APPENDIX D

Evaluation of Alternatives Technical Memorandum

Woodland
Transportation Infrastructure
Strategic Plan

Evaluation of Alternatives Technical Memorandum

Prepared for

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ACRONYMS

BNSF	Burlington Northern Santa Fe (railroad)
CWCOG	Cowlitz-Wahkiakum Council of Governments
DOE	(Washington) Department of Ecology
FEMA	Federal Emergency Management Agency
GMA	(Washington State) Growth Management Act
HAC	High Accident Corridor
HCM	Highway Capacity Manual
HPA	Hydraulic Project Approval
JARPA	Joint Aquatic Resources Permit Application
LOS	Level of Service
MVMT	Million Vehicle Miles Traveled
NCHRP	National Cooperative Highway Research Program
NPDES	National Pollution Discharge Elimination System
NWI	National Wetlands Inventory
Queue	Line of backed up traffic
SEPA	State Environmental Policy Act
Sim-Traffic	Traffic operations model providing visual simulation and traffic queuing analysis
SR	State Route
Synchro	Traffic operations analysis model
TSP	Transportation System Plan
TISP	(Woodland) Transportation Infrastructure Strategic Plan
UGA	Urban Growth Area
V/C	Volume/Capacity (ratio)
Vissim	Traffic operations simulation model
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation

1. INTRODUCTION

1.1 PURPOSE AND CONTEXT

A key challenge of the Woodland Transportation Infrastructure Strategic Plan is the identification and evaluation of a wide range of alternative strategies for improving traffic operations, safety, and multi-modal circulation, while being sensitive to the needs of local residents and businesses. This report documents the development and evaluation of improvement options and alternatives that respond to the needs identified in prior memoranda that documented both the existing and likely future transportation systems.

The range of alternatives identified and evaluated to enhance the existing Woodland transportation system focuses on improved safety and capacity at the I-5 interchanges, along with a variety of other street projects that address growing community traffic demand, increased arterial system connectivity, and enhanced and safer access to growing industrial and residential portions of the city, particularly to serve the Woodland Industrial/Port area and along SR 503. This study will be developed using a collaborative process and will culminate in a strategic infrastructure plan

This report describes the process used to develop the alternatives and design concepts, identifies criteria used both to screen initial concepts and to evaluate refined alternatives, and presents a summary of key findings and conclusions. The results of this analysis form the basis for a recommended improvement plan for the corridor.

1.2 REPORT CONTENT AND ORGANIZATION

This report begins with a brief discussion in Chapter 2 of the nature and magnitude of transportation problems currently being experienced and anticipated within the study as the community continues to develop.

Chapter 3 describes the development of improvement alternatives while Chapter 4 summarizes the criteria and results of the evaluation process undertaken to assess performance and impacts associated with each improvement option or design concept. This chapter concludes with a summary of both preferred long-and short-term improvements.

1.3 SUMMARY OF KEY FINDINGS AND CONCLUSIONS

This section provides a short summary of the key findings and conclusions with respect to the transportation system improvement options. The study area street system is shown in Figure 1-1.

1.3.1 Development of Improvement Options

- The development of improvement options focused addressing the major transportation system issues within the City of Woodland including: existing and future congestion problems at the I-5 interchanges, the lack of east/west connectivity within the city for non-freeway traffic, lack of east/west accessibility over the BNSF mainline railroad, and safety issues along SR 503 in the eastern portion of the city.
- A phased analysis process was undertaken which developed and evaluated a wide range of improvement options. The initial phase focused on brainstorming potential improvements which were screened against a series of evaluation criteria developed through the technical and public involvement process. The result of this screening

was identification of a "short list" of feasible improvement options for which a more detailed evaluation and conceptual design process was conducted.

1.3.2 Overview of Evaluation Results

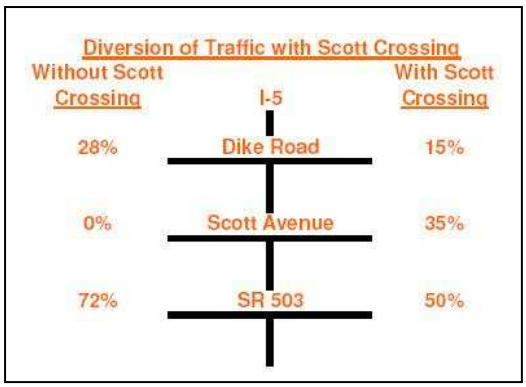
The detailed evaluation of improvement options indicated the following:

I-5 and Dike Road

- The development of single lane roundabouts at the I-5/Dike Road interchange would provide sufficient traffic capacity to accommodate not only traffic forecast for the 2025 planning horizon year based on the City's existing Comprehensive Land Use Plan, but would offer substantial additional capacity to accommodate traffic growth beyond the planning horizon. These roundabouts should be designed to accommodate design vehicle trucks serving the Woodland industrial area.
- Optimal treatment of traffic movement through the I-5/Dike Road interchange area would include development of a single land roundabout at the intersection of Dike Road and Schurman Way. As with the interchange roundabouts, this intersection treatment should accommodate design vehicle trucks.
- Options for improving the I-5/Dike Road interchange by installing traffic signals were also considered. However, these options were rejected as they would require major reconstruction of the existing northbound I-5 freeway and BNSF railroad crossing structures to accommodate the added roadway width need for intersection left turn lanes.

Scott Avenue Crossing

- Several options were evaluated to add east/west connectivity across I-5 and the BNSF mainline tracks. Generally, these options followed the alignment of Scott Avenue, Port Way and Heritage Street.
- The Scott Avenue Crossing was identified as the most effective option for providing east/west street connectivity. This option could be expected to divert the highest levels of traffic from the Dike Road and SR 503 interchange areas of any crossing option, thus providing the greatest level of relief for existing and projected future congestion problems at these locations. The distribution of 2025 PM peak hour traffic among the various east/west streets that cross I-5 is illustrated in the figure below. On the left-hand side is the expected distribution of total traffic crossing I-5 using Dike Road and SR 503. On the right-hand side is the expected distribution of traffic including the Scott Avenue crossing.



- The Scott Avenue Crossing option which includes raising I-5 over Scott Avenue was identified as the preferred course of action. This recommendation was based primarily on the finding that by maintaining the existing street grade for Scott Avenue, property acquisition and access impacts could be minimized. This option is also expected to be less costly than the option of carrying Scott Avenue over I-5.
- The preferred Scott Avenue Crossing option would also include raising this street over the existing BNSF mainline tracks to the west of and paralleling I-5. An undercrossing option was considered but rejected due to the existing high water table which could cause periodic flooding of the undercrossing. Raising of the railroad over Scott Avenue was also considered but rejected due to the high cost involved in railroad trackage temporary relocation and new trackage construction.
- The railroad overcrossing improvement would sever the existing connection between Scott Avenue and N Pekin Road, and several options for replacement of this function were considered. The preferred option would involve extending N Pekin Road northward under Scott Avenue to connect with the existing Port Way cul-de-sac.

I-5 and SR 503

- A wide variety of options were considered to address existing and potential future traffic congestion problems at the I-5/SR 503 interchange. The options included: major widening of SR 503 with added through and turn lane capacity through the interchange, development of multi-lane roundabouts, and creation of a one-way couplet system.
- Each of these options involved development of a large improvement that would not meet the study objective of retaining the small town character of the community. Most also involved major expense, right-of-way acquisition and property access impacts.
- Accordingly, consideration was given to developing a smaller improvement that relied on the diversion of traffic away from the I-5/SR 503 interchange to Scott Avenue to be served by the overcrossing improvement project. This option would involve retaining the existing four-lane cross-section on SR 503 under I-5 with improvements focused primarily on the eastern intersections. This option would be less expensive and disruptive than the other interchange options considered and was recommended contingent on development of the Scott Avenue crossing improvement.

SR 503

- Analysis of existing and future traffic operations along SR 503 through the easterly portion of the city indicates that there are a high number of collisions occurring along the two-lane section east of Goerig Street. As a high percentage of these incidents involve rear end collisions, the provision of a separated left turn lane for intersections and driveways was recommended from east of Scott Avenue to Evergreen Lane. This option would also include provision of sidewalks and bike lanes for the same area.
- The intersections of SR 503 with Goerig Street and Scott Avenue were also evaluated and improvements recommended. These improvements would include a left turn lane and signal at Scott Avenue, and installation of a median to restrict turns to right-in/right-out at Goerig Street. This latter intersection could also be signalized if warrants are met in the future.

- An interim improvement was identified to provide a continuous left turn lane between Hillshire Drive and Gun Club Road. This improvement could be constructed using funds currently available to the City.

