, the PAC and the PMT. This Preferred Streetscape Alternative includes cross-sectional designs for five-lane section, three-lane section, two-lane section, and frontage road section.

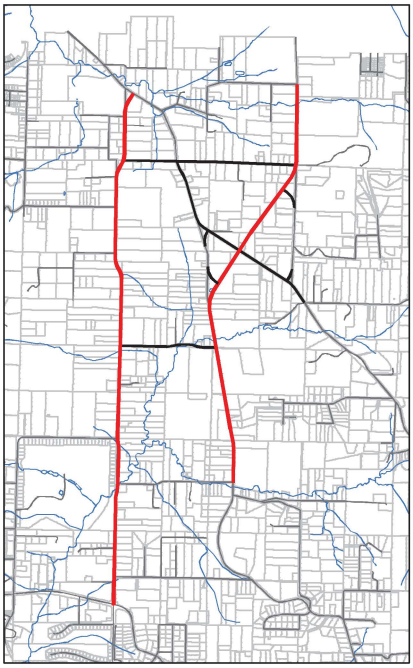
During this stage of the project, a more in-depth analysis of the various corridor alignment evaluation criteria including the potential environmental impacts, land acquisition requirements, and major construction quantities was conducted to identify conceptual-level cost estimates for each alternative. Table 6-6 provides the overall scoring results for the three Most Promising Alternatives.



AT-02



AT-06



AS-10A

3 Most Promising Roadway Alignment Alternatives

Proposed 172nd - 190th Corridor

Proposed 3-Lane Roadway

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure 6-5

Table 6-6: Summary of Most Promising Alternative Evaluation Scores

EVALUATION CRITERIA	AT2	AT6	AS10A
Vehicular Mobility	+1.5	+1.5	+1.5
Multi-Modal Mobility	+1	+1	+1
Local Access	+0.5	+0.5	+0.5
Multi-Modal Safety	+1	+1	+1.67
Impacts to Natural Environment	+0.33	-0.67	+1.33
Impacts to Built Environment	-0.67	-1.33	-0.33
Land Use Compatibility	+1.5	-0.5	+1
Flexibility of Implementation	+0.5	0	+0.5
Cost Effectiveness	0	0	+1
Aesthetic Character	+0.33	+2	-0.33
Environmental Enhancement	0	0	0
Maintenance	+0.5	+0.5	+0.5
Functionality	+2	+2	+1.5
Total Score	**8.49**	**6.00**	**9.84**

Upon review of the total scores for each of the Most Promising Alternatives, Alternative AS10A was initially recommended for the public, project stakeholders, PAC, and PMT to consider as the Preferred Build Corridor Alignment Alternative. AS10A addressed the purpose and need of the project, accommodates future traffic projections, and serves the proposed land uses in the project study area while having the fewest overall impacts and lowest construction cost (within the project study area) compared to alternatives AT2 and AT6.

While AS10A offers several advantages within the project study area, it is also more dependent on several significant transportation projects being completed outside the study area. In particular, it relies on the southern extension/realignment of Foster Road from Vogel to Highway 212 (connecting via the existing 187th Avenue alignment) and the eastern extension/realignment of Sunnyside Road from 172nd Avenue to Foster Road. Without these two planned corridor improvement projects, AS10A would not effectively provide the necessary long-term transportation needs. As such, the initial recommendation of AS10A as the preferred alternative was made understanding the need for these external projects and the potential risk involved should they not be completed within the planning horizon.

The evaluation results and the initial recommendations for the Preferred Build Corridor Alignment Alternative and the Preferred Streetscape Concept were presented to the project stakeholders, the

public, and the PAC through a newsletter, meetings, an open house, and virtual open house to solicit feedback. Based on the evaluation and the feedback received at the Public Open House and Virtual Open House, the PAC recommended AT2 over AS10A as the Preferred Build Alternative to the PMT. Based on PAC recommendation and the uncertainties surrounding the Foster Road extension, the PMT selected AT2 as the Preferred Build Alternative due to its high scores and ability to connect destinations inside and beyond the study area, while relying less on roadway projects planned by others. The Preferred Streetscape Concept was also refined based on the feedback received from the public and project stakeholders as well as recommendations from the PMT. Details of the Round #3 Evaluation can be found in *Tech Memo #8.2 - Three Most Promising Corridor Alignment Alternatives* in the *Technical Appendix*.

ROUND #4 – PREFERRED BUILD ALTERNATIVE

The Preferred Build Alternative AT2 proposes a new roadway heading north-northeast beginning from a point on 172nd Avenue just south of the Wooded Heights Road intersection and connecting to 190th Drive at Cheldelin Road. The new roadway cuts diagonally across existing properties, many of which are larger than five acres. This alternative proposes a five-lane arterial for the primary movement from 172nd Avenue to 190th Drive. This cross-section includes four lanes with a landscaped median/turn lane on 172nd Avenue from Sunnyside Road north to the new roadway, along the entire portion of the new roadway, and on 190th Drive from Cheldelin Road to the County line. A three-lane section is proposed on Foster Road, Cheldelin Road, Hemrick Road, and Tillstrom Road. Minor realignments will reposition the Tillstrom Road/Foster Road connection approximately 800 feet south of the existing intersection. North of Wooded Heights Road, 172nd Avenue will be reconstructed as a three-lane section to the County line and Cheldelin Road will be extended west to intersect with 172nd Avenue.

As mentioned previously, the Preferred Streetscape Concept consists of cross-sectional designs for five-lane section, three-lane section, two-lane section and frontage road section. Variations in streetscape elements were developed within each cross-sectional design to better suit the varied needs in the proposed alignment. Details of the Preferred Build Alternative and Preferred Streetscape Concept can be found in Chapter 7.

The transportation analysis was updated to better reflect year 2035 future conditions based on a more extensive collector network to reflect planned roadways documented in the Pleasant Valley Plan, and Happy Valley Transportation System Plan (TSP). Proposed roadway assumptions in Damascus were also discussed with City of Damascus staff. In addition to the *174th Avenue Extension*, *Foster Road*

Extension, and *Sunnyside Road Extension*, the following planned roadway extensions were included in the analysis:

- Vogel Road between 162nd Avenue and 172nd Avenue
- Troge Road between 162nd Avenue and Tillstrom Road
- Future Scouters Mountain Road between 162nd Avenue and Foster Road
- Hemrick Road between 162nd Avenue and 172nd Avenue
- Borges Road between 162nd Avenue and 172nd Avenue
- Sager Road between 162nd Avenue and new north-south collector road between Foster Road and 190th Drive
- North-south collector roads between 172nd Avenue and Foster Road, and between Foster Road and 190th Drive
- Other collector roads within the Pleasant Valley area
- Foster Road disconnection between Jenne Road and Cheldelin Road
- Realigned 162nd Avenue to better reflect the alignment illustrated in Happy Valley TSP

Inclusion of the above planned roadways, even though they are not part of the financially constrained projects, serves two main purposes:

- They off-load a portion of traffic from study roadways, which better reflect the anticipation of reduced future growth on our study roadways in year 2035, as compared to what is originally planned in Metro's 2035 Regional Transportation Plan (RTP).
- A fully built roadway network within the PSA would better reflect the roadway cross-section and intersection lane configuration needs in year 2035 when the roadway network is fully built out.

Appendix B includes the VISUM model outputs illustrating the lane configuration and roadway network assumptions, as well as the modeling results.

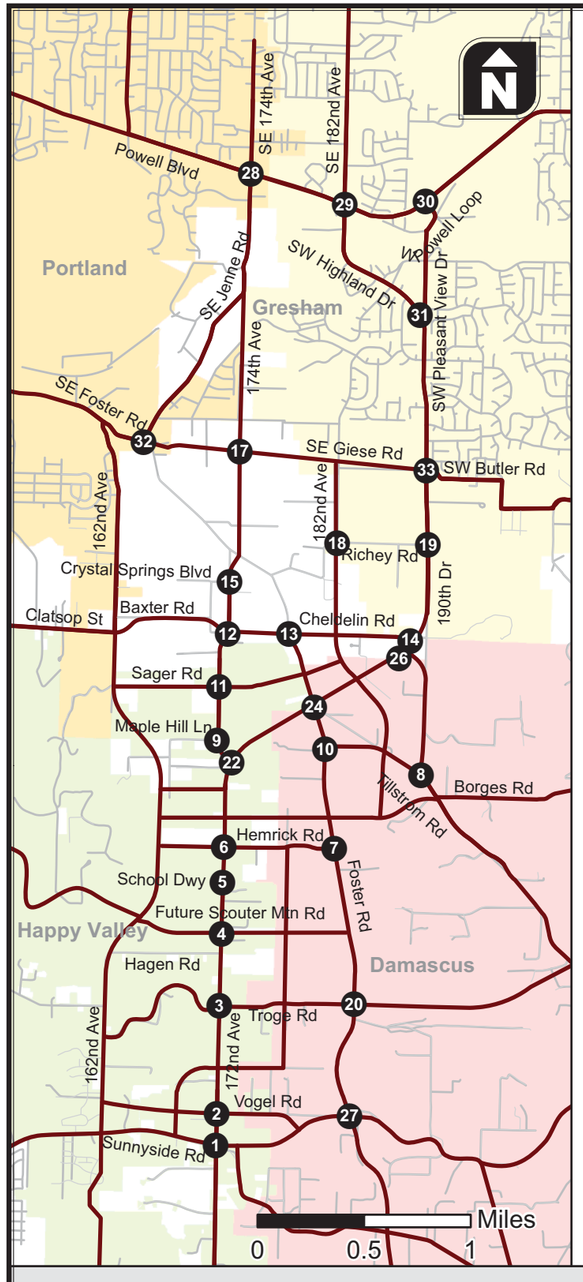
Consistent with previous analyses, model volumes were post-processed using National Cooperative Highway Research Program (NCHRP) 255 methodology to obtain turning movement volumes used to perform intersection analysis. Each study intersection was reviewed to determine the lane configurations and traffic control devices needed to meet the respective jurisdiction's mobility standards. Cross-sections of roadway segments were also taken into account when determining lane

configurations at intersections. Figure 6-6 shows the recommended lane configurations and traffic control devices for the preferred alternative AT2.

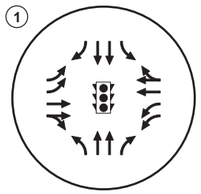
Figure 6-7 summarizes the intersection operations for the preferred alternative AT2 during weekday pm peak hour. As shown in the figure, all intersections operate under capacity and within the respective jurisdiction's mobility standards (level-of-service (LOS) D and 0.99 volume-to-capacity ratio (v/c ratio)), with the exception of the intersections listed below:

- SE 190th Drive/SE Cheldelin Road (roundabout)
- SE Foster Road/Troge Road (roundabout)
- SE Foster Road/Connector Road (roundabout)
- SE Powell Boulevard/SE 182nd Avenue (signal)

The three roundabouts listed above are forecast to operate with LOS E, which does not meet Clackamas County's mobility standard of LOS D. Additionally, the roundabout at SE 172nd Avenue/"Future Scouters Mountain Road" is projected to exceed the City of Happy Valley's performance standard of 0.90 v/c ratio. Given the long-term safety benefits of roundabouts, the need for system consistency, and the fact that the intersections are forecast to operate under capacity, the PMT was comfortable moving forward with these treatments and lane configurations. Furthermore, the roundabout methodology outlined in the *2010 Highway Capacity Manual* is based on current US experience. Experience in Europe and Australia has shown that capacity of roundabouts generally increases over time as driver familiarity improves. Therefore, although these intersections are forecasted to operate slightly over mobility standards as roundabouts, roundabouts may actually operate acceptably 25 years into the future. In addition, a single-lane roundabout generally has a better safety performance than a double-lane. Therefore, under certain circumstances, a single-lane roundabout may be preferred over a double-lane roundabout even if it suffers slightly in operational performance during the peak traffic hour.



