



US 101/West Olympia Access Project

At Kaiser Road and Yauger Way

MP 364.36 to MP 365.98

Interchange Justification Report (IJR)

Prepared for

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This **Interchange Justification Report** has been prepared under my direct supervision, in accordance with the Chapter 18.43 RCW and appropriate Washington State Department of Transportation manuals.

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Stakeholder Acceptance

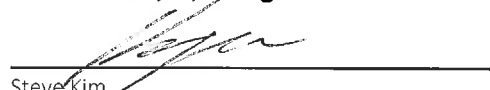
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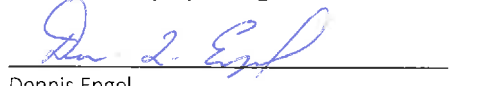
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TABLE OF CONTENTS

EX - EXECUTIVE SUMMARY	EX-1
EX-1 WHAT IS THE BACKGROUND OF THE PROJECT?	EX-1
EX-2 WHAT IS THE PURPOSE OF THE WEST OLYMPIA ACCESS PROJECT?	EX-1
EX-3 WHERE IS THE PROJECT LOCATED AND WHAT DOES IT INCLUDE?.....	EX-1
EX-4 WHAT ARE THE KEY FINDINGS OF THE IJR?	EX-2
EX-4.1 Policy Point #1: Need for the Access Point Revision	EX-2
EX-4.2 Policy Point #2: Reasonable Alternatives	EX-3
EX-4.3 Policy Point #3: Operational and Collision Analysis.....	EX-3
EX-4.4 Policy Point #4: Access Connections and Design.....	EX-4
EX-4.5 Policy Point #5: Land Use and Transportation Plans	EX-4
EX-4.6 Policy Point #6: Future Interchanges	EX-4
EX-4.7 Policy Point #7: Coordination.....	EX-5
EX-4.8 Policy Point #8: Environmental Processes.....	EX-5
 PD - PROJECT DESCRIPTION	 PD-1
PD 1.1 WHAT IS THE BACKGROUND OF THE PROJECT?	PD-1
PD 1.2 WHAT IMPROVEMENTS ARE PROPOSED?.....	PD-2
PD 1.2.1 Black Lake Boulevard and US 101 Interchange	PD-2
PD 1.2.2 US 101 Westbound Off-Ramp to Yauger Way SW	PD-3
PD 1.2.3 Kaiser Road and US 101 Interchange.....	PD-3
PD 1.2.4 US 101 Mainline Widening	PD-4
PD 1.2.5 Local Street Improvements.....	PD-4
PD 1.3 WHAT DOES THE REPORT INCLUDE AND HOW IS IT ORGANIZED?	PD-4
 1. POLICY POINT 1: NEED FOR THE ACCESS POINT REVISION.....	 1-1
1.1 WHAT IS THE PURPOSE OF THE ACCESS IMPROVEMENTS TO US 101?	1-1
1.2 WHAT IS THE PROJECT STUDY AREA?	1-2
1.3 WHAT IS THE HISTORY OF TRANSPORTATION PLANNING IN WEST OLYMPIA?	1-2
1.3.1 Prior Transportation Studies, Programs and Standards That Influenced the 2010 West Olympia Access Study	1-3
1.3.2 2010 West Olympia Access Study	1-5
1.4 WHAT ARE THE RELEVANT TRANSPORTATION PROGRAMS AND STANDARDS?	1-6
1.5 WHAT LOCAL IMPROVEMENTS HAVE BEEN MADE?	1-7
1.5.1 Recent Local Transportation Improvements.....	1-7
1.5.2 Planned Local Transportation Improvements.....	1-9
1.6 WHAT IS THE BASELINE TRANSPORTATION SYSTEM?.....	1-9
1.6.1 Current Physical Features of Project Area Streets and Highways	1-9

TABLE OF CONTENTS (CONTINUED)

1.7	WHAT ARE CURRENT AND EXPECTED FUTURE NO BUILD TRAFFIC CONDITIONS ALONG THE US 101 CORRIDOR?	1-16
1.7.1	2014 Existing Peak Hour Traffic Volumes.....	1-16
1.7.2	Development of Future Peak Hour Traffic Volumes	1-16
1.7.3	2020 No Build Alternative Peak Hour Volumes.....	1-19
1.7.4	2040 No Build Alternative Peak Hour Volumes.....	1-19
1.7.5	Local versus Regional Trips	1-20
1.8	IS THERE A NEED FOR AN ACCESS POINT REVISION?	1-22
2.	POLICY POINT 2: REASONABLE ALTERNATIVES.....	2-1
2.1	HOW WERE ALTERNATIVES DEVELOPED AND EVALUATED?	2-1
2.2	HOW WERE INITIAL IMPROVEMENT IDEAS IDENTIFIED AND SCREENED?	2-2
2.2.1	Initial Public Outreach/Brainstorming of Ideas	2-3
2.2.2	Fatal Flaw Screening of Brainstormed Ideas	2-3
2.3	HOW WERE GROUPS OF VIABLE IMPROVEMENT OPTIONS DEVELOPED AND EVALUATED?	2-4
2.3.1	Grouping of Improvement Options.....	2-4
2.3.2	Screening Criteria used to Assess Groups of Improvement Options.....	2-5
2.3.3	Evaluation Results for Grouped Improvement Options	2-6
2.3.4	Concepts Considered and Not Advanced Through the Screening Process	2-10
2.4	HOW WERE IMPROVEMENT SCENARIOS PACKAGED AND EVALUATED?	2-11
2.4.1	Development of Improvement Scenarios	2-11
2.4.2	Evaluation of Improvement Scenarios	2-13
2.5	HOW WAS THE 2010 RECOMMENDED ALTERNATIVE IDENTIFIED?.....	2-14
2.5.1	Screening Criteria to Identify a Recommended Alternative.....	2-14
2.5.2	Evaluation Results	2-15
2.5.3	Identification of the Recommended Alternative.....	2-16
2.6	HOW WAS THE 2010 HYBRID ALTERNATIVE REFINED AND THE PREFERRED ALTERNATIVE IDENTIFIED?	2-17
2.6.1	Development of Initial Interchange Design Options	2-17
2.6.2	Evaluation of Initial Interchange Design Options	2-20
2.6.3	Development and Evaluation of Refined Design Options	2-24
2.7	WHAT IMPROVEMENT CONCEPTS WERE CONSIDERED AND REJECTED?	2-28
3.	POLICY POINT 3: OPERATIONAL AND COLLISION ANALYSIS	3-1
3.1	WHAT ARE THE PROPOSED IMPROVEMENTS FOR WHICH ANALYSIS IS BEING CONDUCTED?	3-1
3.2	HOW WAS TRAFFIC ANALYSIS CONDUCTED?	3-2
3.2.1	Analysis Assumptions.....	3-2

TABLE OF CONTENTS (CONTINUED)

3.2.2 Traffic Analysis Tools.....	3-3
3.2.3 Two-Hour Peak Average Analysis.....	3-4
3.3 WHAT FUTURE TRAFFIC VOLUMES ARE EXPECTED WITH THE PREFERRED ALTERNATIVE?	3-5
3.4 WHAT ARE THE RESULTS OF TRAFFIC OPERATIONS ANALYSIS ON US 101?	3-6
3.4.1 2014 Existing Conditions.....	3-6
3.4.2 Comparison of 2020 No-Build and Preferred Alternatives.....	3-8
3.4.3 Comparison of 2040 No-Build and Preferred Alternatives.....	3-10
3.5 HOW WAS TRAFFIC ANALYSIS CONDUCTED AT LOCAL STREET INTERSECTIONS? ...	3-15
3.5.1 2014 Existing Conditions.....	3-15
3.5.2 Comparison of 2020 No Build and Preferred Alternatives.....	3-17
3.5.3 Comparison of 2040 No Build and Preferred Alternatives.....	3-22
3.6 WHAT IS THE CRASH EXPERIENCE IN THE PROJECT AREA?.....	3-40
3.6.1 What was the Process used to Evaluate Crashes in the Project Area?	3-40
3.6.2 What is the Existing Crash Experience for US 101?.....	3-41
3.6.3 What is the Existing Crash Experience for Project Area Intersections?.....	3-45
3.7 HOW ARE CRASH RATES EXPECTED TO CHANGE OVER THE PLANNING PERIOD? ...	3-48
3.7.1 How was the ISAT Model Developed for US 101 in the Project Area?	3-48
3.7.2 How do Predicted Crashes with No Build and Preferred Alternatives Compare?.....	3-50
3.7.3 Conclusions	3-56
4. POLICY POINT 4: ACCESS CONNECTIONS AND DESIGN.....	4-1
4.1 WILL THE US 101/WEST OLYMPIA ACCESS PROJECT PROVIDE FULLY DIRECTIONAL INTERCHANGES CONNECTED TO PUBLIC ROADS?	4-1
4.1.1 What are the Proposed Black Lake Boulevard Modifications?.....	4-1
4.1.2 What is Proposed for the New Yauger Way Ramp?	4-1
4.1.3 What is Proposed at the New Kaiser Road Interchange?.....	4-5
4.1.4 What Modifications would be Made to the US 101 Mainline?	4-5
4.2 WILL THE MODIFIED AND NEW INTERCHANGES BE SPACED ACCORDING TO GUIDELINES?.....	4-7
4.3 WILL THE MODIFIED AND NEW INTERCHANGES BE DESIGNED TO PRECLUDE VARIANCES FROM STANDARDS?.....	4-7
4.4 WHAT ARE THE CONCEPTUAL SIGNING PLANS FOR THE NEW OR MODIFIED INTERCHANGES?	4-8
5. POLICY POINT 5: LAND USE AND TRANSPORTATION PLANS.....	5-1
5.1 IS THE PROPOSED ACCESS POINT REVISION COMPATIBLE WITH LAND USE PLANS FOR THE AREA?.....	5-1

TABLE OF CONTENTS (CONTINUED)

5.1.1 Olympia Comprehensive Plan	5-1
5.1.2 Thurston County Comprehensive Plan.....	5-2
5.2 IS THE PROPOSED ACCESS REVISION CONSISTENT WITH STATE, REGIONAL AND LOCAL PLANS?.....	5-2
5.2.1 Washington Transportation Plan, 2035	5-2
5.2.2 Washington State Highway System Plan, 2007-2026.....	5-2
5.2.3 Thurston Regional Transportation Plan (RTP) 2025	5-2
5.2.4 Thurston County Comprehensive Plan, Transportation Element.....	5-3
5.2.5 Olympia Comprehensive Plan, Transportation Element	5-4
5.2.6 5-4	
5.2.7 Olympia Mobility Strategy.....	5-5
6. POLICY POINT 6: FUTURE INTERCHANGES.....	6-1
6.1 ARE THE PROPOSED ACCESS POINT REVISIONS COMPATIBLE WITH OTHER FUTURE INTERCHANGE IMPROVEMENTS?	6-1
7. POLICY POINT 7: COORDINATION.....	7-1
7.1 HOW HAVE THE PROPOSED IMPROVEMENTS BEEN COORDINATED WITH OTHER IMPROVEMENT PROJECTS IN THE AREA?	7-1
7.2 WHAT PUBLIC OUTREACH ACTIVITIES WERE UNDERTAKEN?	7-2
7.2.1 Activities Undertaken as Part of the 2010 West Olympia Access Study.....	7-2
7.2.2 Activities Undertaken as Part of the 2015/2016 IJR.....	7-3
8. POLICY POINT 8: ENVIRONMENTAL PROCESSES.....	8-1
8.1 WHAT TYPE OF ENVIRONMENTAL DOCUMENT WILL BE PREPARED FOR THE PROJECT?	8-1
8.2 ECOSYSTEM RESOURCES.....	8-1
8.3 WATER RESOURCES	8-3
8.4 VISUAL QUALITY.....	8-5
8.5 NOISE	8-5
8.6 LAND USE.....	8-6
8.7 SOCIAL AND ENVIRONMENTAL JUSTICE	8-9
8.8 CULTURAL RESOURCES	8-10

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

	Page
Table 1-1. Relevant Prior Transportation Plans and Studies in West Olympia.....	1-3
Table 1-2. Reports Prepared for 2010 West Olympia Access Study.....	1-6
Table 1-3. Relevant On-Going Transportation Improvement Programs	1-7
Table 1-4. Relevant Engineering Standards	1-7
Table 2-1. Description and Evaluation of Grouped Improvement Options.....	2-7
Table 2-2. Analysis Results for West Olympia Interchange Scenarios.....	2-15
Table 2-3. PM Peak Hour Traffic Operations Analysis Results – US 101/Black Lake Boulevard ..	2-27
Table 3-1. US 101 West Olympia Access – Proposed Improvements	3-1
Table 3-2. 2014 AM and PM Peak Hour Freeway Operations.....	3-7
Table 3-3. 2020 AM Peak Hour Freeway Operations - No Build and Preferred Alternatives	3-8
Table 3-4. 2020 PM Peak Hour Freeway Operations - No Build and Preferred Alternatives	3-9
Table 3-5. 2040 AM Peak Hour Freeway Operations - No Build and Preferred Alternatives	3-10
Table 3-6. 2040 PM Peak Hour Freeway Operations - No Build and Preferred Alternatives	3-11
Table 3-7. 2014 Existing Peak Hour Intersection Operations.....	3-15
Table 3-8. 2014 Existing Peak Hour Traffic Queuing at Key Locations	3-16
Table 3-9. 2020 AM Peak Hour Intersection Operations - No Build and Preferred Alternatives	3-18
Table 3-10. 2020 AM Peak Hour Traffic Queuing at Key Locations – No Build and Preferred Alternatives.....	3-19
Table 3-11. 2020 PM Peak Hour Intersection Operations - No Build and Preferred Alternatives	3-20
Table 3-12. 2020 PM Peak Hour Traffic Queuing at Key Locations – No Build and Preferred Alternatives	3-22
Table 3-13. 2040 AM Peak Hour Intersection Operations - No Build and Preferred Alternatives	3-24
Table 3-14. 2040 AM Peak Hour Traffic Queuing at Key Locations – No Build and Preferred Alternatives.....	3-25
Table 3-15. 2040 PM Peak Hour Intersection Operations - No Build and Preferred Alternatives	3-26
Table 3-16. 2040 PM Peak Hour Traffic Queuing at Key Locations – No Build and Preferred Alternatives	3-28
Table 3-17. 2040 PM Peak Hour Traffic Queuing on Black Lake Boulevard – Vissim Simulation Results	3-30
Table 3-18. US 101 Crashes by Type, 2010-2014.....	3-43
Table 3-19. US 101 Crashes by Severity, 2010-2014.....	3-44

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

	Page
Table 3-20. US 101 Crashes by Contributing Factors, 2010-2014.....	3-45
Table 3-21. Existing Intersection Crash Rate Analysis (1/1/2010 to 12/31/14)	3-46
Table 3-22. Existing Crashes on US 101 in Project Area.....	3-49
Table 6-1. Projects from WSDOT’s Highway System Plan	6-1
Table 6-2. Projects from the Thurston Regional Transportation Plan.....	6-2

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

	Page
Figure EX-1. Project Study Area	EX-2
Figure PD-1. Vicinity Map.....	PD-2
Figure PD-2. Black Lake Boulevard.....	PD-2
Figure PD-3. Yauger Way	PD-3
Figure PD-4. Kaiser Road Improvement.....	PD-4
Figure 1-1. Project Study Area and Interchanges.....	1-4
Figure 1-2. Transportation Improvements in West Olympia, 2007 to 2014	1-8
Figure 1-3. Project Study Area Streets and Intersections	1-12
Figure 1-4. West Olympia Traffic Model Review Area	1-17
Figure 1-5. Network Improvements included in Project Area Traffic Model	1-19
Figure 1-6. Destination of PM Peak Hour Trips Using US 101/Black Lake Ramps	1-20
Figure 1-7. Destination of AM Peak Hour Trips Using US 101/Black Lake Ramps	1-22
Figure 1-8. 2014 Peak Hour Traffic Volumes on US 101	1-23
Figure 1-9. 2014 AM Peak Hour Intersection Traffic Volumes.....	1-24
Figure 1-10. 2014 PM Peak Hour Intersection Traffic Volumes.....	1-25
Figure 1-11. 2020 Peak Hour Traffic Volumes on US 101 – No Build Alternative	1-26
Figure 1-12. 2020 AM Peak Hour Intersection Traffic Volumes – No Build Alternative	1-27
Figure 1-13. 2020 PM Peak Hour Intersection Traffic Volumes – No Build Alternative	1-28
Figure 1-14. 2040 Peak Hour Traffic Volumes on US 101 – No Build Alternative	1-29
Figure 1-15. 2040 AM Peak Hour Intersection Traffic Volumes – No Build Alternative	1-30
Figure 1-16. 2040 PM Peak Hour Intersection Traffic Volumes – No Build Alternative	1-31
Figure 2-1. Multi-Phased Planning Process.....	2-2
Figure 2-2. US 101 Improvement Concepts at Black Lake Boulevard and Evergreen Parkway	2-12
Figure 2-3. Hybrid Interchange Alternative – West End	2-18
Figure 2-4. Hybrid Interchange Alternative – East End.....	2-19
Figure 2-5. US 101/Black Lake Boulevard Yauger Flyover Ramp Design Option	2-21
Figure 2-6. US 101/Black Lake Boulevard Modified Single Point Urban Interchange Design Concept (THRUI)	2-22
Figure 2-7. US 101/Black Lake Boulevard Diverging Diamond Interchange (DDI) Design Concept.....	2-23
Figure 2-8. THRUI Concept Design Option 1	2-25

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

	Page
Figure 2-9. THRU Concept Design Option 2	2-26
Figure 3-1. Preferred Alternative Improvements.....	3-2
Figure 3-2. 2040 PM Peak Hour Traffic Volume Shifts with the Preferred Alternative	3-6
Figure 3-3. 2020 Peak Hour Traffic Volumes on US 101 – Preferred Alternative.....	3-12
Figure 3-4. 2040 Peak Hour Traffic Volumes on US 101 – Preferred Alternative.....	3-13
Figure 3-5. 2040 PM Peak Hour Traffic Queues for US 101/Black Lake Boulevard Interchange Area	3-14
Figure 3-6. Existing 2014 Intersection Level of Service	3-31
Figure 3-7. 2020 AM Peak Hour Intersection Traffic Volumes – Preferred Alternative	3-32
Figure 3-8. 2020 AM Peak Hour Intersection Level of Service	3-33
Figure 3-9. 2020 PM Peak Hour Intersection Traffic Volumes – Preferred Alternative	3-34
Figure 3-10. 2020 PM Peak Hour Intersection Level of Service	3-35
Figure 3-11. 2040 AM Peak Hour Intersection Traffic Volumes – Preferred Alternative	3-36
Figure 3-12. 2040 AM Peak Hour Intersection Level of Service	3-37
Figure 3-13. 2040 PM Peak Hour Intersection Traffic Volumes – Preferred Alternative	3-38
Figure 3-14. 2040 PM Peak Hour Intersection Level of Service	3-39
Figure 3-15. US 101 Crashes by Year, 2010-2014	3-41
Figure 3-16. 2010-2014 Crashes on US 101 by Location and Direction of Travel	3-42
Figure 3-17. Crashes on US 101 per Month East of Crosby Interchange Before and After Speed Limit Drop to 45 MPH	3-42
Figure 3-18. US 101 Crashes by Type, 2010-2014	3-43
Figure 3-19. US 101 Crashes by Severity, 2010-2014	3-44
Figure 3-20. US 101 Crashes by Contributing Factors, 2010-2014.....	3-45
Figure 3-21. Crash Analysis Intersections	3-47
Figure 3-22. ISATe Safety Analysis Freeway Segments, Ramps and Ramp Termini.....	3-51
Figure 4-1. Conceptual Layout for Black Lake Boulevard Interchange.....	4-2
Figure 4-2. Conceptual Layout for Yauger Way Interchange	4-3
Figure 4-3. Enlargement of Conceptual Plan for Yauger Way Ramp.....	4-4
Figure 4-4. Conceptual Layout for Kaiser Road Interchange.....	4-6
Figure 4-6. Signing and Striping Plan for Center of Project Area	4-9

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

	Page
Figure 4-5. Signing and Striping Plan for West End of Project Area	4-9
Figure 4-7. Signing and Striping Plan for East End of Project Area.....	4-10
Figure 5-1. Olympia Transportation 2030 Westside Improvements	5-4
Figure 7-1. June 2015 Open House Handout	7-4
Figure 8-1. Existing Wetlands and Land Cover Types.....	8-2
Figure 8-2. Proposed Noise Wall A - Kaiser Off-Ramp Area	8-7
Figure 8-3. Proposed Noise Wall B – Ken Lake Area	8-8

TABLE OF CONTENTS (CONTINUED)

LIST OF APPENDICES

Appendix A	Methods and Assumptions Memorandum
Appendix B	Traffic Counts
Appendix C	Traffic Sensitivity Report
Appendix D	Traffic Forecasting Worksheets
Appendix E	2014 Operations and Queuing Analysis
Appendix F	2020 No Build Alternative Operations and Queuing Analysis
Appendix G	2020 Preferred Alternative Operations and Queuing Analysis
Appendix H	2040 No Build Alternative Operations and Queuing Analysis
Appendix I	2040 Preferred Alternative Operations and Queuing Analysis
Appendix J	Crash Data
Appendix K	Crash Analysis

ACRONYMS

BMPs	Best Management Practices
CABS	Compost Amended Bio-filtration Swale
CAVFS	Compost Amended Vegetated Filter Strip
CE	Categorical Exclusion
CFR	Code of Federal Regulations
DDI	Diverging Diamond Interchange
FHWA	Federal Highway Administration
GMA	Growth Management Act
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
HSP	Highway System Plan
HSS	Highway of Statewide Significance
IJR	Interchange Justification Report
ISAT	Intersection/Interchange Safety Analysis Tools
LOS	Level of Service
MOEs	Measures of Effectiveness
NAC	Noise Assessment Criteria
NEPA	National Environmental Policy Act
NHS	National Highway System
RCW	Revised Code of Washington
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
SEPA	State Environmental Policy Act
SPUI	Single Point Urban Interchange
THRUI	Modified SPUI with Through Movement on the Ramps
TIP	Transportation Improvement Program
TRPC	Thurston Regional Planning Council
TSM	Transportation System Management
VHT	Vehicle Hours of Travel
VMT	Vehicle Miles of Travel
WDFW	Washington Department of Fish and Wildlife
WOAS	West Olympia Access Study
WOBA	West Olympia Business Association
WSDOT	Washington State Department of Transportation
WTP	Washington Transportation Plan

EX - EXECUTIVE SUMMARY

EX-1 WHAT IS THE BACKGROUND OF THE PROJECT?

Traffic congestion and the lack of reasonable options to travel by transit, bicycling, or walking on Olympia's west side raises concerns about how to maintain mobility in the future. City and state infrastructure are showing the strain of sustained residential and economic growth. Nowhere is this more evident than at the intersection of Black Lake Boulevard and Cooper Point Road, and the adjacent Black Lake / US 101 interchange. Traffic delays during the p.m. peak period are approaching unacceptable levels and mobility for other travel modes in the area is strained. Olympia's west side is a major regional center for commerce, medical services, Yauger Park and other recreational facilities, and is a significant employment hub and residential area that would be constrained by the lack of adequate transportation access. A strategy is needed to ensure future mobility can be maintained.

Between 2006 and 2010, the City of Olympia and the Washington State Department of Transportation (WSDOT) partnered on the *West Olympia Access Study* (WOAS) to identify recommended improvements to address growing congestion problems. These improvements included a variety of local street system enhancements as well as major improvements to US 101 including:

- A half-diamond interchange on US 101 at Kaiser Road that included an eastbound on-ramp and westbound off-ramp.
- A grade-separated westbound off-ramp extension from the existing US 101/Black Lake Boulevard off-ramp to Yauger Way.