Other improvements identified to address existing and/or future congestion problems include the following:

- Old Pacific Highway at Green Mountain Road – add southbound left turn lane and signalize intersection.
- Old Pacific Highway at Scott Avenue – add southbound left turn lane, signalize and reconfigure to provide 90-degree intersection on E. Scott Avenue leg.
- Davidson Avenue at 5th Street – restrict on-street parking to add westbound left turn lane and signalize intersection.

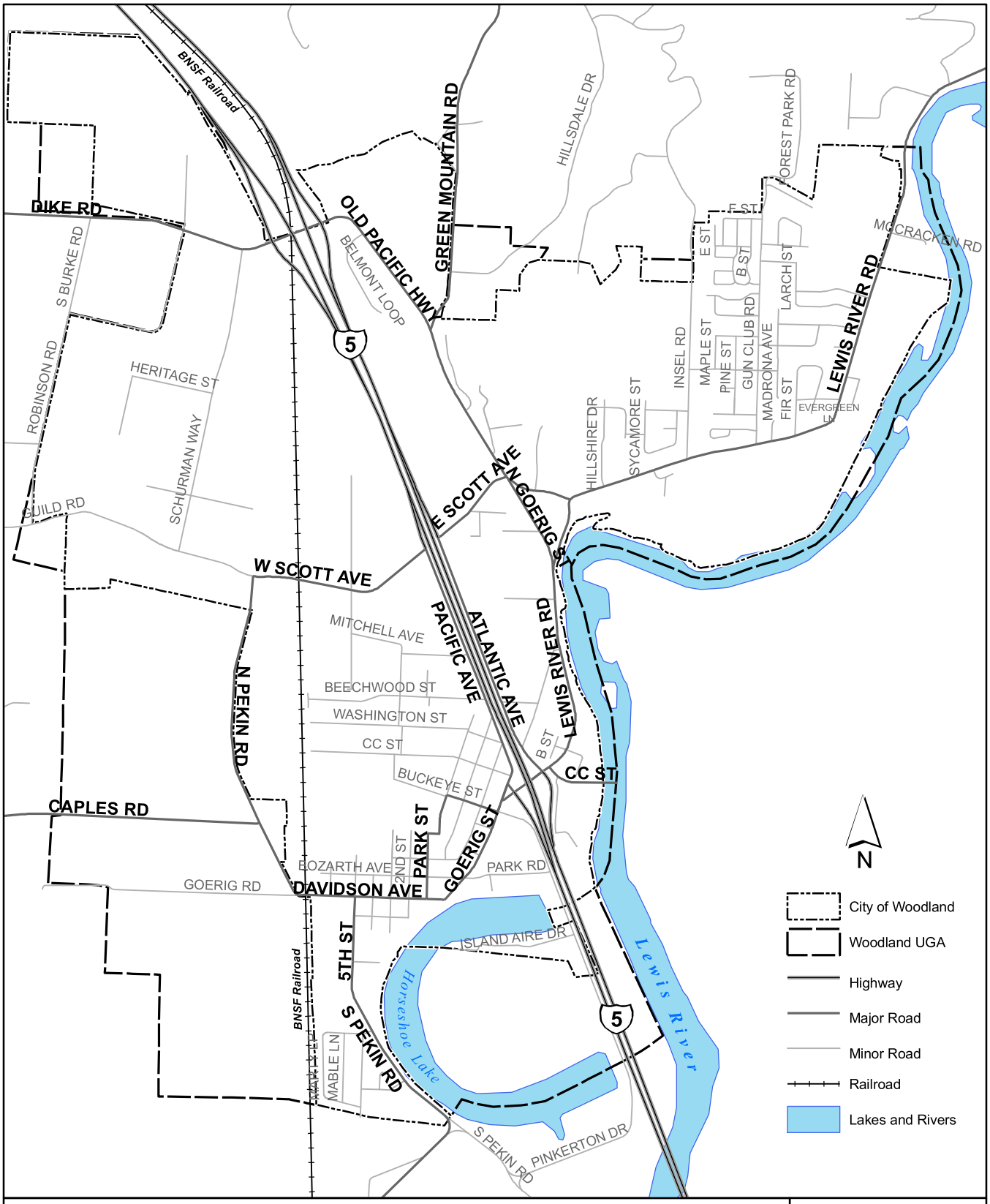


Figure 1-1: Woodland Study Area

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The Transpo Group

Woodland Transportation Strategic Infrastructure Plan

Analysis by C. Hainey; Analysis Date: July 2007; Plot Date: October 2007; File Name: 1-1_StudyArea.mxd

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2. SUMMARY OF IMPROVEMENT NEEDS

This chapter presents a summary of existing and anticipated future transportation system improvement needs which form the basis for the development of a variety of study area enhancement alternatives.

2.1 SUMMARY OF EXISTING NEEDS

The following is a short summary of the key findings and conclusions with respect to the existing transportation system in the study area. Included in the discussion are issues related to congestion, safety, street connectivity, truck traffic, railroad crossings, roadway design issues, pedestrians/bicycle facilities, and environmental/permitting issues. These findings are important for two reasons. First, they provide an understanding of current improvement needs in the city's transportation system. Second, they help to establish priorities for building recommended projects.

- **Congestion** - Consistent with the growth in both population and employment, traffic volumes on major streets in Woodland have also grown over the past five to ten years (ranging from 2 to 4 percent per year in the eastern and northwestern portions of city). This growth has also affected the I-5 interchanges at both SR 503 and Dike Access Road which have seen an increase in traffic. While these intersections still operate at acceptable levels of service, extensive traffic queuing occurs due to the closely spaced intersections between the southbound on-ramp to I-5 and CC Street. Generally, most other intersections in the city are currently operating at an acceptable level of service D or better with the exception of SR 503 (Lewis River Road) at N Goerig Street, SR 503 (Lewis River Road) at E Scott Avenue. and Buckeye Street at Goerig Street. All are currently unsignalized intersections.

- **Safety** - A more significant existing problem on major streets in the city is the high accident experience, particularly along sections of SR 503 (Goerig Street to Gun Club Road) and at the intersections of the state highway with Insel Road. Rear end accidents tend to predominate occurring at intersections and driveway accesses and indicating the effects of congestion and frequent turning movements. Existing accident experience has lead to many of the improvement recommendations in the city's Transportation Plan which involve widening of SR 503 to provide for center turn lanes and other improvements. Additionally, concern

was raised during the public process for the ability of heavy trucks to accelerate up the northbound on-ramp to I-5 from Dike Road.

- **Connectivity** - While east/west roadway connections are adequate from a traffic operations and delay perspective, connections from one part of the city to the other should be improved to enhance traffic flow and safety. Another key issue with respect to general street connectivity in the study area involves north/south traffic, particularly to the west of I-5 where improved truck access and circulation should be provided to/from the developing industrial properties.

- **Truck traffic** - There is a significant volume of truck traffic in the industrial sections of city and on other streets resulting from logging and quarry operations outside of the urban growth area. In the northwestern portion of the city, truck traffic comprises more than 20 percent of existing volumes, with significant levels also occurring in the southwestern portion of the city and as much as 5 percent of the traffic stream along SR 503. This level of truck traffic can have a major effect on traffic movement and on the development and consideration of improvement alternatives.

  In addition to increase in general vehicle traffic, major increases in truck traffic are also anticipated, much of which will be focused on travel to/from I-5. This truck traffic will be generated by local industrial development, by quarries east of the Lewis River in Clark County, and by local retail and service businesses, particularly along Pacific and Atlantic Avenues between SR 503 and Scott Avenue.

- **Railroad Crossings** – Several east/west streets on the west side of Woodland are impacted by the existing at-grade crossings of the BNSF railroad. Of particular significance are Davidson Avenue west of 5th Street and W Scott Avenue east of N Pekin Road. As the level of train traffic increases the connectivity of the local street network will be important to provide travel route alternatives.

- **Roadway Design Issues** –
  - Sight distance is impaired at two locations along SR 503, approaching the N Goerig Street intersection from the south, and approaching the E Scott Avenue intersection also from the south. Additionally, the skewed angle of Goerig Street at its intersection with SR 503 makes it difficult to view traffic traveling westbound on SR 503.
  - Many segments of SR 503 do not currently meet WSDOT standards for access management. This can result in increased safety concerns as motorists stopping for on-coming traffic are rear-ended by those coming up from behind them. Frequent access points can also significantly reduce the capacity of a street or highway corridor to carry growing traffic volumes.
  - Limited right-of-way and/or the need to acquire right-of-way along several arterials possibly including SR-503.
  - Physical constraints around the Dike Road interchange related to rail, and short spacing between some major intersections (such as SR 503 from the I-5 ramps to CC Street, including Atlantic Avenue).