SE Sunnyside Rd & SE 172nd Ave (1)



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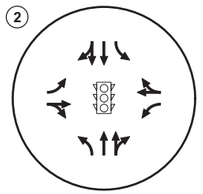

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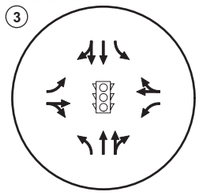
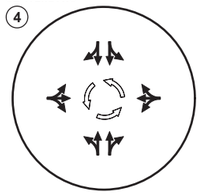
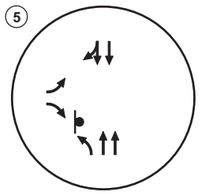


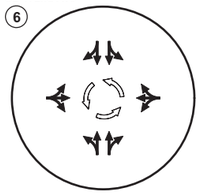
Future Scouter Mountain Rd & SE 172nd Ave (4)



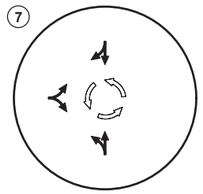
School Driveway & SE 172nd Ave (5)



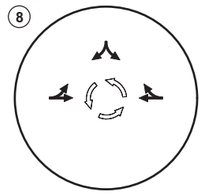
SE Hemrick Rd & SE 172nd Ave (6)



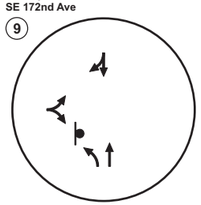
SE Hemrick Rd & SE Foster Rd (7)



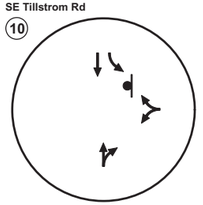
SE Tillstrom Rd & SE 190th Dr (8)



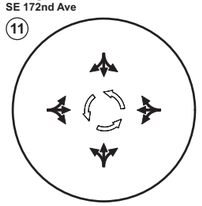
SE Maple Hill Ln & SE 172nd Ave (9)



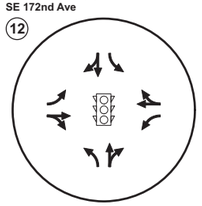
SE Foster Rd & SE Tillstrom Rd (10)



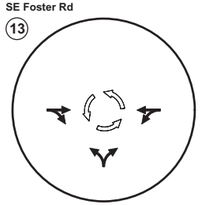
SE Sager Rd & SE 172nd Ave (11)



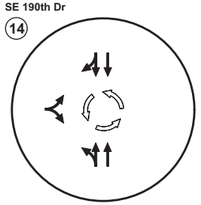
SE Cheldelin Rd & SE 172nd Ave (12)



SE Cheldelin Rd & SE Foster Rd (13)

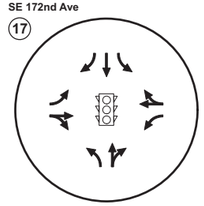


SE Cheldelin Rd & SE 190th Dr (14)



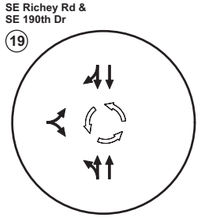
SE Crystal Springs Blvd & SE 172nd Ave (15)

SE Giese Rd & SE 172nd Ave (17)

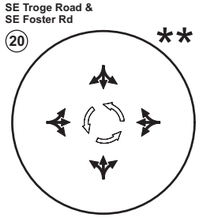


SE Richey Rd & SE 182nd Ave (18)

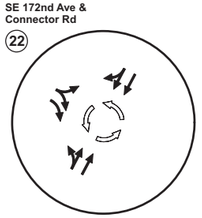
SE Richey Rd & SE 190th Dr (19)



SE Troge Road & SE Foster Rd (20) **

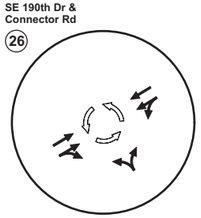


SE 172nd Ave & Connector Rd (22)

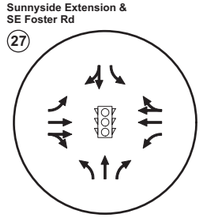


Connector Rd & SE Foster Rd (24)

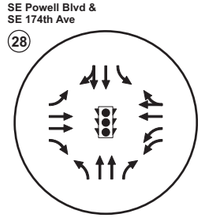
SE 190th Dr & Connector Rd (26)



Sunnyside Extension & SE Foster Rd (27)

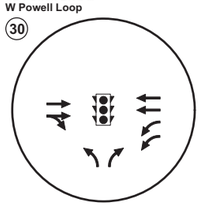


SE Powell Blvd & SE 174th Ave (28)

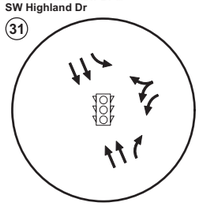


SE Powell Blvd & SE 182nd Ave (29) *

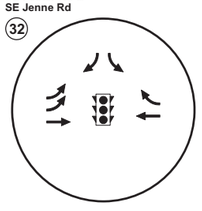
SE Powell Blvd & W Powell Loop (30)



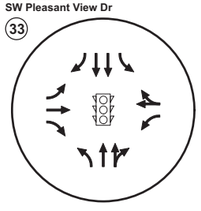
SW Pleasant View Dr & SW Highland Dr (31)



SE Foster Rd & SE Jenne Rd (32)



SW Butler Rd & SW Pleasant View Dr (33)



* Intersection lane configuration needs to be further evaluated through Gresham TSP Update and East Metro Connection Plan (EMCP)

** Future alignment of SE Troge Road Extension (east of Foster Road) needs further evaluation

StudyIntersections
Arterial/Collector Streets
Local Street

Traffic Signal

Stop Sign

Proposed Traffic Signal

Proposed Roundabout

Year 2035 AT2 Preferred Alternative Recommended Lane Configurations & Traffic Control Devices

172nd / 190th Corridor Plan

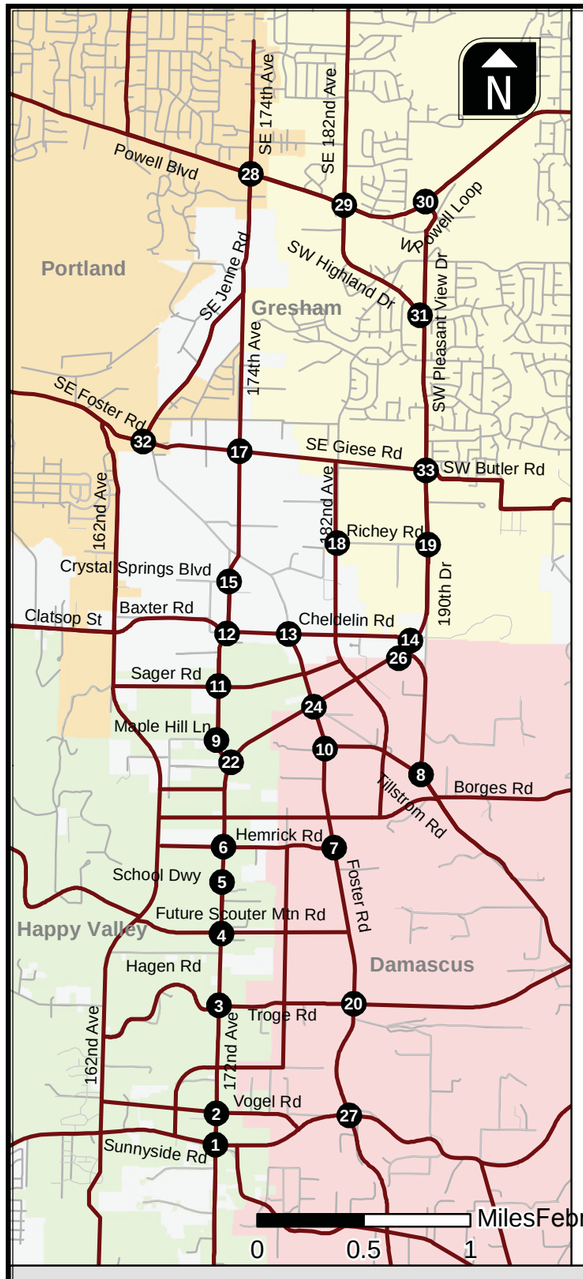
CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

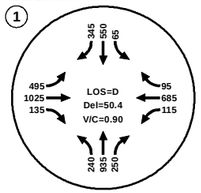
Figure

6-6

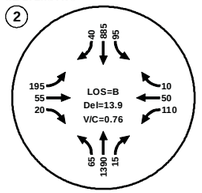
H:\projfile\10213 - 172nd Ave Sunnyside Rd Alter. Design\Tech Memos\TM 8.1 Transportation Analysis of Alternatives\GIS\Figure_AT2_FINAL_Lane_Config.mxd



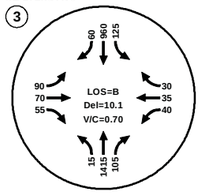
SE Sunnyside Rd & SE 172nd Ave



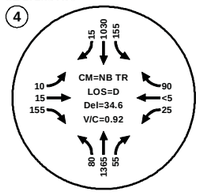
SE Vogel Rd & SE 172nd Ave



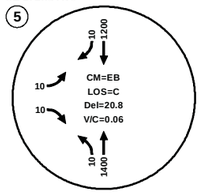
SE Troge Road & SE 172nd Ave



Future Scouter Mountain Rd & SE 172nd Ave



School Driveway & SE 172nd Ave



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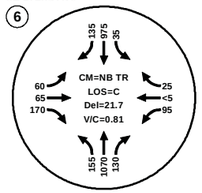
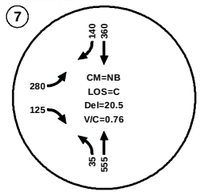
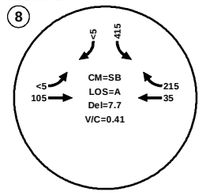


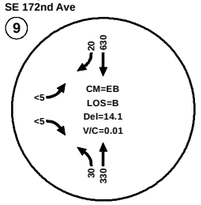
SE Hemrick Rd & SE Foster Rd



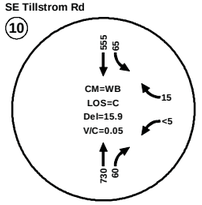
SE Tillstrom Rd & SE 190th Dr



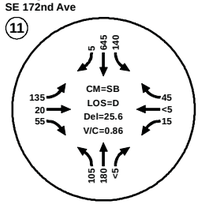
SE Maple Hill Ln & SE 172nd Ave



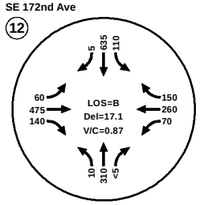
SE Foster Rd & SE Tillstrom Rd



SE Sager Rd & SE 172nd Ave



SE Cheldelin Rd & SE 172nd Ave



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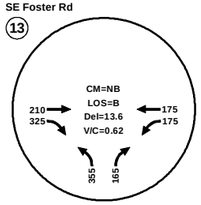
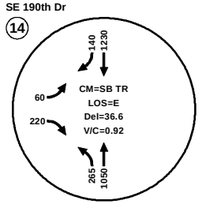
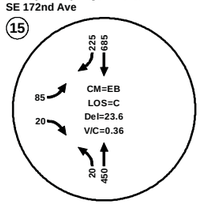


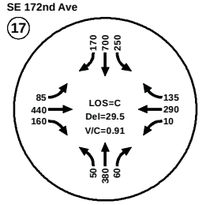
SE Cheldelin Rd & SE 190th Dr



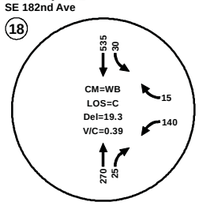
SE Crystal Springs Blvd & SE 172nd Ave



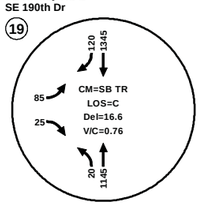
SE Giese Rd & SE 172nd Ave



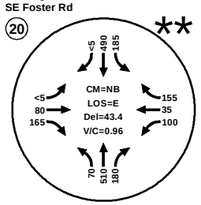
SE Richey Rd & SE 182nd Ave



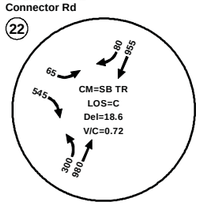
SE Richey Rd & SE 190th Dr



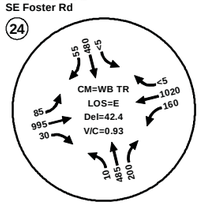
SE Troge Road & SE Foster Rd **



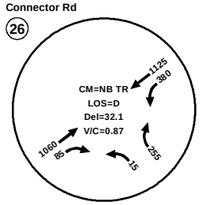
SE 172nd Ave & Connector Rd



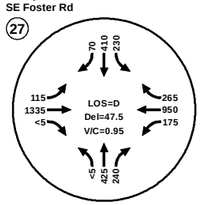
Connector Rd & SE Foster Rd



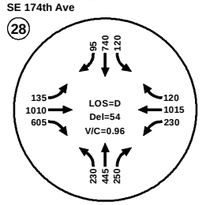
SE 190th Dr & Connector Rd



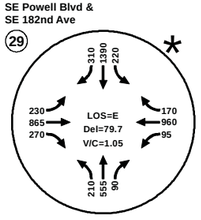
Sunnyside Extension & SE Foster Rd



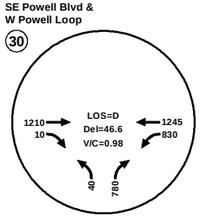
SE Powell Blvd & SE 174th Ave



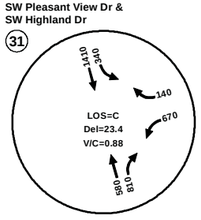
SE Powell Blvd & SE 182nd Ave



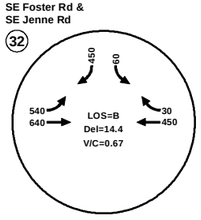
SE Powell Blvd & W Powell Loop



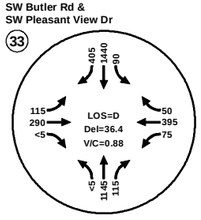
SW Pleasant View Dr & SW Highland Dr



SE Foster Rd & SE Jenne Rd



SW Butler Rd & SW Pleasant View Dr



* Intersection lane configuration needs to be further evaluated through Gresham TSP Update and East Metro Connection Plan (EMCP)

** Future alignment of SE Troge Road Extension (east of Foster Road) needs further evaluation

StudyIntersections
Arterial/Collector Streets
Local Street

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

Year 2035 AT2 Preferred Alternative Weekday PM Peak Hour Traffic Conditions

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure

6-7

H:\profile\10213 - 172nd Ave Sunnyside Rd Alter. Design\Tech Memos\TM 8.1 Transportation Analysis of Alternatives\GIS\Figure_AT2_FINAL_Ops.mxd

Year 2035 traffic forecasts developed for the SE 172nd Avenue/190th Drive Corridor Management Plan indicate that the SE Powell Boulevard/SE 182nd Avenue intersection will operate slightly over capacity with a volume-to-capacity ratio of 1.05. Based on these forecasts and the current mobility standards within the City of Gresham, additional northbound and/or southbound through lanes would be required for the intersection to operate within capacity. However, it should be noted that Metro is updating its 2035 land use projections at the time of this plan's publication which could result in different, and likely lower traffic demand at this intersection. It is also important to note that this intersection is outside the PSA, and its capacity needs were examined for informational purposes to the City of Gresham. Thus, the SE 172nd Avenue/190th Drive Corridor Management Plan should not be considered for the final determination of intersection needs at this location. Moreover, providing additional through lanes is not in compliance with Metro's policy stating that arterials should not be greater than five lanes.