The study also directed City of Olympia staff to advance work into the next phase of implementation including preparation of an Interchange Justification Report or IJR (which is the subject of this report), and the environmental documentation and preliminary design effort needed to obtain formal approval to build new ramps to and from US 101. The technical findings and conclusions of the eight policy points required by WSDOT and the Federal Highway Administration (FHWA) as a condition of approval for the new and/or modified US 101 access points are addressed in this IJR.

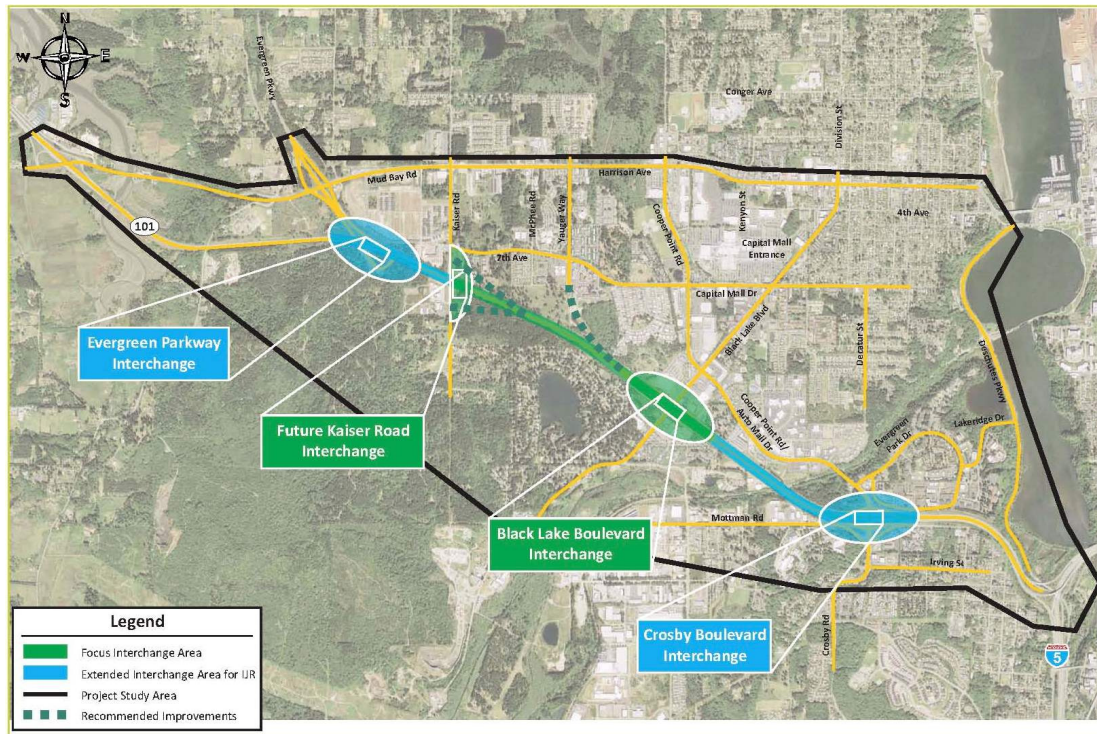
EX-2 WHAT IS THE PURPOSE OF THE WEST OLYMPIA ACCESS PROJECT?

The purpose of the US 101/West Olympia Access Project is to identify improvements that will relieve traffic congestion on Olympia's west side to enhance access and circulation, and accommodate current and projected traffic.

EX-3 WHERE IS THE PROJECT LOCATED AND WHAT DOES IT INCLUDE?

Based on the update to and refinement of earlier planning work completed in 2010, the US 101/West Olympia Access Project focuses on the interchange of US 101 at Black Lake Boulevard and includes one interchange on either side of this location – US 101 at Crosby Boulevard/Cooper Point Road-Auto Mall Drive and US 101 at Evergreen Parkway. The project area also includes the Cooper Point Road/Black Lake Boulevard intersection where severe delay often impacts travelers, including emergency responders who access the Capital Medical Center via US 101 and the Cooper Point Road/Black Lake Boulevard intersection. The project area is illustrated in Figure EX-1.

Figure EX-1. Project Study Area



The following actions are recommended as part of the US 101/West Olympia Access Project:

- A new westbound off-ramp from US 101 to Kaiser Road and an eastbound on-ramp from Kaiser Road to US 101.
- A new westbound off-ramp from US 101 to Yauger Way via an at-grade connection through the existing interchange at US 101 and Black Lake Boulevard.
- Auxiliary lanes (one in each direction) on US 101 between Black Lake Boulevard and the new Kaiser Road ramps to facilitate weaving and merge/diverge movements safely.
- Local street improvements that complement the new ramps.

Proposed interchange improvements are shown in Figures PD-2, PD-3 and PD-4 in the Project Description chapter.

EX-4 WHAT ARE THE KEY FINDINGS OF THE IJR?

The eight policy points required by WSDOT and FHWA are briefly summarized in this section. More detail on each of the policy points is provided in the relevant chapter and in supporting documentation such as the project design report and environmental studies.

EX-4.1 Policy Point #1: Need for the Access Point Revision

Document current and projected travel needs for the study area transportation system, and determine why the existing access points and the existing and/or improved local system cannot adequately address travel needs.

Olympia's commitment to multimodal travel and demand management has not been able to alleviate growing congestion. Poor connectivity by critical arterial streets resulting from decisions in the 1970s limits route effectiveness. This in turn strains the small number of intersections which are incapable of

accommodating the resulting traffic growth. While the brunt of the congestion impacts key local intersections – most notably the Black Lake/Cooper Point intersection – the spillover effects impact US 101 interchanges, causing long vehicle queues that extend onto the US 101 mainline at certain times.

Local and regional growth has strained the ability of the transportation system to support reliable travel. Chronic congestion impacts not only private automobile travel, it also slows emergency responders, transit, and freight delivery while negatively impacting pedestrian and bicycle travel through the corridor. There is an imbalance between where people want to go and the routes available to serve them, which translates into significant delays.

Improved highway access will be needed to support planned community growth and maintain emergency access, while providing safe and acceptable levels of service on both local and state transportation facilities.

EX-4.2 Policy Point #2: Reasonable Alternatives

Describe the process to develop alternatives, determine that they are viable, and identify the preferred course of action.

This policy point presents a synopsis of the wide range of highway, local street, and multimodal alternatives that were identified and considered during the 2010 *West Olympia Access Study* (WOAS), as well as subsequent efforts undertaken as part of this IJR. Included in this chapter is a discussion of:

- The analysis process used to conduct the entire study from outset in 2007 through efforts undertaken for the 2010 *Study*, and concluding with an update that reflects 2014/2015 conditions and a 2040 project design year.
- The full range of alternatives that were developed and considered, including both interchange and local street improvements.

- Screening criteria used to continually refine and narrow the range of options under consideration leading to the identification of a Preferred Alternative.
- Options that were not carried forward for further consideration and the rationale for this decision.

EX-4.3 Policy Point #3: Operational and Collision Analysis

Identify how the proposed project will affect safety and traffic operations of the year of opening and in the design year.

Policy Point 3 discusses the operational and safety impacts associated with the No Build and Preferred Alternatives along US 101 from west of I-5 to west of the Evergreen Parkway interchanges. Included is a summary of analysis methodologies and assumptions, key findings, and conclusions with respect to traffic operations on US 101 (including the mainline and merge/diverge/weaving areas) and key project study area intersections. Also included is a discussion of existing traffic crash experience, expected crash issues with the No Build Alternative and potential safety enhancements with the Preferred Alternative.

Overall, the analysis shows that the proposed interchange modifications at US 101/Black Lake Boulevard and the additional ramps connecting US 101 to both Yauger Way and Kaiser Road would improve the safety and operation of the freeway. This would result from a reduction in merging and weaving volumes at the Black Lake Boulevard interchange. The proposed improvements would also enhance traffic operations at the Black Lake Boulevard/Cooper Point Road intersection. This would be accomplished by providing additional routing choices into the West Side from US 101 that would redirect traffic away from this location. The new interchanges, with associated highway widening, will generally maintain or improve both opening year (2020) and design year (2040) operating conditions.

EX-4.4 Policy Point #4: Access Connections and Design

Address design considerations for the proposed access revision focusing on whether the revision will provide fully directional connections to public streets, and whether it is spaced appropriately and designed to meet WSDOT full design level geometric criteria.

This policy point presents a discussion of engineering design considerations for each element of the proposed Project. Full interchange directionality is maintained at the US 101/Black Lake Boulevard interchange and includes the addition of a new westbound off-ramp to the Yauger Way extension. Partial interchange connections are proposed for the new US 101/Kaiser Road interchange with a westbound off-ramp and an eastbound on-ramp. One auxiliary lane in each direction will be provided along US 101 between the Black Lake Boulevard and Kaiser Road interchanges.

There is greater than one mile spacing between the Black Lake Boulevard and Kaiser Road interchanges. There is less than the minimum spacing requirement of one mile between Evergreen Parkway and Kaiser Road, but both are half interchanges that direct traffic to and from the east, so there would be no interaction of weaving traffic.

No deviations from WSDOT design standards are anticipated. However, several potential design justifications are expected that relate to non-typical ramp design and signal timing at the Black Lake Boulevard interchange, and cut and fill slope rates. Proposed interchange and highway signing plans are also presented.

EX-4.5 Policy Point #5: Land Use and Transportation Plans

Identify that the proposed access point revision is compatible with all land use and transportation plans for the area.

The proposed access revisions along US 101 with Black Lake Boulevard and the establishment of a new access point at Kaiser Road are consistent

with the affected local and countywide land use plans including the City of Olympia Comprehensive Plan (2014) and the Thurston County Comprehensive Plan (2007). Both plans comply with the Washington State Growth Management Act (GMA) (Revised Code of Washington (RCW), Chapter 36.70A).

The proposed improvements to US 101, access modifications at the Black Lake Boulevard interchange and the development of a new interchange at Kaiser Road are also consistent with state, regional and local transportation plans. These plans include:

- *Washington Transportation Plan (WTP) 2035*
- *Washington State Highway System Plan (HSP) 2007-2026*
- *Thurston Regional Transportation Plan (RTP) 2025, as amended to 2035*
- *Thurston County, Transportation Plan*
- *City of Olympia Transportation Element of the Comprehensive Plan*
- *City of Olympia, Transportation Mobility Strategy, 2009*

EX-4.6 Policy Point #6: Future Interchanges

Discuss if the proposed access point revision is compatible with a comprehensive network plan including other known new access points and known revisions to existing points in the project vicinity.

Review of the current WSDOT *State Highway System Plan* (2007-2026), indicates that there are no new interchanges proposed on the US 101 corridor within five miles of the project area. However, the system plan identifies a number of freeway and /or interchange modifications that were reviewed for consistency with the proposed improvements.

In addition to the *Highway System Plan*, the *Thurston Regional Transportation Plan 2025*, as amended was reviewed to identify and assess

compatibility with any potential interchange improvements in the project vicinity.

Based on review of these two documents, the proposed US 101/West Olympia Access Project was determined to be consistent with other existing interchanges and with other proposed freeway improvements in the project vicinity.

EX-4.7 Policy Point #7: Coordination

Identify whether all projects and actions needed to successfully implement the proposed access revision have been programmed and funded. Discuss public and agency coordination and engagement.

The City of Olympia and Thurston County have either implemented or plan to implement projects that support the US 101/West Olympia Access Project. These projects include:

- Widening of Kaiser Road NW to add a two-way left turn lane and a southbound bicycle lane, between the intersections with 5th Way SW and 7th Avenue SW (completed).
- Extension of Yauger Way NW southward from Capital Mall Drive SW (completed)
- Widening of Mud Bay Road/Harrison Avenue NW between Evergreen Parkway NW and Yauger Way NW from a two/three-lane cross-section to a four/five lane cross-section with a new traffic signal at Kaiser Road NW (completed).
- Evergreen Parkway/Mud Bay Road Southbound Ramps – install signal (Thurston County project located outside Olympia city limits). This improvement could also be a roundabout (before 2040 per *Comprehensive Plan*).
- Evergreen Parkway/Mud Bay Road Northbound Ramps – install signal (Thurston County project located

outside Olympia city limits). This improvement could also be a roundabout (before 2040 per *Comprehensive Plan*).

- Black Lake Boulevard/Cooper Point Road – add 2nd eastbound right with extension through the Haggen entrance intersection as a through lane (before 2040 per *Comprehensive Plan*).

Extensive public outreach activities have been undertaken – both as part of the 2010 *West Olympia Access Study*, and during the preparation of the IJR for the US 101/West Olympia Access Project.

EX-4.8 Policy Point #8: Environmental Processes

Identify the status of the proposal's environmental processes.

A preliminary screening of potential environmental impacts was conducted as a part of the *West Olympia Access Study (WOAS)*, and was used as a foundation for the environmental analysis performed to investigate possible impacts associated with the design options considered during the IJR process. Environmental review for the Preferred Alternative focused on disciplines for which potential impacts were anticipated. These impact areas are briefly highlighted in Policy Point 8.

A SEPA Checklist has been prepared for the project concurrent with the IJR based on the findings and conclusions of several discipline-specific reports. The IJR is intended to result in a “Finding of Engineering and Operational Acceptability” and will be approved at the same time as a formal decision is made on the SEPA document. If or when a federal funding nexus occurs for the project, it is expected that FHWA will either adopt the SEPA checklist to fulfill the requirements of NEPA or a NEPA Documented Categorical Exclusion (DCE) will be prepared.

PD - PROJECT DESCRIPTION

PD 1.1 WHAT IS THE BACKGROUND OF THE PROJECT?

Traffic congestion and the lack of reasonable options to travel by transit, bicycling, or walking on Olympia’s west side raises concerns about how to maintain mobility in the future. City and state infrastructure are showing the strain of sustained residential and economic growth. Nowhere is this more evident than at the intersection of Black Lake Boulevard and Cooper Point Road, and the adjacent Black Lake / US 101 interchange. Traffic delays during the p.m. peak period are approaching unacceptable levels and mobility for other travel modes in the area is also strained. A strategy is needed to ensure future mobility can be maintained.

In 2006, the City of Olympia and the Washington State Department of Transportation (WSDOT) partnered on the *West Olympia Access Study* (WOAS) to determine what transportation system changes were needed to preserve future mobility. The *West Olympia Access Study* was initiated with the purpose of evaluating current and future multi-modal mobility concerns on Olympia’s west side, and identifying a strategy for improving access and circulation. The partnership recognized that both agencies have a vested interest in addressing mobility concerns on Olympia’s west side.

When completed in 2010, the *West Olympia Access Study* (referred to hereafter as the “2010 Study”) identified a series of phased improvements that included:

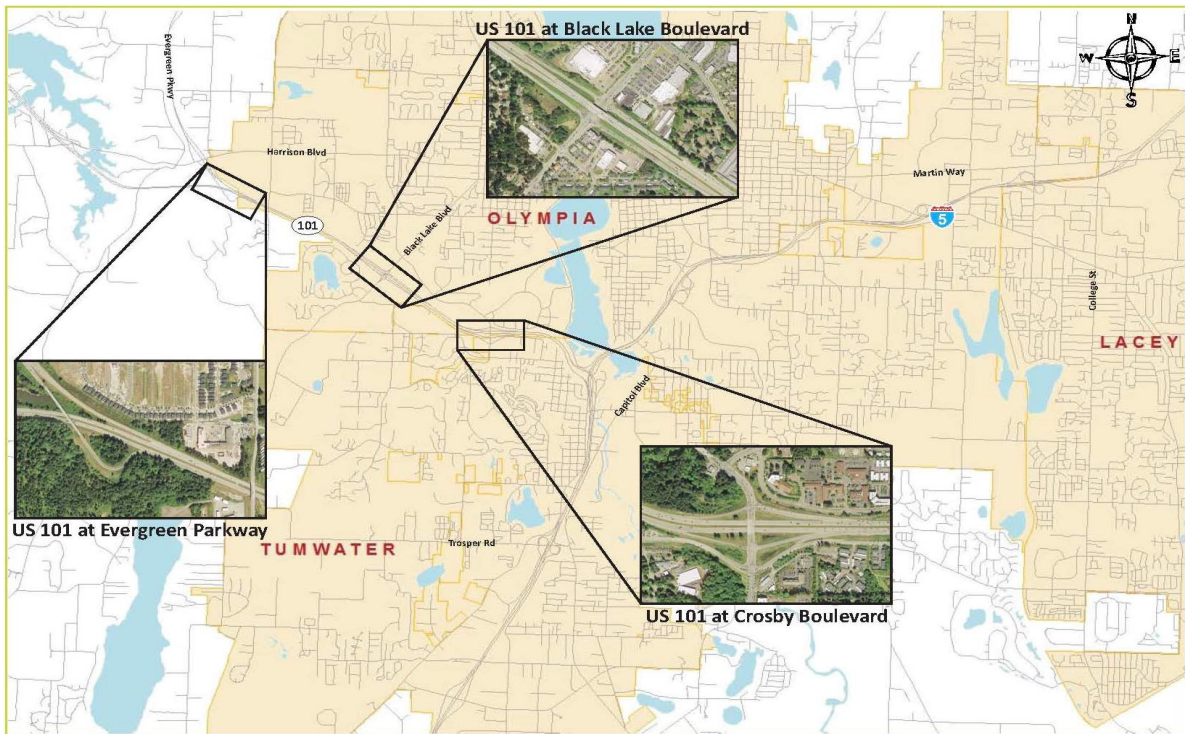
- Stage (Phase) 1: Kaiser Road half-diamond interchange —an eastbound on-ramp and westbound off-ramp with direct access to/from US 101. Following completion of the Stage 2 Yauger Way Extension, access to Kaiser Road will be from an extension of the Black Lake Blvd off ramp.

- Stage 2: Yauger Way Connection—a westbound off-ramp extension from the existing Black Lake Boulevard off-ramp to Yauger Way. This ramp will be built after completion of the Kaiser Road ramps.

The study also directed City of Olympia staff to advance work into the next phase of implementation including an Interchange Justification Report (IJR), environmental documentation, and supporting design work to achieve formal approval to build new ramps to and from US 101. This process was initiated in July of 2014. The IJR will revisit and update the earlier assessment of current conditions, future needs, and environmental impacts associated with enhancing traffic operations, safety, and efficiency along the US 101 mainline in the vicinity of the US 101/Black Lake Boulevard Interchange..

As required by WSDOT and FHWA, eight specific policy points are addressed in this IJR, including technical findings and conclusions of each. These eight policy points were described in the *Methods and Assumptions Memorandum* (Appendix A) prepared at the outset of the current study effort (dated October 2014) and are further described in Chapter 550 of the WSDOT *Design Manual*. During earlier phases of the *West Olympia Access Study*, several of these points were thoroughly evaluated including Policy Points #1, #2 and #3, leading to initial identification of recommended improvements. The current study effort brings this earlier documentation forward, and updates and combines it with analysis conducted in the current effort. Collectively, the findings, conclusions and recommendations of both study phases are presented in policy point format in this document. Figure PD-1 illustrates the general project location within its regional context.

Figure PD-1. Vicinity Map



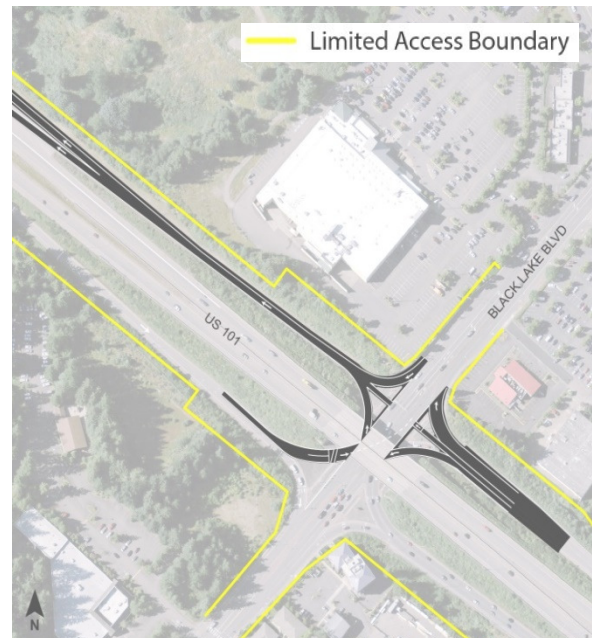
PD 1.2 WHAT IMPROVEMENTS ARE PROPOSED?

The US 101/West Olympia Access Project would build new westbound off-ramps from US 101 to Kaiser Road and Yauger Way SW, and a new eastbound on-ramp to US 101 from Kaiser Road. The project would also include modifications at the US 101 interchange at Black Lake Boulevard, the addition of auxiliary lanes along US 101 between Black Lake Boulevard and Kaiser Road, and selected local street improvements that complement the new ramps. These project elements are described below.

PD 1.2.1 Black Lake Boulevard and US 101 Interchange

As shown in Figure PD-2, a through movement would be added to the westbound off-ramp at the Black Lake Boulevard/US 101 Single Point Urban Interchange (SPUI) to connect westbound US 101 and the new westbound ramp to Yauger Way SW. To accommodate this new through movement, the US 101 westbound SPUI off-

Figure PD-2. Black Lake Boulevard



ramp at Black Lake Boulevard would be modified by converting the existing double left-turn lanes to a through lane and a single left-turn lane. The final configuration of the US 101 westbound off-

ramp would be one left-turn lane, one through lane, and two right-turn lanes.

The traffic signals at the SPUI interchange would be modified to accommodate the new westbound through movement by including a new signal phase. This would reduce the amount of green signal time to the existing US 101 eastbound off-ramp. A second left-turn lane would be added to the eastbound off-ramp approaching the signal to provide additional capacity and minimize the impact of the new signal phase.

PD 1.2.2 US 101 Westbound Off-Ramp to Yaeger Way SW

As shown in Figure PD-3, a westbound off-ramp would be built from US 101 to Yaeger Way SW by allowing through movement at the existing westbound ramps of the Black Lake Boulevard

Figure PD-3. Yaeger Way



interchange. This is currently a Single Point Urban Interchange (SPUI) that does not allow

through movement across Black Lake Boulevard from the westbound off-ramp to the westbound on-ramp. The existing westbound on-ramp would split into a separate on-ramp to US 01 and a separate off-ramp to Yaeger Way which would turn north to connect into the existing Yaeger Way SW street alignment at its intersection with Forestbrooke Way SW. Per WSDOT standard practice for new interchange ramps, full-control limited access that prohibits new intersecting roadways or driveways would extend along both sides of the off ramp to a location just south of Forestbrooke Way SW where the off-ramp becomes an urban street. South of Forestbrooke Way SW, Yaeger Way SW would be one-way northbound. Southbound traffic on Yaeger Way SW at Forestbrooke Way SW would be limited to left or right turns, and would not be able to travel straight through the intersection into the opposing off-ramp. During the design phase for this project, consideration will be given to developing a roundabout to help reduce the potential for wrong-way traffic entering the freeway off-ramp.

PD 1.2.3 Kaiser Road and US 101 Interchange

Kaiser Road currently spans US 101 via a two-lane bridge but does not provide access to the state highway. The project would construct a half-diamond interchange on the east side of Kaiser Road, with the westbound off-ramp to the north of US 101 and the eastbound on-ramp to the south of the highway. The westbound off-ramp would be a one-lane roadway as it exits from US 101, then widen to two lanes near the intersection with Kaiser Road. The eastbound on-ramp would be one lane.

As shown in Figure PD-4, this project would construct improvements along Kaiser Road from 7th Avenue SW to about 500 feet south of the bridge over US 101. The west side of the existing Kaiser Road bridge would be widened by approximately 27 feet. The widened bridge would allow for new 5-foot-wide bicycle lanes and 8-foot-wide sidewalks on the bridge. Kaiser Road would be widened primarily on the west

side. Retaining walls (no higher than 30 feet) would be built, where needed, to allow the roadway to remain within the City of Olympia's right-of-way.

Kaiser Road would have two through lanes (one in each direction) with new left-turn pockets at the new eastbound on-ramp to US 101 and to 7th Avenue SW. The 5-foot-wide bicycle lanes would traverse the length of the Kaiser Road improvements. There would be 10-foot-wide sidewalks with tree planters north of the bridge, and 6-foot-wide sidewalks with 8-foot-wide planter strips south of the bridge.