  - Confusion at the intersection of SR 503 with the I-5 northbound off-ramp/Atlantic Avenue as some travelers have been observed treating Atlantic Avenue as a one-way street (e.g., for northbound traffic), rather than an existing two-way street.

- **Pedestrian and Bicycle Facilities –** The existing pedestrian system currently has large gaps, particularly along SR 503 and N Pekin Road. Bicycle facilities are largely unavailable in the study area with the exception of roadway shoulder areas. Improvements for these modes should be considered to provide enhanced network connectivity to community destinations, employment centers, recreational facilities (like the Skateboard Park and Horseshoe Lake), and schools.
- **Emergency Response** – Concern has been raised about the negative effect of railroad blockage of Scott Avenue and Davidson Avenue on emergency response to northwestern Woodland. This issue is expected to become more severe should a new high school be built near Dike Road. Additionally, there is concern that congestion delays also impact emergency response times, particularly in relation to the location of the current and future police/fire stations.
- **Environmental Issues** - In addition to the challenges related to growth and travel demand, environmental constraints and permitting requirements must be considered in developing improvement recommendations. It will be important to pay particular attention to:
  - Existing natural resources (e.g., habitat, wetlands and flood plains), particularly along SR 503 east of the interchange with I-5. Some seasonal flooding also occurs in the vicinity of the I-5/Dike Road interchange.
  - Potential issues with hazardous materials sites. Additional site analysis will be required when specific improvements enter the design phase of project development.

2.2 SUMMARY OF POTENTIAL LONG-RANGE NEEDS

Significant growth in traffic congestion is anticipated in the Woodland study area by the planning horizon year of 2025. Two land use growth scenarios were evaluated. One represents development expectations based on the existing 2005 Comprehensive (Comp) Land Use Plan which would add approximately 4,100 more residents by 2025 in comparison with 2007 estimates. The second scenario (Comp Plan Plus) would add nearly 6,000 more residents over today's levels with a concentration of this additional residential development assumed to occur in the southwestern portion of the City.

With either the Comp Plan or Comp Plan Plus land development scenarios, it is anticipated that traffic volumes will grow substantially and that many intersection in the study area will operate with unacceptably long delays. Failing intersections would include:

- I-5 southbound ramps/Pacific Avenue at SR 503
- I-5 northbound ramps/Atlantic Avenue at SR 503
- SR 503 at CC Street
- SR 503 at Goerig Street (both westerly and easterly intersections)
- SR 503 at E. Scott Avenue
- I-5 southbound ramps at Dike Road
- I-5 northbound ramps at Dike Road

- Old Pacific Highway at Green Mountain Road
- Old Pacific Highway at E. Scott Avenue
- Davidson Avenue at 5th Street
- Buckeye Street at Goerig Street

Within the vicinity of the I-5 interchange at SR 503 signalized traffic operations are affected by vehicles spilling back from one intersection to another. Traffic queues are expected to be lengthy and impact the entire interchange area from approximately Buckeye Street on the west to beyond CC Street on the east.

For unsignalized intersections, traffic operational failures affect primarily the stop-controlled side streets where long delays and lengthy queues would be experienced. Traffic queues on the I-5 off-ramps to Dike Road are expected to exceed 700 feet on the southbound ramp and to be nearly 500 feet in length on the northbound ramp. Table 2-1 summarizes traffic queuing analysis results for future conditions at key intersections in the study area.

As noted in the table, nearly all movements at the intersections along SR 503 in the vicinity of the I-5 interchange would exceed available storage space for vehicle queuing. This indicates that traffic frequently backs up from one intersection into the next, impacting traffic operations for the area as a whole. Consequently, when improvements are considered for this location, they must accommodate the movement of vehicles through the entire interchange area and not rely on satisfying demand at a single location.

Table 2-1. 2025 PM Peak Hour Traffic Queues at Key Intersections

		Future (2025) Comp Plan		Future (2025) Comp Plan Plus	
Intersection	**Available Storage (ft)**	**Movement**	**Queue Length (ft)**	**Movement**	**Queue Length (ft)**
SR 503 (Lewis River Rd) @ I-5 NB Ramp	400 ft	EB Left	**530 ft (1)**	EB Left	**560 ft (1)**
	50 ft	EB Thru	**410 ft (1)**	EB Thru	**450 ft (1)**
	150 ft	WB Thru	N/A (2)	WB Thru	NA (2)
	150 ft	SB Right	**406 ft (1)**	SB Right	**480 ft (1)**
	1000 ft	NB Thru/Left	**1,090 ft (1)**	NB Thru/Left	**1,200 ft (1)**
	200 ft	NB Right	**460 ft (1)**	NB Right	**500 ft. (1)**
SR 503 (Lewis River Rd) @ I-5 SB Ramp	300 ft	EB Thru	**360 ft (1)**	EB Thru	**420 ft (1)**
	400 ft	WB Left	**680 ft (1)**	WB Left	**680 ft. (1)**
	800 ft	WB Thru	**450 ft (1)**	WB Thru	**670 ft (1)**
	100 ft	SB Left	**540 ft (1)**	SB Left	**540 ft (1)**
	100 ft	SB Thru	260 ft	SB Thru	260 ft
	150 ft			EB Left	**140 ft (1)**
SR 503 (Lewis River Road) @ CC Street	N/A	EB Thru	N/A (2)	EB Thru	N/A (2)
	100 ft	WB Left	**200 ft (1)**	WB Left	**200 ft (1)**
	200 ft	WB Thru	**450 ft (1)**	WB Thru	**520 ft (1)**
	120 ft	NB Left	**230 ft (1)**	NB Left	**245 ft (1)**
Dike Access Road @ I-5 SB Ramps	1000 ft	SB All	780 ft	SB All	760 ft
Dike Access Road @ I-5 NB Ramps	1000 ft	NB All	490 ft	NB All	490 ft

(1) Exceeds available vehicle storage space as indicated by **bold** shading.
(2) Metered by signal.

Traffic signal and left turn lane warrants were evaluated at each of the adversely affected intersections with the following results:

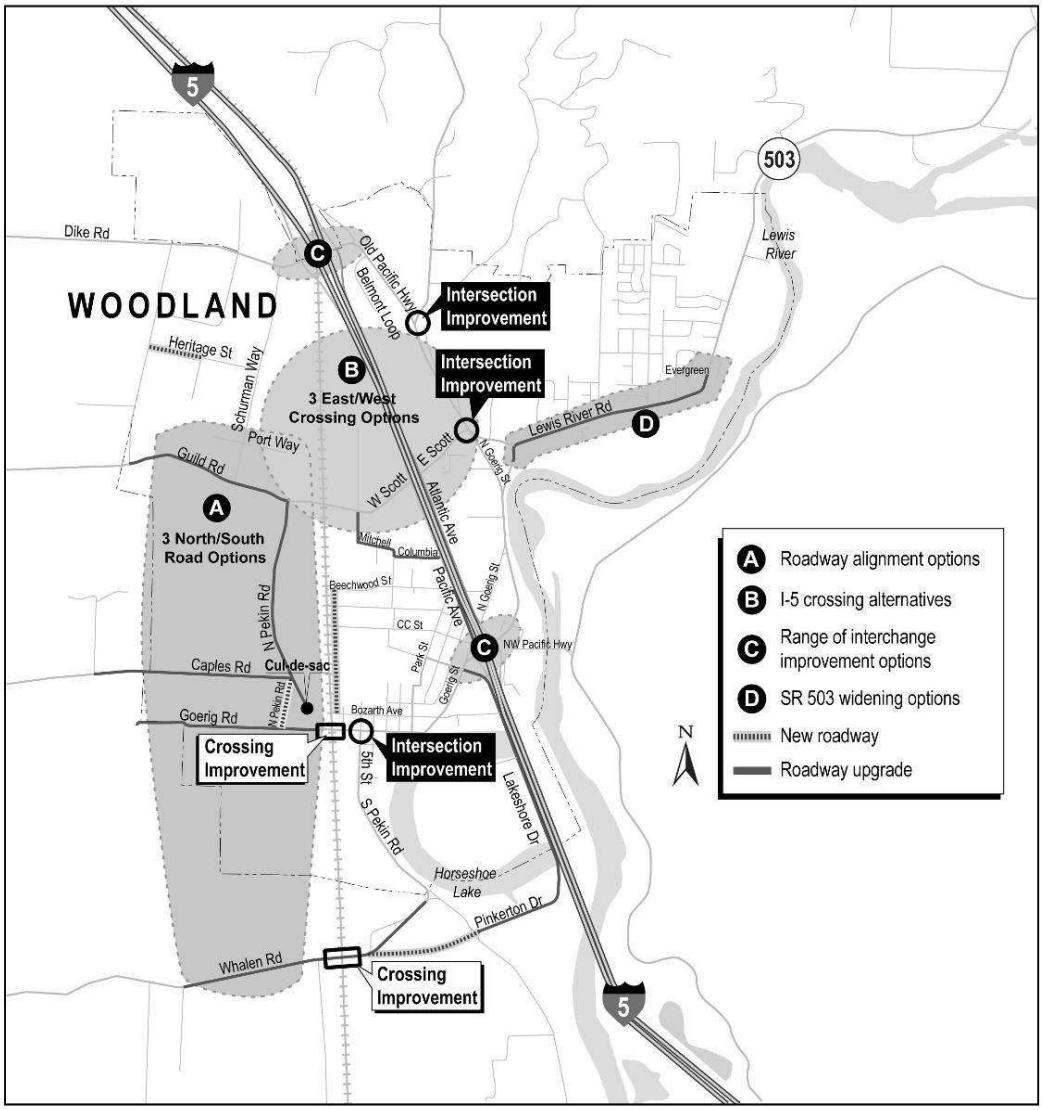
- Signal warrants would be met at the intersections of:
  - SR 503 and Goerig Street (west)
  - SR 503 and Goerig Street (east)