The East Metro Connections Plan (EMCP) and Gresham TSP Update will further examine future needs at SE Powell Boulevard/SE 182nd Avenue intersection based on the updated 2035 land use projections. In addition, the Clackamas County TSP Update will also include the updated 2035 land use projections to determine whether north-south corridor volumes will change as compared to current model forecasts.

This intersection, as well as other intersections outside the PSA, was analyzed to determine the impacts of various corridor alignment concepts on the surrounding transportation system and facilitate the selection of alignment concepts. As a result, the Corridor Management Plan was not intended to recommend improvements outside the PSA. Analyses of various alignment concepts shown in *Tech Memo #7.1 - Refined Corridor Alignment Concepts* and *Tech Memo #8.1 - Transportation Analysis of Alternatives* indicate that the different corridor alignment concepts have little impact on needs at the SE Powell Boulevard/SE 182nd Avenue intersection. Therefore, the selection of the Preferred Build Alternative has little effect on the intersection needs at the SE Powell Boulevard/SE 182nd Avenue intersection.

Appendix B includes the intersection analysis worksheets. Details of the Preferred Build Alternative development process can be found in *Tech Memo #8.3 – Preferred Build Alternative* in the *Technical Appendix*.

Section 7 Corridor Management Plan

7. CORRIDOR MANAGEMENT PLAN

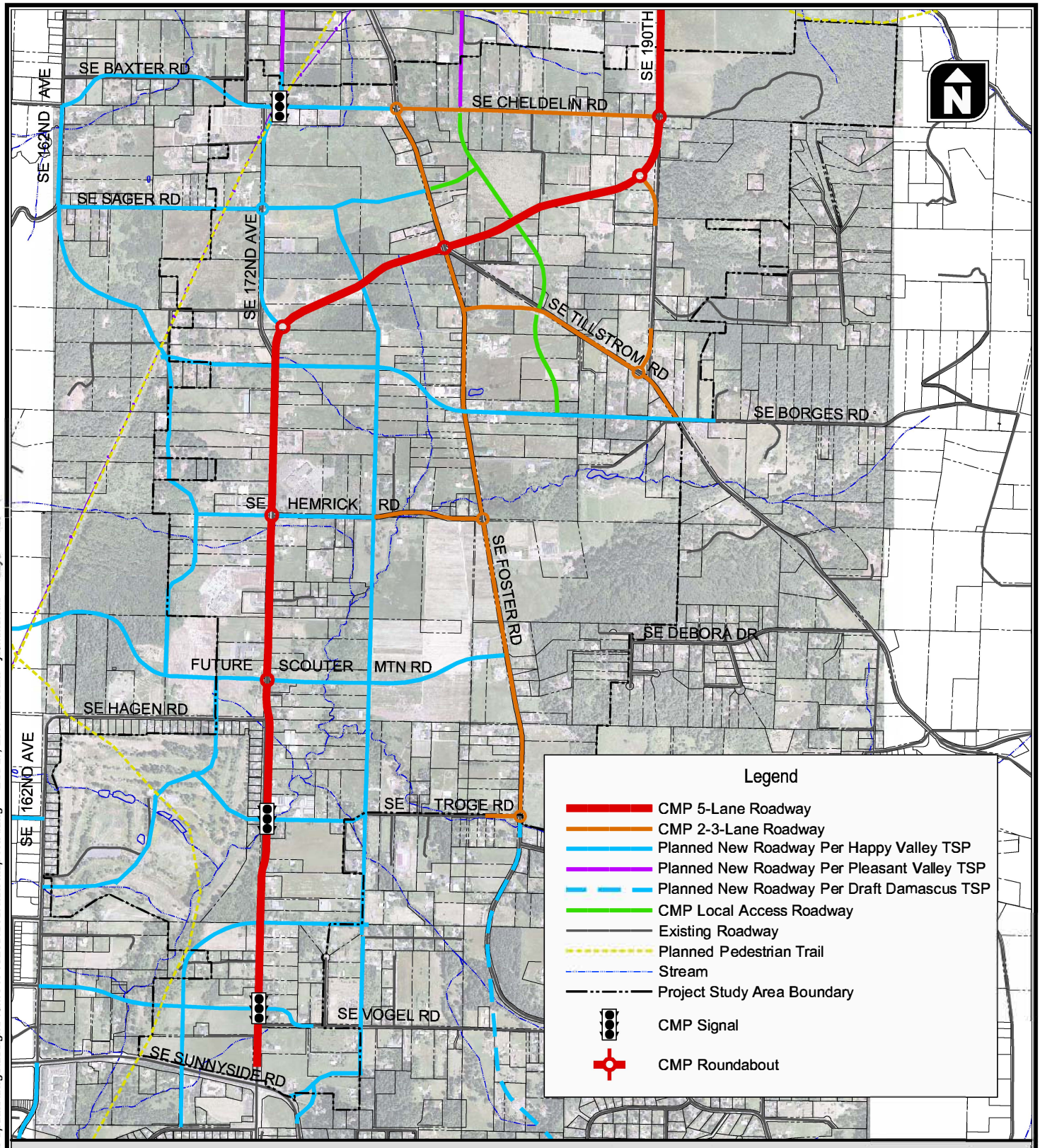
This chapter presents the Corridor Management Plan for connecting SE 172nd Avenue and 190th Drive between SE Sunnyside Road and SE Cheldelin Road. Specifically, the plan identifies the following elements:

- Preliminary alignment design,
- Typical streetscape sections,
- Intersection lane configurations and traffic control treatments,
- Local access plan,
- Bridge and culvert considerations,
- Construction cost estimate, and
- Other design considerations.

OVERVIEW

The Corridor Management Plan provides a comprehensive plan of transportation improvements to establish the long-term vision for the SE 172nd Avenue/190th Drive Corridor and to serve the growing multi-modal travel needs within the area for the next 25 years and beyond, as described in the purpose and need statement in Chapter 1. The plan was developed with extensive public involvement through the alternative screening and evaluation process, as described in Chapters 2 and 6.

Figure 7-1A and 7-1B present an overview map of the Corridor Management Plan, including the roadway improvements and intersection treatments within the PSA. In addition to the existing roads and environmental features, this map also displays planned new roadways based on the adopted transportation plans from the cities of Gresham and Happy Valley. The City of Damascus's transportation plan is currently under development, and the planned new roadways from the city's *draft* plan are also shown.



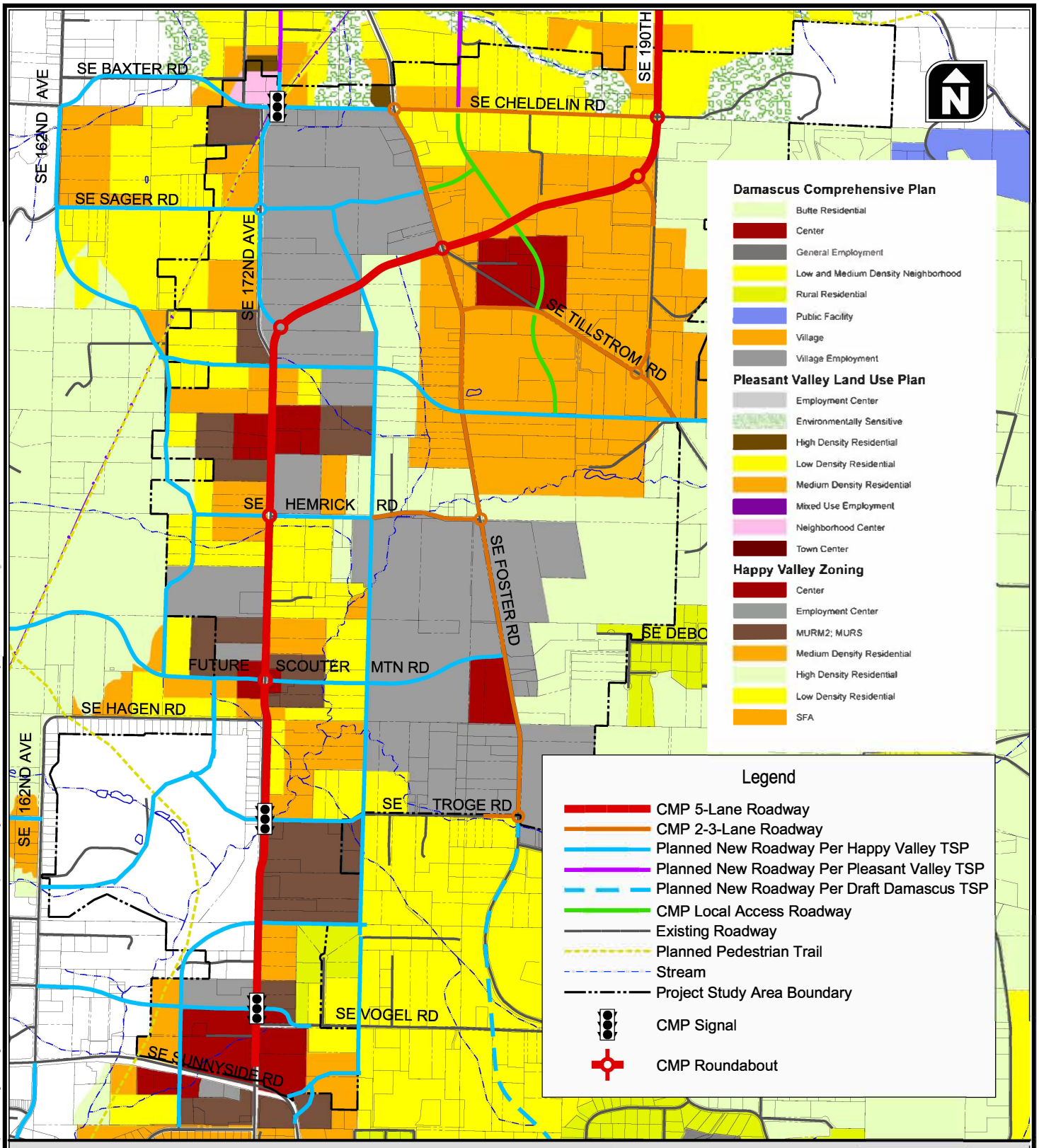
Corridor Management Plan Overview Map

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure 7-1A



Corridor Management Plan Overview Map

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure 7-1B

Table 7-1 summarizes roadway improvement projects identified in this Corridor Management Plan. The list is not comprehensive; minor connections to existing or future roadways will be subject to planning approvals and requirements at the time of development.

Table 7-1: Summary of Corridor Management Plan Roadway Improvements

#	Roadway	Location	Description
1	SE 172nd Avenue	SE Sunnyside Road to SE 172nd-190th Connector	Widen to five lanes
2	SE 172nd Avenue	SE 172nd-190th Connector to SE Cheldelin Road	Widen to three lanes
3	SE 172nd-190th Connector	SE 172nd Avenue to SE Foster Road	Construct new five-lane roadway
4	SE 172nd-190th Connector	SE Foster Road to SE 190th Drive	Construct new five-lane roadway
5	SE Cheldelin Road (SE Clatsop Street Extension)	SE 172nd Avenue to SE Foster Road	Construct new two-lane roadway
6	SE Cheldelin Road	SE Foster Road to SE 190th Drive	Widen to two lanes
7	SE Foster Road	SE Cheldelin Road to SE Troge Road	Widen to three lanes
8	SE Tillstrom Road	SE Foster Road to SE 190th Drive	Widen to three lanes and realign at Foster Road intersection
9	SE Hemrick Road	SE 172nd Avenue to SE Foster Road	Widen to two/three lanes
10	SE Troge Road	SE 172nd Avenue to approx. 1000' east of SE 172nd Avenue	Widen to three lanes and construct new bridge