PD 1.2.4 US 101 Mainline Widening

This project also would widen US 101 to create westbound and eastbound auxiliary lanes between the Kaiser Road and Black Lake Boulevard interchanges. These auxiliary lanes are needed due to the short distance between the new Kaiser Road interchange ramps and existing Black Lake Boulevard interchange ramps.

PD 1.2.5 Local Street Improvements

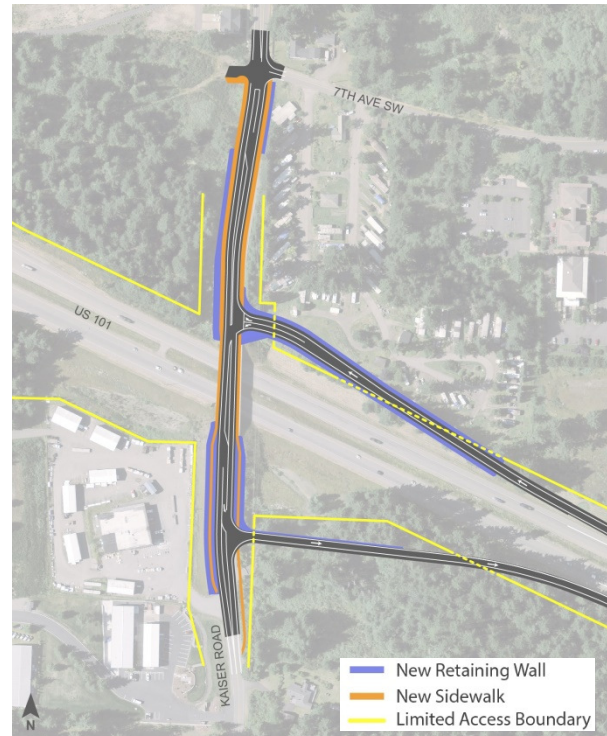
To complement the interchange improvements at Kaiser Road and Yauger Way, traffic signals or roundabouts will be installed at the following locations:

- Kaiser Road at 7th Avenue
- Yauger Way at Capital Mall Drive

PD 1.3 WHAT DOES THE REPORT INCLUDE AND HOW IS IT ORGANIZED?

This report is organized into ten chapters. The report begins with an Executive Summary that provides an overview of the key elements, findings, conclusions and recommendations for the IJR. Following the Executive Summary is a short section that includes a description of the project including a summary of its background, its purpose and its key component elements. Chapters 1 through 8 respond to each of the eight policy points identified in Chapter 550 of

Figure PD-4. Kaiser Road Improvement



the WSDOT *Design Manual* (July 2014). These include:

- Chapter 1 – Policy Point #1: Need for the Access Point Revision
- Chapter 2 – Policy Point #2: Reasonable Alternatives
- Chapter 3 – Policy Point #3: Operational and Collision Analyses
- Chapter 4 – Policy Point #4: Access Connections and Design
- Chapter 5 – Policy Point #5: Land Use and Transportation Plans
- Chapter 6 – Policy Point #6: Future Interchanges
- Chapter 7 – Policy Point #7: Coordination
- Chapter 8 – Policy Point #8: Environmental Processes

1. POLICY POINT 1: NEED FOR THE ACCESS POINT REVISION

Olympia’s west side is a major regional center for commerce, medical services, Yauger Park and other recreational facilities, and is a significant employment hub and residential area. It is served by a mix of traditional gridded streets, a suburban arterial network built in the 1970s, and US 101. Most local facilities support pedestrian travel and the area is served by an extensive bike network. Transit provides an important travel choice which is complemented by an aggressive Commute Trip Reduction program.

Olympia’s commitment to multimodal travel and demand management has not been able to alleviate growing congestion. Poor connectivity by critical arterial streets resulting from decisions in the 1970s limits route effectiveness. This in turn puts a huge strain on a small number of intersections which are incapable of accommodating the resulting traffic impacts. While the brunt of the congestion impacts key local intersections – most notably the Black Lake/Cooper Point intersection – the spillover effects impact US 101 interchanges, causing vehicle queues that extend onto the mainline at certain times.

Local and regional growth has strained the ability of the transportation system to support reliable travel. Chronic congestion impacts not only private automobile travel, it also slows emergency responders, transit, and freight delivery while negatively impacting the walkability and bikeability of the area. There is an imbalance between where people want to go and the routes available to serve them, which translates into significant delays.

Work conducted for the *West Olympia Access Study*, completed in 2010, included careful evaluation of local and state transportation systems, projected travel demand, and alternatives for improving access and circulation. That work demonstrated a need for revisions to

US 101 access to complement the suite of local measures identified for implementation.

Policy Point #1 supports this conclusion by:

- Defining current and projected travel needs and the deficiency(ies) that need to be addressed.
- Describing existing and expected future conditions under a No Build scenario to identify operating conditions that define project need.
- Demonstrating that improvements to the local system and existing interchanges are incapable of satisfactorily accommodating current and future travel demand.
- Describing traffic mitigation measures that were considered to address existing and future congestion and safety issues.
- Describing how local and regional traffic could benefit from this project, with an emphasis on meeting regional travel needs.

The information presented in this chapter begins with a discussion of background study efforts in the project area including factors leading to current conditions and previous efforts to understand and address congestion and safety problems.

1.1 WHAT IS THE PURPOSE OF THE ACCESS IMPROVEMENTS TO US 101?

The purpose of the US 101/West Olympia Access Project is to identify improvements that will relieve traffic congestion on Olympia’s west side to enhance access and circulation and accommodate current and projected traffic.

Congestion and the lack of travel routing choices in West Olympia are impacting safety and mobility on local streets as well as the US 101

corridor. This congestion impacts private vehicles, as well as transit, emergency response vehicles and commercial freight movement. Additionally, while the City has made significant investment in sidewalk and bicycle infrastructure, the existing suburban land use pattern does not encourage these travel modes. Increasing congestion raises questions about the best ways to accommodate growth while maintaining safe and acceptable levels of mobility for all travel modes.

The current study effort was identified in the WSDOT 2003-2022 Highway System Plan (HSP), as well as in the current HSP (2007-2026) as a ‘solution that requires further analyses’. In addition, the City of Olympia *Comprehensive Plan* identifies the need for additional access to West Olympia from US 101.

1.2 WHAT IS THE PROJECT STUDY AREA?

The US 101/West Olympia Access Project study area focuses on the interchange of US 101 with Black Lake Boulevard and includes one interchange on either side of this location – US 101 at Crosby Boulevard/Cooper Point Road-Auto Mall Drive and US 101 at Evergreen Parkway. The project area also includes the Cooper Point Road/Black Lake Boulevard intersection where severe delay often impacts travelers, including emergency responders who access the Capital Medical Center via US 101 and the Cooper Point Road/Black Lake Boulevard intersection. These critical junctions in the West Olympia street network are inadequate to meet growing travel demand based on future traffic forecasts.

To evaluate traffic conditions and improvement needs affecting these locations, the US 101/West Olympia Access Project area includes a broad segment of the existing city street network where congestion on US 101 currently impacts traffic movement, and will continue to create impacts into the future. This area is bounded on the north by Mud Bay Road/Harrison Avenue; on the east by Capitol

Lake; and on the south and west by a boundary line that runs southeast from the US 101/Mud Bay Road interchange on the west, continuing south and east past the Black Lake Boulevard/Mottman Road intersection to an area just south of the US 101/I-5 interchange. This project study area is illustrated in Figure 1-1.

1.3 WHAT IS THE HISTORY OF TRANSPORTATION PLANNING IN WEST OLYMPIA?

This IJR is built upon an extensive and in-depth study of existing and projected transportation planning analysis in the West Olympia project area. This analysis includes:

- Numerous planning and engineering studies conducted between 1986 and 2006 that addressed US 101 design modifications, project area development impacts, area corridor studies and/or master plans, safety and multimodal improvements, and agency comprehensive transportation plans that affected the project area. Key documents produced during this time period that influenced the development of US 101 interchange improvement alternatives are documented in Table 1-1.
- The *West Olympia Access Study* (WOAS) initiated in 2007 and completed in 2010. This study evaluated a range of US 101 access improvement concepts and concluded with a recommended, multi-phased “hybrid” alternative. As noted earlier in this IJR report, the WOAS has been updated and refined to reflect current (2014) conditions and to extend the planning horizon year to 2040. Major deliverables produced during the WOAS are outlined in Table 1-2.

1.3.1 Prior Transportation Studies, Programs and Standards That Influenced the 2010 West Olympia Access Study

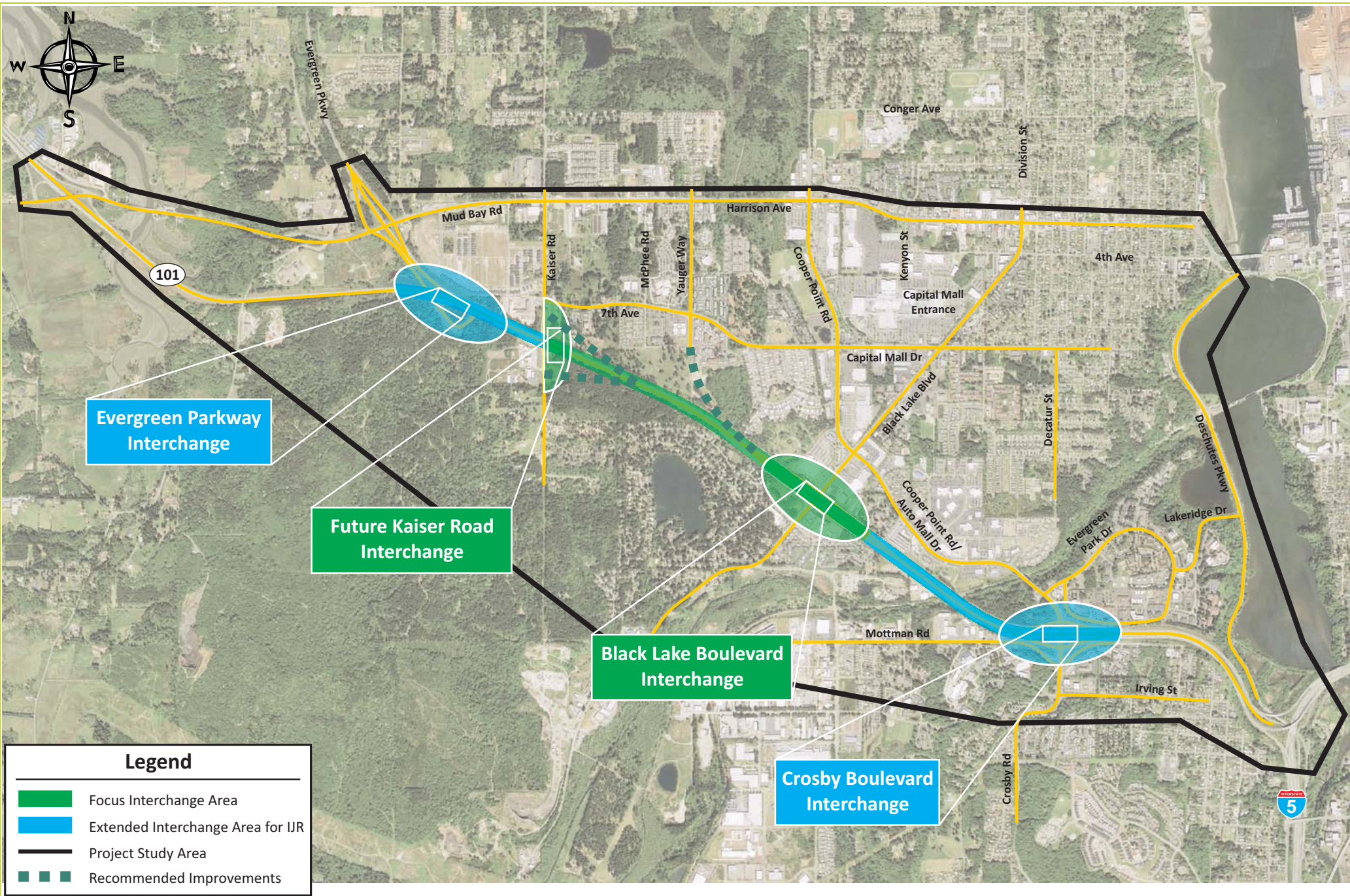
Over the decades many different planning studies have taken place in a portion or all of the US 101/West Olympia Access Project area. In preparation for the 2010 Study, an assessment was made of plans, studies and decisions completed prior to 2007 that could have bearing on the range of options that were considered in that study. A synopsis of each relevant study was prepared along with a determination of its relevance to the 2010 planning effort. The awareness and consideration of prior plans and studies helped to ensure that the results of the 2010 Study were consistent with existing

regulations and decisions governing transportation, land use, environment, historic and cultural activities on Olympia’s west side. This research also helped the 2010 Study take advantage of previous analyses and preserve the continuity of integrated planning and decision-making.

A short summary of prior transportation planning studies completed prior to 2007 with particular relevance to the analysis undertaken in the 2010 Study is presented in Table 1-1. It should be noted that this is not a complete list of all the prior studies conducted in the area, only the most relevant. For a full list of plans and studies that were reviewed and considered see *West Olympia Access Study, Synopsis of Previous Plans and Studies Associated with the Study Area*, WSDOT, June 2007.

Table 1-1. Relevant Prior Transportation Plans and Studies in West Olympia

Plan or Study	Bearing on US 101 Access Choices
<i>Evergreen Parkway Design Report</i> , Washington State Department of Transportation, 1970	Maybe – Documents design considerations and WSDOT’s concerns about capacity demands on US 101.
<i>Preliminary Estimate, Kaiser Road Overcrossing</i> , Intra-departmental communication, WSDOT, February 18, 1986	Yes – Explains issues related to providing access control to/from US 101 at Kaiser Road
<i>West Olympia Traffic Study</i> , Michael Birdsall, City of Olympia and TRPC, June 1991	Yes – Includes access recommendations specific to the project area
<i>Report to Value Engineering Team, US 101 Black Lake Boulevard Interchange</i> , WSDOT, March 1991	Yes – Background for selection of an urban interchange. This design influences choices and considerations for the West Olympia Access Study
<i>Design Report for Black Lake Interchange to I-5 (XL-0643)</i> , WSDOT, April 24, 1992	Yes – Valuable resource for history on the development of this segment of US 101
<i>Letter from Thurston County Department of Public Works</i> , WSDOT, May 12, 1992	Yes – Documents the approval of access decisions at Evergreen Parkway and Mud Bay Road
<i>Design Report for the Reconstruction of the US 101 Black Lake Blvd Interchange (OL-0696)</i> , Prepared for WSDOT by Greiner Inc., March 1992	Yes – Background on development of the existing highway system
<i>Crosby Boulevard/Mottman Road Interchange Value Engineering Report</i> , WSDOT, September 1996	Yes – VE study laid the groundwork for the West Olympia Access Study to be added to the State Highway System Plan
<i>Olympia Woodland Trail Master Plan</i> , City of Olympia, July 1999	Maybe – Provides basis for considering connections to existing trail termini
<i>Olympia Gateway Project – 4th/5th Avenue Corridor Improvements</i> , SCA Consulting Group, City of Olympia, August 2000	Maybe – Provided comparative traffic flow data



US 101/West Olympia Access Project
 at Kaiser Road and Yaeger Way
 Olympia, Washington

Figure 1-1
Project Study Area
and Interchanges

Table 1-1 Continued. Relevant Prior Transportation Plans and Studies in West Olympia

Plan or Study	Bearing on US 101 Access Choices
<i>Washington State Highway System Plan, 2003-2022</i> , WSDOT, February 2002	Yes – Outlines potential solutions for US 101 (note: this document has subsequently been updated)
<i>Medians in the City</i> , City of Olympia, October 2003	Yes – Provides a checklist to determine suitability of new/proposed medians
<i>Decatur Street and Fern Street/16th Avenue Street Connections</i> , Staff Report, City of Olympia, November 9, 2004	Yes – Connecting Decatur Street and 16 th Avenue as local access routes in southwest Olympia identified for evaluation
<i>College Station TIA</i> , The Transpo Group, November 2004	Yes – Any future change in US 101 access may shift projected development traffic
<i>City of Olympia Annual Concurrency Reports, 1995-2006</i> , City of Olympia and TRPC	Yes – The most current report used in the 2010 Study included projections to 2011 and identified recommended capacity projects
<i>Capitol Way Corridor Study</i> , City of Olympia, February 2006	No – not relevant unless City reduces cross-section of Capitol Way
<i>Harrison Avenue Corridor Study – Final Report</i> , Shea & Carr, TRPC, and City of Olympia, June 2006	Yes – Determined ultimate cross-section for Harrison Avenue
<i>Kaiser Heights TIA</i> , Heath & Associates, June 2006	Yes – Identifies new system connection
<i>Fixed Route Short- and Long-Range Planning Studies</i> , Intercity Transit, June 2006	Yes – Influences travel demand projections
<i>Thurston 2025 Regional Transportation Plan – Guiding Our Future</i> , TRPC, May 2004, updated June 2006	Yes – Includes projects specific to area, regional LOS standards, and relevant goals and policies (note: document amended in 2010 and a 2015 amendment is pending)
<i>Church of Living Water TIA</i> , Mirai Transportation Planning & Engineering, September 2006	Yes – Potential effect of driveway on Yauger Way may affect freeway access
<i>Washington State Transportation Plan</i> , WSDOT, November 2006	Yes – Did not include specific recommendations related to US 101 access in project area but provided guidance on WSDOT priorities
<i>Transportation Mobility Strategy for the City of Olympia</i> , ECO Northwest, et.al, July 2009	Yes – provides policy direction for development of a full multimodal transportation system that helps achieve the City’s Comprehensive Plan vision.

1.3.2 2010 West Olympia Access Study

Between 2007 and 2010, the *West Olympia Access Study* produced a significant list of reports documenting the study process, along with key findings, conclusions and

recommendations. These reports and their relevance to the IJR are discussed in Table 1-2. Particularly useful in understanding the prior planning effort is the *West Olympia Access Study, Executive Summary*, prepared by WSDOT Olympic Region and dated August 2010.

Table 1-2. Reports Prepared for 2010 West Olympia Access Study

Report	Bearing on IJR
<i>West Olympia Access Study, Traffic Analysis Assumptions</i> , Parametrix, December 2007	Documents study technical procedures and assumptions
<i>West Olympia Access Study, Background Report #1: Significant Transportation and Land Use Events</i> , TRPC, April 2008	Provides historical context for the development of the transportation system and land use pattern in the project area
<i>West Olympia Access Study, Background Report #2: Transportation Characteristics</i> , TRPC, April 2008	Provides discussion of base year transportation system and transportation concurrency mobility goals
<i>West Olympia Access Study, Background Report #3: Land Use and Environmental Characteristics</i> , TRPC, April 2008	Provides land use and natural environmental context for the transportation planning study
<i>West Olympia Access Study, Background Report #4: Social and Economic Characteristics</i> , TRPC, April 2008	Provides context for the transportation planning study
<i>West Olympia Access Study, Technical Memorandum #1: Evaluation Methods and Screening</i> , WSDOT Olympic Region, May 15, 2008	Documents initial identification of need and the development and fatal flaw screening of improvement alternatives
<i>West Olympia Access Study, Technical Memorandum #2: Existing 2007 and Year 2030 No Build Technical Analysis</i> , Parametrix, July 8, 2008	Documents base and future year traffic volumes and conditions, defines need for improvement
<i>West Olympia Access Study, Technical Memorandum #3: Traffic Operations Analysis</i> , Parametrix, November 10, 2008	Documents traffic operations analysis for a shortlist of improvement alternatives
<i>West Olympia Access Study, Collision History and Summary Analysis</i> , WSDOT Olympic Region, August 28, 2009	Documents 2005-2007 crash history along US 101 and at key interchanges in project area
<i>West Olympia Access Study, Technical Memorandum #4: Alternative Screening Evaluation and Concept Design</i> , Parametrix, July 12, 2010	Documents evaluation of a refined list of improvement alternatives leading to a phased implementation strategy
<i>West Olympia Access Study, Executive Summary</i> , WSDOT Olympic Region, August 2010	Documents study process leading to phased implementation strategy of a preferred concept

1.4 WHAT ARE THE RELEVANT TRANSPORTATION PROGRAMS AND STANDARDS?

In addition to conducting a review of prior transportation studies that might influence the understanding of future traffic conditions and improvement alternatives in the project area, an assessment was made of on-going local and state transportation programs and engineering standards that would also have relevance. Table

1-3 summarizes the on-going programs for the development of the multimodal transportation system, bicycle and pedestrian facilities, neighborhood traffic management, commute trip reduction program, and transportation concurrency. This table also provides an indication of the effect these programs might have on the development and evaluation of US 101 access alternatives.

Table 1-3. Relevant On-Going Transportation Improvement Programs

Program	Bearing on US 101 Access Choices
Bicycle Master Plan, City of Olympia, 2009	Maybe – Provides input on planned bike improvement projects in project area (see City website for further details)
Sidewalk Program, City of Olympia, 2003	Maybe – Provides input on pedestrian improvements in project area
Neighborhood Funded NTMP, City of Olympia	Maybe – NTMP projects have been built in the project area, need for more may be identified
Pedestrian Crossing Improvement Program, City of Olympia	Maybe – Identifies projects in project area and explores criteria for making improvements
Commute Trip Reduction Program, City of Olympia	Maybe – Can influence travel behavior within the project area
Transportation 2030, City of Olympia	Yes – Influences by the use of concurrency-based mobility standards for project area intersections

Table 1-4 presents a summary of the engineering design standards that were considered (and must continue to be

considered) as improvement alternatives are identified and evaluated.

Table 1-4. Relevant Engineering Standards

Engineering Standards	Bearing on US 101 Access Choices
<i>Engineering Design & Development Standards</i> , City of Olympia, December 2014	Yes – Influences planning for street extensions and right-of-way needs
Washington State Highway Design Manual, updated 2014, and as amended	Yes – Describes the design guidelines for the US 101 access improvements

1.5 WHAT LOCAL IMPROVEMENTS HAVE BEEN MADE?

The City of Olympia is a growing community in Thurston County with existing and new development occurring throughout the city, including areas along the north side of US 101 in the project area. For many years the City has been planning for growth based on its adopted Comprehensive Plan. This Plan identifies land use designations by location, and forms the basis for determining transportation system improvement needs.