  - SR 503 and E. Scott Avenue
  - I-5 northbound and southbound ramps at Dike Road
  - Old Pacific Highway at Green Mountain Road and at E. Scott Avenue
  - Buckeye Street at Goerig Street
  - Davidson Street at 5th Street (for the Comp Plan Plus scenario only)
- Left turn lane warrants were also evaluated using WSDOT methodology. Warrants would be met at the following intersections along SR 503:
  - Hillshire Drive
  - Insel Road
  - Gun Club Road
  - Fir Avenue
  - Evergreen Lane

3. DEVELOPMENT OF IMPROVEMENT ALTERNATIVES

This chapter documents the process used to identify a range of reasonable improvement alternatives and design options to address the existing and likely future transportation system problems within the Woodland study area. These alternatives included several options for new roadway extensions, roadway widening, interchange improvements, and railroad crossings, along with many options for improvement of key intersections throughout the study area. The primary focus of the improvement alternatives included: the existing SR 503 and Dike Road interchanges with Interstate 5, a potential new street which connect the east and west sides of the city by crossing I-5 somewhere between Scott Avenue and Dike Road, SR 503 on the east side of the city, and a potential new north/south arterial street on the west side of the city (west of the railroad) to serve the growing industrial portion of the city. The major focal points or transportation improvement choices of this study are illustrated in Figure 3-1 below.

Figure 3-1 Major Transportation Improvement Choices



This chapter includes discussion of the following:

- Development of an initial broad range of improvement options taking into account input received from the public, ideas that had been discussed in the City's Transportation Plan or in association with potential local development activity, and ideas developed by the project planning team
- Evaluation and screening of this initial range of options
- Identification of the most promising options to carry forward into more detailed analysis prior to the selection of specific improvement recommendations.

The more detailed discussion of promising options is presented in Chapter 4.

3.1 INITIAL RANGE OF IMPROVEMENT OPTIONS

The analysis of existing and future traffic operations shows that as community growth and development occurs in Woodland, improvements to and expansions of the existing transportation system will be necessary to accommodate the anticipated growth in congestion.

Woodland is projected to grow significantly during the next twenty years and a piecemeal approach to transportation system planning will not result in the integrated network that is needed. It is essential that Woodland develop transportation strategies that provide transportation options for all residents, optimize investments in existing facilities, and coordinate with the County and WSDOT systems.

Using the technical analysis of needs and deficiencies identified in the preceding chapter as a starting point, a wide range of possible improvements was identified and discussed during a series of participatory meetings involving the general public, a Citizen's Advisory Committee, a Technical Advisory Committee, and the study team. Early input on potential alternatives was also received during a series of stakeholder interviews conducted at the outset of the study.

Based on this input, a strategic approach was developed to address identified needs that focused on the targeted areas for improvement as identified in Figure 3-1 that would accomplish several objectives including:

- Congestion relief,
- Improved connectivity,
- Safety enhancement,
- Consideration of multi-modal travel needs and a variety of other factors.

To meet these objectives, a variety of improvement options were developed.

1. For the I-5/Dike Road interchange area options included the following (see Figures A-1A through A-1D in Appendix A for illustration of the various options):
   - Modifications to the interchange connections with Dike Road
   - Installation of traffic signals and/or roundabouts at the intersections along Dike Road including the freeway ramps and Schurman Way
   - Widening of Dike Road
2. For the I-5/SR 503 interchange area options (see Figures A-2A through A-2E in Appendix A) included:
   - Widening of SR 503 through the interchange area to provide added through and turning lane capacity along with greater separation of existing traffic signals where possible.

- Replacement of existing traffic signals with multi-lane roundabouts through the interchange area, and/or a combination of roundabouts and traffic signals
- Development of a Single Point Urban Interchange concept
- Development of a one-way frontage road system through the interchange.

3. For crossings of I-5 and the railroad several alignment options were considered (see Figures B1 through B-3 for plan and profile views of these options):
   - A new road generally along the alignment of Port Way between Old Pacific Highway and Schurman Way with grade-separated overcrossings of I-5 and the railroad.
   - Several options for grade-separated over or undercrossings of I-5 and the railroad along the alignment of existing Scott Avenue
   - A new road generally along the alignment of Heritage Street between Old Pacific Highway and Schurman Way with grade-separated overcrossings of I-5 and the railroad.
4. Modifications to the I-5 frontage roads were considered in conjunction with the various overcrossing options (see Figures C-1 through C-6). These included:
   - Concepts for connectivity to I-5 from the various crossing options focusing on Scott Avenue and Port Way
5. Development of a new and/or improved north/south arterial road to serve the west side of the city including:
   - An extension and moderate realignment of N and S Pekin Road between Guild Road and Whalen Road.
   - An extension of Schurman Way from its current southerly terminus at Guild Road southward to Whalen Road.
   - Improvement of Robinson Road south of Dike Road and extension southward from Guild Road to Whalen Road.
6. Widening and intersection improvements along SR 503 between Goerig Street and approximately Fir Avenue (see two graphics in Appendix A):
   - Widen highway to provide a continuous two-way left turn lane with various options for improvements to the intersections with Goerig Street and Scott Avenue including signalization, addition of turning lanes and/or roundabouts.

Each of these design options or concepts was evaluated to identify major pros and cons and to determine which options should be carried forward for more detailed concept development and evaluation. This initial screening was intended to reduce the number of options considered allowing the remainder of the study to focus on the most promising concepts.

3.2 METHODOLOGY FOR EVALUATING IMPROVEMENT OPTIONS

3.2.1 Develop a Vision

Strategies to accommodate growth and to provide a safe, convenient, and economic transportation system must be developed consistent with the community vision. Accordingly, a study area vision statement and desired outcomes were developed and presented to the public for general concurrence. This vision statement and desired outcomes were intended to articulate the objectives of the Woodland TISP and the values of the community in relation to transportation to help identify the preferred solutions.

The project Vision Statement articulates a clear desired "end state" that would be realized if the preferred solutions were implemented:

> ***Vision Statement:*** *The City of Woodland's transportation system effectively and efficiently moves people and goods while reinforcing the City's small town feel, with improved connections between Woodland's residential neighborhoods, industrial areas, downtown, farms, parks, I-5 and recreational areas.*

Desired outcomes are intended to describe the vision statement in greater detail so that the effectiveness of various improvement options could be assessed for their ability to generally satisfy the vision. The desired outcomes presented to and discussed with the public included the following in relation to each improvement option:

- Provides a plan to manage traffic congestion now and for the future, while maintaining current conditions or improving traffic on the I-5 off-ramps.
- Serves all forms of street travel including autos, trucks, pedestrians, bicyclists and future transit
- Maximizes safety for all users
- Improves local street connections to reduce need to use I-5 Interchanges for local trips
- Accommodates growth consistent with Woodland's adopted Comprehensive Plan
- Can be constructed in phases, is cost-effective and meets state and local requirements
- Provides for property access without degrading safety and the capacity to move traffic
- Enhances emergency vehicle response time and provides emergency evacuation routes
- Improves links to recreational areas for Woodland residents and those from outside community
- Addresses rail crossing issues
- Addresses flooding issues
- Results in a clearly articulated plan that addresses needs, is supported by the community, and can be used by elected leadership to advocate for project priorities and secure funding
- Establishes a partnership among local, county, state, and federal agencies, as well as the private sector to implement plan recommendations.