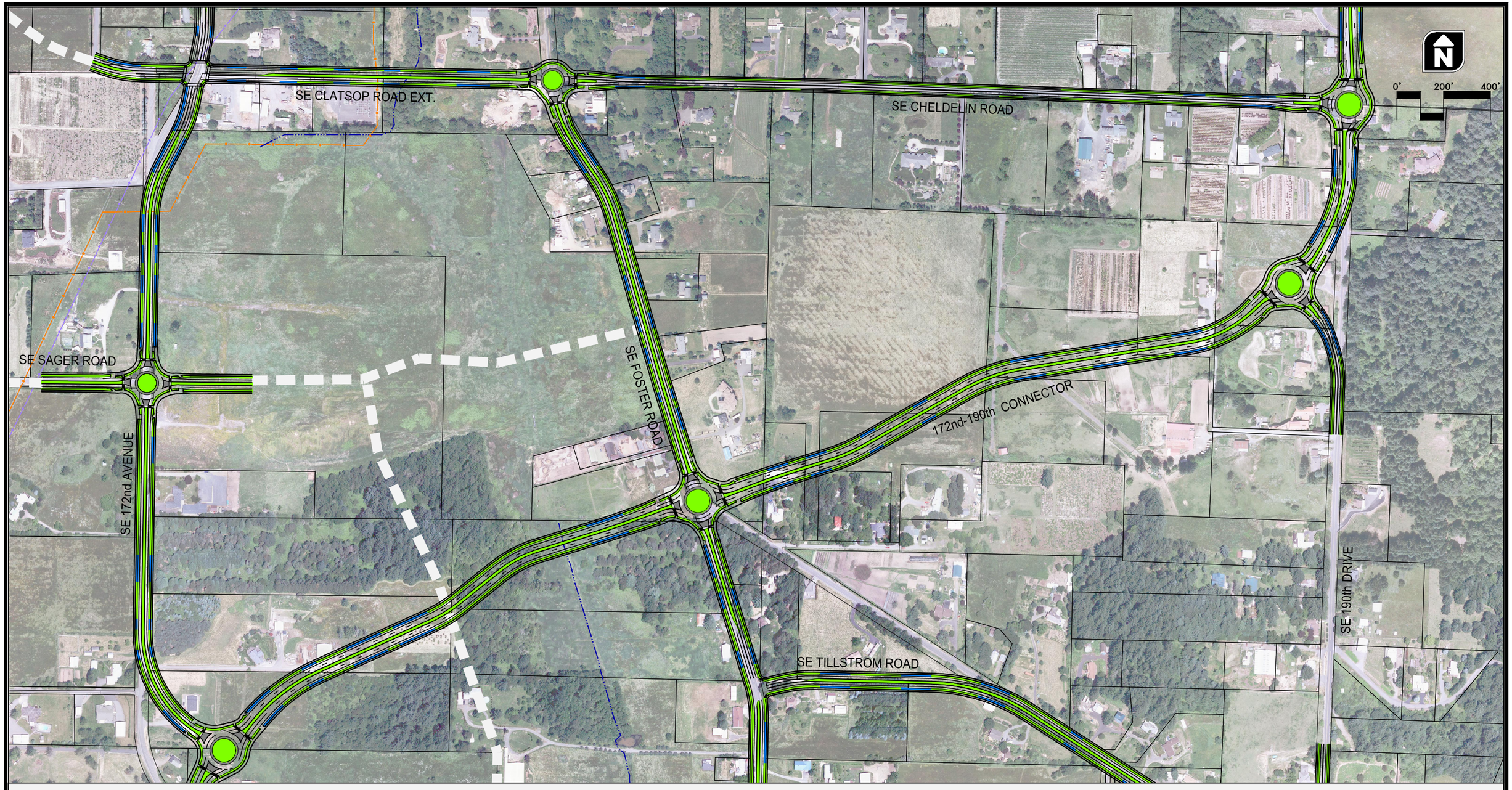
Details related to the alignments, cross-sections, intersection treatments, and additional design considerations are provided in the remainder of this section.

PRELIMINARY ALIGNMENT DESIGN

The conceptual design for the Corridor Management Plan improvements is shown in Figures 7-2A through 7-2D. These figures display 1"=400' scale drawings of the preliminary (15% level) horizontal design, including intersection layouts, pedestrian and bicycle facilities, and approximate right-of-way needs. Additional design information can be found in *Appendix C,* which includes 1"=100' scale horizontal plan views, preliminary vertical alignment design information, and conceptual stormwater utility plans.

Figure 7-2E provides an overview of the conceptual design plan at 1"=1000' scale.

The key features and design considerations for each of the various segments of the Corridor Management Plan are described below.



LEGEND

- EXISTING CREEK CHANNEL
- EXISTING TAX LOT LINE
- PROPOSED CURB
- PROPOSED ROADWAY STRIPING
- PROPOSED PLANTER / MEDIAN
- PROPOSED STORMWATER FACILITY

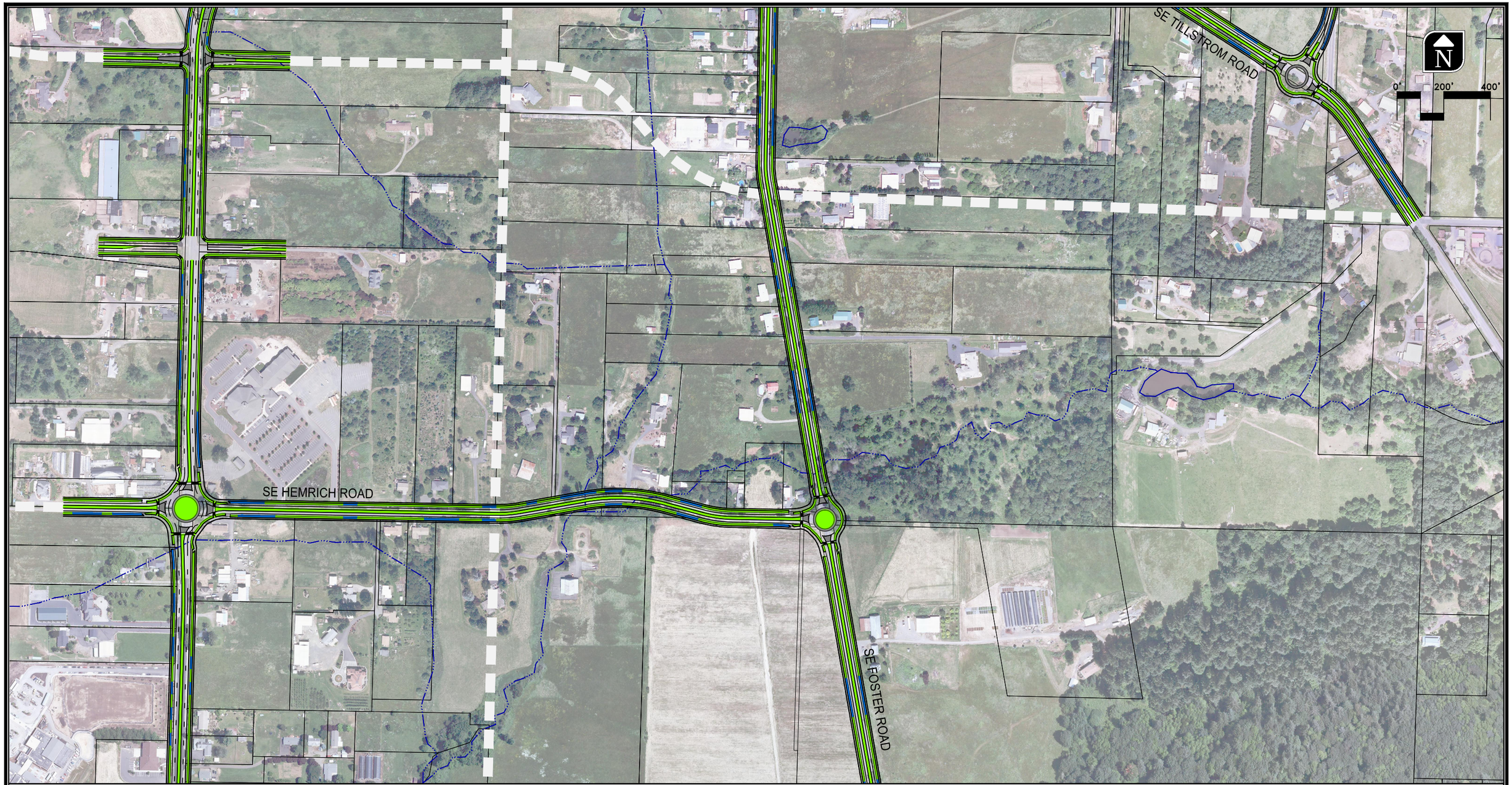
Corridor Management Plan Improvements (Sheet 1 of 4)

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

Figure

7-2A



LEGEND

- EXISTING CREEK CHANNEL
- EXISTING TAX LOT LINE
- PROPOSED CURB
- PROPOSED ROADWAY STRIPING
- PROPOSED PLANTER / MEDIAN
- PROPOSED STORMWATER FACILITY

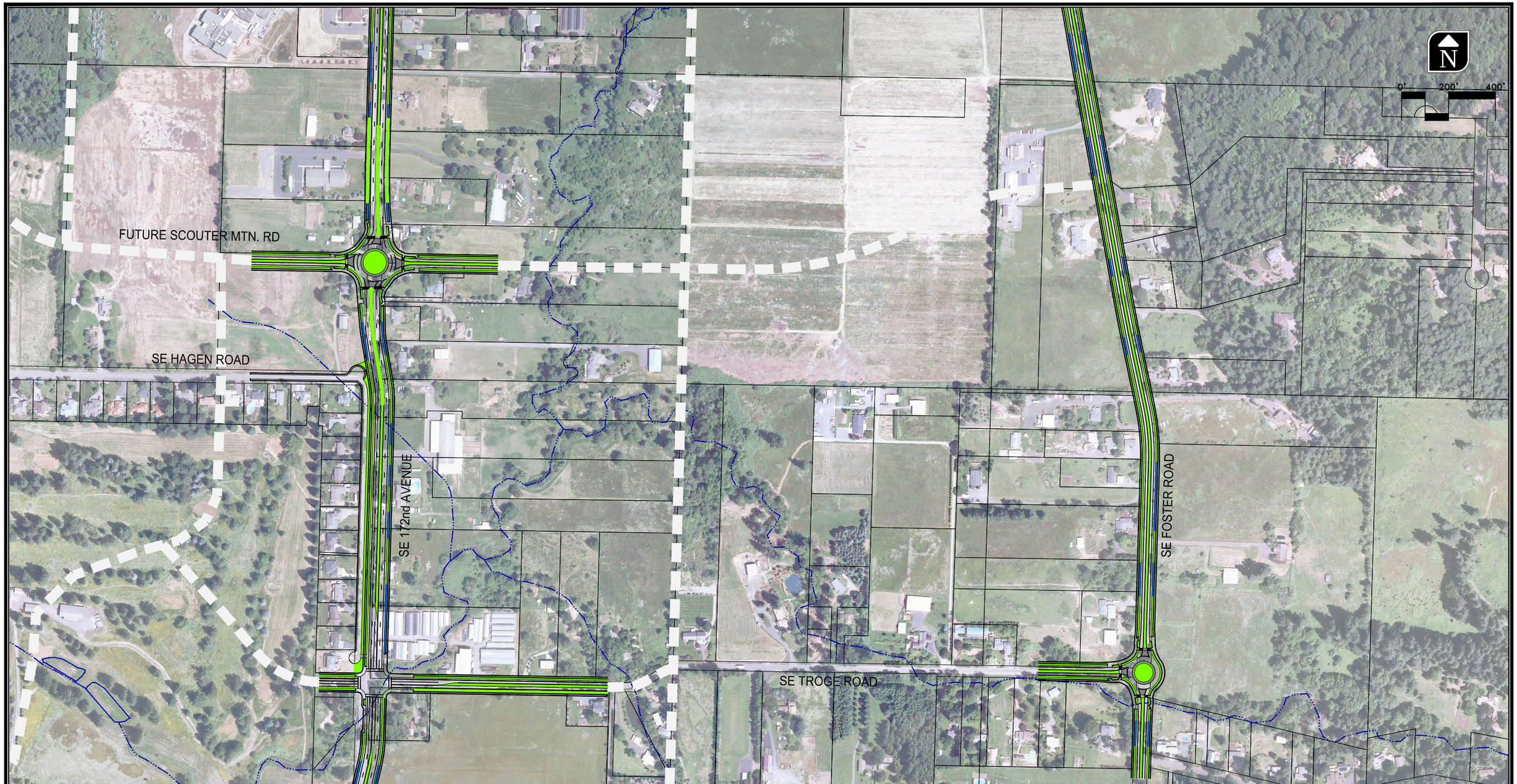
Corridor Management Plan Improvements (Sheet 2 of 4)

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

Figure

7-2B



LEGEND

- EXISTING CREEK CHANNEL
- EXISTING TAX LOT LINE
- PROPOSED CURB
- PROPOSED ROADWAY STRIPING
- PROPOSED PLANTER / MEDIAN
- PROPOSED STORMWATER FACILITY

Corridor Management Plan Improvements (Sheet 3 of 4)

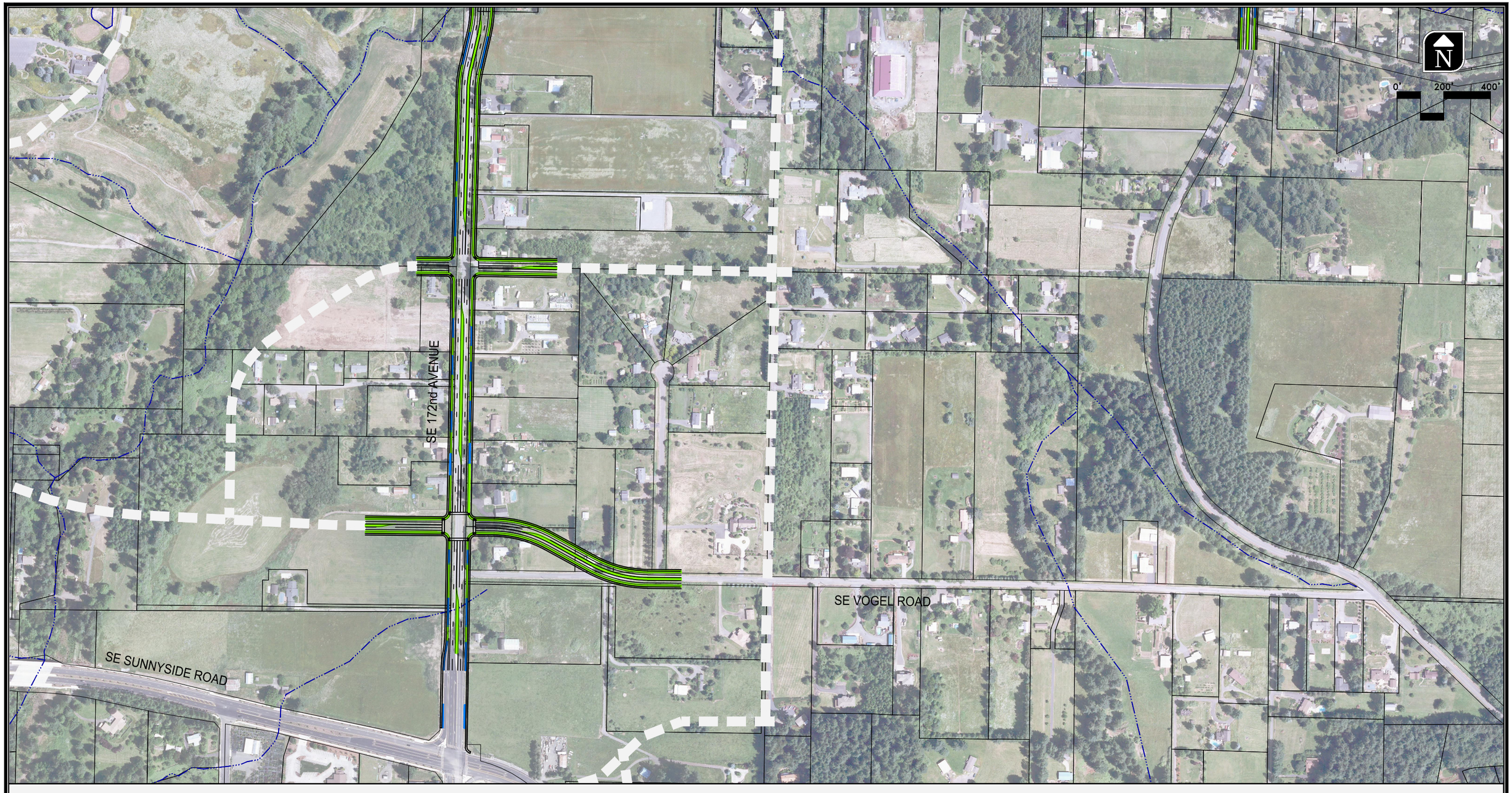
172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure