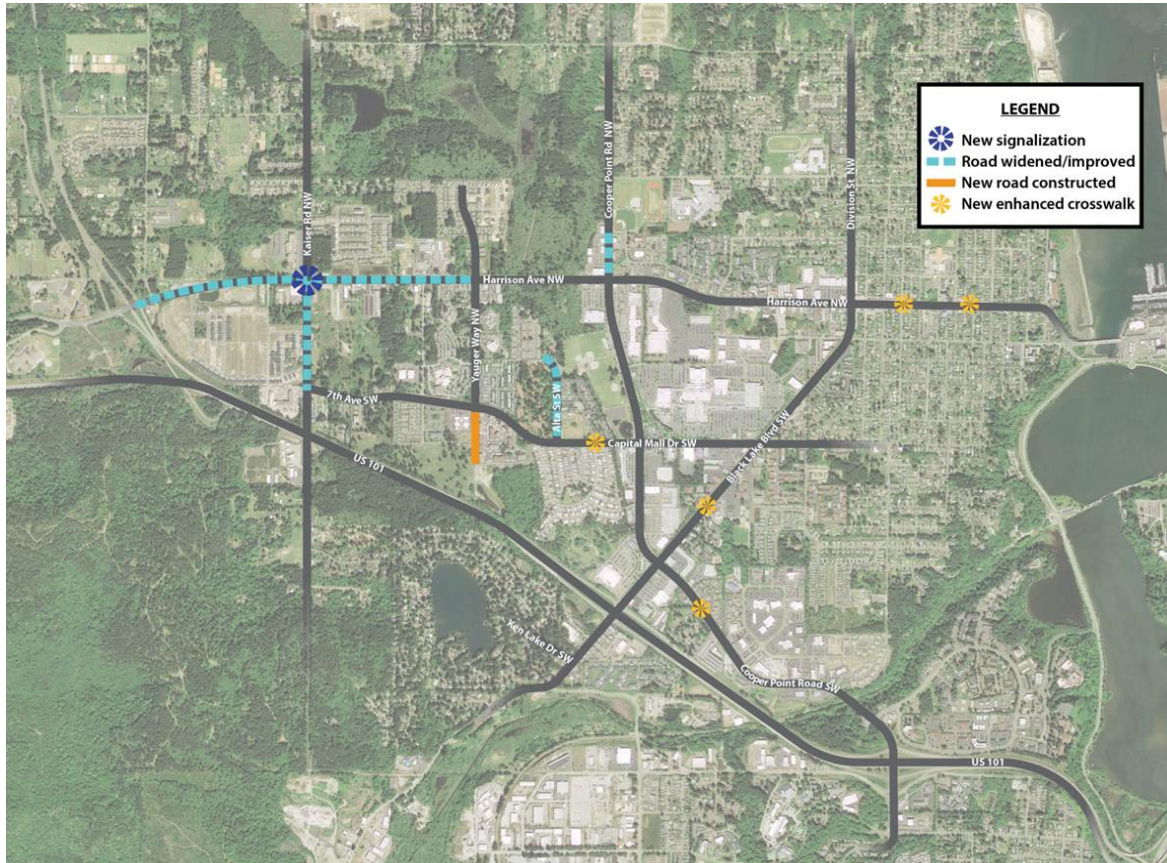
To accommodate travel demand within the project area, the City of Olympia recently built a number of street improvements, and has plans for many more during the 20-year planning horizon of this IJR. These improvements will help to accommodate short trips within the project

area, and provide local arterial routing options to using US 101. Recent and planned improvements within the project area are described in the following sections.

1.5.1 Recent Local Transportation Improvements

Since completion of the *West Olympia Access Study* in 2010, there have been a number of improvements made to the existing transportation system in the project area. Most of these improvements are relatively minor and would likely have little or no impact on traffic operations along US 101 or at its key access locations. However, some would have bearing on the findings and conclusions of this IJR. Recent transportation system improvements in the project area are illustrated in Figure 1-2.

Figure 1-2. Transportation Improvements in West Olympia, 2007 to 2014



The most significant project completed over the past few years was the widening of Mud Bay Road/Harrison Avenue NW between Evergreen Parkway NW and Yauger Way NW from a two/three-lane cross-section to a four/five lane cross-section with a new traffic signal at Kaiser Road NW. Other improvements include:

- Widening of Kaiser Road NW to add a two-way left turn lane and a southbound bicycle lane (between the intersections with 5th Way SW and 7th Avenue SW).
- Addition of multiple new roads on the west side of Kaiser Road NW (leading to a new large residential development, Woodbury Estates), south of the Harrison Avenue NW intersection, and north of US 101.
- Extension of Yauger Way NW southward from Capital Mall Drive SW.
- Widening of Cooper Point Road NW from a new commercial driveway (Cooper Point Village) southward to Harrison Avenue NW from three lanes to five lanes.
- Various enhanced pedestrian crossings including crosswalks and pedestrian refuges on Black Lake Boulevard SW just south of Westmoor Court SW, and on Cooper Point Road SW between Black Lake Boulevard SW and Carriage Street SW.
- Bus stop landing pads were added on Harrison Avenue/Kaiser Road on the far side of intersection in both directions. This location is currently served by Grays

Harbor Transit and Mason Transit bus routes.

Other than the widening of Harrison Avenue NW, the short widenings or street extensions are expected to have limited impact of sub-regional traffic movement.

1.5.2 Planned Local Transportation Improvements

Based on the land use designations in its Comprehensive Plan, the City has identified a series of needed transportation facilities to support these designations and the expected long-term travel demand associated with it. Planned transportation improvements expected to be in place before 2040 include:

- Evergreen Parkway/Mud Bay Road Southbound Ramps – install signal (Thurston County project located outside Olympia city limits). This improvement could also be a roundabout.
- Evergreen Parkway/Mud Bay Road Northbound Ramps – install signal (Thurston County project located outside Olympia city limits). This improvement could also be a roundabout.
- Harrison Avenue/McPhee Road – install signal (needed beyond 2040 plan horizon year). This improvement could also be a roundabout.
- Harrison Avenue/Cooper Point Road – 2nd northbound and westbound left lanes
- Division Street/Harrison Avenue – change northbound and southbound lane geometrics
- Black Lake Boulevard/Capital Mall Drive – add southbound right turn lane
- Black Lake Boulevard/Cooper Point Road – add 2nd eastbound right with extension through the Haggen entrance intersection as a through lane

- Cooper Point Road-Auto Mall Drive/Evergreen Park Drive – add southwest bound right
- Deschutes Parkway/Lakeridge Drive – install signal (this improvement could also be a roundabout)

1.6 WHAT IS THE BASELINE TRANSPORTATION SYSTEM?

This section presents a short discussion of the existing street and highway system in the project area, including documentation of current physical features of streets and highways in the project area and geometric conditions.

1.6.1 Current Physical Features of Project Area Streets and Highways

This IJR focuses on a 1.62 mile portion of US 101 (MP 364.36 to MP 365.98) with the interchange of US 101 at Black Lake Boulevard at its heart (see Figure 1-1). This section of the report briefly describes the geometric configurations of this freeway and each key project area interchange. Due to the proximity of the interchange of US 101 with Interstate 5 (I-5), this facility is also addressed, as are the key local streets that provide access to the interchanges and/or offer travel routing alternatives to US 101.

Freeways

US 101

US 101 is a state highway that predominantly serves regional travel demand and connects the Olympic Peninsula to major activity centers on the east side of Puget Sound through the City of Olympia. Within the project area, US 101 is a two- to three-lane highway in each direction. US 101 is classified by WSDOT as an Urban Other Freeway/Expressway (UI) and has a posted speed limit of 60 mph. US 101 is part of the National Highway System (NHS) and is also listed as a Highway of Statewide Significance (HSS). Within the project area, US 101 is also considered a T1 freight route, a designation

indicating that the road carries over 10,000,000 tons of freight per year. This is the highest classification in the freight mobility system.

Interstate 5

I-5 is the primary route for north-south interstate travel through Washington and provides connections between some of the largest cities in the Puget Sound region. Between the US 101 and City Center interchanges to the north, I-5 has three to four northbound lanes and three to four southbound lanes, both with a posted speed limit of 60 mph. WSDOT classifies this portion of I-5 as an Urban-Interstate (U5) and as a Highway of Statewide Significance (HSS). I-5 is also part of the National Highway System.

Key Interchanges

Key interchanges within or potentially affecting the project area include (from west to east):

- US 101 at Evergreen Parkway interchange
- US 101 at Black Lake Boulevard interchange
- US 101 at Crosby Boulevard/Cooper Point Road interchange
- US 101 at Interstate 5

US 101 at Evergreen Parkway Interchange

Direct movements between US 101 and Evergreen Parkway NW are limited at this interchange. Westbound traffic on US 101 is allowed to exit to Evergreen Parkway NW (westbound off-ramp), but there is no direct connection for traffic on Evergreen Parkway NW to enter onto westbound US 101 (westbound on-ramp). Similarly, there is no exit from eastbound US 101 to Evergreen Parkway NW (eastbound off-ramp); however, eastbound US 101 accepts traffic from Evergreen Parkway NW (eastbound on-ramp). Just north of US 101, the westbound off-ramp and eastbound on-ramp connect with Mud Bay Road NW to form a full diamond-style interchange with Evergreen Parkway NW elevated over Mud Bay Road NW. This interchange provides access to The

Evergreen State College, as well as low-density residential areas to the west and north. It also connects to Mud Bay Road NW, which extends eastward towards higher-density commercial, public, and residential areas and westward to low density residential and resource-based land uses.

US 101 at Black Lake Boulevard Interchange

The US 101 interchange at Black Lake Boulevard is configured as a single-point urban interchange (SPUI). With this configuration, left- and right-turns to and from the mainline are separated, with the left-turns converging at a single signalized intersection. This interchange provides the primary access to several important regional facilities, including the Capital Medical Center, the Westfield Capital Mall, several commercial developments and parks, and residential areas to the south.

US 101 at Crosby Boulevard/Cooper Point Road Interchange

The US 101 interchange at Crosby Boulevard/Cooper Point Road is similar to a standard full diamond interchange configuration, except for a separate access point on the south side of US 101 from Mottman Road SW to eastbound US 101 that is located in the middle of the on-ramp. This interchange primarily serves the Capital Auto Mall and commercial office uses north of the interchange, and South Puget Sound Community College and single and multi-family residences in Tumwater south of the interchange. This is the last interchange before US 101 connects to I-5.

I-5 at US 101 Interchange

I-5 at US 101 is a system interchange where the two highways meet. I-5 northbound and southbound off-ramps (Exit 104) join to form westbound US 101 (decreasing milepost). The northbound ramp to US 101 crosses under I-5 and receives traffic from Deschutes Parkway SW in addition to traffic exiting I-5 as it becomes part of US 101 westbound. At this juncture, the ramp joins two lanes of traffic coming from the I-5 southbound off-ramp. Just 0.2 miles past that

southbound off-ramp on I-5 is the 2nd Avenue SW off-ramp (Exit 103) resulting in closely-spaced interchanges on I-5.

Where eastbound US 101 (increasing milepost) ends at I-5; traffic must go either north or south. Two lanes bear north to I-5 via a flyover ramp where it merges with local traffic from Deschutes Parkway before merging with I-5 northbound. One lane bears south from US 101, where traffic can either exit to 2nd Avenue SW (Exit 103 from I-5) or continue on to merge with I-5 southbound traffic approximately 0.4 miles south of the 2nd Avenue SW exit.

Local Streets

The following paragraphs describe key local streets within the project area, including those that provide access to/from US 101. The location of these streets is illustrated in Figure 1-3.

Several of these streets have been identified by the City of Olympia as urban and strategy corridors. An **urban corridor** is an arterial road along which the City is encouraging more infill development and redevelopment supported by a strong multimodal transportation system with a variety of commuting options. Under Olympia's transportation concurrency program level of service E (LOS E) is considered acceptable in an urban corridor.

Strategy corridors are those local facilities where traditional LOS standards do not necessarily trigger concurrency issues if congestion exceeds adopted levels. This is because the arterial is already at its maximum five lane mid-block width, or it is constrained by environmental or land use factors that prohibit its widening any further. Congestion levels in these strategy corridors are likely to exceed adopted LOS standards in the future. A comprehensive package of strategies including efficiency measures, multi-modal travel alternatives, travel demand management, land use intensification, and street connectivity will be needed to maintain future mobility and access. Within strategy corridors travel by foot, bicycle or on transit will be made more attractive and

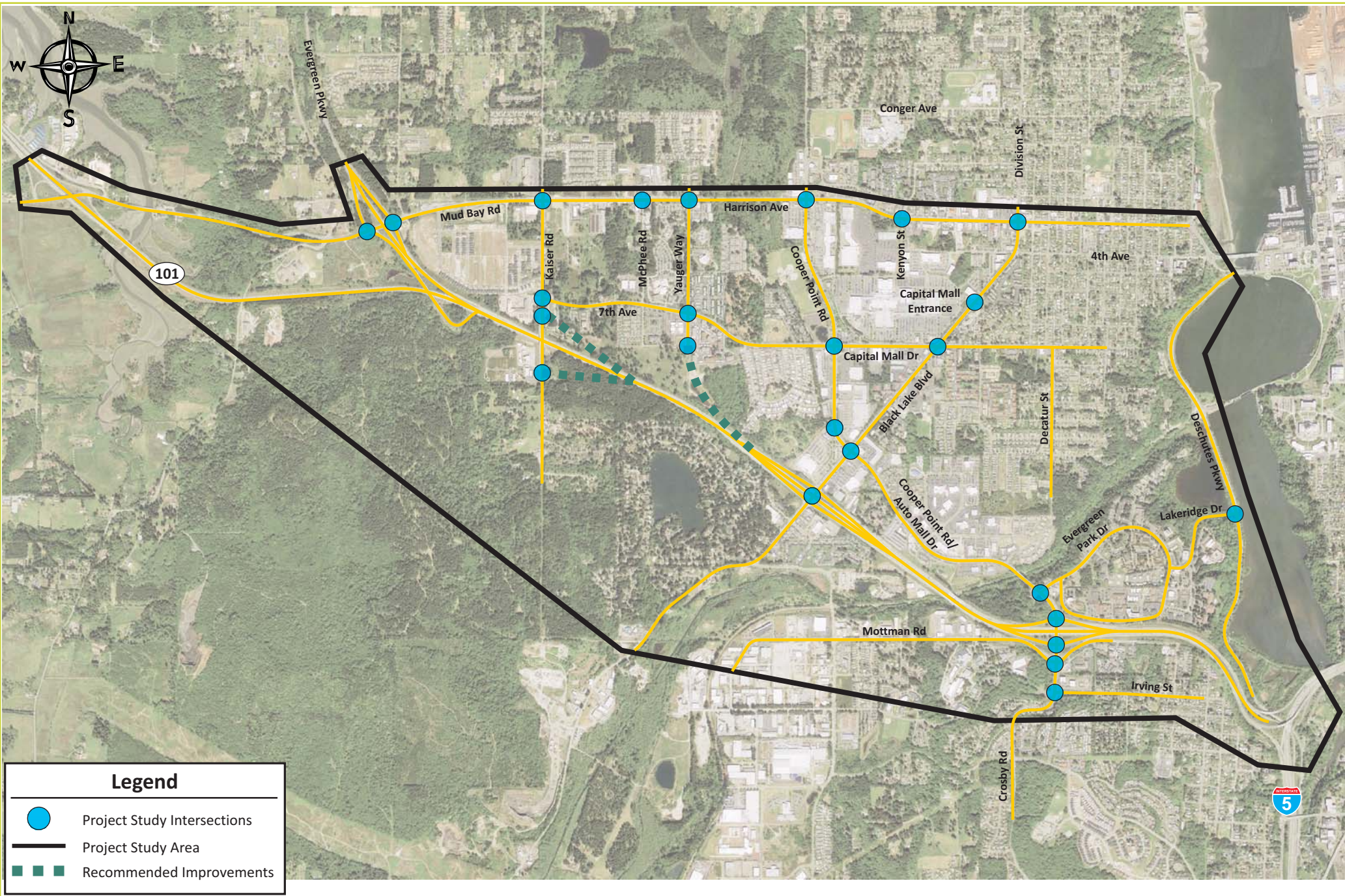
convenient. Bus corridors and bus stops will be developed where improved transit efficiency can encourage increased transit use.

Local streets identified and discussed below include the following (it should be noted that bus stop locations and bus routes are not included in the descriptions):

- Black Lake Boulevard SW (strategy corridor between Harrison Avenue NW and US 101 interchange)
- Cooper Point Road SW-Auto Mall Drive (strategy corridor between Harrison Avenue NW and US 101 interchange)
- Crosby Boulevard (strategy corridor at the US 101 interchange)
- Mud Bay Road NW
- Harrison Avenue NW (strategy corridor from Cooper Point Road SW through the project area into Downtown Olympia)
- 7th Avenue SW
- Capital Mall Drive SW
- Kaiser Road SW
- Yauger Way SW
- Kenyon Street SW
- Division Street NW
- Decatur Street SW
- Deschutes Parkway SW

Black Lake Boulevard SW

The City of Olympia has designated Black Lake Boulevard SW as an arterial, an urban corridor and a strategy corridor. This four to five lane road provides access to and from US 101 and extends from Tumwater through West Olympia. It has sidewalks on both sides but no bicycle lanes. The roadway serves several major businesses such as Capital Mall, Haggen, Walgreens and other commercial/industrial land uses, in addition to residential land uses. In the project area, Black Lake Boulevard SW runs north/south from US 101 to just south of Harrison Avenue NW and has a posted speed limit of 25 to 30 mph.



US 101/West Olympia Access Project
 at Kaiser Road and Yaeger Way
 Olympia, Washington

Figure 1-3
 Project Study Area
 Streets and Intersections

Cooper Point Road SW-Auto Mall Drive

Cooper Point Road SW is a five lane arterial fronting the Olympia Auto Mall extending from US 101 through West Olympia and into unincorporated Thurston County. It is also referred to as Auto Mall Drive in the vicinity of the Auto Mall. South of US 101, it becomes Crosby Boulevard. It provides access to and from US 101. It has sidewalks on both sides and very limited bike lanes. Within the project area, this roadway extends from US 101 to Harrison Avenue NW with a posted speed limit of 35 mph. The City of Olympia has designated Cooper Point Road SW-Auto Mall Drive as a strategy corridor. The segment from Black Lake Boulevard to Harrison Avenue has also been designated as an urban corridor. This roadway provides access to several commercial/industrial land uses such as Capital Mall, Olympia Auto Mall and Evergreen Park business park, as well as residential uses.

Crosby Boulevard

Crosby Boulevard is a five lane arterial with a posted speed limit of 25 mph. Most of it is within the City of Tumwater. It has sidewalks and bike lanes on both sides. It extends from US 101 south into Tumwater. North of US 101 it becomes Cooper Point Rd/Auto Mall Drive. This roadway provides driveway access to South Puget Sound Community College and commercial/ industrial land use, including connection into the Mottman Industrial Complex. Crosby Boulevard also provides access to and from US 101. The City of Olympia has identified this roadway as a strategy corridor.

Mud Bay Road NW

Mud Bay Road NW is a four-to-five lane arterial extending from West Olympia west into rural, unincorporated Thurston County. Within the project area it extends from US 101/Mud Bay Road interchange to Overhulse Road at the city limits. It has bike lanes and sidewalks on the south side, from approximately Overhulse Road to Kaiser Road; the north side is unimproved. East of Overhulse Road, Mud Bay Road becomes

Harrison Avenue. This roadway provides access to and from US 101 and serves The Evergreen State College, as well as residential and commercial/industrial land uses. It has a posted speed limit of 35 mph.

Harrison Avenue NW

Harrison Avenue NW is a four-to-five lane arterial and has been identified as both an urban and strategy corridor by the City of Olympia. It extends from Overhulse Road on the west, where it becomes Mud Bay Road, to the roundabout at West Bay Drive and Olympic Way which serves as the gateway into downtown Olympia. It has sidewalks on both sides, and bike lanes on both sides between Overhulse Road and Division Street. In the project area, Harrison Avenue has a posted speed limit of 25 to 35 mph. This roadway serves residential and commercial land uses, and provides direct access to Capital Mall and the adjacent regional retail complex, as well as providing connections to the Capital Medical Center.

7th Avenue SW

7th Avenue SW is a two-to-three lane major collector connecting Kaiser Road SW and McPhee Road SW. This street is relatively unimproved with limited sidewalks and no bicycle lanes. East of McPhee Road, SW 7th Avenue becomes Capital Mall Drive NW. This roadway primarily provides access to low density residential land uses and has a posted speed limit of 25 mph.

Capital Mall Drive SW

Capital Mall Drive SW runs east from where it begins at McPhee Road SW to Black Lake Boulevard, where it becomes 9th Avenue. It is a three lane major collector, with two east bound lanes, one west bound lane, and a two-way center left turn lane. It has sidewalks and bike lanes on both sides of the street. East of Black Lake Boulevard, where it becomes 9th Avenue, the street cross-section is reduced to two lanes. Capital Mall Drive provides driveway access to the Capital Medical Center, Capital Mall, Yauger Park and several commercial land uses. It also

directly serves several high density residential apartment complexes, a 55+ mobile home complex, and several special care residential communities. Capital Mall Drive NW has a posted speed limit of 25 mph.

Kaiser Road SW

Kaiser Road SW extends from just south of US 101 north through the project area and into unincorporated Thurston County. Within the project area, Kaiser Road SW has two through lanes and a center left turn lane from 5th Way SW to 7th Avenue SW. Sidewalks and bike lanes exist throughout most of the project area on the west side of Kaiser; the east side is unimproved. The City of Olympia has classified this road as a major collector. Kaiser Road provides access to residential and commercial land uses on Olympia's west side and has a posted speed limit of 35 mph.

Yauger Way SW

Yauger Way SW runs from south of Capital Mall Drive to Harrison Avenue and is located fully in the project area. It is classified by the City of Olympia as a major collector. Within the project area, Yauger Way has two through lanes with a two-way center turn lane. It has sidewalks and bicycle lanes on both sides. This road provides direct access to the Capital Medical Center, other medical services, special care residential communities, high density residential apartment complexes, and several commercial sites. The posted speed limit is 25 mph.

Kenyon Street SW

Kenyon Street SW extends from inside the Capital Mall retail complex at Mall Loop Drive SW north to its intersection with Bush Avenue, and is classified by the City of Olympia as a major collector. Within the project area Kenyon Street SW has four lanes connecting from Harrison Avenue NW to Mall Loop Drive SW. It has sidewalks on both sides of the street but no bicycle lanes. This roadway has a posted speed limit of 25 mph and serves commercial and high density residential land uses.

Division Street NW

Division Street NW extends from the terminus of Black Lake Boulevard south of Harrison Avenue, north through West Olympia and into unincorporated Thurston County. South of Harrison Avenue, where it intersects with Black Lake Boulevard, it has two lanes in each direction. North of Harrison Avenue through the rest of the project area, it is a two-lane arterial. South of Harrison Avenue it has sidewalks on both sides but no bicycle lanes. North of Harrison Avenue it has sidewalks and bike lanes on both sides. Division Street NW has a posted speed limit of 25 mph. Division Street provides access to commercial uses along Harrison Avenue and serves residential land uses to the north and the south.

Decatur Street SW

Decatur Street SW is a two lane major collector that begins south of 15th Avenue SW at a non-motorized path and continues to north of Harrison Avenue NW. This road primarily serves residential traffic. A long-planned connection to Caton Way SW at its southern terminus has been removed from consideration at this time. The posted speed limit along Decatur Street SW is 25 mph throughout the project area.

Deschutes Parkway SW

Deschutes Parkway SW is a major collector that extends from Tumwater in the south to downtown Olympia in the north, where it ends with a connection to 5th Avenue SW. This limited access road wraps around the western edge of Capital Lake. It includes an on-ramp to northbound I-5 where on-ramp traffic merges with traffic exiting from US 101 bound for northbound I-5. This two lane road serves north/south travel with a posted speed limit of 25 to 35 mph. A parking lane on the east side of the Deschutes Parkway SW extends the majority of the roadway's length. In addition to connecting Olympia and Tumwater, it provides access to Marathon Park and other public facilities along Capital Lake, and to Tumwater Historical Park. It also connects to one of the

two streets that access the Thurston County Courthouse and the employment center on Evergreen Park Drive.

Project Study Area Intersections

Interchange Locations

As illustrated in Figure 1-3, locations to be evaluated in the vicinity of the three project area interchanges along US 101 include:

- Evergreen Parkway NW Interchange and vicinity
 - Southbound Ramp Termini @ Mud Bay Road NW
 - Northbound Ramp Termini @ Mud Bay Road NW
- Black Lake Boulevard Interchange and vicinity
 - Eastbound Ramp Termini Right Turns
 - Westbound Ramp Termini Right Turn
 - SPUI (left turns and through movements)
- Cooper Point Road SW/Auto Mall Drive/Crosby Boulevard SW Interchange and vicinity
 - Eastbound Ramp Termini
 - Westbound Ramp Termini
- Future Kaiser Road SW Interchange and vicinity
 - Eastbound Ramp Termini
 - Westbound Ramp Termini
- Future Yauger Way Ramp termini @ Forestbrooke Way SW

Other Intersections

As also illustrated in Figure 1-3, the following intersections were evaluated in the 2010 study and have been updated in this analysis.