3.2.2 Establish Criteria to Measure Success in Achieving the Vision

Based on the vision and desired outcomes highlighted above, a series of evaluation criteria were developed that could be assessed either qualitatively or quantitatively to determine the extent to which each improvement option would meet the study's vision. The criteria used to conduct this assessment were developed using input received from the public and study committees, and include the following measures (as appropriate for the option under consideration and at a level of detail appropriate for initial screening):

- Improve existing and/or projected future traffic congestion (as measured by intersection levels of service and traffic queues)
- Improve street connectivity and local circulation

- Affect and improve transportation safety for all users including emergency vehicle accessibility
- Provide improved mobility for pedestrians and bicyclists, and facilitate connections to/between transportation modes
- Improve access to major community destinations such as schools, recreation, downtown and commercial/employment centers
- Promotes fiscal responsibility by making good use of existing facilities, and encouraging cost-effective solutions
- Can be constructed in fundable and implementable phases
- Minimize environmental impacts (noise, historic, natural resources, hazardous materials, etc)
- Minimizes land acquisition and the potential for business or residential displacement
- Supports County and City land use plans and objectives including preservation of neighborhoods and promotion of economic development opportunities
- Meet state and federal transportation standards, if required

Using these criteria, an initial screening of various improvement options, concepts and ideas was conducted to identify those which would likely be most effective in meeting the overall objectives of the study. As noted above, the purpose of carrying out an initial screening is to reduce the number of options carried forward for more detailed evaluation to a short list of those that have the greatest potential for achieving the vision of the Woodland TISP. This initial screening process and its results are discussed below.

3.3 INITIAL SCREENING OF IMPROVEMENT OPTIONS

The initial screening of improvement options relied upon traffic forecasts developed for combinations of the options discussed in Section 3.1 above, and in a planning level review of other evaluation criteria to highlight differences among the options. Traffic forecasts were prepared for baseline (no-build) conditions and for four systemwide alternatives that packaged a variety of improvement options including.

- Elements related to freeway interchange improvements,
- Options to connect the eastern and western portions of the city by providing a grade separation from the freeway and railroad,
- Options to provide a new north/south arterial street on the west side of the city (generally between N Pekin and Robinson Roads), and
- Options to accommodate new and/or modified connections to I-5.

3.3.1 Travel Forecasting for Improvement Alternatives

Four system wide improvement alternatives were developed that include a variety of individual improvement options. These alternatives are useful in helping to determine how the various improvement options compare with each other in terms of the levels of traffic attracted and the potential for reducing existing and projected future congestion problems. The system wide alternatives are illustrated in Appendix B along with 2025 PM peak hour intersection level traffic forecasts for both baseline (no-build) and “with” Scott crossing conditions. The alternatives are shown in Figures B-1 through B-4. The four systemwide alternatives include the following distinguishing features:

- **Alternative 1:** this alternative includes a freeway and railroad overcrossing at Port Way coupled with a new north/south arterial roadway extending from Schurman Way at Guild Road southward to Whalen Road (see Figure B-1).
- **Alternative 2:** this alternative includes a freeway and railroad overcrossing at Scott Avenue coupled with a new north/south arterial roadway extending from N Pekin Road just north of Goerig Road southward to Whalen Road (see Figure B-2):
- **Alternative 3:** this alternative includes a freeway and railroad overcrossing at Heritage Street coupled with a new north/south arterial roadway extending from Robinson Road at Guild Road southward to Whalen Road (see Figure B-3).
- **Alternative 4:** this alternative includes a freeway and railroad overcrossing at Port Way coupled with a new north/south arterial roadway extending from N Pekin Road just north of Goerig Road southward to Whalen Road (see Figure B-4).

2025 PM peak hour traffic forecasts for baseline conditions and for each alternative were prepared using the travel demand model developed for the Woodland urban area as described in the Future Conditions Technical Memorandum. For purposes of this initial screening, evaluation was limited to comparison of roadway traffic volumes attracted by each alternative to the key roadways under study and did not include intersection level traffic operations analysis. Turning movement forecasts for the No-Build and Scott Crossing Options are presented in Chapter 4 as Figures 4-1 and 4-2.

Key findings with respect to the levels of traffic expected on the proposed options for east/west connectivity over I-5 and the railroad are shown in Table 3-1 below.

Table 3-1. Comparison of PM Peak Hour Traffic with East/West Connectivity Options

	2025 PM Peak Hour Traffic Volumes for Comp Plan Plus Scenario				
Location	**Baseline (No-Build)**	**Alternative 1: Port Way Crossing**	**Alternative 2: Scott Avenue Crossing**	**Alternative 3: Heritage Street Crossing**	**Alternative 4: Port Way Crossing with Pekin**
Dike Road					
Eastbound	703	571	223	581	583
Westbound	520	421	466	381	423
Total	1,223	992	689	962	1,006
Overcrossing					
Eastbound	0	237	816	134	218
Westbound	0	143	290	98	125
Total	0	380	1,106	232	343
SR 503					
Eastbound	1,107	1,002	823	1,115	1,010
Westbound	2,095	2,050	1,910	2,155	2,068
Total	3,202	3,052	2,733	3,270	3,078
Totals					
Eastbound	1,810	1,810	1,862	1,830	1,811
Westbound	2,615	2,614	2,666	2,634	2,616
Total	4,425	4,424	4,528	4,464	4,427

Source: The Transpo Group, 2008.

It should be noted that each of these alternatives also includes a variety of roadway and intersection improvement projects, some of which have previously been identified in the

City's Transportation System Plan and others of which have been suggested through public input and/or technical analysis. These are illustrated in blue in Figures B-2 through B-5.

Key findings with respect to the levels of traffic expected on the proposed options for north/soutn connectivity west of the railroad tracks, generally between Guild Road and Whalen Road are shown in Table 3-2 below.

Table 3-2. Comparison of PM Peak Hour Traffic with North/South Connectivity Options

	2025 PM Peak Hour Traffic Volumes for Comp Plan Plus Scenario			
Location	**Baseline (No-Build)**	**Pekin Road Extension**	**Schurman Way Extension**	**Robinson Road Extension**
South of Dike Road				
Northbound	440	199	273	72
Southbound	211	118	161	36
Total	651	317	434	108
North of Scott Avenue/Guild Road				
Northbound	283	137	220	54
Southbound	164	148	162	38
Total	447	285	382	92
South of Scott Avenue/Guild Road				
Northbound	131	172	86	30
Southbound	135	221	111	33
Total	266	393	197	63
South of Scott Avenue/Guild Road plus Pekin				
Northbound	131	172	166	112
Southbound	135	221	178	97
Total	266	393	344	209
North of Goerig Road				
Northbound	156	152	90	57
Southbound	162	204	118	46
Total	318	356	208	103
North of Whalen Road				
Northbound	0	54	37	29
Southbound	0	113	68	31
Total	0	167	105	60

Source: The Transpo Group, 2008.

3.3.2 Results of Screening Analysis

As noted above, each alternative assumes a variety of improvement options at the Dike Road and SR 503 interchanges with I-5 to address and resolve existing congestion and safety issues. The options also address improvement needs to provide enhanced connectivity in Woodland with the addition of an over or undercrossing of I-5 and the Burlington Northern railroad, and to SR 503 on the east side of the city. Appendix C provides a detailed matrix which outlines the results of the initial screening of alternatives.

Drawing on the detailed evaluation information in Appendix C, a summary of the results of initial screening of a wide range of roadway, interchange and intersection improvement options is presented in Tables 3-3 through 3-9. Included in each table, respectively, are options related to the following geographical areas:

- I-5 / Dike Road interchange area (Table 3-3)
- I-5 / SR 503 interchange area (Table 3-4)
- I-5 and railroad crossing options (Table 3-5)
- I-5 frontage road and/or modified interchange options (Table 3-6)
- North/south arterial road options for the west side of the city (Table 3-7)
- Options to improve SR 503 by adding left turning capacity. (Tables 3-8 to 3-11)

Also indicated in these tables are recommendations as to which of the various options offers the greatest promise for meeting the overall objectives of the study to provide capacity enhancement, greater connectivity and improved safety.

3.3.3 I-5 at Dike Road and Vicinity

Table 3-3 presents a summary of the key findings with respect to the various improvement options that were considered in the vicinity of the I-5/Dike Road interchange. As noted previously, graphics illustrating these options are presented in Appendix A.

As indicated in the table, it is recommended that Options 3B (including roundabouts at the two I-5 interchange intersections and at the intersection of Dike Road with Schurman Way), and 4B (including signalization at all three intersections) be carried forward for further detailed evaluation. During the discussion of these options, a further option was also suggested for further analysis. Identified as modified Option 5, this concept would include signals at the two freeway ramps and a signal at Dike Road/Schurman Way that would not allow for northbound left turns (e.g. from northbound Schurman Way to westbound Dike Road – heading away from the freeway).