7-2C



LEGEND

- EXISTING CREEK CHANNEL
- EXISTING TAX LOT LINE
- PROPOSED CURB
- PROPOSED ROADWAY STRIPING
- PROPOSED PLANTER / MEDIAN
- PROPOSED STORMWATER FACILITY

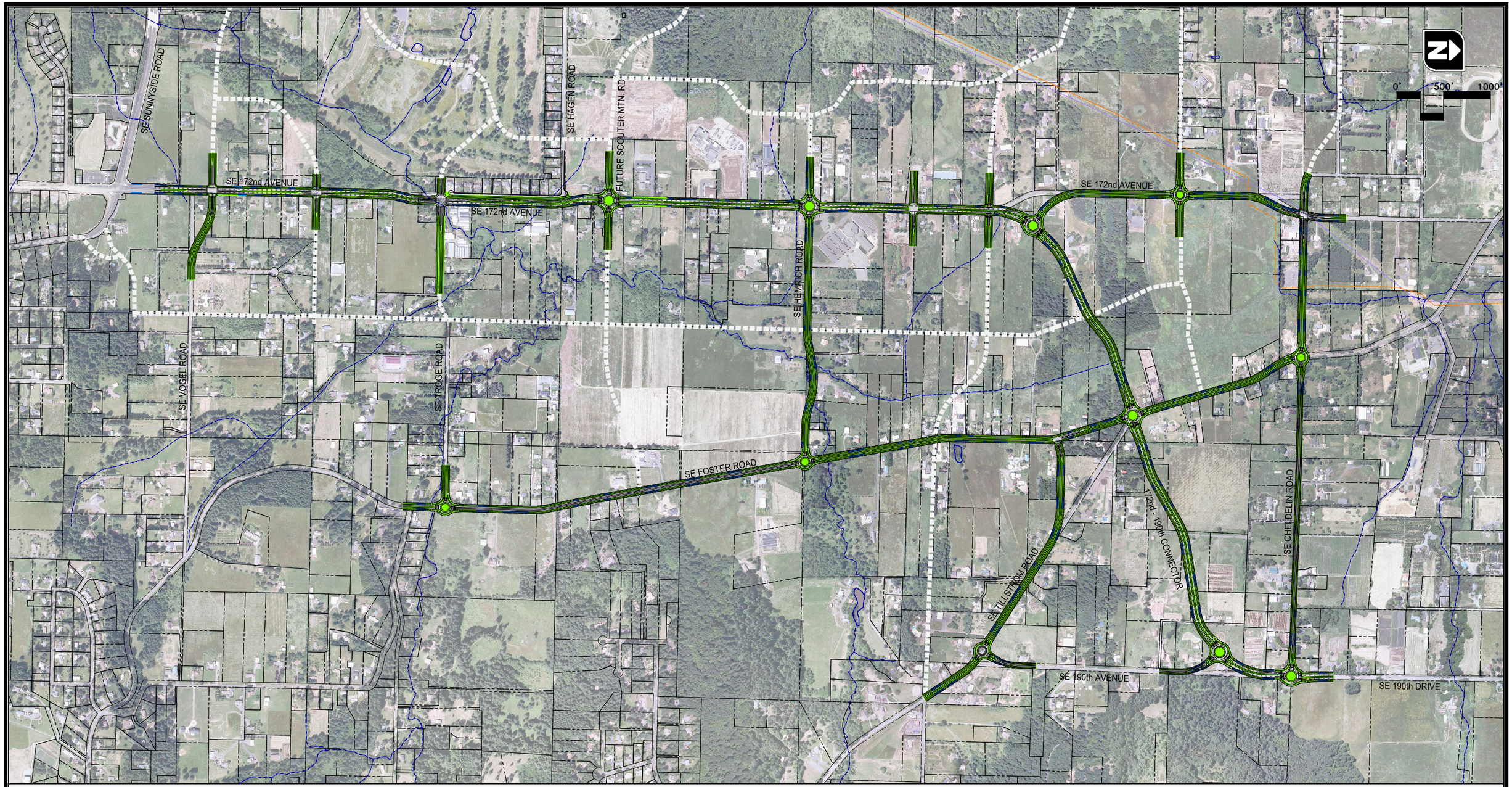
Corridor Management Plan Improvements (Sheet 4 of 4)

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

Figure

7-2D



LEGEND

- EXISTING CREEK CHANNEL
- EXISTING TAX LOT LINE
- PROPOSED CURB
- PROPOSED ROADWAY STRIPING
- PROPOSED PLANTER / MEDIAN
- PROPOSED STORMWATER FACILITY

Corridor Management Plan Improvements Overview

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

Figure

7-2E

1) SE 172nd Avenue: SE Sunnyside Road to SE 172nd-190th Connector

The preliminary horizontal design for the SE 172nd Avenue corridor from the new 172nd-190th Connector to SE Sunnyside Road is displayed in Figures 7-2B through 7-2D. As shown, the design consists of widening the corridor to five lanes and matching to the existing five-lane cross-section approximately 350 feet north of SE Sunnyside Road.

The Corridor Management Plan calls for widening symmetrically on both sides of the existing centerline, with the exception of the section generally located between SE Hagen Road and SE Troge Road. This quarter-mile section includes twelve existing single-family residences on the west side, each with individual access to SE 172nd Avenue. Maintaining these accesses onto the five-lane arterial would not be consistent with access management guidelines, and modifying or consolidating accesses while keeping SE 172nd Avenue on its existing centerline would not be feasible without substantially impacting all of the residences. Therefore, the roadway centerline alignment shifts approximately 45 feet east of the existing centerline in this section. As shown on Figure 7-2C, a two-lane frontage road would be constructed between SE Hagen Road and SE Troge Road to provide access to the residential properties on the west side of SE 172nd Avenue. The frontage road will outlet to SE Hagen Road with a cul-de-sac at its southern end. An emergency access route would be provided at the end of the cul-de-sac. SE Hagen Road will be disconnected from SE 172nd Avenue. A new bridge spanning both SE 172nd Avenue and SE Troge Road will replace the existing Rock Creek crossing. This structure will be approximately 140-feet long to account for the angle at which the roadway and stream intersect.

2) SE 172nd Avenue: SE 172nd-190th Connector to SE Cheldelin Road

As shown in Figure 7-2A, the remaining segment of SE 172nd Avenue north of the new 172nd-190th Connector would be widened to provide a three-lane cross-section and would primarily remain on its current alignment from SE Cheldelin Road to the new 172nd-190th Connector intersection. The only exception is the southernmost portion of the roadway, which will be realigned approximately 200 feet north of the SE Maple Hill Lane intersection to the new 172nd-190th Connector intersection. The alignment utilizes a roundabout intersection with the northern leg of SE 172nd Avenue intersecting the new 172nd-190th Connector perpendicularly.

3) SE 172nd-190th Connector: SE 172nd Avenue to SE Foster Road

Figure 7-2A displays the proposed horizontal alignment for the new five-lane roadway connecting SE 172nd Avenue and SE 190th Drive. As shown, this new alignment diverges from the existing SE 172nd Avenue alignment beginning just south of the SE Wooded Heights Road intersection and heads north-

northeast connecting to SE 190th Drive just south of SE Cheldelin Road. The new roadway cuts diagonally across existing properties and intersects with SE Foster Road at approximately the location of the existing SE Foster Road/SE Tillstrom Road intersection.

4) SE 172nd-190th Connector: SE Foster Road to SE 190th Avenue

As shown in Figure 7-2A, the SE 172nd-190th Connector completes the connection from SE Foster Road to SE 190th via a new alignment continuing in a northeasterly direction and joining the existing SE 190th alignment immediately south of SE Cheldelin Road.

In conjunction with the new 172nd-190th Connector, SE Tillstrom Road would be realigned beginning at a point approximately 1,200 feet east of SE Foster Road. The realignment entails curving SE Tillstrom Road in a westerly direction and creating a new intersection with SE Foster Road approximately 800 feet (no closer than 600 feet) south of the new 172nd-190th Connector/SE Foster Road intersection.

Similarly, SE 190th Drive would be realigned where it intersects the new 172nd-190th Connector. Beginning at a point approximately 1,200 feet south of SE Cheldelin Road, SE 190th Drive would curve in a northwesterly direction to intersect the new 172nd-190th Connector approximately 800 feet (no closer than 600 feet) south of the 172nd-190th Connector/SE Cheldelin Road intersection.

North of SE Cheldelin Road, SE 190th Drive will be widened symmetrically on both sides to provide a five-lane cross section consistent with the SE 172nd Avenue-190th Drive Connector. As the five-lane expansion extends north of the project study area boundary, the typical cross section may modified slightly, subject to the requirements of the City of Gresham and the Pleasant Valley District Plan.

5) SE Cheldelin Road: SE 172nd Avenue to SE Foster Road

The conceptual design plan for the SE Foster Road corridor is shown in Figures 7-2A through 7-2C. As demonstrated in the traffic analysis results presented in Section 6, SE Foster Road will function acceptably under projected design year traffic conditions as a three-lane roadway. In this design and per the *Pleasant Valley District Plan*, SE Foster Road will be disconnected to the north beyond SE Cheldelin Road.

Given the multitude of existing and potential future access points along its length, a consistent three-lane cross-section is maintained within the project study area. The design widens SE Foster Road symmetrically on each side of the existing centerline. Ultimately when construction drawings are prepared for the SE Foster Road corridor, it may be appropriate to consider refinements to the design, including possible adjustments to the existing centerline alignment.

6) SE Tillstrom Road

As shown in Figure 7-2A, SE Tillstrom Road will be widened to a three-lane roadway between SE Foster Road and SE Borges Road, with a new roundabout intersection at the realigned SE 190th Drive. Additionally, the western end of the road will be realigned beginning at a point approximately 1,800 feet east of SE Foster Road, in order to separate the SE Tillstrom Road/SE Foster Road intersection by approximately 800 feet (no closer than 600 feet) away from the new 172nd-190th Connector/SE Foster Road intersection. Additionally, SE 190th Drive will be realigned near its southern terminus to form a more perpendicular roundabout intersection with SE Tillstrom Road, as shown in Figure 7-2B.

7) SE Hemrick Road

As a collector roadway, SE Hemrick Road will be widened to urban design standards, including bike lanes and sidewalks. Left-turn lanes may be provided at intersections, depending on future development plans and associated traffic analyses. The cross sectional details of SE Hemrick Road will be based on applicable city and/or county design standards. Figure 7-2B shows a symmetrical widening of SE Hemrick Road about its existing centerline. Extensions to the existing underground culverts will be necessary to provide drainage to the Rock Creek watershed.

8) SE Troge Road

As shown in Figure 7-2C, the Corridor Management Plan includes widening SE Troge Road to provide a three-lane approach to the intersection with SE 172nd Avenue. To minimize impacting the natural and built environments, the plan retains the existing alignment of SE Troge Road and assumes a future extension of SE Troge Road directly to the west. The widening of SE Troge Road as well as SE 172nd Avenue will involve constructing one long bridge that would follow the existing Rock Creek alignment and span both legs of the intersection. More discussion of the bridge design considerations is provided later in this chapter.

TYPICAL STREETSCAPE SECTIONS

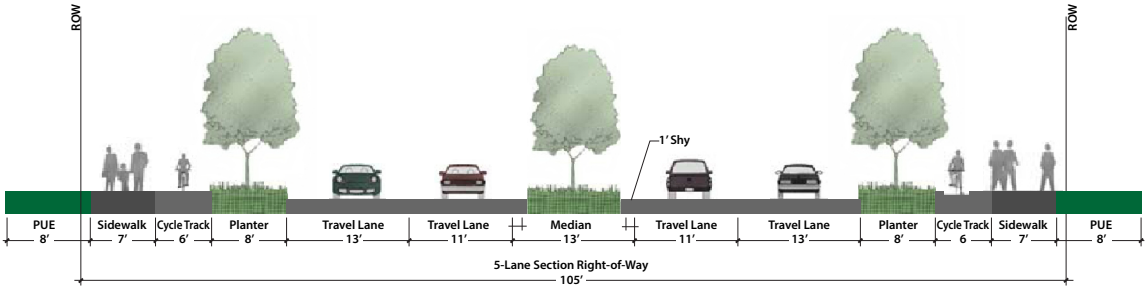
The streetscape characteristics for the SE 172nd Avenue/190th Drive Corridor Management Plan were developed to meet the vehicular travel needs while achieving the other project objectives, including:

- Providing a safe and comfortable route for pedestrians and bicyclists.
- Integrating green street features.
- Supporting future public transit opportunities.