- Black Lake Boulevard/Division Street NW @ Harrison Avenue NW

- Cooper Point Road NW @ Harrison Avenue NW
- Cooper Point Road SW @ Capital Mall Drive SW
- Cooper Point Road SW @ Haggen Entrance
- Cooper Point Road-Auto Mall Drive SW @ Evergreen Park Drive SW
- Crosby Boulevard SW @ Mottman Road SW
- Crosby Boulevard SW @ Irving Street SW
- Black Lake Boulevard SW @ Cooper Point Road SW
- Black Lake Boulevard SW @ Capital Mall Drive SW
- Black Lake Boulevard SW @ Capital Mall Entrance
- Harrison Avenue NW @ Kenyon Street NW
- Harrison Avenue NW @ McPhee Road SE
- Lakeridge Drive SW @ Deschutes Parkway SW
- Yauger Way SW @ Capital Mall Drive SW
- Yauger Way NW @ Harrison Avenue NW
- Kaiser Road NW @ Mud Bay Road NW/Harrison Avenue NW
- Kaiser Road SW @ 7th Avenue SW (not previously analyzed but included due to its proximity to a recommended improvement project).

1.7 WHAT ARE CURRENT AND EXPECTED FUTURE NO BUILD TRAFFIC CONDITIONS ALONG THE US 101 CORRIDOR?

1.7.1 2014 Existing Peak Hour Traffic Volumes

Traffic volume counts were collected from a variety of sources including WSDOT for the US 101 mainline, the City of Olympia for most intersections, and counts taken specifically for this IJR to supplement data available from the City. Most count data reflects conditions in 2014, but a few counts were taken in 2013 and one was taken during the spring of 2015. These counts were considered to represent average 2014 conditions as traffic volumes have not substantively changed over the period from 2013 to 2015. Data includes both the AM and PM peak periods.

2014 AM and PM peak hour counts for US 101 mainline and ramps were developed based on peak hour traffic counts from the Permanent Traffic Recorder station R098 located on US 101 immediately west of I-5 but before the Crosby Boulevard/Cooper Point Road-Auto Mall Drive interchange. These counts were used as control totals for the mainline to which the various ramp counts obtained from the City of Olympia or through project-related data collection were added or subtracted.

Figure 1-8 illustrates existing AM and PM peak hour traffic volumes along US 101 in the project area. Figure 1-9 shows AM peak hour turning movements at the twenty-three intersections included for study in the IJR. Figure 1-10 presents PM peak hour intersection turning movement counts. Traffic volume count data is included in Appendix B.

Analysis of traffic operations at project area locations is discussed in detail under Policy Point 3. In summary, of the three existing US 101 interchanges serving West Olympia, the interchanges at Black Lake Boulevard and Crosby Boulevard/Cooper Point Road-Auto Mall Drive serve most of traffic traveling between the

freeway and this portion of the city. Both interchanges funnel vehicles directly to the intersection of Black Lake Boulevard with Cooper Point Road, resulting in chronic heavy congestion and a poor environment for pedestrians and bicyclists. Traffic at this intersection currently experiences significant delay with Level of Service (LOS) E conditions during the PM peak hour.

1.7.2 Development of Future Peak Hour Traffic Volumes

Forecasted traffic volumes were developed for both the expected year of project opening (2020) and the long-range planning horizon or design year (2040). Both of these forecasts were built on the base year (2014) AM and PM peak hour traffic volumes using an estimation process that is described below.

Thurston Regional Planning Council (TRPC) Model Base

Traffic forecasts for the original 2010 *West Olympia Access Study* were developed using an older version of the regional travel demand model maintained and updated regularly by TRPC. The base year for that model was 2005 and the future planning horizon year was 2030.

The current TRPC model has a 2009 base year and 2035 planning horizon year. This model is based on regionally adopted household and employment projections and reflects the land use patterns in the adopted Comprehensive Plans of the three capital area cities (Olympia, Lacey and Tumwater). The 2035 scenario also includes network revisions to reflect roadway and intersection improvements identified in the current Regional Transportation Plan (RTP). This model provides both AM and PM peak hour assignment scenarios.

To help determine the magnitude of differences in the long-range traffic volume forecasts for the 2030 and 2035 models, and to identify the viability of recommendations developed using the 2030 forecasts, a comparison was made of land use and roadway network assumptions for

both base year and future planning horizons. This evaluation concluded that project area forecast volumes are expected to remain relatively consistent between the 2030 model results and results for 2035. This consistency is primarily the result of two factors:

- Base year traffic volumes dropped by approximately 2 percent within the project area between the 2007 base year for the 2010 study and current 2013/2014 conditions.
- The difference between modeled traffic volume growth using the 2030 model (i.e., 2005 to 2030 growth) and the 2035 model (i.e., 2009 to 2035 growth) is expected to be very small (less than 1 percent increase in 2035 over 2030).

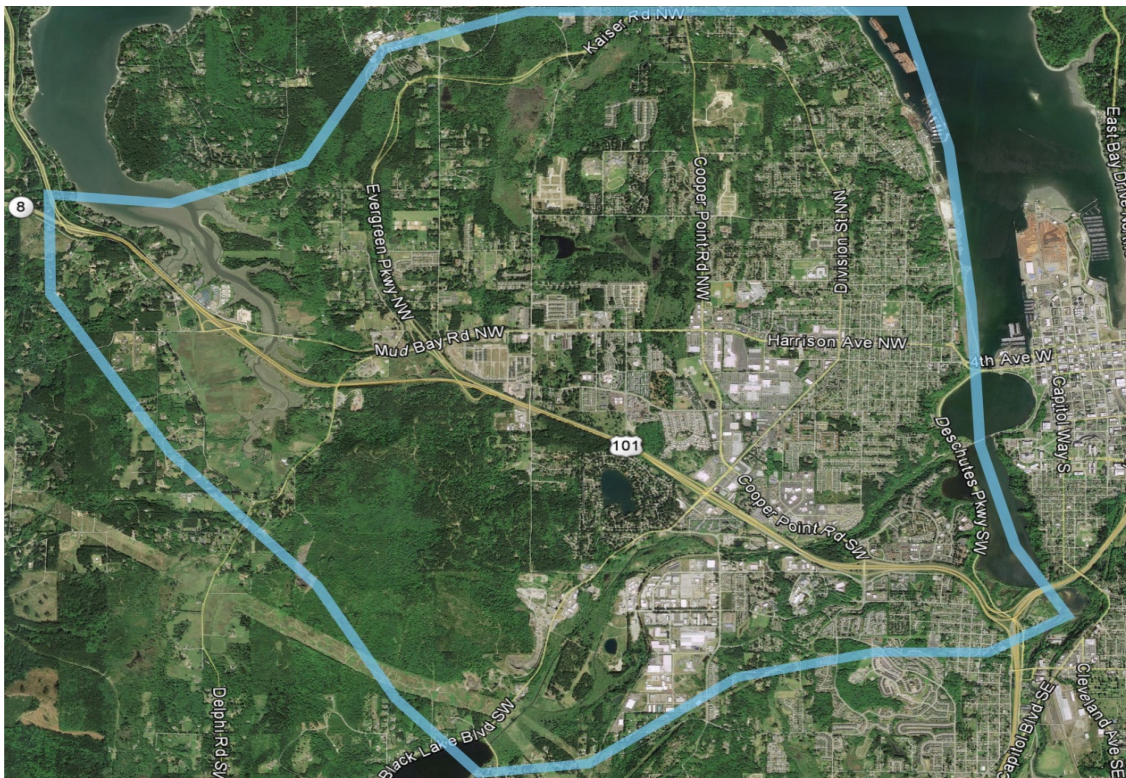
Accordingly, it was not expected that the differences in forecast traffic volumes between the 2030 and 2035 models would have a substantive effect on the preliminary project

recommendations as identified in the 2010 *West Olympia Access Study* report. It was determined by the IJR Support Team (consisting of representatives of local, regional, state and federal agencies), that the 2035 model represented a valid tool for use in conducting the added traffic operations analysis required by the IJR. A traffic sensitivity report discussing this conclusion in greater detail is included in Appendix C.

Model Refinements

For this analysis, the 2035 forecast year model network and land use parameters were reviewed within the Model Review Area identified on Figure 1-4. As a result of the specific demands of this project, the model has been enhanced to include additional land use and network detail within the project area. Model parameters in areas outside of the model review area were left as adopted by TRPC because they would have little or no effect on traffic patterns within the project area.

Figure 1-4. West Olympia Traffic Model Review Area



Model refinements to the project area included land use and roadway network adjustments to reflect the latest planning assumptions. Revisions to the 2035 model were developed in coordination with City of Olympia and reviewed in a meeting with TRPC and the City of Olympia on February 5, 2015. Both agencies concurred with these revisions. Revisions were presented to the IJR Support Group at a meeting on February 11, 2015.

Land Use Adjustments

The 2035 model's household and employment assumptions in the project area were reviewed to determine if adjustments should be made. In a few instances, small adjustments were made to align the 2035 land use forecast with known growth patterns. The biggest adjustment made to the land use forecast was an increase in growth potential for the Friendly Village mobile home park. Friendly Village is a 55+ complex with about 230 units located south of Capital Mall Drive, west of Cooper Point Road, and east of Yauger Way. The underlying zoning for the Friendly Village property has been changed to High Density Corridor 4 which allows for commercial development within a predominately residential area.

Working with City of Olympia planners a redevelopment estimate was made for the property. Employment growth for the 42 acre property was projected to include approximately 50 percent infill by commercial uses by 2035. This resulted in a total employment growth estimate of 915 retail/service employees. The household total was assumed to remain at current levels (230 units) due to zoning requirements.

Roadway Network Adjustments

The 2035 TRPC model assumed a variety of roadway improvements consistent with the RTP. The City reviewed the model network and opted

to include in the 2035 No Build model only those improvements that were in the 6-year Transportation Improvement Program (TIP) or otherwise considered funding-committed. No funded projects were identified within the Model Review Area. However, due to the direct influence on the streets adjacent to the preferred alternative, the network was adjusted to reflect two specific capacity projects in the project review area:

- Street connectivity adjustments were made in the vicinity of the Friendly Village mobile home park to reflect the area's redevelopment potential.
- The Kaiser Road Extension was included. This project involves extending a two lane collector roadway from the current southern terminus of Kaiser Road, southward then eastward intersecting Black Lake Boulevard approximately three quarters of a mile south of US 101. This project would be built by developers as a condition of development approval as the area grows.

The network improvements included in the 2035 baseline model are shown in Figure 1-5.

Model Post-Processing

While the model is calibrated to broadly replicate existing travel patterns, base year traffic volumes on individual roadways vary somewhat from existing traffic counts, particularly with respect to intersection level turning movements. To account for this variance, transportation model volume assignments were post-processed to better align them with existing traffic counts.

Figure 1-5. Network Improvements included in Project Area Traffic Model



Using widely accepted planning procedures, the traffic volume growth predicted by the model was added to existing traffic counts to derive 2040 AM and PM peak hour intersection turning movement projections. This growth estimate reflected a twenty-six year period of time (2014 to 2040) which is consistent with the twenty-six year period of time in the 2035 model (built on a 2009 base year). This facilitated the estimation of future year volumes and no further adjustments or extrapolation was necessary. The spreadsheets detailing the post-processing calculations are included in Appendix D.

The 2020 AM and PM peak hour turning movements were calculated by interpolating between 2014 and 2040. This interpolation included consideration of the potential traffic diversion effects of various long-term street improvement projects that would not be in place or affect 2020 traffic.

1.7.3 2020 No Build Alternative Peak Hour Volumes

Using the adjusted travel demand model and the forecasting process described above, 2020 AM and PM peak hour traffic projections were prepared for the No Build Alternative. This alternative is based on the existing transportation system without the preferred project improvements.

Figure 1-11 illustrates projected 2020 AM and PM peak hour mainline and ramp volumes for US 101. Figure 1-12 presents turning movement projections at project area intersections for the AM peak hour, while Figure 1-13 shows turning movement volumes for the PM peak hour.

1.7.4 2040 No Build Alternative Peak Hour Volumes

As with the 2020 No Build Alternative forecasts, AM and PM peak hour volumes for the 2040 No Build condition also do not include the improvements identified in the preferred

alternative. However, they do reflect the traffic diversion potential of two regional improvements identified in the RTP:

- Kaiser Road extension from existing southern terminus to Black Lake Boulevard
- Harrison Avenue widening from a 2/3 lane cross-section to a 4/5 lane cross-section between Yauger Way and Evergreen Parkway

The No Build Alternative also includes a variety of smaller roadway improvements planned by the City of Olympia within or affecting the project area. These improvements are identified in Section 1.5.2 and focus largely on adding traffic signals or additional turning lanes at congested intersections.

Figure 1-14 illustrates projected 2040 AM and PM peak hour mainline and ramp volumes for US 101. Figure 1-15 presents turning movement projections at project area intersections for the AM peak hour, while Figure 1-16 shows turning movement volumes for the PM peak hour.

1.7.5 Local versus Regional Trips

Selected link analyses were conducted for project area interchanges to identify what share of future year traffic is expected to use US 101 for trips within the project area (i.e., “local”

trips) as compared with trips with destinations outside the project area (i.e., “regional” trips traveling either west of the Evergreen Parkway interchange or to/from I-5). Analysis was conducted using the TRPC 2035 travel demand model for No Build and Preferred Alternatives. This adequately represents the estimated split between local and regional trips in 2040.

At the interchange of US 101 with Black Lake Boulevard, Figure 1-6 shows that most AM peak hour trips (generally over 90 percent) that enter or exit the highway are expected to travel either west of Evergreen Parkway or onto I-5. There is little difference in the magnitude of these “regional” trips between the No Build and Preferred Alternatives, with the exception of trips using the westbound on-ramp. With the No Build Alternative, 33 percent of forecasted trips are destined internally to the Evergreen Parkway off-ramp. With the Preferred Alternative, internal trip-making would increase to 43 percent to a combination of both the Evergreen Parkway and the new Kaiser Road off-ramps. This change is consistent with the fundamental purpose of the US 101/ West Olympia Access Project to encourage a better balance in traffic movement between the highway and local streets, particularly in the vicinity of the Black Lake Boulevard intersection with Cooper Point Road.

Figure 1-6. Destination of AM Peak Hour Trips Using US 101/Black Lake Ramps

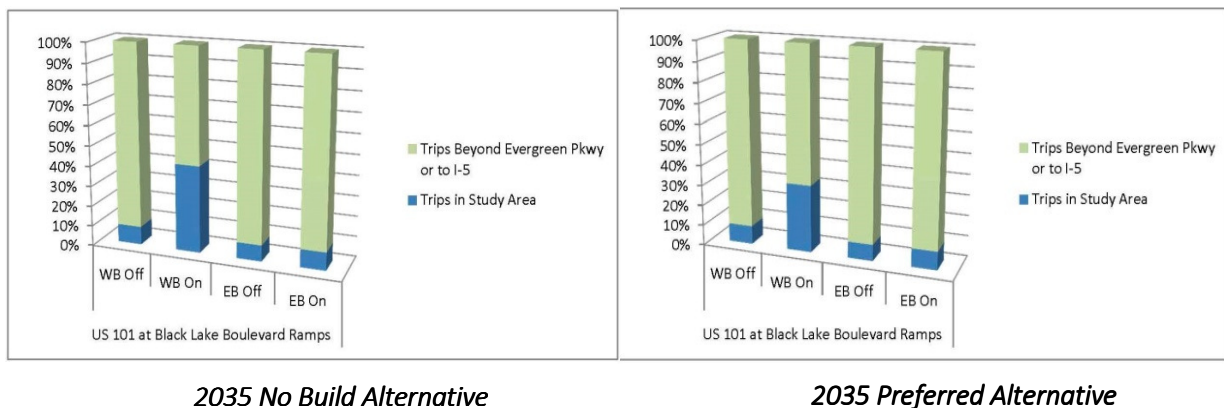
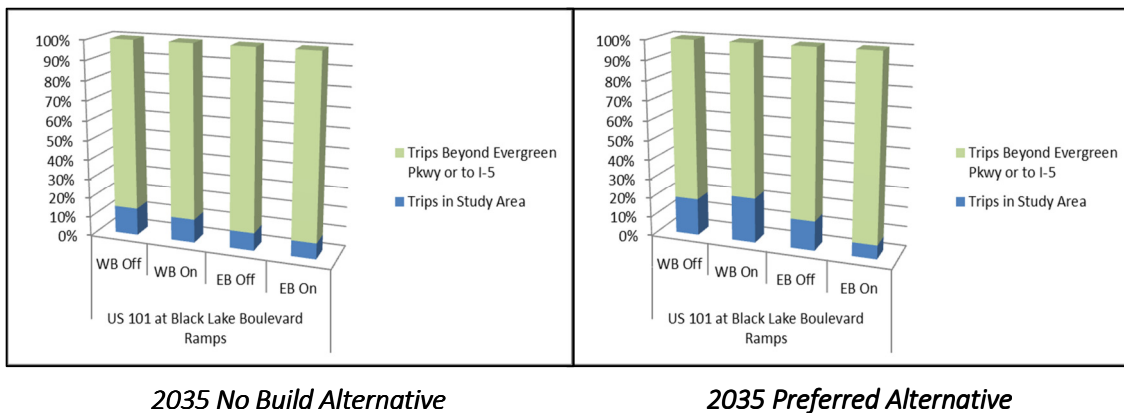


Figure 1-7 compares PM peak hour trips on the US 101/Black Lake Boulevard interchange ramps between the No Build and Preferred Alternatives for 2035. Greater differences between the No Build and Preferred Alternatives are anticipated, with the largest difference occurring on the westbound on-ramp. Under the No Build Alternative, approximately 12 percent of on-ramp volumes would be categorized as “local” trips and would likely use other project area interchanges. With the Preferred Alternative, the share of “local” trips is expected to increase

to 23 percent. The westbound on-ramp is anticipated to see a 5 percent increase in “local trips” with the Preferred Alternative, while the eastbound off-ramp is expected to see a 6 percent increase in comparison with the No Build Alternative. This is consistent with the intent of the Preferred Alternative to better distribute traffic throughout west Olympia with improved connectivity and circulation. There would be little difference between the two alternatives on the eastbound on-ramp.

Figure 1-7. Destination of PM Peak Hour Trips Using US 101/Black Lake Ramps



1.8 IS THERE A NEED FOR AN ACCESS POINT REVISION?

Improved highway access will be needed to support planned community growth and maintain emergency access, while providing safe and acceptable levels of service on both local and state transportation facilities.

As discussed in detail in Chapter 3 under Policy Point 3, the existing transportation network in West Olympia is inadequate for current mobility needs at peak times and is incapable of meeting growing travel demand, particularly at the interchange of US 101 and Black Lake Boulevard and at the critical intersection of Black Lake Boulevard and Cooper Point Road.

Out of the three existing US 101 interchanges serving West Olympia, the interchanges at Black Lake Boulevard and Crosby Drive/Cooper Point Road-Auto Mall Drive serve most of the traffic

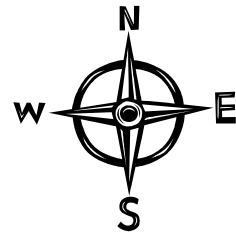
traveling between the freeway and this portion of the City. Both interchanges funnel vehicles directly to the intersection of Black Lake Boulevard and Cooper Point Road, resulting in heavy congestion and a poor environment for pedestrians and bicyclists. Traffic at this intersection currently experiences significant delay with level of service (LOS) E conditions during the PM peak hour. This congestion impedes vehicle trips including emergency responders accessing Capital Medical Center via US 101 and the Black Lake Boulevard/Cooper Point Road intersection, and two public transit routes. Both the 2025 Regional Transportation Plan and the analysis conducted for this IJR indicate that even with aggressive efficiency measures, the Cooper Point Road/Black Lake Boulevard intersection will fail within the next 20 years. This would cause undesirable delays and would also adversely impact nearby roads

and intersections, potentially including US 101 interchange operations at two locations – US 101 at Black Lake Boulevard and US 101 at Crosby Drive/Cooper Point Road-Auto Mall Drive.

On the US 101 mainline, short weave sections, frequent lane change maneuvers, and steep grades in some areas currently contribute to peak period congestion and safety concerns. By 2040, some segments of US 101 would experience high traffic congestion and unacceptable LOS E and LOS F conditions during the PM peak hour. The City of Olympia has used WSDOT's practical design guidance to determine the recommended improvement strategies for this area which are identified and discussed in this IJR.

In addition to the operational challenges on US 101, its key interchanges and the intersection of Black Lake Boulevard with Cooper Point Road,

many other intersections on the major streets in West Olympia are expected to experience significant congestion during peak periods by 2040. To address this congestion, the City plans to implement a broad array of improvements such as adding traffic signals, coordinated signal timing, and enhancing turn lane channelization. While these local street improvements will significantly help West Olympia traffic circulation, they cannot resolve current or future congestion at the US 101 interchanges. Additionally, they cannot adequately address congestion at the intersection of Black Lake Boulevard with Cooper Point Road which is heavily impacted by traffic using the Black Lake Boulevard and Cooper Point Road interchanges. Improvements to US 101 access are essential to meeting the travel needs of this growing community.