Table 3-3. Screening of Initial Improvement Options – I-5 at Dike Road

Concept	Key Findings	Recommendations
1 SB loop ramp, NB signal (Figure A-1A)	• Likely most expensive option • May create weaving impacts on I-5 • Impact to Wal-Mart parking lot	• Do not carry forward due to cost and potential I-5 mainline impacts
2 Signals with SB ramp moved west (Figure A-1B)	• Some traffic movements may not operate acceptably due to spacing of signals • Very wide cross-section on Dike • Impact to Wal-Mart parking lot	• Do not carry forward due to right-of-way impact
3A Roundabouts with SB ramp moved west (Figure A-1B)	• Most movements likely LOS D or better • Reduced crash potential and severity • Impact to Wal-Mar parking lot • May not need to widen Dike Road under I-5 and the railroad	• Do not carry forward due to right-of-way impact

Table 3-3. Screening of Initial Improvement Options – I-5 at Dike Road Continued

Concept No.	Location and Improvement Option	Findings and Conclusions
3B Roundabouts at existing ramps (Figure A-1C)	• Most movements likely LOS D or better • Reduced crash potential and severity • May not need to widen Dike Road under I-5 and the railroad	• **Carry forward option for further consideration**
4A Signals at both ramps, (Figure A-1C)	• Some traffic movements may not operate acceptably due to spacing of signals • Poor operations at Schurman/Dike with stop sign • Will likely require widening and raising I-5 NB and railroad structures	• Do not carry forward as 4B may be a better signalized option
4B Signals at ramps and Schurman Way (Figure A-1D)	• Some traffic movements may not operate acceptably due to spacing of signals • Will likely require widening and raising I-5 NB and railroad structures	• **Carry forward option for further consideration**
5 Signals at both ramps, right-in/right-out at Schurman Way (Figure A-1D)	• Some traffic movements may not operate acceptable due to spacing of signals • Restricts access to/from Schurman resulting in out-of-direction travel for industrial vehicles	• Do not carry forward as 4B may be a better signalized option • **Consider a modified option that includes signalization and partial restrictions on turns at Schurman Way**

3.3.4 I-5 at SR 503 and Vicinity

Table 3-4 presents a summary of the key findings with respect to the various improvement options that were considered in the vicinity of the I-5/SR 503 interchange. As noted previously, graphics illustrating these options are presented in Appendix A.

As indicated in the table, it is recommended that the following options be carried forward for further detailed analysis: Option 2B (including multi-lane roundabouts that accommodate traffic movement along SR 503 between Buckeye Street and CC Street), Option 3B (including major widening of SR 503 to accommodate added through and turning lanes at the freeway ramp intersections and relocation of the CC Street connection further east), and a variation of Option 5 (to include a one-way couplet through the interchange area using the existing roadway for westbound traffic and providing a new roadway for eastbound traffic under I-5).

Table 3-4. Screening of Initial Improvement Options – I-5 at SR 503

Concept	Key Findings	Recommendations
1 Multi-lane roundabouts, relocate access to CC Street, signalize Goerig/Buckeye (Figure A-2A)	• Most traffic movements would likely operate at LOS D or better • Reroutes CC Street access, may affect access along A Street • Allows good 2-way access to frontage roads • Potential conflict between roundabouts and traffic signals • Reduced crash potential and severity	• Do not carry forward as other roundabout options will likely operate better
2A Multi-lane roundabouts, combine NB off and CC Street (Figure A-2B)	• Most traffic movements would likely operate at LOS D or better • Integrates intersection with CC Street • Potential conflicts between roundabouts and traffic signals • Requires new I-5 northbound off-ramp • Reduced crash potential and severity	• Do not carry forward as other roundabout options will likely operate better
2B Multi-lane roundabouts, combine NB off and CC Street, combine SB on and Buckeye (Figure A-2B)	• Most traffic movements would likely operate at LOS D or better • Integrates intersection with CC Street • Add some out-of-direction travel for westbound to southbound traffic access I-5 • Eliminates potential conflict between roundabouts and traffic signals • Requires new I-5 northbound off-ramp • Likely most expensive of the roundabout options within existing right-of-way • Impacts park-and-ride lot	• **Carry forward option for further consideration**
3A Major widening, signalize all existing intersections (Figure A-2C)	• Requires major widening of SR 503 • Some traffic movements may not operate acceptably and back-ups expected • Does not resolve conflict between CC Street and I-5 northbound off-ramp intersections	• Do not carry forward as other signalized options will likely operate better
3B Major widening, signalize all intersections and relocate CC Street connection of 'A' Street (Figure A-2C)	• Requires major widening of SR 503 • Some traffic movements may not operate acceptably and back-ups expected • Reroutes CC Street access, may affect access along A Street • Signal progression can likely be achieved at the expense of side street movements	• **Carry forward option for further consideration**
4 Single Point Urban Interchange (SPUI) (Figure A-2D)	• Not functional • Very expensive	• Rejected due to loss of all-way connections to SR 503 at both Pacific and Atlantic Avenues
5A One-way couplet from Buckeye to 'A' Street with signals (Figure A-2E)	• Requires construction of new eastbound arterial road to serve as SR 503 through I-5 interchange area • Adequate traffic progression on SR 503 • May experience some back-ups on northbound leg between eastbound and westbound segments of SR 503 • Reroutes CC Street access, may affect access along A Street • Potential out-of-direction travel	• **Carry forward option for further consideration**

Table 3-4. Screening of Initial Improvement Options – I-5 at SR 503 Continued

Concept	Key Findings	Recommendations
5B One-way couplet from Buckeye to 'A' Street with roundabouts at both ends and signals in between (Figure A-2E)	• More complicated and likely more expensive than 5A without significantly greater benefit • U-turn movements accommodated to reduce need for out-of-direction travel • May be conflicts between roundabout and traffic signal operations	• Do not carry forward as other roundabout options will likely operate better

3.3.5 I-5 and Railroad Crossings

Evaluation of the traffic forecasts for the various I-5 and railroad crossing alignment options (see Table 3-1) highlights the benefits of locating this crossing along or close to the existing portion of Scott Avenue between Schurman Way and Old Pacific Highway. Accordingly, the development of plan and profile concepts for over and undercrossing options focused on the Scott Avenue alignment with some general consideration give to benefits related to the Port Way and Heritage Street options for comparative purposes.

Table 3-5 presents a summary of the key findings and recommendations with respect to the I-5 and railroad crossing options. As indicated in the table, options recommended for further evaluation and consideration focus on developing a crossing along the Scott Avenue alignment including an overcrossing concept (Option 2A) with more gentle grades than other options considered, and a variation on undercrossing Option 2C that would involve raising I-5 over Scott Avenue (which would remain at grade), and then raising Scott Avenue over the existing railroad tracks (including provision for a future third track alignment).

The Port and Heritage Street alignment options were not recommended for further consideration largely due to the added construction needs associated with the new roadway extensions. Additionally, these options would attract approximately one-quarter to one-third of the traffic that Scott Avenue would attract, reducing their effectiveness in relieving existing and future congestion along Dike Road and SR 503. However, it should be recognized the both the Port Way and Heritage Street options would likely see a greater ease of implementation as they would pass through relatively undeveloped property.

Table 3-5. Screening of Initial Improvement Options – I-5 and Railroad Crossings

Concept	Key Findings	Recommendations
1 Port Way Overcrossing	• Moderate relief of traffic from Dike Road and minor relief from SR 503 • Significant right-of-way acquisition but area largely undeveloped • Could be coupled with modified ramps to/from I-5 that would increase diversion of traffic from Dike Road and SR 503	• Do not carry forward due to low level of effectiveness and likely high cost

Table 3-5. Screening of Initial Improvement Options – I-5 and Railroad Crossings Continued