- Encouraging lower speeds within commercial centers.
- Accommodating emergency service vehicles and freight vehicles.
- Providing an aesthetically pleasing design.
- Balancing streetscape features with maintenance considerations.

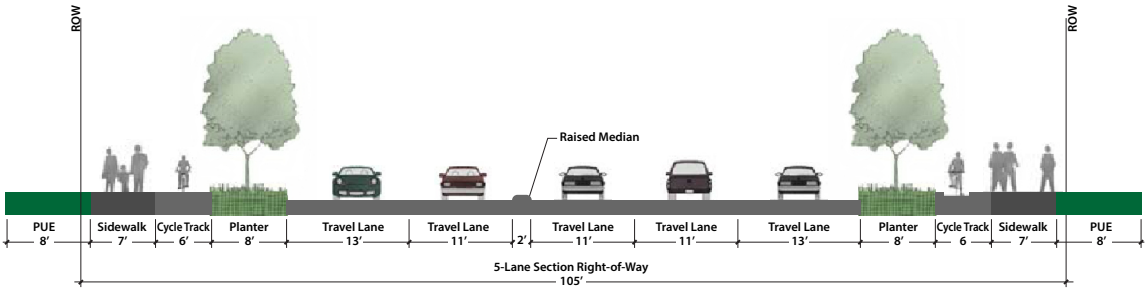
To that end, the streetscape designs shown in Figures 7-3A, 7-3B, and 7-3C were developed for varying lane configuration and land-use environments.

5A-1



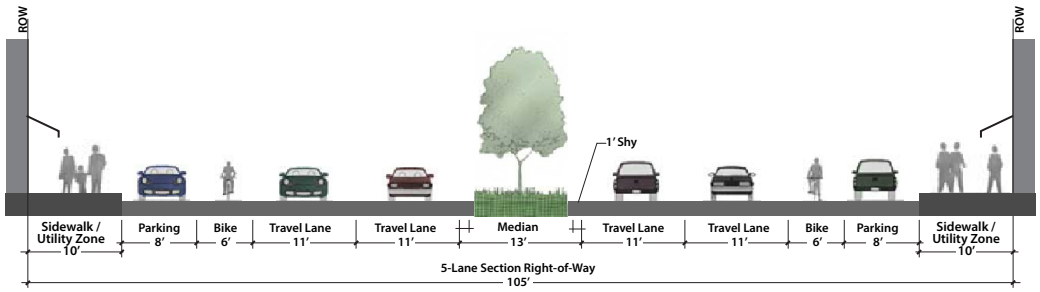
5-Lane Section with Median

5A-2



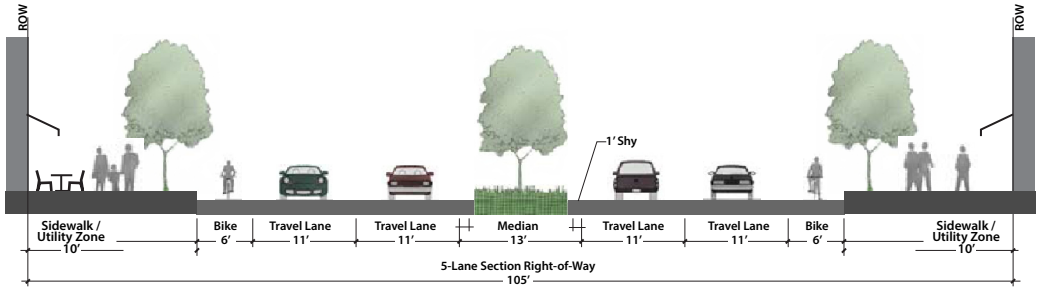
5-Lane Section with Left Turn Lane

5B



5-Lane Section with On-street Parking in Urban Center

5C



5-Lane Section in Urban Center

Corridor Management Plan
5-Lane Streetscape

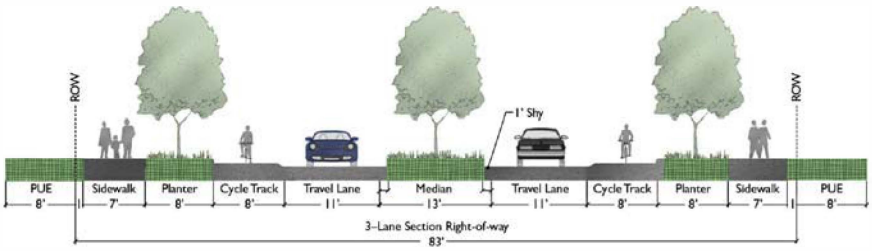
172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

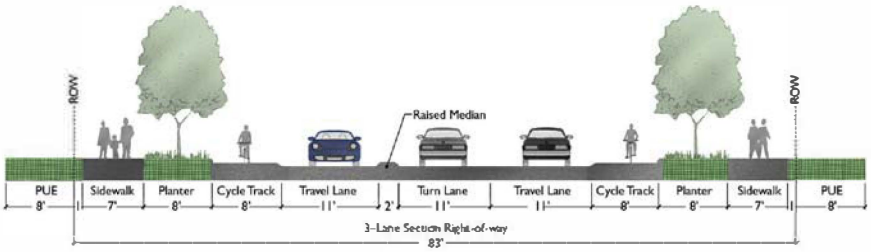
Figure 7-3A

3A-1



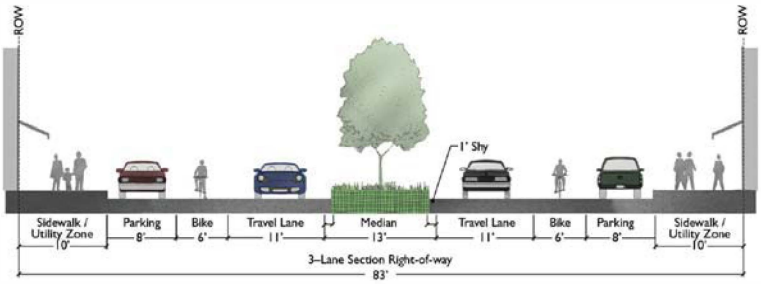
3-Lane Section with Median

3A-2



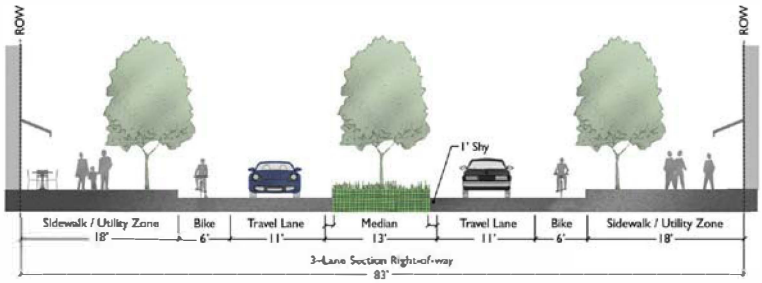
3-Lane Section with Left Turn Lane

3B



3-Lane Section with On-street Parking in Urban Center

3C



3-Lane Section in Urban Center

Corridor Management Plan
3-Lane Streetscape

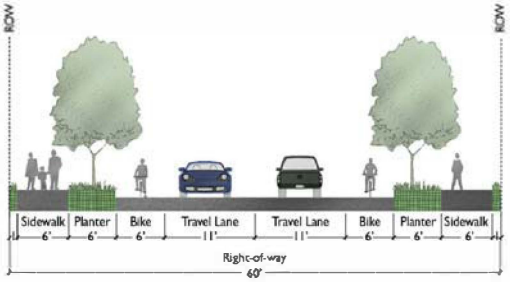
172nd / 190th Corridor Plan

CLACKAMAS COUNTY

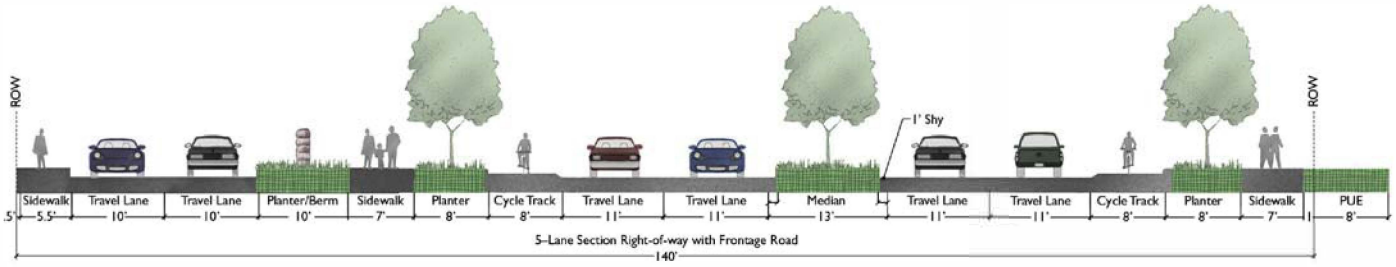
HAPPY VALLEY, OR EST. 1965

Figure 7-3B

2A



2-Lane Section



2B 5-Lane Section with Median and Frontage Road

Corridor Management Plan
2-Lane Streetscape

172nd / 190th Corridor Plan

CLACKAMAS COUNTY

HAPPY VALLEY, OR EST. 1965

Figure 7-3C

Table 7-2 summarizes the streetscape features and dimensions for various land use environments.

Table 7-2: Corridor Management Plan Streetscape Characteristics and Typical Dimensions

Street Element	Residential or Industrial Areas	Commercial Centers (No Parking)	Commercial Centers with Parking
Vehicle Travel Lane Width	11 feet	11 feet	11 feet
Median Width	13 feet	13 feet	13 feet
Cycle Track Width	8 feet	--	--
Bike Lane Width	--	6 feet	6 feet
Planter Strip Width	8 feet	--	--
Sidewalk Width	7 feet	18 feet	10 feet
Parking	--	--	8 feet
Total ROW – Five-Lane Corridor	105 feet	105 feet	105 feet
Total ROW – Three-Lane Corridor	83 feet	83 feet	83 feet
Five-Lane Corridor Illustration	5A (1 or 2)	5B	5C
Three-Lane Corridor Illustration	3A (1 or 2)	3B	3C
Two-Lane Corridor Illustration	2A	--	--

Additional discussion of the streetscape design elements is provided below.

VEHICLE TRAVEL LANES

Standard lane widths of 11 feet shall be used for the project corridors. These lane widths correspond to the minimum dimension allowed by *Clackamas County Roadway Standards*. Where necessary to accommodate truck turning movements at intersections (especially roundabout intersections), wider travel lanes may be used.

MEDIANS

A consistent median width of 13 feet shall be provided for the 172nd Avenue/190th Drive and SE Foster Road corridors within the PSA. At intersections and access points requiring left-turn lanes, the 13-foot median width can be striped to demarcate an 11-foot left-turn lane with a two-foot median (striped and/or raised) between opposing directions of traffic. For segments between intersections where no left-turn lane is required, a raised landscaped median should generally be provided. The raised median will generally be 11 feet wide, providing one-foot shy distance to the travel lanes on either side.

CYCLE TRACKS

A cycle track is an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane. Although located adjacent to the travel lane (similar to a standard bike lane), cycle tracks on the 172nd Avenue/190th Drive corridor are elevated above the street level using a low-profile curb and a distinctive pavement material. By separating cyclists from motor vehicle traffic, cycle tracks can offer a higher level of security than bike lanes and are attractive to a wider spectrum of the public.

Example cycle track in Bend, Oregon

As shown in Figures 7-3A and 7-3B, cycle tracks shall be eight feet wide, which includes the low-profile curb and shy distance to the vehicular travel lane. The cycle tracks shall be constructed using concrete pavement with coloring to be specified by Clackamas County.

BIKE LANES

For segments of the corridor within commercial centers or on two-lane roadways, the cycle tracks may be eliminated and replaced by standard six-foot bike lanes. In these areas, the two-foot surplus width (in comparison to the eight-foot cycle tracks used elsewhere) will be used to provide wider sidewalks.

PLANTER STRIPS

Planter strips separating the roadway from the sidewalk shall be provided in all areas along the corridor, except within commercial centers. Planter strips will be eight feet wide and may be used to provide water quality treatments and/or other green street design elements.

In commercial centers, planter strips can be eliminated and replaced by wider sidewalks, tree wells, and other street furniture, as shown in Figures 7-3A and 7-3B.

SIDEWALK WIDTH

Sidewalks will generally be at least seven-feet wide for segments of the corridor outside of commercial centers. Within commercial centers, sidewalks will be 18 feet wide where on-street parking is not provided, and 10 feet wide where on-street parking is provided.

PARKING

Parking may be provided within the vicinity of commercial centers. Where provided, parking stalls will be eight feet wide and located between the bike lane and sidewalk, as shown in Figures 7-3A and 7-3B.