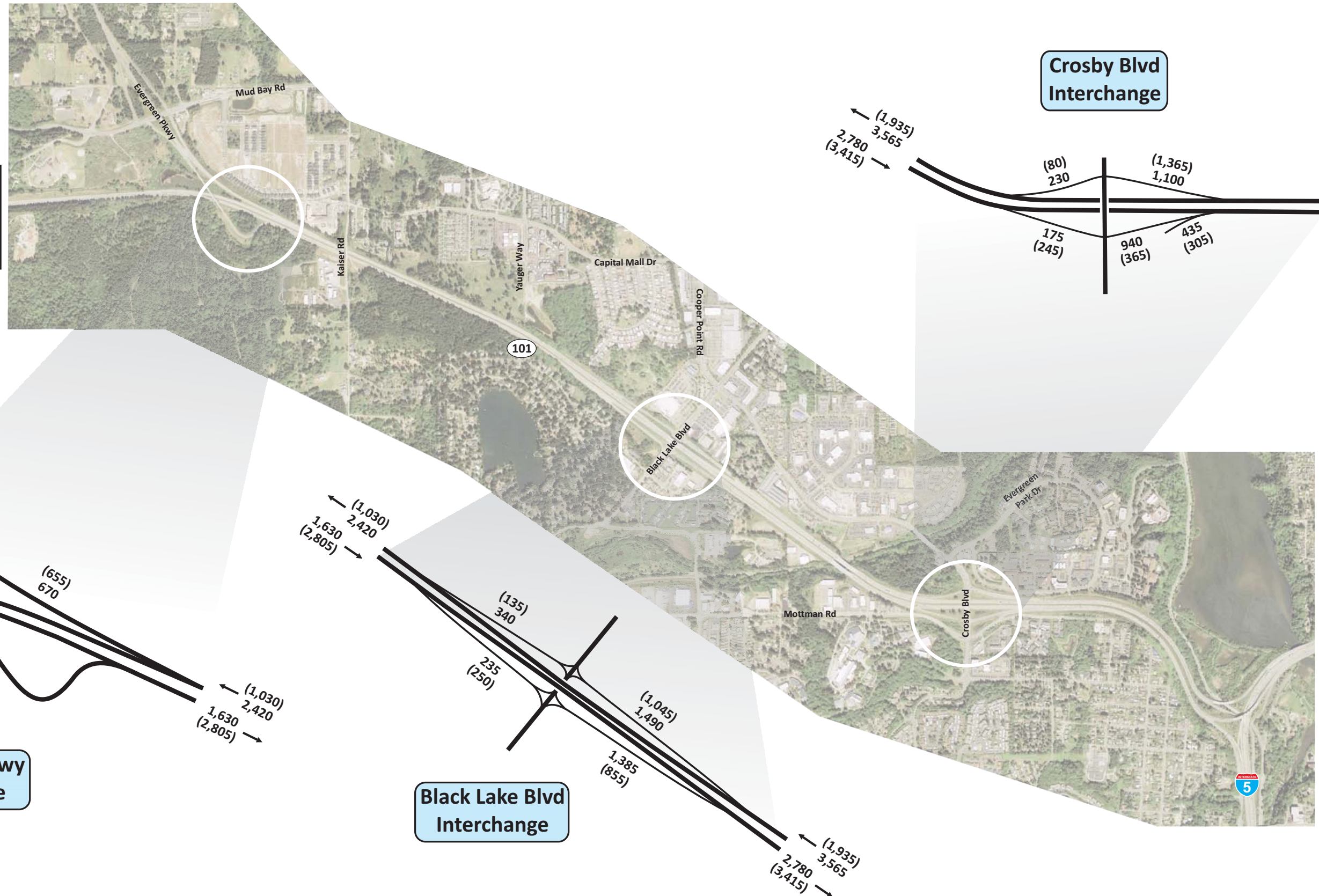


Legend

XXX → PM Peak Hour Volume
 (XXX) ← AM Peak Hour Volume

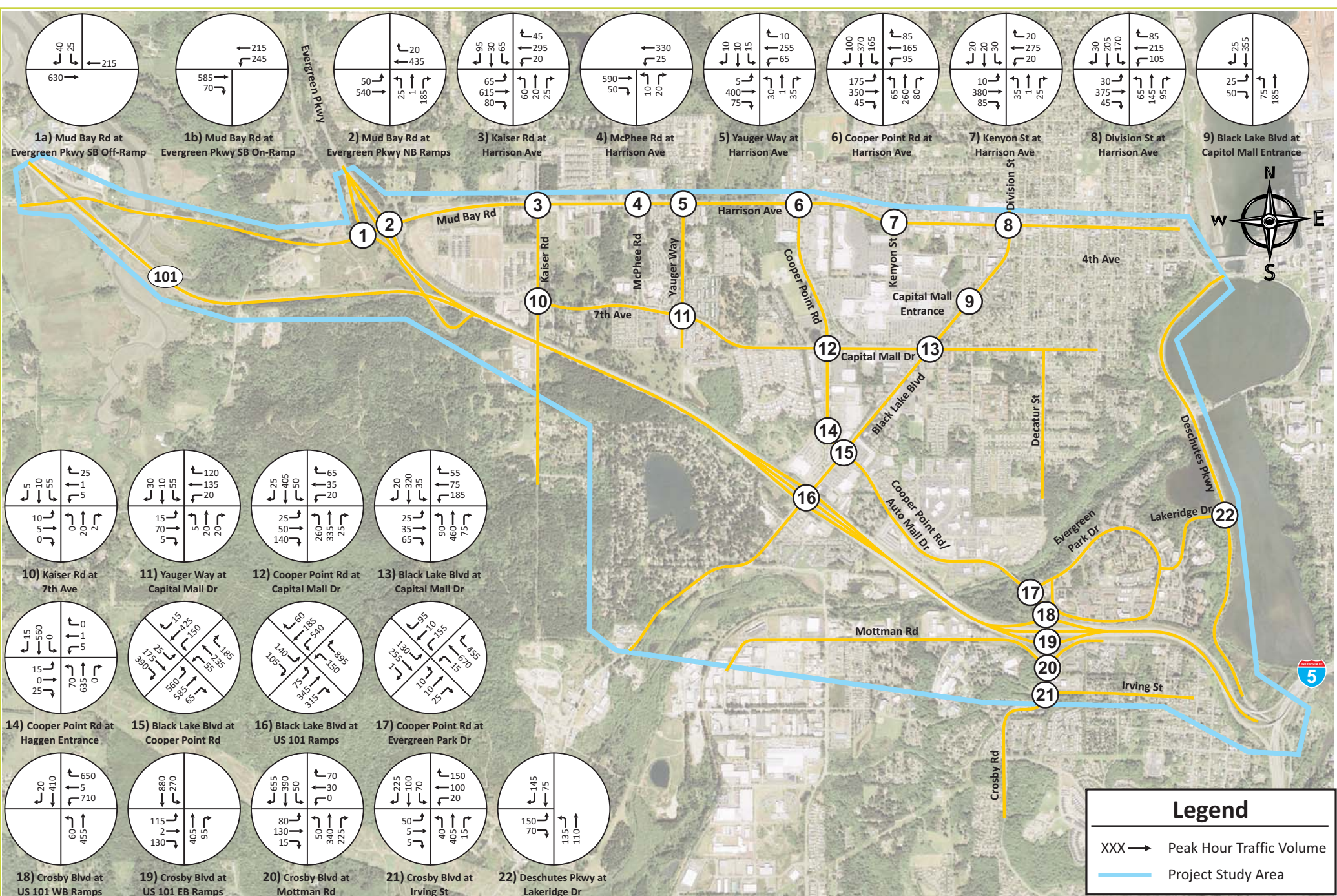
Note

Volumes were calculated to the single digit then rounded to the nearest five. Rounding may result in a five vehicle discrepancy between locations.



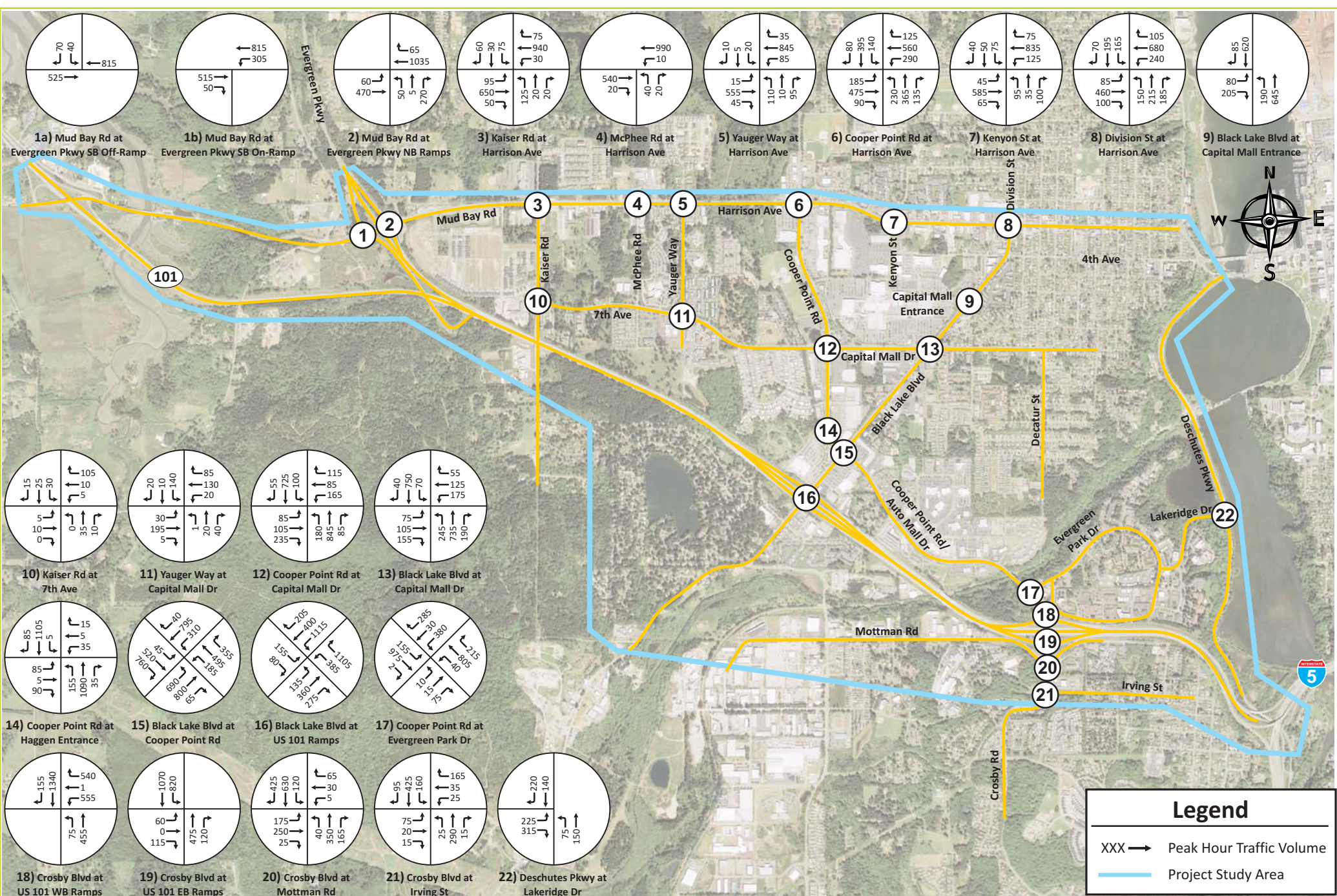
US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 1-8
 Existing 2014 Peak Hour
 Traffic Volumes on US 101



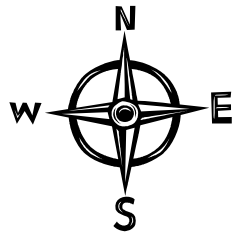
US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 1-9
 Existing 2014 AM Peak Hour
 Intersection Traffic Volumes



US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 1-10
 Existing 2014 PM Peak Hour
 Intersection Traffic Volumes

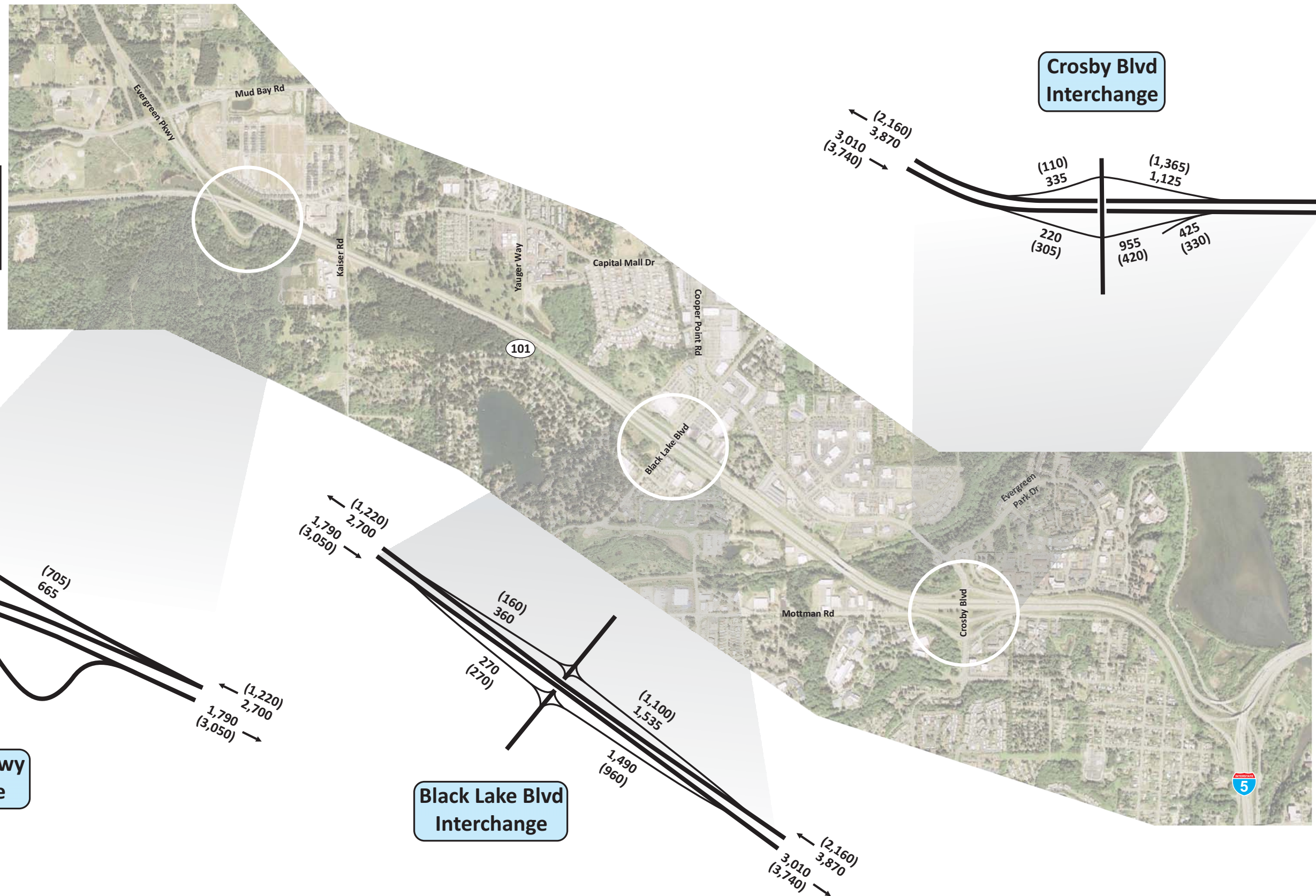


Legend

XXX → PM Peak Hour Volume
 (XXX) ← AM Peak Hour Volume

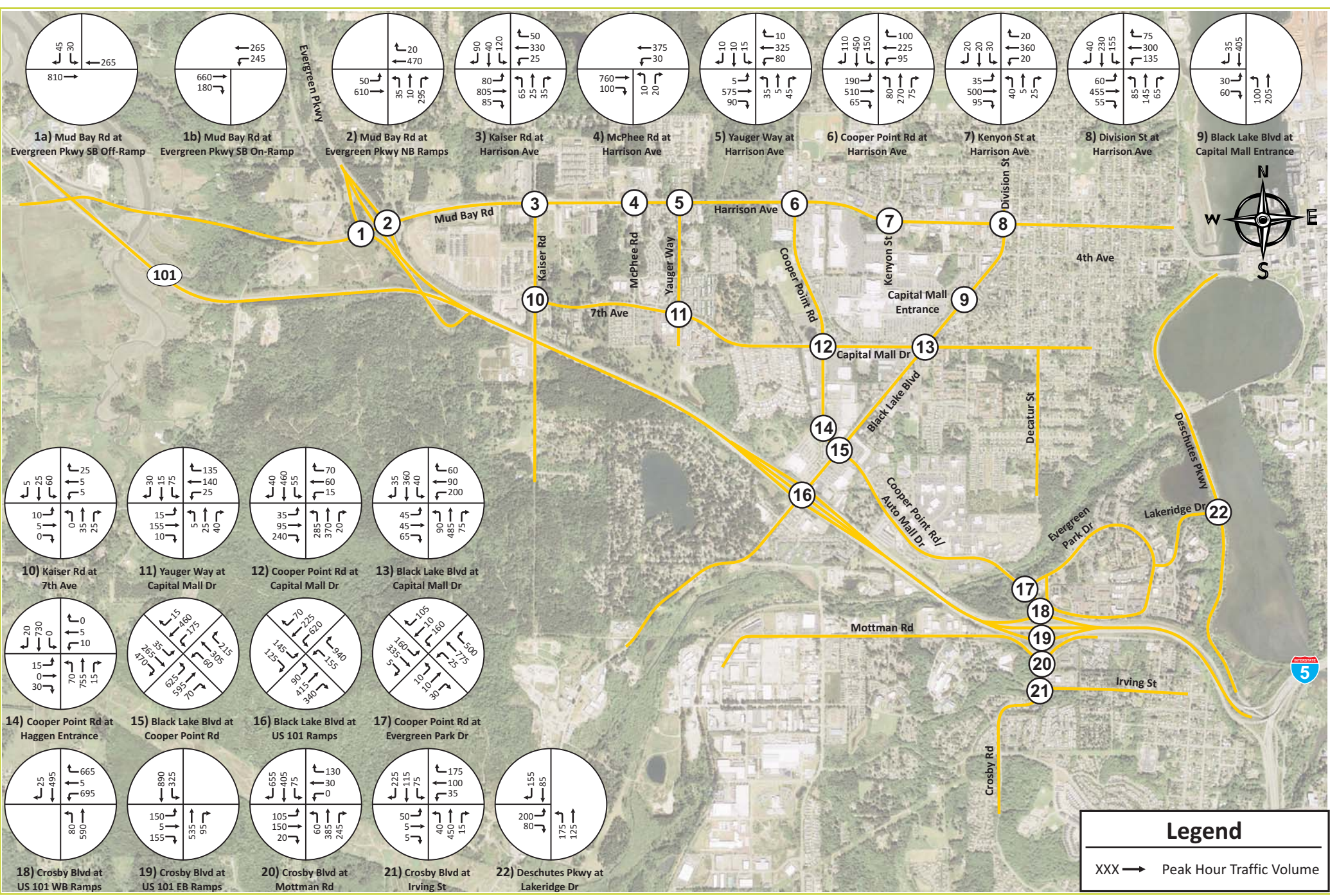
Note

Volumes were calculated to the single digit then rounded to the nearest five. Rounding may result in a five vehicle discrepancy between locations.



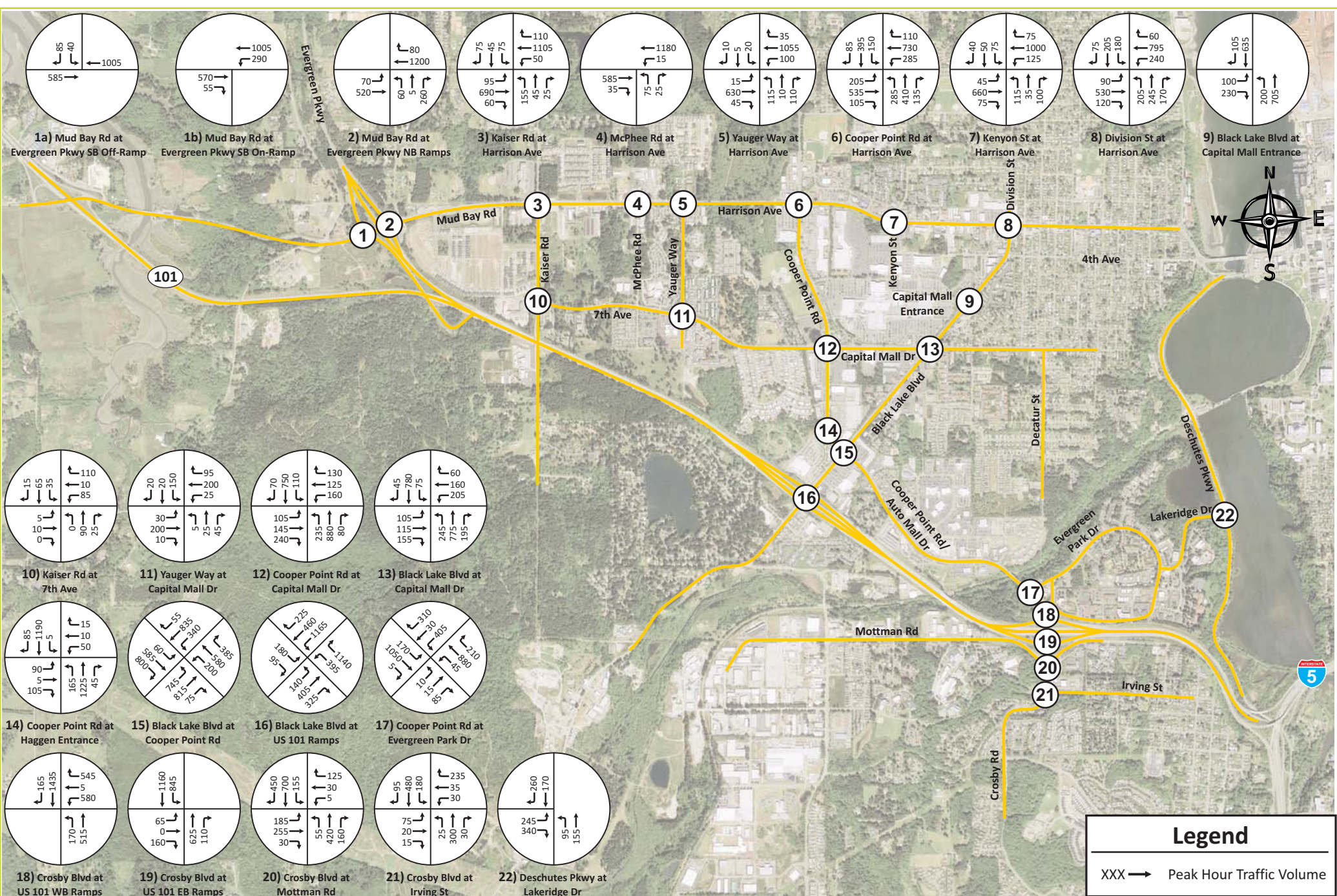
US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 1-11
 2020 Peak Hour Traffic Volumes
 on US 101 - No Build Alternative



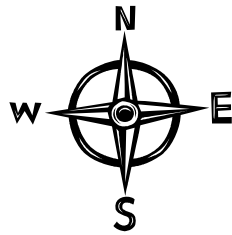
US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 1-12
 2020 AM Peak Hour Intersection
 Traffic Volumes - No Build Alternative



US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 1-13
 2020 PM Peak Hour Intersection
 Traffic Volumes - No Build Alternative

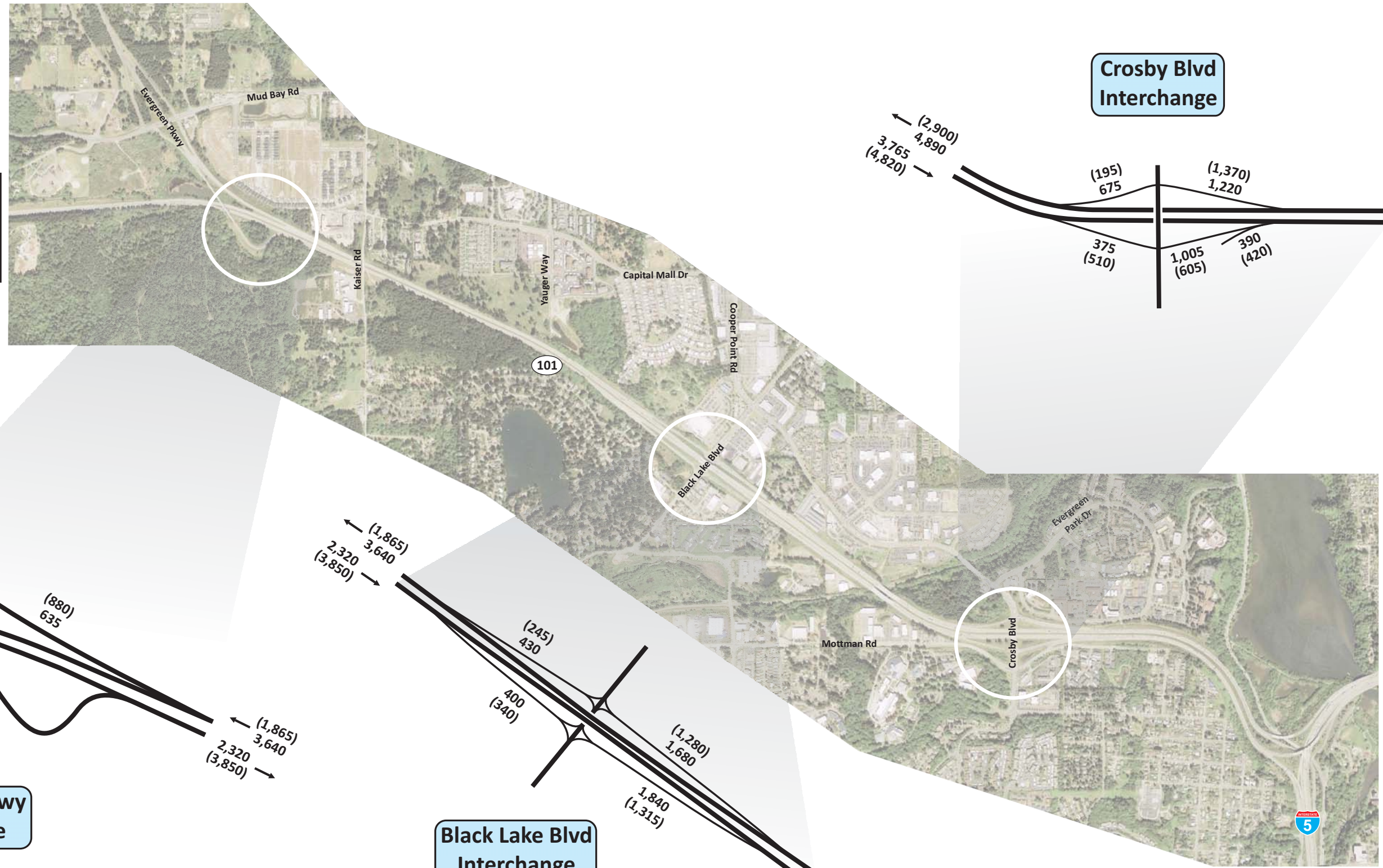


Legend

XXX → PM Peak Hour Volume
 (XXX) ← AM Peak Hour Volume

Note

Volumes were calculated to the single digit then rounded to the nearest five. Rounding may result in a five vehicle discrepancy between locations.