Concept	Key Findings	Recommendations
2A Scott Avenue Overcrossing with smoother slopes	• Significant relief of traffic from Dike Road, moderate relief from SR 503 • Would require rerouting of Pekin/Schurman connection including right-of-way acquisition • Impacts local connectivity, may not be able to retain connection to Downriver Drive • Significant right-of-way acquisition and property access impacts on east side of I-5	• **Carry forward option for further consideration**
2B Scott Avenue Overcrossing with steeper slopes	• Significant relief of traffic from Dike Road, moderate relief from SR 503 • Reduces right-of-way acquisition and property access impact on both sides of I-5 • Steer vertical curve with 20 mph design speeds, undesirable from safety standpoint • One option could provide connectivity to Downriver Drive	• Do not carry forward due to safety implications
2C Scott Avenue undercrossing with I-5 raised	• Significant relief of traffic from Dike Road, moderate relief from SR 503 • Requires major improvement on I-5 involving raising the freeway over Scott Avenue • Reduces right-of-way acquisition and property access impact on both sides of I-5 • Provides connectivity to existing accesses along Scott Avenue • May result in flooding problems where project passes under railroad	• **Carry forward option for further consideration, develop concept for overcrossing of railroad**
2D Scott Avenue undercrossing with I-5 and railroad raised	• Significant relief of traffic from Dike Road, moderate relief from SR 503 • Requires major improvement on I-5 involving raising the freeway over Scott Avenue • Major project to raise railroad over Scott involving up to 2 miles of new and/or temporary dual trackage • Reduces right-of-way acquisition and property access impact on both sides of I-5 • Provides connectivity to existing accesses along Scott Avenue	• Do not carry forward due to major cost and railroad impacts
3 Heritage Street Overcrossing	• Moderate relief of traffic from Dike Road and virtually no relief from SR 503 • Significant right-of-way acquisition but area largely undeveloped • Could be coupled with modified ramps to/from I-5 that would increase diversion of traffic from Dike Road and SR 503	• Do not carry forward due to low level of effectiveness and like high cost

3.3.6 I-5 Frontage Roads and New/Modified Interchanges

Table 3-6 presents a summary of the various frontage road options that focus on improving connections between I-5 and the Scott Avenue overcrossing options. A key objective with these options was to retain, at a minimum, the existing connections to and from I-5 to the north of Woodland.

As indicated in the table, it is recommended that a modification of Option 2 be carried forward for further assessment: This option would involve establishing full signalized intersections where the Scott Avenue over/undercrossing would connect with I-5. Other options considered would likely not acceptable to WSDOT and/or the Federal Highway Administration (including ramps from Scott Avenue to/from I-5 on the south), or effective (such as options for increased connectivity using the Port Way alignment vicinity.

Table 3-6. Screening of Initial Improvement Options – I-5 Frontage Roads/Interchanges

Concept	Key Findings	Recommendations
1 Scott Avenue Overcrossing-maintain existing ramps (Figure C-1)	• Significant relief of traffic from Dike Road, moderate relief from SR 503 • Requires major structure over I-5 and local street improvements • No connection between Scott and frontage roads • Potential loss of access to property west of I-5 and south of Scott	• Do not carry forward as project does not maximize congestion relief
2 Scott Avenue Overcrossing with diamond interchange (Figure C-2)	• Likely greater relief of Dike and SR 503 with added I-5 ramps • Requires major structure over I-5 with ramps and local street improvements • No two-way frontage road access to Scott • Potential loss of access to property west of I-5 and south of Scott	• **Carry forward for further consideration with Scott Crossing option**
3 Scott Avenue at-grade with I-5 overcrossing and diamond interchange (Figure C-3)	• Likely greater relief of Dike and SR 503 with added I-5 ramps • Requires major structure over I-5 with ramps and local street improvements • Extensive staging and traffic control challenges • No two-way frontage road access to Scott • Potential loss of access to property west of I-5 and south of Scott	• **Carry forward for further consideration with Scott Crossing option**
4 Port Way Overcrossing with no ramps (Figure C-4)	• Moderate relief of traffic from Dike Road and minor relief from SR 503 • Requires major structure over I-5	• Do not carry forward as project does not maximize congestion relief
5 Port Way Overcrossing with Collector-Distributor road to Scott Avenue (Figure C-5)	• Likely greater relief of Dike and SR 503 with added I-5 ramps but still expected to be less than similar Scott crossing options • Connects Port Way to Scott via one-way frontage roads	• Do not carry forward as project does not maximize congestion relief

Table 3-6. Screening of Initial Improvement Options – I-5 Frontage Roads/Interchanges Continued

Concept	Key Findings	Recommendations
6 Port Way overcrossing with I-5 ramps (Figure C-6)	• Likely greater relief of Dike and SR 503 with added I-5 ramps but still expected to be less than similar Scott crossing options • Provides access to northbound and southbound I-5 from Scott and Port Way using frontage road	• Do not carry forward as project does not maximize congestion relief

3.3.7 North/South Arterial Roads on West Side of City

As indicated in the traffic forecasting data presented in Table 3-2 and discussed in Table 3-7 below, the most effective option for providing improved north/south connectivity in Woodland west of the railroad tracks would likely involve extension of Pekin Road south of Goerig Road to Whalen Road. This improvement could be coupled with a realignment of Pekin Road in the vicinity of Goerig Road to increase the separation between the Goerig/Pekin intersection and the railroad crossing. This increased separation would help to improve safety at both the intersection and the railroad crossing and would allow modification of the roadway approach on the west side of the railroad to reduce grade.

It is recommended that this option be considered in greater detail at a future time, perhaps during preparation of the City's next Transportation System Plan update.

Table 3-7. Screening of Initial Improvement Options – North/South Arterial Roads

Concept	Key Findings	Recommendations
1 Pekin Road Extension, Guild to Whalen	• Carries highest traffic volumes of three alternative alignments • Likely nominal environmental impacts • Would require right-of-way acquisition from just north of Goerig to Whalen • Can be constructed in phases as development occurs	• **Carry forward option for further consideration**
2 Schurman Way Extension, north of Caples to Whalen	• Carries less traffic than Pekin alignment but more than Robinson alignment • Potential wetland and channel crossing impacts • Impacts existing industrial property south of Guild Road • Would require right-of-way acquisition from Guild to Whalen, largely undeveloped	• Do not carry forward as major north/south arterial option due to low volumes expected. Could be built as part of localized development
3 Robinson Road Extension, Guild to Whalen	• Carries least amount of traffic of the three options • Potential wetland and channel crossing impacts • Would require right-of-way acquisition from Guild to Whalen, largely undeveloped	• Do not carry forward as major north/south arterial option due to low volumes expected. Could be built as part of localized development

3.3.8 SR 503 Improvement Options

A key objective of the Woodland Transportation Infrastructure Strategic Plan was to evaluate a range of potential options to address existing safety and location-specific traffic congestion

problems along SR 503 from approximately Goerig Street eastward to McCracken Road. As noted in the discussion of existing traffic conditions, the intersection of SR 503 with Scott Avenue currently operates at Level of Service (LOS) F during the PM peak hour, while the intersection of SR 503 with Goerig Street operates at LOS E. Both conditions exceed the adopted operational performance threshold of LOS D for this facility. Additional, the WSDOT has currently designated SR 503 from Goerig Street to the eastern city limits as a High Accident Corridor (HAC). The highway segment between Goerig Street and Gun Club Road, in particular, is currently experiencing an accident rate that exceeds the statewide average for similar types of highways (e.g. 2.60 annual accidents per million vehicle miles of travel versus a statewide average of 1.62/MVMT). The predominate accident type along SR 503 are rear end collisions, a type of accident that is consistent with the lack of turning lanes to separate turning traffic from through traffic.

3.3.8.1 Improvement Options Considered

To address existing safety and potential future congestion problems along SR 503 a variety of improvement options was considered. Initial evaluation concluded that, due to the frequency of intersecting streets and driveways along SR 503, if would be preferable to develop a continuous left turn lane in the segment between Goerig Street and Evergreen Lane. Analysis then focused on evaluating a series of options for improving key intersections beyond the provision of left turns along the highway. These improvement options focused on the intersections of SR 503 with Scott Avenue and with Goerig Street. A description of the key options considered is outlined in Table 3-8.

Table 3-8. Description of Options Analyzed for SR 503 Improvements

Option	Signal Intersection Control	Restrict Intersection Movements	Roundabout Intersection Control	Two-Way Left Turn Lane
1	N Goerig Street/Lewis River Road(SR 503) [1] E. Scott Avenue/Lewis River Road (SR 503)			SR 503 Hillshire Drive to Fir Avenue
2	N Goerig Street/Lewis River Road (SR 503) [1]		E Scott Avenue/Lewis River Road (SR 503)	SR 503 Hillshire Drive to Fir Avenue
3		N Goerig Street/Lewis River Road (SR 503) [2]	E Scott Avenue/Lewis River Road (SR 503)	SR 503 Hillshire Drive to Fir Avenue

1. N Goerig Street/Lewis Road (SR 503) would have a northbound left-turn lane.
2. Restrict the north-to-northwest left-turns. This movement would take place north of this intersection at the roundabout. This would allow this intersection to operate without a signal or any widening.

3.3.8.2 Results of Screening

Level of service analysis was conducted at the N Goerig Street/Lewis Road and E Scott Avenue/Lewis Road intersections for each of the options described above. Table 3-9 shows the results of the analysis.