RIGHT-OF-WAY WIDTH

As shown in Figures 7-3A and 7-3B, the total required right-of-way width is 105 feet for the five-lane corridor and 83 feet for three-lane corridors. Additionally, an eight-foot public utility easement is required on both sides for all arterial locations, except within the commercial centers where utilities may be provided underground within the right-of-way. Additional slope easements may also be needed outside of the standard right-of-way width, depending on final grading limits. A preliminary assessment of the future right-of-way footprint can be found in the preliminary 15 Percent Design Plans (see *Appendix C)*.

INTERSECTION LANE CONFIGURATIONS AND TRAFFIC CONTROL

Traffic analysis results for the 2035 design year were presented in Chapter 6 of this report. Based on the results of the capacity analysis, the lane configurations and traffic control forms were determined for each study intersection. In general, roundabouts were selected as the preferred form for major intersections, if feasible based on the environmental constraints and traffic analysis results. Roundabouts provide several advantages over signalized intersections, including:

- Safety benefits – roundabouts have been shown to have significantly fewer fatal and injury crashes.
- Operational benefits – roundabouts typically have lower overall delay compared to signalized intersections, especially during non-peak travel periods.
- Environmental benefits – roundabouts result in fewer stops and less time idling than signalized intersections.
- Complementary with community values – roundabouts provide opportunities for aesthetic enhancements such as artwork and landscaping. Additionally, roundabouts promote a slower speed environment, which enhances the comfort level for pedestrians, bicyclists, and other non-motorized modes.

At some study intersections, roundabouts were found to require additional travel lanes and/or did not fit well with the surrounding network. In these, cases traffic signals were selected as the preferred form

of traffic control. Table 7-3 summarizes the intersection lane configurations and traffic control treatments, as identified in this Corridor Management Plan.

Table 7-3: Summary of Intersection Treatments

Intersection	Proposed Intersection Form
172nd Ave / Vogel Rd	Signal
172nd Ave / Troge Rd	Signal
172nd Ave / Future Scouters Mountain Rd	2-Lane Roundabout
172nd Ave / Hemrick Rd	2-Lane Roundabout
172nd Ave / 172nd-190th Connector	2-Lane Roundabout
172nd-190th Connector / Foster Rd	2-Lane Roundabout
172nd-190th Connector / 190th Ave	2-Lane Roundabout
172nd-190th Connector / Cheldelin Rd / 190th Ave	2-Lane Roundabout
172nd Ave / Sager Rd	1-Lane Roundabout
172nd Ave / Cheldelin Rd	Signal
Foster Rd / Cheldelin Rd	1-Lane Roundabout
Foster Rd / Tillstrom Rd	Stop Controlled
Foster Rd / Hemrick Rd	1-Lane Roundabout
Foster Rd / Troge Rd	1-Lane Roundabout
190th / Tillstrom Rd	1-Lane Roundabout

LOCAL ACCESS PLAN

Local access and circulation within the PSA will be accommodated through a combination of new and upgraded collector and local streets. The future network of collector-level roadways is comprised of planned roadways from the City of Happy Valley's *Transportation System Plan* (TSP), the City of Gresham's *Pleasant Valley District Plan*, and a number of additional new roadways from this CORRIDOR MANAGEMENT PLAN. These new collector roadways are shown on the Corridor Management Plan Overview Map in Figure 7-1A and described below.

HAPPY VALLEY TSP

The City of Happy Valley's TSP identifies five existing east-west roadways within the PSA to be extended and upgraded as collector facilities. These roadways are shown schematically in Figure 7-1A and listed as follows:

- SE Baxter Road – to be realigned with SE Clatsop Street and extended from SE 162nd Avenue to SE Foster Road, aligning with SE Cheldelin Road.
- SE Sager Road – to be extended from SE 172nd Avenue to SE Foster Road.
- SE Hemrick Road – to be extended from SE 172nd Avenue to the future extension of SE 162nd Avenue.
- SE Troge Road – to be extended from SE 172nd Avenue to SE 162nd Avenue.
- SE Vogel Road – to be extended from SE 172nd Avenue to SE 162nd Avenue, aligning with SE Misty Drive.

Additionally, the Happy Valley TSP establishes four *new* east-west collector roadways that will cross SE 172nd Avenue within the PSA. These include two new roadways located between SE Sager Road and SE Hemrick Road, the future "Scouters Mountain" roadway between SE Hemrick Road and SE Hagen Road, and a new roadway between SE Troge Road and SE Vogel Road.

Finally, the Happy Valley TSP proposes intermittent north-south connections along the alignment of SE 177th Avenue to be provided between various east-west roadways.

PLEASANT VALLEY DISTRICT PLAN

The City of Gresham's *Pleasant Valley District Plan* identifies one new collector roadway within the PSA: an extension of SE 182nd Avenue. This future collector would extend from the existing southern terminus of SE 182nd Avenue, follow a portion of the existing SE Richey Road alignment, and connect to SE Cheldelin Road approximately 800 feet east of SE Foster Road.

ADDITIONAL NEW ROADWAYS

This Corridor Management Plan identifies a number of additional collector-level roadways to complete the local circulation network within the PSA. These new roads are shown schematically in Figure 7-1A and described as follows.

- **Future "177th Avenue" Corridor** – The Corridor Management Plan will connect the missing segments of this planned north-south collector corridor from the Happy Valley TSP, to provide a continuous corridor from SE Sager Road to SE Vogel Road. This collector will serve the local circulation needs while SE 172nd Avenue and SE Foster Road will serve more regional travel needs.

- **SE 182nd Avenue Extension** – This new roadway will continue the planned extension of the SE 182nd Avenue corridor (as proposed in the *Pleasant Valley District Plan*) from SE Cheldelin Road south to the future extension of SE Borges Road.
- **SE Sager Road Extension** – The planned extension of SE Sager Road from the Happy Valley TSP will be further extended in an easterly direction from SE Foster Road to the Future SE 182nd Avenue Extension.
- **SE Borges Road Extension** – This improvement would realign the westernmost portion of SE Borges Road to intersect SE Tillstrom Road at a more perpendicular angle. It would then extend the corridor in a westerly direction to the Future "177th Avenue" corridor, aligning with the planned new collector facility as established in the Happy Valley TSP.
- **Future "Scouters Mountain Road" Extension** – The planned new east-west collector from the Happy Valley TSP will be extended eastward from the Future "177th Avenue" to SE Foster Road.

BRIDGE AND CULVERT CONSIDERATIONS

One new bridge is designed and included in the plan set and cost estimate. This bridge is located at the intersection of SE 172nd Avenue and SE Troge Road, crossing Rock Creek. The bridge will be a single span structure, straddling the regulated 100-year floodway and will maintain or improve the existing flow capacity. Given the skewed angle of the creek crossing and the need to include two legs of the intersection, the bridge design assumes precast pre-stressed deck bulb-t girders. Items of note during the final design phase are the high skew angle at the 172nd crossing resulting in a long bridge, and the proximity of the proposed signalized intersection. The construction of the bridge may take at least three stages as it overlaps with both the existing bridge on 172nd Avenue and the existing bridge on Troge Road. To maintain traffic and the required turns, distinct portions of the structure will have to be constructed as well as timed with demolition of the existing bridges.

Scour potential and wildlife corridor crossing will be addressed by raising the bridge and roadway elevation. The proposed roadway typical sections, with the exception of the landscaped planters, will be carried through the bridge segment and appropriate bridge rail will protect pedestrians and bicyclists at the outer edge of the sidewalk. The bridge will accommodate utilities underneath the roadway or sidewalk surface

Two culverts are assumed in this design package: one at a tributary of Rock Creek near the 172nd-190th Connector Road east of the Foster intersection, and one immediately north of the Foster/Hemrick

intersection. Each culvert will be a fish-passable box culvert, utilizing either a bottomless structure or a countersunk box. Alternatively, bridges may be used in lieu of culverts, if found to be cost effective. The typical roadway section will be carried through the culvert crossing, with a pedestrian rail at the headwalls to minimize earthwork fill and length of structure. The cost for each structure is provided on an individual basis, and further engineering studies will tighten these costs at the time of final design.

CONSTRUCTION COST ESTIMATE

Planning-level cost estimates were prepared for individual segments of the overall corridor plan using current construction material costs, tax assessor data for property acquisitions, and historical cost data. The major disciplines comprising roadway construction were consulted in preparing estimates: roadway/civil engineering, bridge/structural engineering, stormwater treatment, traffic design, wetland mitigation, and property analysis. For each discipline, an estimate of the materials necessary to complete construction was made. While not comprehensive in scope, the items quantified are intended to define the major construction elements needed to complete the work using a typical engineering design. For example, estimates include a cost per foot of roadway section; features such as landscaped medians or widened road versus new roadway are noted. Aggregated items shown in previous reports have been separated into further detail for ease of tracking costs and isolating construction activities.

The unit costs for construction materials are provided in 2011 dollars and are are based upon historic bid tabulation data from the Oregon Department of Transportation (ODOT), estimate work from previous arterial roadway and bridge construction, and other estimating procedures based on project experience and construction cost trends in the region.

Finally, contingencies were included as a percentage of the overall construction cost. Three separate contingencies are noted. Soft costs, set at 30%, account for costs incurred through necessary permitting, plan review fees, additional studies, and design and consultation fees. Construction contingencies, also set at 30%, account for the general level of design detail available upon which to complete the estimate, material price fluctuations, and to cover items not quantified or for which a cost cannot currently be determined. Construction Engineering contingency, set at 10%, is a standard contingency found in both planning projects and those anticipating construction. This contingency covers administration of the construction contract, inspections, and testing services.

Preliminary cost estimates, including contingencies, for each segment of the Corridor Management Plan are shown in Table 7-4.

Table 7-4: Estimated Construction Costs

#	Project	Estimated Cost
1	SE 172nd Avenue (SE Sunnyside Road to SE 172nd-190th Connector)	$43M
2	SE 172nd Avenue (SE 172nd-190th Connector to SE Cheldelin Road)	$10M
3	SE 172nd-190th Connector (SE 172nd Avenue to SE Foster Road)	$10M
4	SE 172nd-190th Connector (SE Foster Road to SE 190th Avenue)	$18M
5	SE Cheldelin Road (SE 172nd Ave to SE Foster Rd)	$5M
6	SE Cheldelin Road (SE Foster Rd to SE 190th Dr)	$7M
7	SE Foster Road (SE Cheldelin Rd to SE Troge Rd)	$28M
8	SE Tillstrom Road (SE Foster Rd to SE Borges Rd)	$11M
9	SE Hemrick Road (SE 172nd Ave to SE Foster Rd)	$8M
10	SE Troge Road (SE 172nd Ave to approx. 1000' east of SE 172nd Ave)	$4M
	GRAND TOTAL	**$144M**

Details of the construction cost estimates can be found in *Appendix C*.

OTHER DESIGN CONSIDERATIONS

Retaining Walls

The preliminary design shown on the 15 Percent Design Plans anticipates mechanically-stabilized earth (MSE) retaining walls. Walls of this type consist of a wall panel (typically concrete blocks) tied into the slope using reinforcing materials between compacted soil layers. Retaining walls are proposed in areas where the roadway section requires a cut or fill with a depth over five-feet. Areas with a depth less than five-feet will be graded to catch the existing ground at a 2H:1V slope and may require slope easements.

Relocation of Significant Utilities

Relocation of utilities will generally be a minor task in reconstruction of the roadway network within the PSA. The two utilities that are unlikely to be relocated and shall be considered as fixed in future planning efforts are the 30-inch natural gas pipeline and the overhead electrical transmission lines. Cost and coordination efforts for relocating these items will likely surpass efforts to prepare alternate roadway alignments. Careful design and coordination with these utility providers will be critical when designing the roadway widening of SE 172nd Avenue and the new intersection of Cheldelin and 172nd Avenue for the protection of the gas main and electrical lines.

Several existing electrical lines converge near the widening of SE 172nd Avenue just south of the new intersection with Cheldelin. The final design for the roadway widening should aim to avoid impacting the existing steel towers, but may impact a number of wood pole structures and guy anchors. The crossing of SE 172nd Avenue over the gas line occurs at a 90-degree angle, minimizing the crossing impacts; however, careful protection of the underground pipe will be necessary when compacting the structural section for the widened roadway. Any construction activity across or near the large gas line will likely require a permit from the pipeline owner; coordination is anticipated to require a 6-month lead time. Additionally, the large water main paralleling SE 172nd Avenue from SE Sunnyside Road to SE Troge Road will require careful consideration when altering surrounding roadways and the proposed bridge structure crossing Rock Creek.

Utility Infrastructure

Perhaps more significant than relocation is the opportunity to bring new public infrastructure to the properties within the PSA as the 172nd/190th Corridor Plan develops. While nearly all properties in the PSA are served by electricity and communication utilities, public services such as domestic water, sanitary sewer, and stormwater treatment do not extend north beyond Scouters Mountain School, the most recent development in the PSA. Careful coordination among utility designers will allow for upgrades to existing lines and an opportunity to expand service areas.

In planning the improvements to the roadways, the design team included the cost for new public utilities. These costs, while managed by separate public agencies/jurisdictions, are included to reflect the overall cost for public improvements. This includes stormwater conveyance, detention storage and treatment, sanitary sewer mainlines, and domestic water pipes and appurtenances. Pipe sizing is provided in the cost estimate resulting from general approximations. A detailed engineering study to determine pipe sizing should be performed prior to any construction improvements.

Proposed domestic water infrastructure will likely begin at connection point near Scouters Mountain School. An 18-inch water line exists within SE 172nd from this point south to SE Sunnyside Road. It is estimated that the water main, with an average pipe diameter of 12 inches, will be extended throughout the project on all improved streets. Appurtenances including hydrants, air release valves, valves at intersections, and service connections are estimated at 10% of the mainline cost. Reservoir improvements, pressure release valves, booster pumps or the like are not included in the design and estimate at this phase.