US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 1-14
 2040 Peak Hour Traffic Volumes
 on US 101 - No Build Alternative

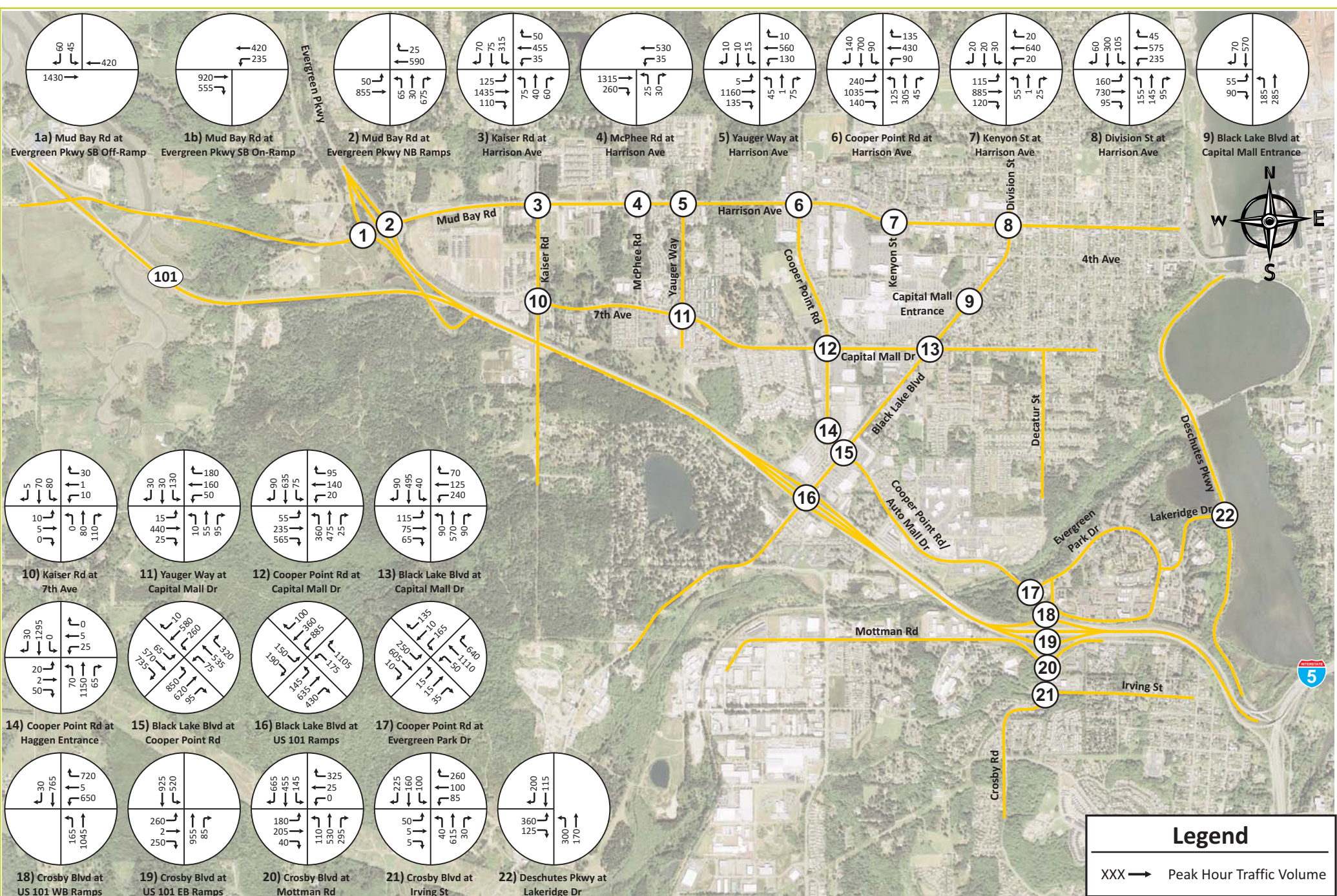


Figure 1-15
2040 AM Peak Hour Intersection
Traffic Volumes - No Build Alternative

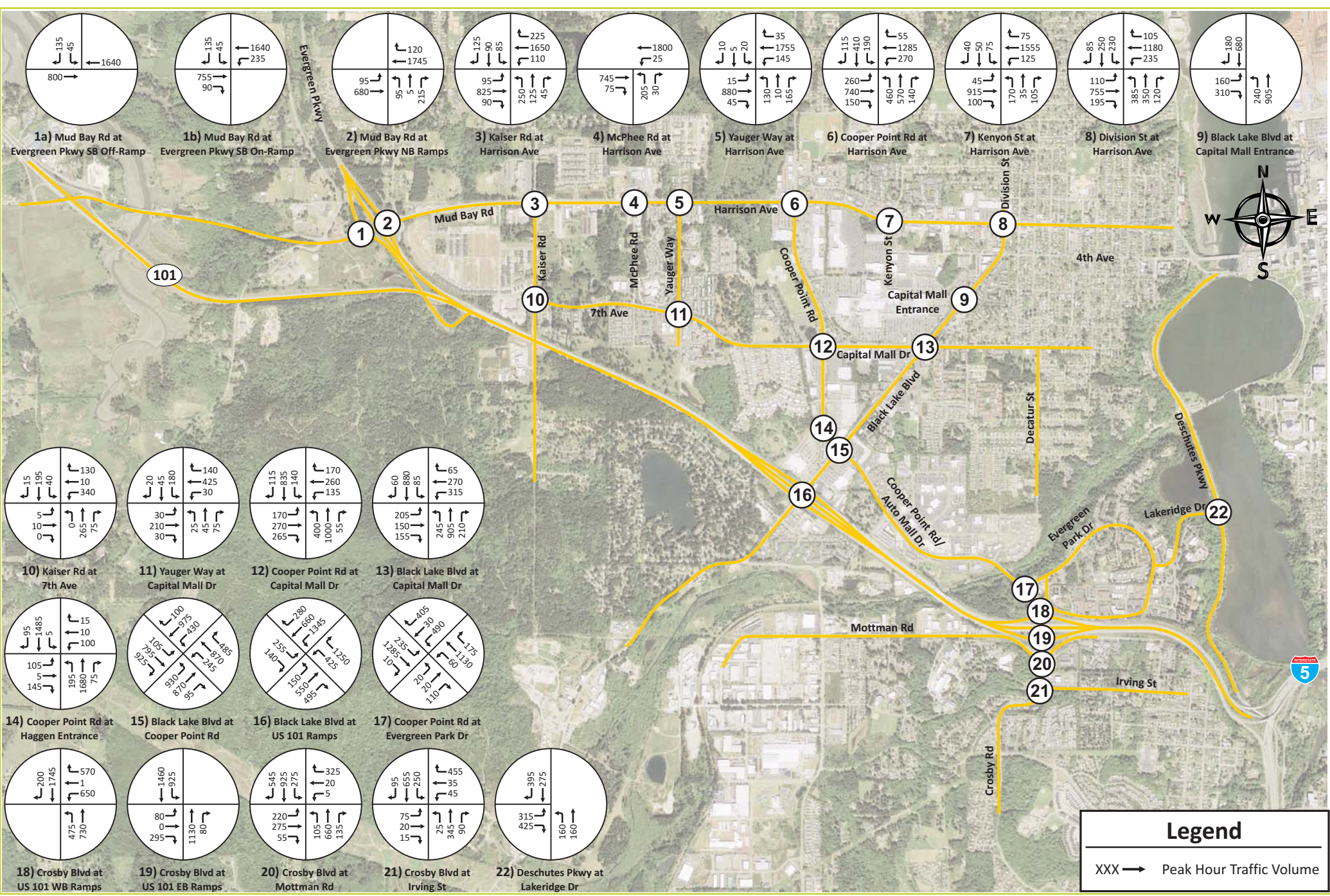


Figure 1-16
 2040 PM Peak Hour Intersection
 Traffic Volumes - No Build Alternative

2. POLICY POINT 2: REASONABLE ALTERNATIVES

Policy Point 2 describes the development and evaluation of alternative improvements to address congestion problems along US 101 and on key roads and intersections that access the freeway. Included in this chapter is a discussion of the alternatives identified and considered during the 2010 *West Olympia Access Study* (WOAS), as well as subsequent efforts undertaken as part of this IJR. While a final report and supportive technical memoranda for the 2010 *Study* were prepared and disseminated during that process, key information from that effort has been incorporated into this IJR to provide a more complete synopsis of the entire planning effort that led to the Preferred Alternative. This chapter addresses and describes:

- The analysis process used to conduct the entire study from outset in 2007 through efforts undertaken for the 2010 *Study* and concluding with an update to earlier work to reflect 2014/2015 conditions and a 2040 project design year.
- The full range of alternatives, including both interchange and local street improvements, that were developed and considered.
- Screening criteria used to continually refine and narrow the range of options under consideration.
- Options that were rejected from further consideration and the rationale for this rejection.

One major objective of the updated analysis in this IJR was to ensure that the recommended alternative would continue to be the most appropriate course of action given recent

changes in land development, traffic volumes, and travel patterns. A second objective was to ensure that the alternatives analysis leading to the Preferred Alternative was consistent with the analysis used in the project's environmental documentation.

2.1 HOW WERE ALTERNATIVES DEVELOPED AND EVALUATED?

The development of a Preferred Alternative for improved access to US 101 in West Olympia represents the culmination of a multi-phased planning process that was first initiated in 2007 with the *West Olympia Access Study* (WOAS). The 2010 *Study* used an approach wherein various improvement concepts were gradually screened down from a wide range of potential strategies. The WOAS was completed in 2010 and concluded by identifying a recommended "hybrid" alternative for improved access to and from US 101.

The 2010 *Study* was followed by the transportation / environmental analysis and preliminary engineering effort that is documented in this IJR. The current project effort has revisited the assumptions, findings and recommendations of the 2010 *Study*. The result of that effort is the refined "Preferred Alternative" as described in the Project Description (PD) chapter.

The planning process from study initiation in 2007 through development of the Preferred Alternative is outlined in Figure 2-1. The first four steps (shown in green) were conducted as part of the 2010 *Study*. The last step (shown in blue) was conducted for this IJR and led to the Preferred Alternative.

The five-step process included:

- **Step 1: Brainstorming of Ideas and Fatal Flaw Screening** – Identification and screening of a wide range of freeway and local street improvements that emerged from an extensive public outreach effort in 2007.
- **Step 2: Initial Screening of Viable Groups of Improvement Options** – options that survived the fatal flaw screening were validated and grouped by project type for an initial screening to determine the types and magnitude of potential impacts and benefits that could result from implementation. The purpose of this screening was to eliminate options that were not found to merit further consideration because they do not address the study goals.
- **Step 3: Screening of Packaged Improvement Scenarios** – the more effective improvement options were packaged into a series of nine scenarios that focused on addressing local system improvements, along with various interchange improvement concepts for enhancing access to and from US 101.
- **Step 4: Evaluation of Final Alternatives and Recommendation of Hybrid Alternative** – the nine alternatives studied in the prior step were reduced to three: a) improvements to the Black Lake interchange, b) improvements to the Evergreen Parkway interchange and c) a hybrid alternative that built on elements of the other two options. Based on the analysis in this step, the “Hybrid Alternative” was identified at the conclusion of the 2010 *Study* as the recommended course of action.
- **Step 5: Revisit and Refine 2010 Hybrid Alternative** – based on effort initiated in 2014, the findings, conclusions and recommendations of the 2010 *Study* were revisited and updated. This

Figure 2-1. Multi-Phased Planning Process



analysis is fully documented in this IJR and supportive technical memoranda prepared in 2014 and 2015. This analysis broadly confirmed the conclusions and recommendations of the 2010 *Study* and further refined the earlier recommendation into a Preferred Alternative.

2.2 HOW WERE INITIAL IMPROVEMENT IDEAS IDENTIFIED AND SCREENED?

The initial development and evaluation of improvements to the US 101 corridor and local streets in West Olympia included a two-phased effort. The initial phase involved an extensive public and stakeholder outreach effort to define the nature of the problem to be resolved and to brainstorm the widest possible range of potential improvements. The second phase included a “fatal flaw” screening of

brainstormed ideas, allowing unfeasible ideas to be eliminated and reasonable options to be grouped for further evaluation and study.

2.2.1 Initial Public Outreach/Brainstorming of Ideas

The 2010 *Study* was initiated by a broad public and stakeholder outreach effort intended to surface all issues, concerns and improvement opportunities in the study area. These activities were conducted between February and March, 2007. The outreach effort included two general public workshops, and provided the opportunity to submit comments to the project team via email or regular mail. Input also included interviews with local jurisdictions and resource agencies.

Over 200 various suggestions were compiled during a formal public outreach process. These suggested solutions included land use policy/regulation changes, transit, bicycle, pedestrian, roadway, intersection and interchange ideas. One of the parameters established for this study was that land use must be based on the current adopted regional and local plans, and that the study would not address changes to land use designations and/or policies. Therefore, land use concepts were identified as fatal flaws, but were placed in a “parking lot” for future consideration by the local and regional jurisdictions.

Brainstormed ideas that were identified as transit, bicycle and pedestrian concepts were held into abeyance for further consideration later in the study process. Over fifty-nine of the concepts were identified as transit, bicycle or pedestrian solutions. These Transportation Demand Management (TDM) concepts were packaged and evaluated separately to determine compatibility with the reasonable/preferred options coming out of the study’s screening process. A list of possible Transportation System Management (TSM) improvements was also developed from the suggested solutions that could be considered later for incorporation into

reasonable/preferred options for physical access improvements.

2.2.2 Fatal Flaw Screening of Brainstormed Ideas

As noted above, improvement ideas identified at the outset of the 2010 *Study* ranged from highway access modifications and local road improvements to TDM and transit strategies. The first step of the screening process included reviewing initial brainstormed suggestions and conducting a fatal flaw screening. This screening was designed to provide a qualitative assessment of concepts and suggested solutions compiled from stakeholder, resource agencies, and WSDOT interviews, public meetings, and other public outreach activities. The purpose of the fatal flaw analysis was to eliminate the concepts that did not meet the objectives of the study.

To make this screening process relatively simple and easy to understand, a simple yes/no rating was used to indicate the potential effectiveness of each option and its ability to meet study objectives. Any concept that received a “no” response to any of the following criteria was judged to have a fatal flaw.

- Would the concept reasonably meet the purpose of the study?
- Would the concept be consistent with local, regional, or state policies or design criteria?
- Would the concept likely receive the required environmental and design permits? (concept inordinately difficult and/or time-consuming to permit)
- Would the concept be feasible to implement? (including policy or financial limitations or physical constraints that would reasonably prevent implementation)

The project study team met with WSDOT on July 17, 2007, to conduct the fatal flaw screening analysis. Appendix A of the *West Olympia Access*

Study, *Technical Memorandum #1 - Evaluation and Screening Methods* dated May 15, 2008 includes a detailed list of the brainstormed improvement concepts and the results of fatal flaw screening.

During the fatal flaw analysis it was determined that no new full interchange could be considered due to lack of adequate spacing between existing interchanges as defined by the WSDOT Design Manual. It was noted that if a new or modified access point to US 101 were necessary, it would probably have to be associated with one of the existing interchanges.

2.3 HOW WERE GROUPS OF VIABLE IMPROVEMENT OPTIONS DEVELOPED AND EVALUATED?

The ideas and concepts that remained under consideration after the July 17, 2007 fatal flaw analysis were grouped into thematic options that had similar component elements or characteristics. The grouping and evaluation of options employed a consensus-based process and generally used qualitative information. The grouping of improvement options occurred at an Option Development Charrette held on August 14, 2007 and involving WSDOT, FHWA, TRPC, Intercity Transit, and City representatives. Options included TSM and TDM actions and were grouped into five categories to assess their effectiveness as a system.

2.3.1 Grouping of Improvement Options

The categories of improvement options included the following which are described in greater detail in Table 2-1.

Network Connections

Five options were studied including completion of a basic street system grid in West Olympia and in southwest neighborhoods, and extension of city streets in two locations: 1) extending Kaiser Road between US 101 and Black Lake, and 2) extending Yauger Way to Cooper Point Road.

The addition of a frontage road to connect Black Lake Boulevard and Kaiser Road was also considered.

Corridor Improvements

Six options were studied including adding auxiliary lanes on US 101, adding a truck climbing lane, creating a one-way couplet along Black Lake and Cooper Point with various other roadway widenings and intersection modifications, widening 7th Avenue/Capital Mall Drive, and widening Mud Bay Road.

Interchange Modifications

Seven modifications to the existing interchanges were identified and considered. These options included three possible modifications to the existing US 101/Black Lake Boulevard Single Point Urban Interchange (SPUI) (incorporating various connections to Yauger Way or other grade-separations), two possible changes to the Evergreen Parkway interchange (including connections to Kaiser Way), a modification to the US 101/Crosby Boulevard interchange, and development of a collector/distributor roadway system between Crosby Boulevard and Kaiser Road.

Improvements to the Existing Local Roadway System

Two options were considered that involved various roadway widening projects on major streets throughout West Olympia. These options considered both signalized and roundabout intersection traffic control.

Access Management and Operation Improvements

Three options were evaluated including selective ramp metering, and implementation of access control along Harrison Avenue or Cooper Point Road. Access control on these two streets would include installation of a barrier or median with left turn channelization at major intersections.

2.3.2 Screening Criteria used to Assess Groups of Improvement Options

The purpose of the evaluation process for grouped improvement options was to eliminate scenarios that were not found to merit further consideration because they would not adequately address study goals. The initial screening was conducted at a high planning level using a mix of quantitative and qualitative criteria to rate each option from most impacts (worst) to least impacts (best).

Screening criteria used to evaluate the benefits and impacts of improvement groups included the following. These criteria were not weighted.

Community Impacts

- Economic Vitality (business impacts) – *What effect would an option have on commercial properties?* Based on the proximity of business properties, this criterion assessed the potential for any direct or indirect impacts on commercial properties including access restrictions and/or loss of parking.
- Residential Impacts – *What affect would an option have on residential properties?* This criterion provided a planning level estimate of how many residential properties could be impacted, highlighting whether an option would disrupt any existing neighborhoods.
- Neighborhood Traffic – *How would implementation of an option affect neighborhood traffic?* This criterion assessed the potential for increased cut-through traffic in neighborhoods and the creation of or change in physical barriers. This evaluation was subjective as the travel demand model did not offer sufficient detail to support a quantitative assessment.

Natural Environmental Impacts

- Wetlands/Shorelines – *How would implementation of an option impact known wetlands and shorelines?* Using GIS data and assessing the proximity of options to identified wetlands and buffers, this criterion assessed the potential for any direct or indirect wetland/shoreline impacts.
- Water Resources – *How would implementation of an option impact water basins and sub-basins?* This criterion focused on a qualitative planning level assessment of potential impacts to surface and ground water resources. Of particular concern to the City of Olympia were potential impacts to the Allison Springs wellhead protection area located within the study area. The amount of new impervious surface area associated with each option was estimated, as was the proximity of an option to the Allison Springs wellhead protection area and capture zones.

Feasibility

- Timeliness – *How feasible is the option to implement?* This criterion provided an indication of the ability to “construct” an option sooner rather than later. Considerations included such factors as the ability to phase a project and/or secure funding, as well as consistency with the WSDOT 2007-2026 Highway System Plan.

Safety

- Vehicle Accident Reduction – *How effective will the option be in minimizing traffic collisions?* This criterion included a subjective assessment of the potential for reduced vehicle crashes with an option. It was measured as a percent reduction.

Mobility

This assessment was based on preliminary, quantitative PM peak hour traffic volume changes at key screenline locations identified in the regional travel demand model. Synchro traffic analysis output was used to test certain options in greater detail to determine their effectiveness. Key elements of the mobility assessment included:

- *Connectivity* – How does the option affect connectivity and access within the West Olympia area? This was a qualitative assessment of potential impacts to accessibility within the study area based on output from the regional travel demand model.
- *Circulation* – How does the option affect traffic operations within the study area? This involved a qualitative assessment of traffic volume changes at critical intersections in the West Olympia “Triangle” (Black Lake Boulevard / Cooper Point Road / Harrison Avenue) in comparison to 2030 no-project conditions.
- *Highway Impact* – How does the option affect traffic operations on US 101 and I-5? This criterion focused on a preliminary assessment of the options’ impact on freeway traffic operations including potential changes in PM peak period traffic volumes along highway segments.

Travel Options

- *Pedestrian/Bicycle Impacts* – How does the option affect biking and walking?

This criterion addresses at a planning level how an option would augment, limit or impact completion of the non-motorized grid

2.3.3 Evaluation Results for Grouped Improvement Options

The various groups of improvement options were initially evaluated based on planning level estimates, qualitative technical review and other available information. No individual criterion was weighted higher than another criterion in this evaluation process. The initial screening rated each option on a scale from most impacts (worst) to least impacts (best). Information from the evaluation of options were used in a consensus-based decision-making process to eliminate some options from further consideration, and advance others for more detailed analysis.

The study team met on October 17th and 30th of 2007, to screen the initial options from the August 14th options development charrette against the identified criteria. Where possible, a quantitative measure of effectiveness was developed and applied to each criterion. Some of the criteria were not quantifiable; as a result the team relied on the knowledge and technical expertise of team members and stakeholders, as well as data available to allow adequate judgments. Table 2-1 summarizes the results of the screening process for improvement option groups and indicates which options were eliminated from further consideration and which were carried forward.

Table 2-1. Description and Evaluation of Grouped Improvement Options

Option #	Option	Description	Screening Results
Network Connections			
1	Complete Comp Plan Grid Connections	New east/west connections from McPhee to Kaiser Way south of Mud Bay Road. New east/west connection between Overhulse Road south of Mud Bay Road from 5 th to 6 th Avenues – includes north/south connection to Mud Bay Road. New connection from Harrison Avenue to 4 th Avenue in vicinity of Kenyon Street.	Combined options 1, 3 and 4 into new Option 1A and retained for consideration
2	SW Neighborhood Grid Connections	Decatur Street Extension, Fern Street Extension, 16 th Street Extension	Retained for further consideration
3	Kaiser Road Extension	Extend Kaiser Road east-west between US 101 and Black Lake Boulevard	See #1 above
4	Yauger Way Extension	New east/west connection between Yauger Way and the Haggen’s vicinity (Cooper Point Road)	See #1 above
5	Black Lake/Kaiser Frontage Road	Add a frontage road connecting Black Lake Boulevard vicinity and Kaiser Road, and add a frontage road connecting Kaiser Road and Black Lake Boulevard south of US 101.	Eliminated – for severe impacts to environment, right-of-way and adjacent neighborhood. Improvement to West Olympia “Triangle” is minimal.
Corridor Improvements			
6	US 101 Auxiliary Lanes	Add westbound auxiliary lane between I-5 and Crosby Boulevard I/C (MP 366.65–MP 366.91). Provides a deceleration lane onto the Crosby Boulevard off-ramp and would serve as a climbing lane. Add an eastbound auxiliary lane from Crosby I/C to 2 nd Avenue (MP 366.75–MP 367.35). Provides a ramp acceleration lane into 2 nd Avenue off ramp and would serve as a climbing lane.	Eliminated – Does not meet Purpose & Need, does not improve access or circulation to West Olympia. Though this improvement could improve this section of US 101 it could create additional weaving to/from I-5.
7	US 101 Climbing Lane	Add eastbound truck climbing lane from Delphi Road to Evergreen Parkway Interchange	Eliminated – Does not meet project Purpose & Need, does not improve access or circulation to West Olympia. Though the option provides localized capacity improvement, it’s not being added to a location with significant existing congestion.
8A	Black Lake Boulevard/Cooper Point Road Couplet	Change Black Lake Boulevard/Cooper Point Road into a one-way couplet from Black Lake/Cooper Point intersection to 9 th Ave. Widen Capitol Mall Drive to 4-lanes (Black Lake Blvd to Cooper Point). Modify Cooper Point & Capitol Mall intersection and Black Lake Blvd & 9 th Ave/Capitol Mall Drive intersection.	Eliminated – Operations do no work well, increases vehicle miles of travel and results in increased left turns which impact safety and crash concerns. Though the option improves the Black Lake/Cooper Point intersection it worsens congestion at downstream intersections.