Table 3-9. Level of Service Summary for SR 503 Options

Intersection	2025 PM Peak Hour with Comp Plan Plus Scenario		
	Average Delay (sec.)	Volume-to-Capacity Ratio	LOS
Option 1			
N Goerig Street @ Lewis River Road (SR 503) [1]	13.8	0.65	B
E Scott Avenue @ Lewis River Road (SR 503)	17.0	0.84	B
Option 2			
N Goerig Street @ Lewis River Road (SR 503) [1]	13.8	0.65	B
E Scott Avenue @ Lewis River Road (SR 503) [2]	45.9	NA	D
Option 3			
N Goerig Street @ Lewis River Road (SR 503) [3]			
E Scott Avenue @ Lewis River Road (SR 503)			

1. Assumes protected/permissive phasing for northbound left turn.
2. Assumes one lane roundabout.
3. Restrict to north-to-northwest left turns and assumes stop sign control on the eastbound approaches.

Option 1 would provide adequate intersection operations with future 2025 traffic projections. Option 2 would provide adequate intersection operations based on the overall intersection analysis; however, the southbound approach of the E Scott Avenue/Lewis River Road intersection (controlled by a roundabout) would operate at LOS F and queues would extend for more than 1,600 feet. With Option 3, the eastbound approach of N Goerig Street/Lewis River Road would operate at LOS E and the E Scott Avenue/Lewis River Road intersection would operate at LOS F. Therefore, the best operations are anticipated with Option 1.

Since operations at the E Scott Avenue/Lewis River Road intersection would likely be poor with roundabout control, two additional scenarios were developed for Option 3 including:

- Option 3b – Signalization of the E Scott Avenue/Lewis Road and N Goerig Street/Lewis River Road intersections
- Option 3c – Signalization of the N Goerig Street/Lewis River Road intersection and Flying-T at E Scott Avenue/Lewis River Road intersection. A Flying-T intersection would allow NB traffic to flow freely without signal control unless there was a pedestrian crossing.

Table 3-10 shows the results of the additional analysis.

Table 3-10. Level of Service Summary for Additional SR 503 Improvement Options

Intersection	2025 PM Peak Hour with Comp Plan Plus Scenario		
	Average Delay (sec.)	Volume-to-Capacity Ratio	LOS
Option 3b			
N Goerig Street @ Lewis River Road (SR 503) [1]	15.5	0.84	B
E Scott Avenue @ Lewis River Road (SR 503) [2]	22.9	0.83	C
Option 3c			
N Goerig Street @ Lewis River Road (SR 503) [1]	15.5	0.84	B
E Scott Avenue @ Lewis River Road (SR 503) [2]	38.0	0.88	D

Source: The Transpo Group, 2007.
1. Restricts the north-to-northwest left turns and assumes stop control on the eastbound approach.
2. Assumes additional northbound left turns since N Goerig Street intersection would restrict left turns. Provides a northbound left turn lane with protected/permissive phasing, and a southbound right turn.

As shown in the table, operations would be improved with traffic signals at the N Goerig Street/Lewis Road intersection and either signalization or provision of a flying-T at the E Scott Avenue/Lewis River Road intersection.

3.3.8.3 Recommendations and Information for Cost Estimation

Based on this analysis, Options 1 and 3b should be explored further since they provide the best operations. The graphics in Appendix A illustrate the traffic control, extensions of the two-way left-turn lane, and lengths of proposed turn lanes. Guardrail or barrier will need to be considered in locations where WSDOT clear zone is not met. The options are described below:

Option 1

- Traffic signals at N Goerig Street/SR 503 with protected/ permitted phasing on the northbound approach (Lewis River Road).
- Widening of SR 503 for a 300-foot northbound left-turn lane at N Goerig Street.
- Traffic signals at the E Scott Avenue/Lewis River Road intersection.
- Provision of a two-way left-turn lane from west of Hillshire Drive to Evergreen Lane with median breaks every 500 to 1,000 feet to discourage passing. The breaks can include raised islands or taller reflectorized pylons for better nighttime visibility. The location of breaks should be based on locations that do not block driveway access.
- Roadway cross-section would be as shown in Table 3-11.

Table 3-11. SR 503 Roadway Cross-Section

Item [1]	Running Cross-Section Total (feet)
66-foot Cross-Section (45-foot Roadway)	
6-foot Sidewalk	6-feet
5-foot Landscape Area (for signing and lighting)	11-feet
0.5-foot Curb	11.5 feet
4-foot Shoulder	15.5 feet
11-foot Travel Lane	26.5 feet
14-foot Two-Way Left Turn Lane	40.5 feet
11-foot Travel Lane	51.5 feet
4-foot Shoulder	55.5 feet
0.5-foot Curb	56-feet
4-foot Landscape Area (for signing and lighting)	60 feet
6-foot Sidewalk	66 feet
70-foot Cross-Section (49-foot Roadway)	
6-foot Sidewalk	6-feet
5-foot Landscape Area (for signing and lighting)	11-feet
0.5-foot Curb	11.5-feet
5-foot Shoulder	16.5-feet
12-foot Travel Lane	28.5-feet
14-foot Two-Way Left Turn Lane	42.5-feet
12-foot Travel Lane	54.5-feet
5-foot Shoulder	59.5-feet
0.5-foot Curb	60-foot
4-foot Landscape Area (for signing and lighting)	64-feet
6-foot Sidewalk	70-feet

1. Roadway items are listed as they appear in a roadway cross-section.
2. Guardrail or concrete barrier will need to be considered along segments of SR 503 that do not meet WSDOT clear zone criteria.

Option 3b

- Side-street stop controlled on the N Goerig Street approach of the N Goerig Street/Lewis River Road intersection. Traffic signals should be considered in the future when traffic volumes warrant.
- Traffic signals at the E Scott Avenue/Lewis River Road intersection
- Widening of Lewis River Road to provide a 250-foot northbound left-turn lane and 100-foot southbound right-turn lane at E Scott Avenue.
- Provision of a two-way left-turn lane from west of Hillshire Drive to Evergreen Lane with median breaks every 500 to 1,000 feet to discourage passing. The breaks can include raised islands or taller reflectorized pylons for better nighttime visibility. The raised objects for the median breaks should be 2 feet from the edge of traveled way. The location of breaks should be based on locations that do not block driveway access.
- Roadway cross-section as shown in Table 3-11.

3.4 SUMMARY OF RECOMMENDATIONS BASED ON INITIAL SCREENING

3.4.1 Options Considered for Further Study

Based on the initial screening of improvement options, several were recommended for more detailed evaluation as these were determined to be reasonable, feasible and effective in meeting the vision and general objectives of the Woodland TISP. These recommendations are based on the results of public and agency input, and a general assessment of how well these options meet the overall objectives of the study. Options identified for further study are illustrated in Appendix D and include the following.

- <u>I-5 / Dike Road Vicinity</u>
  - 3B – Roundabouts at existing ramp locations and Schurman Way
  - 4B – Signals at existing ramp locations and Schurman Way
  - 5 – Signals at both existing ramps with modified signal at Schurman Way (allows WB lefts but not NB lefts)
  - Address existing drainage problems with added culverts and drainage retention areas
- <u>I-5 / SR 503 Vicinity</u>
  - 2B – Multi-lane roundabouts which combine NB off ramp/Atlantic with CC Street into a five-legged facility
  - 3B – Major widening of SR 503 through interchange area, modify all signals at existing locations, add signal at Goerig/Buckeye, relocate CC Street further east to A Street intersection
  - 5 – One-way couplet with consideration for roundabouts and/or signals where appropriate (not illustrated in Appendix A)
- <u>I-5 and Railroad Crossings</u>
  - 4D – Create new option that includes elements of others to go under I-5, meet Downriver Drive at grade, go over railroad and minimize impacts to local street and property connections on the west side of the railroad
  - 4E – Create new option that goes over I-5, meets Downriver Drive at grade and goes over railroad while minimizing impacts to local street and property

connections on west side of railroad and east side of freeway (not illustrated in Appendix A)

- <u>I-5 Interchange and/or Frontage Road Connections</u>
  - 2 – Scott Avenue overcrossing with connections to existing ramps
  - 3 – Scott Avenue at grade with I-5 overcrossing with connections to existing ramps
- <u>North/South Arterial Road</u>
  - Final decision on appropriate arterial road alignment should be made during update of Comprehensive Plan (land use and transportation elements). It should be noted that the analysis conducted for the WTISP indicates that the most effective options appears to be an extension of N Pekin Road further south with an improved connection between N Pekin Road and Schurman Way
- <u>SR 503 on East Side of Town (Goerig to Fir)</u>
  - 1 – Two-way left turn lane with signals at intersections of Goerig/SR 503 and Scott/SR 503
  - 3B – Two way left turn lane with signals at Goerig/SR 503 and Scott/SR 503 with restricted northbound left turns at Goerig (this movement would be relocated to Scott Avenue where a separate left turn lane would be provided)