The cost estimate includes line items for proposed sanitary sewer infrastructure to connect the majority of the PSA properties which utilize septic tanks and drain fields. An existing sanitary sewer

trunk line runs up the Rock Creek corridor from SE Sunnyside Road to SE Troge Road, then continues up SE 172nd Avenue to Scouters Mountain School. For all other road improvements, new sanitary lines are provided in the estimate. Using the roadway lengths, 8 and 12-inch sanitary lines are estimated, with the 8-inch lines serving the roadways at the high points – generally from the northeast corner of the PSA running downhill to the southwest corner at the connection point near Rock Creek.

The stormwater conveyance system proposed at this level of design considers the contributing area for roadway improvements only, not future developments. Per Clackamas County Stormwater Management Guidelines, new developments are required to detain and treat stormwater onsite prior to releasing the water to a public system or stream. Depending on timing of property developments, a parallel stormwater sewer system serving adjacent property developments may be constructed within the right-of-way before outfalling to the nearest body of water. Pipe sizing for the stormwater system results from general approximations to convey the roadway runoff. The stormwater pipe sizes were estimated using the CIA method to relate required pipe sizes to contributing impervious area:

- 12-inch pipe for contributing areas less than 5 acres,
- 18-ince pipe for contributing areas between 5 and 15 acres, and
- 24-inch pipe for contributing areas over 15 acres.

Other utility infrastructure that may be incorporated as the roadway network develops may include natural gas, telecommunications, ITS technology for traffic management, and electricity. Each roadway is planned for an eight-foot public utility easement (PUE) on each side of the proposed roadway. This area will serve the private utility companies, providing a space for an underground joint trench and vaults or for placement of poles for aerial utilities. The space was reserved, but the cost to supply and install the infrastructure is not included in the cost estimates, with the exception of conduit for ITS infrastructure.

Drainage Constraints

Designers will need to provide for water quality treatment and detention for all runoff from new or redeveloped impervious area, utilizing vegetated treatment facilities where appropriate. Soils appear to have relatively low permeabilities and on-site testing will be necessary to assess how well any proposed infiltration facilities will drain. Clackamas County WES requires infiltration of the first 0.5 inches of runoff, detention for a range of storm events, and water quality treatment for all runoff from new or redeveloped impervious area. Infiltration rates will depend upon numerous factors including the soil characteristics and the depth to groundwater. Many of the suggested pond sites are in relatively low areas and may be impacted by the seasonal water tables found in those areas

Planning for right-of-way acquisition and roadway design will consider the area required for stormwater treatment facilities such as swales and planters adjacent to roads.

Water Quality Treatment

Clackamas County has placed a high priority on using vegetative treatment of runoff water. These facilities utilize infiltration of water and are most cost effective if underdrains are not required. On-site infiltration tests will be required to assist in choosing the type of water quality treatment system to be applied to different sections of the project. For the contributing roadway surface area, treatments for managing stormwater runoff may include a variety of options such as linear swales and rain gardens located at low positions within the eight-foot landscape strip within the roadways rights of way.

Regional Detention Facilities

Opportunities for developing regional detention facilities beyond the project boundaries should be evaluated. These could serve the proposed SE 172nd Avenue/190th Drive Corridor Management Plan as well as other privately-owned properties needing detention. As an interim design, 17 smaller detention ponds are sized and located throughout the PSA to collect runoff from the roadway surface only. Future development could increase the size and number of detention ponds, whose size and location must be determined through a separate analysis. The right-of-way needed for the ponds is shown on the 15 Percent Design Plans and provided in the estimate.

Section 8 Implementation Plan

8. IMPLEMENTATION PLAN

This section describes the SE 172nd Avenue/190th Drive Corridor Management Plan implementation strategy, and the purpose is to identify the process and steps required to fully adopt, monitor, and implement the plan. The implementation plan also includes discussion on potential financing mechanisms and monitoring procedures that will ensure transportation improvements are constructed and funded as development occurs, and so that the plan will be updated as needed over time.

IMPLEMENTATION OVERVIEW

To ensure that the Corridor Management Plan remains relevant and dynamic to changes over time, the City of Happy Valley, City of Damascus, and Clackamas County should ensure the following:

- The City of Happy Valley and Clackamas County should amend their respective Transportation System Plans (TSP) to adopt the SE 172nd Avenue/190th Drive Corridor Management Plan by reference.
- Clackamas County's adoption by reference will serve as interim implementation, pending full integration of the Corridor Management Plan into the updated Clackamas County TSP.
- Happy Valley should adopt amendments to their TSP that fully implement the Corridor Management Plan.
- The City of Damascus should incorporate the SE 172nd Avenue/190th Drive Corridor Management Plan into its future TSP, and ensure their future Development Code is consistent with the adopted TSP.
- The City of Happy Valley and Clackamas County should amend their development codes, as needed, per the code amendments provided in *Appendix D*.
- Develop an interagency funding strategy outlining improvement prioritization, affected area, and agency roles and responsibilities.

- Review corridor right-of-way and access management needs prior to adopting local plan amendments or approving local land use actions.
- Develop an interagency monitoring program that includes periodic safety and operational reviews to determine the need and timing of corridor plan improvements.

ADOPTION ELEMENTS

Implementation of the SE 172nd-190th Drive Corridor Management Plan will occur at several levels of government. The City of Happy Valley and Clackamas County will need to amend their TSPs and Comprehensive Plans to incorporate the relevant elements of the Corridor Management Plan or adopt in its entirety by reference. The City of Damascus will need to incorporate the Corridor Management Plan elements into its future TSP. In addition, new ordinances, or amendments to existing ordinances, resolutions, and/or Inter-Governmental Agreements (IGA) will be required to ensure that the improvements, right-of-way, access management, and coordination elements of the Corridor Management Plan are achieved in a way that will allow the transportation system to build toward the long-term needs of the project study area.

This adoption process will include City Planning Commission and City Council hearings at the city level and Planning Commission and Board of County Commissioner's hearings at the county level. Following successful adoption at the City of Happy Valley and Clackamas County, the Corridor Management Plan will be presented to the Metro for adoption as an amendment to the Regional Transportation Plan (RTP), if necessary.

To implement the Corridor Management Plan, the following actions should occur:

1. The City of Happy Valley should adopt the SE 172nd Avenue/190th Drive Corridor Management Plan as an amendment to the City's TSP and Comprehensive Plan. The Corridor Management Plan will serve as the long-range comprehensive management plan for providing the transportation facilities that are specifically addressed in this plan, including specific improvements, access management considerations, and right-of-way needs.

2. Clackamas County should adopt the SE 172nd Avenue/190th Drive Corridor Management Plan as an amendment to its TSP and Comprehensive Plan. The Corridor Management Plan will serve as the long-range comprehensive management plan for providing the transportation facilities that are specifically addressed in this plan, including specific improvements, access management considerations, and right-of-way needs.

3. The City of Happy Valley and Clackamas County should amend their respective land use codes, as needed, to adopt the strategies to ensure that the corridor is preserved and developed consistent with the Corridor Management Plan (see *Appendix D* for specific amendment materials).

4. Metro should amend the RTP to include the SE 172nd Avenue/190th Drive Corridor Management Plan, if deemed necessary.

5. Subsequent to the local adoption of the Corridor Management Plan, the City of Happy Valley, City of Damascus, and Clackamas County should explore potential funding sources, monitoring and improvement responsibilities, and project prioritization. These efforts should be captured within an Intergovernmental Agreement (IGA) or similar agreement.

Figure 8-1 illustrates the overall adoption process.

Figure 8-1: SE 172nd Avenue/190th Drive Corridor Management Plan adoption process.

IMPLEMENTATION PLAN FRAMEWORK

Steps necessary to adopt the Corridor Management Plan include the following:

1. Draft City of Happy Valley and Clackamas County plan and land use code amendments.

2. Obtain an endorsement for the Corridor Management Plan by the Project Management Team.

3. Provide 45-day notice to the Department of Land Conservation and Development (DLCD).

4. Conduct City of Happy Valley Planning Commission and City Council hearings on the Corridor Management Plan.

5. Conduct Clackamas County Planning Commission and Board of Commission hearings on the Corridor Management Plan.

6. Following local adoption, forward the Corridor Management Plan to Metro for review and adoption as an amendment to the RTP, if deemed necessary.

IMPLEMENTATION OF PLAN ELEMENTS

The following three subsections describe the processes through which the Corridor Management Plan could be implemented in the future based private development actions, non-federally funded capital improvement project(s), and/or federally funded capital improvement project(s).

Implementation of Plan Elements through Private Development Actions

The following section outlines the transportation requirements for development and land use amendment applications and describes how the City of Damascus, City of Gresham, City of Happy Valley, and Clackamas County should coordinate in reviewing these applications. The intent of the Implementation Plan and associated transportation requirements is to allow development within the City and County to rely upon the planning work completed for this Corridor Management Plan that identifies the transportation needs in the corridor.

DEVELOPMENT REVIEW PROCEDURES AND COMPLIANCE PROCESS

The implementation of the Corridor Management Plan through private development land use actions and/or land use amendments will follow the development application and approval procedures of the local agency having land use jurisdiction. The Corridor Management Plan through its adoption will serve as the transportation system plan element and provide guidance for identifying the necessary transportation facility provisions (e.g., right-of-way, improvements, traffic control devices, etc.) associated with a specific land use action(s) and amendment(s). However, the Corridor Management Plan's adoption does require the local agency with land use jurisdiction to consider the following elements when reviewing and approving specific land use actions:

- *Right-of-Way Dedication Requirements:* Right-of-way dedications should be consistent with the Corridor Management Plan and the delineated and surveyed centerline and 15-percent plans contained in *Appendix C*. Any deviations to the Corridor Management Plan and/or the specified centerline must be approved in writing by the Clackamas County.
- *Direction of Requiring Construction of Improvements, Partial Improvements, or Cash-in-Lieu Payments:* The local agency with land use jurisdiction will require through conditions of approval and/or development agreements the specific improvements, partial improvements, or cash-in-lieu payments consistent with and necessary to implement the Corridor Management Plan based on the impacts and properties associated with the specific land use action and/or amendment.

- *Administration of Cash-in-Lieu Payments (Optional):* The local agencies may seek to receive cash-in-lieu of construction payments for land use actions that would result in isolated elements of the corridor being constructed prior to use. These funds would need to be properly administered by the local agencies in order to both preserve and allocate the funds in the most appropriate manner to facilitate the implementation of the overall Corridor Management Plan.

Implementation of Plan Elements through Capital Improvement Projects

The implementation of the Corridor Management Plan by the City of Damascus, City of Happy Valley, and/or Clackamas County will be initiated by associated project(s) being incorporated into the respective capital improvement plans. Once the project(s) is incorporated into the capital improvement plan, the lead local agency will initiate a design and construction project that is consistent with the specified centerline and 15-percent plans contained in Appendix C. Any deviations to the Corridor Management Plan and/or the specified centerline must be approved in writing by the Clackamas County.

Monitoring Process

The purpose of the Corridor Management Plan is to ensure that adequate safety and capacity is provided for highway users throughout the 20-year horizon. While general monitoring thresholds are included within the plan to assist agencies in reviewing the need and timing of phased implementation, the Corridor Management Plan should remain dynamic and responsive to development and changes to the adopted land use and transportation plans. To accomplish this goal, a monitoring process should be agreed upon by the Cities and County in an IGA that identifies triggers for reviewing the Corridor Management Plan and how development within the surrounding area will be reviewed and coordinated with all parties.

Inter-Governmental Agreement

To ensure that the Corridor Management Plan continues to preserve operational integrity and safety of the 172nd-190th corridor, the City of Happy Valley, City of Damascus, and Clackamas County should develop an inter-governmental agreement (IGA) stipulating each agency's funding obligations to the transportation improvements in the Corridor Management Plan and to the following monitoring and update program:

- The agencies will review the Corridor Management Plan pursuant to the "triggers" described below to ensure that the original assumptions and recommendations regarding the Corridor Management Plan, funding obligations, access management, right-of-way, and coordination efforts are still appropriate and effective given the current and projected future conditions. This review should be conducted through a meeting initiated by the City of Happy Valley, City of Damascus, and/or Clackamas County.
- In addition to the established triggers for the Corridor Management Plan review, the agencies can request a review of the Corridor Management Plan at any time if, in their determination, specific land use or transportation changes warrant a review of the underlying assumptions and/or recommendations within the Corridor Management Plan.
- If the participants in the Corridor Management Plan review meeting agree that, once the impacts of the "trigger" that necessitated the review are examined, an amendment to the Corridor Management Plan is not warranted a recommendation of "no action" may be documented and submitted in the form of a letter to the City of Happy Valley, City of Damascus, and Clackamas County.
- If the findings and conclusions of the Corridor Management Plan review meeting demonstrate the need for an update to the plan, review participants will initiate a Corridor Management Plan update process. Initial steps in updating the Corridor Management Plan will include scoping the planning process, identifying funding, and outlining a schedule for plan completion.

Corridor Management Plan Review Triggers

Periodically, the Corridor Management Plan implementation program will need to be evaluated to ensure it is meeting the needs of the managing agencies. Events that will trigger a review of the Corridor Management Plan include:

- Every fifth year from the date of Corridor Management Plan adoption or its latest update.
- Identified safety issues as noted by periodic review of crash data, statewide ranking and prioritization, and findings from traffic impact studies.
- Identified mobility failures as noted through periodic agency review and findings from traffic impact studies.
- Comprehensive Plan and Zone change applications.
- Adoption of the City of Damascus Comprehensive Plan.
- Adoption of the City of Damascus TSP