Table 2-1 Continued. Description and Evaluation of Grouped Improvement Options

Option #	Option	Description	Screening Results
Corridor Improvements Cont.			
8B	Black Lake Boulevard/Cooper Point Road Couplet	Change Black Lake Boulevard/Cooper Point Road into one-way couplet from Black Lake Boulevard/Cooper Point Road intersection to Harrison Avenue/Division Street. Modify Black Lake Boulevard & Division Street intersection and Harrison Avenue/Cooper Point Road intersection.	Eliminated – Operationally does not work well; the option increases vehicle miles of travel and results in increased left turns, which impact safety and crash concerns. Though the option improves the Black Lake Boulevard/Cooper Point Road intersection it worsens congestion at downstream intersections.
9	7 th Avenue (Capitol Mall Drive	Widen 7 th Avenue & Capitol Mall Drive (Cooper Point Road to Kaiser Way).	Eliminated – Does not improve access to West Olympia
10	Mud Bay Road	Widen Mud Bay Road to 4-lanes (Evergreen Parkway to 2 nd Street).	Eliminated – Environmental constraints. Improvement is outside the city UGA and cannot be implemented by the City of Olympia. Benefit to West Olympia Triangle is minimal.
Interchange Modifications			
11	Crosby Boulevard-Mottman Road Interchange	Widen structure to 6 lanes to allow 2 northbound lanes and add one northbound lane from US 101 to Irving Street.	Eliminated – Improves interchange and intersection operations at Crosby Boulevard and Mottman Road, but does not necessarily improve mainline operations. Access improvement benefit to West Olympia Triangle is questionable.
12A	Black Lake Interchange/Yauger Ramp	Add westbound off ramp in vicinity of Yauger Way and add eastbound on ramp from Yauger Way onto US 101.	Retained for further consideration
12B	Black Lake Interchange/Yauger Ramp	Add westbound off-ramp to vicinity of Yauger Way, extend Yauger Way over US 101 to Black Lake Boulevard south of US 101.	Retained for further consideration
12C	Black Lake Interchange/Flyover Ramp	Fly over ramp from vicinity Black Lake Boulevard & Cooper Point Road intersection to vicinity of eastbound on ramp.	Retained for further consideration
13A	Evergreen Parkway Interchange	Complete current Evergreen Parkway interchange by adding ramps to/from the west.	Eliminated – Does not improve access to West Olympia

Table 2-1 Continued. Description and Evaluation of Grouped Improvement Options

Option #	Option	Description	Screening Results
Interchange Modifications Cont.			
13B	Evergreen Interchange with Kaiser Ramps	Complete current Evergreen Parkway interchange by adding ramps to/from the west, and adding ramps to/from the east at Kaiser Road with a frontage road to Evergreen Parkway.	Retained for further consideration
14	Collector Distributor	Add Collector/Distributor road from the Crosby Boulevard Interchange to Kaiser Road.	Eliminated – Environmentally challenged, impacts right-of-way, private property and wetlands severely. Improves highway capacity but at same time could create more concentrated weaving that may offset decrease in mainline volume.
Improve Existing			
15A	Improve Existing including Intersection Improvements	Widen Harrison Avenue to 5 lanes with two-way left turn lane (Black Lake & Division to West Bay vicinity); widen Harrison Avenue (Mud Bay Road) to 4 lanes from Kaiser Road to Evergreen Parkway; widen Black Lake Boulevard to 3 lanes (Black Lake I/C to Black Lake/Belmore Road). Improve Black Lane Boulevard/Division Street, Harrison Avenue/Cooper Point Road, and Black Lake Boulevard/Cooper Point Road intersections.	Retained for further consideration
15B	Improve Existing, includes Roundabouts	Widen Harrison Avenue (Mud Bay Road) to 4 lanes from Kaiser Road to Evergreen Parkway, widen Black Lake Boulevard to 3 lanes (Black Lake I/C to Black Lake/Belmore Road). Improve Black Lane Boulevard/Division Street, Cooper Point Road/Capitol Mall Drive, and Black Lake Boulevard/Cooper Point Road intersections. Add roundabout at Harrison Avenue/McPhee Road and Harrison Avenue/Cooper Point Road intersection.	Eliminated – Roundabouts are not the most feasible operational option at identified intersections due to approach volumes not being equal or the need for 3-lane roundabouts at some locations.
Access Management & Operation Improvement			
16	Ramp Metering	Ramp meter at Henderson Boulevard southbound entrance onto I-5; at Plum Street northbound entrance onto I-5; at Mottman Rd eastbound; at Cooper Point Road.	Retained for further consideration
17	Harrison Avenue	Add barrier/median with left turn channelization at major intersections.	Eliminated – Doesn't improve access to West Olympia
18	Cooper Point Road	Add barrier/median with left turn channelization at major intersections.	Retained for further consideration

2.3.4 Concepts Considered and Not Advanced Through the Screening Process

Concepts that were initially considered or discussed during the screening of grouped improvement options but not advanced included:

- Diverging Diamond Interchange and/or Continuous Flow-Double Crossing Intersection at Black Lake Boulevard – it was determined that there was insufficient room to implement this concept at the Black Lake interchange.
- Split Interchanges including connection of Crosby/Mottman and Black Lake interchanges – based on information contained in the technical memoranda for the WOAS, this concept was determined to be fatally flawed and, because it resulted in partial interchanges at both locations, was not considered consistent with policies allowing full interchange movement.
- Close Westbound Ramps at Crosby-Mottman Interchange – based on information contained in the technical memoranda for the WOAS, this concept was determined to be fatally flawed and not consistent with policies for providing full interchange movements.
- Close Westbound Off-ramp at Black Lake Boulevard and construct off-ramp to Yauger Way – based on information contained in the technical memoranda for the WOAS, this concept was determined to be inconsistent with WSDOT/FHWA policies for allowing full movements.
- Single Point Urban Interchange (SPUI) at Crosby/Mottman Interchange – a SPUI was considered during the Value Engineering Study conducted in 1996 for this interchange. At that time WSDOT and the City of Tumwater agreed not to build this interchange beyond five lanes at mid-block due to capacity limitations, and to keep the area as human scale as possible. Part of this agreement was to study additional future access to US 101. New access between US 101 and West Olympia would distribute traffic more evenly throughout the street network and take pressure off streets that otherwise would be overburdened. A diamond interchange design was adopted as a result of the study. Accordingly, there was no need to further consider this concept as part of the WOAS.
- Triple Left Turn from Black Lake Boulevard to Eastbound US 101 – was determined to be fatally flawed and not consistent with design criteria, particularly with respect to providing sufficient space for traffic to merge safely.
- Add Clover Leaf On-Ramps at Black Lake Boulevard – was determined to be fatally flawed and inconsistent with design standards that would discourage mixing loop ramps with a SPUI. Adding a loop with a direct ramp may cause additional vehicular conflicts.
- Change Harrison Avenue and 4th Avenue to a one-way couplet from the Harrison Avenue/Black Lake Boulevard intersection to the vicinity of the 4th Avenue bridge – previous studies for the 4th/5th Avenue Corridor examined this concept and found it inconsistent with the City's Comprehensive Plan goals, policies and visions for this street and neighborhood.
- Connect Deschutes Parkway to 4th Avenue roundabout – this was examined during the previous 4th Avenue Bridge study which demonstrated that the concept did not provide enough benefit to consider implementation.

2.4 HOW WERE IMPROVEMENT SCENARIOS PACKAGED AND EVALUATED?

Based on the screening of various grouped improvements, options that were selected for further consideration were packaged into preliminary alternatives called scenarios. The assessment of improvement scenarios focused on traffic operations to ascertain which packages of improvements would have the greatest potential for reducing congestion on local streets and along US 101 in West Olympia.

The development of improvement scenarios and their evaluation is more fully documented in technical memoranda prepared for the *2010 Study (Technical Memorandum 2, Existing 2007 and Year 2030 No Build)* (Parametrix 2008a) and *Technical Memorandum 3, Traffic Operations Analysis* (Parametrix 2008b).

2.4.1 Development of Improvement Scenarios

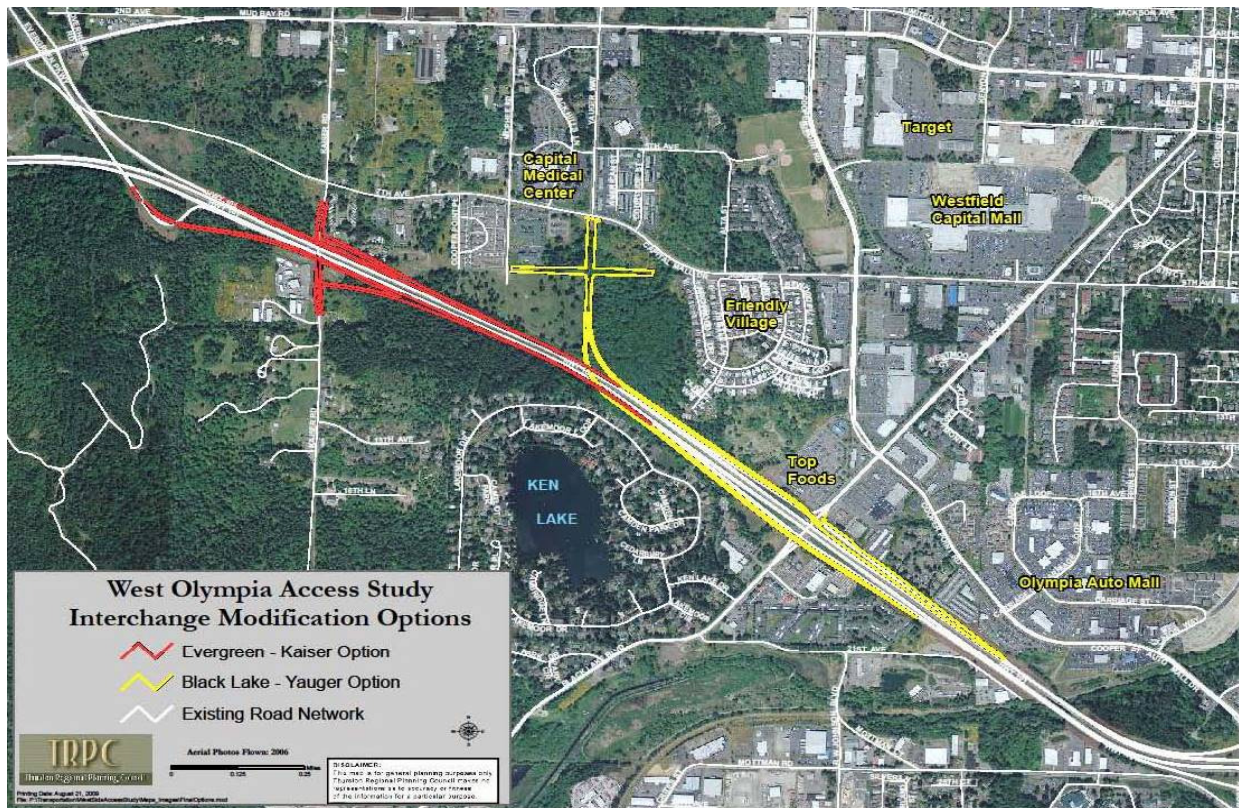
The result of the initial screening process eliminated potential improvement options with fatal flaws and identified a set of reasonable scenarios (Scenarios 1 through 7) to be carried forward for further consideration. During the evaluation process, WSDOT and the City of Olympia expressed a desire to conduct evaluation of two additional interchange improvement scenarios (Scenarios 8 and 9). These improvement scenarios included:

- **No-Build (Scenario 1)** – The No-Build Scenario 1 accounted for various local and State projects identified for construction and completion prior to 2030, but did not include any improvements to US 101 or the local transportation system directly related to the build scenarios.
- **Local System Only (Scenarios 2 and 3)** – These scenarios focused on changes to the local transportation system only and would not modify US 101 access. The

difference between these scenarios was the inclusion of three street connections between existing roadway facilities in the southwest residential area of West Olympia, collectively referred to as the “Southwest Connections.” Scenario 2 did not include the Southwest Connections and Scenario 3 did include the Southwest Connections. See *2010 Study Technical Memorandum 3, Traffic Operations Analysis* for a complete list of the roadway improvements included in Scenarios 2 and 3.

- **Black Lake Boulevard Interchange (Scenarios 4 and 5)** – In addition to the improvements included in the Local System Only Scenarios 2 and 3, these scenarios also included modified access to US 101. The existing Black Lake Boulevard interchange would be modified with an additional lane diverging from the westbound off ramp that connects to Yauger Way SW, and another lane from Yauger Way SW would connect the existing eastbound on-ramp prior to merging with the US 101 mainline. Scenario 4 would not include the Southwest Connections and Scenario 5 would include the Southwest Connections. The US 101 elements of these scenarios are presented in Figure 2-2.
- **Evergreen Parkway Interchange (Scenarios 6 and 7)** – These scenarios also included the arterial network improvements included in the Local System Only Scenarios 2 and 3, but also modified access to US 101. These scenarios included straightening the existing eastbound on-ramp and westbound off-ramp at Evergreen Parkway such that both gore points with US 101 would be located further east. Ramps to and from Kaiser Road SW would also be added that would

Figure 2-2. US 101 Improvement Concepts at Black Lake Boulevard and Evergreen Parkway



connect to the re-aligned on- and off-ramps. Both relocated eastbound and westbound ramps would parallel US 101 under the Kaiser Road SW bridge. Scenario 6 does not include the Southwest Connections and Scenario 7 does include the Southwest Connections. The US 101 elements of these scenarios are also presented in Figure 2-2.

- **Hybrid Interchange (Scenarios 8 and 9)** – These scenarios are a hybrid of the Black Lake Boulevard and Evergreen Parkway interchange scenarios. Similar to the Black Lake Boulevard interchange scenarios, a second ramp would be constructed that diverges from the existing Black Lake Boulevard westbound off-ramp and would connect

to Yauger Way SW. Unlike the Black Lake Boulevard interchange scenarios, this new ramp would continue westbound and terminate at Kaiser Road. In the eastbound direction of US 101, an additional on-ramp from Kaiser Road would be constructed downstream of the existing on-ramp from Evergreen Parkway, which would also be straightened and connect to US 101 further east of its current location. The arterial network improvements included in the Local System Only Scenarios 2 and 3 would also be included in the Hybrid Interchange scenarios. Scenario 8 does not include the Southwest Connections and Scenario 9 does include the Southwest Connections.

2.4.2 Evaluation of Improvement Scenarios

As noted above, the evaluation of the nine improvement scenarios focused primarily on traffic operational impacts with some consideration given for accessibility to/from key destinations, accommodation of seasonal traffic peaks and general project feasibility

Based on the assessment conducted for the nine West Olympia US 101 access improvement scenarios the following recommendations were made:

Local System Only Scenarios 2 and 3

During the analysis of the Build Scenarios (3 through 9) it was determined that the Local System Only Scenario impacts would be substantially higher than other build scenarios. Intersections needing improvement are generally built out and implementation would require property acquisition for right-of-way. Full or partial displacement of existing uses would substantially increase project costs, lengthen project schedules, and would likely be more difficult to implement.

Analysis further indicated that:

- They could not resolve traffic operational problems at the highly congested US 101/Black Lake Boulevard SUI or the Black Lake Boulevard/Cooper Point Road intersection.
- With feasible improvements only, several intersections would operate at unacceptable LOS E or F conditions with high delay at US 101/Black Lake Boulevard SUI, Black Lake Boulevard/Cooper Point Road as well as three to four other intersections.
- There would be no accessibility or travel time benefit to Capital Medical Center and other key locations compared to other build scenarios.

- There would be no benefit during holiday shopping time periods, particularly around Capital Mall compared to other build scenarios.

Based on this evaluation, a recommendation was made to eliminate the Local System Only Scenarios from further consideration. This recommendation was presented to the project Stakeholder Group on September 29, 2008. At this meeting, the group agreed that the Local System Only street improvements would not accommodate future traffic demand in the study area and, thus, would not satisfy the Purpose and Need for the project.

Scenarios 4 through 9

Traffic operations at local intersections that form the “Triangle” and Black Lake SUI coordinated system were of paramount importance in assessing the difference among scenarios 4 through 9. Analysis showed that both the Black Lake Boulevard and Evergreen Parkway interchange scenarios had merit and could potentially address future mobility needs in West Olympia. Operational differences between these scenarios were minor enough to render them all as feasible options warranting further consideration.

Black Lake Scenarios 4 and 5, and to a lesser degree the Hybrid Scenarios 8 and 9, would also provide important travel time and accessibility benefits to the Capital Medical Center by providing a direct route between the hospital and US 101 for emergency vehicles, avoiding the highly congested Black Lake Boulevard and Cooper Point Road corridors. In a similar fashion, the Black Lake Boulevard and Hybrid Scenarios also provide an important secondary route to and from Capital Mall and surrounding retail businesses during peak holiday shopping weekends and seasons. A holiday season peak period traffic analysis was not specifically conducted; however, the new ramp connection to and from Yauger Way would likely improve safety and reduce vehicle queues and congestion

that oftentimes extends into the US 101 mainline during these peak shopping days.

Recommendations

Based on this information, it was recommended that further evaluation be conducted on Interchange Scenarios 4 through 9. This analysis would include concept design, accident/safety analysis, and an environmental screening evaluation to provide more detailed information to select a recommended interchange alternative to move forward into the Interchange Justification Report (IJR) process.

2.5 HOW WAS THE 2010 RECOMMENDED ALTERNATIVE IDENTIFIED?

The evaluation of Scenarios 4 through 9 focused on improvements to the interchanges at Evergreen Parkway, Black Lake Boulevard and a hybrid combination of both interchanges. The evaluation was conducted using criteria that are described below leading to the recommendation of a preferred alternative.

2.5.1 Screening Criteria to Identify a Recommended Alternative

Five criteria were identified each of which was further defined by several performance metrics as described below.

Criterion 1: Built Environmental Impacts

- Disruptions and Displacements – quantitative estimate of the net number of properties adversely affected and an initial assessment of full or partial acquisitions.
- Right-of-way Needs – quantitative estimate of additional right-of-way requirements.

Criterion 2: Natural Environmental Impacts

- Wetlands/Shorelines - planning level assessment of impacts and quality of impacted wetlands and wetland buffers.
- Water Resources (Stormwater) – quantitative estimate of added impervious surface, planning level estimate of impacts and quality of impacted water basins including the Allison Springs wellhead protection area.

Criterion 3: Constructability

- Constructability – qualitative judgments based on potential overall construction schedule, impacts to traffic operations, ability to sequence and phase project delivery, etc.
- Probable Construction Cost – estimate based on INROADS footprint cut/fill volumes and typical markups for similar projects. An assessment was also made of bridge structure and retaining wall needs.

Criterion 4: Safety

- Compatibility with Freeway Safety – quantitative list of the number of congested conflict zones (ramps, merge and diverge segments) in relation to levels of service (LOS).
- Compatibility with Local Street Safety – quantitative assessment of impacts to key intersections based on the number of crashes per year in relation to traffic volumes.
- Ability to Meet Design Standards – nominal safety was examined in reference to compliance with standards, warrants, guidelines and sanctioned design procedures. Design deviations and the magnitude of design issues were identified.

Criterion 5: Transportation Benefits

- Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) – quantification from the regional model of projected daily amount of vehicle travel and the total daily hours of travel for vehicles on the study area road system.
- Compatibility with Freeway Operations – quantification of the number of poorly performing mainline segments defined as LOS D, E or F and mainline travel speeds.
- Compatibility with Local System Operations – based on the potential for increases or decreases in LOS at key intersections (focused on the “Triangle” and the Black Lake SPUI intersections).

Each alternative scenario was scored for each criterion on a scale from 1= (most impact and no benefit) through 5 = Best (no impact or highest benefit).

2.5.2 Evaluation Results

Table 2-2 presents a summary of key findings and conclusions from the screening of three different interchange alternative scenarios (Evergreen Parkway Interchange, Black Lake Boulevard Interchange, and a Hybrid Interchange). The advantages and disadvantages shown in this table were quantified according to the scoring system described above. The scoring process was conducted by project stakeholders and represents a consensus of opinion.

Table 2-2. Analysis Results for West Olympia Interchange Scenarios

Criteria	Element	Black Lake Interchange	Evergreen Interchange	Hybrid Interchange
1. Built Environmental Impacts	<i>Disruptions & Displacements</i>	<ul style="list-style-type: none"> • No displacements • No disruptions of access identified 	<ul style="list-style-type: none"> • Potential relocation of 3 mobile homes • Potential disruption of access to residential & commercial properties in the US 101/Kaiser Road interchange area 	<ul style="list-style-type: none"> • Potential relocation of 3 mobile homes • Potential disruption of access to residential & commercial properties in the US 101/Kaiser Road interchange area
	<i>Right-of-Way</i>	<ul style="list-style-type: none"> • Less right-of-way acquisition (147,000 SF) • Impacts to platted and existing commercial developments (15,700 SF) 	<ul style="list-style-type: none"> • More right-of-way acquisition (240,000 SF) • No impacts to platted developments or existing commercial properties 	<ul style="list-style-type: none"> • More right-of-way acquisition (310,000 SF) • No impacts to platted developments or existing commercial properties
2. Natural Environmental Impacts	<i>Wetland/ Shorelines</i>	<ul style="list-style-type: none"> • Slightly less wetland and buffer impacts (1.7 ac) 	<ul style="list-style-type: none"> • Slightly more wetland and buffer impacts (2.5 ac) 	<ul style="list-style-type: none"> • Slightly more wetland and buffer impacts (2.1 ac)
	<i>Water Resources (Stormwater)</i>	<ul style="list-style-type: none"> • Less impacts based on proximity to Allison Springs (11.7 ac) • Slightly more impervious surface (8 ac) 	<ul style="list-style-type: none"> • More impacts based on proximity to Allison Springs (21.4 ac) • Slightly less impervious surface (7 ac) 	<ul style="list-style-type: none"> • More impacts based on proximity to Allison Springs (30.8 ac) • Slightly more impervious surface (14.2 ac)
3. Constructability	<i>Constructability</i>	<ul style="list-style-type: none"> • More difficult to construct: periodic and major disruptions to traffic • More bridge structures and retaining walls required 	<ul style="list-style-type: none"> • Least difficult to construct: periodic disruptions to traffic, can be built mostly outside of roadway • Least bridge structures and less retaining walls required 	<ul style="list-style-type: none"> • Moderately difficult to construct periodic disruptions to traffic, can be built mostly outside of roadway • Fewer bridge structures and less retaining walls required

Table 2-2 Continued. Analysis Results for West Olympia Interchange Scenarios

Criteria	Element	Black Lake Interchange	Evergreen Interchange	Hybrid Interchange
	<i>Probable Construction Cost</i>	<ul style="list-style-type: none"> Higher estimated construction cost (\$86M) 	<ul style="list-style-type: none"> Lower estimated construction cost (\$34M) 	<ul style="list-style-type: none"> Higher estimated construction cost (\$85M)
4. Safety	<i>Compatibility with Freeway Safety</i>	<ul style="list-style-type: none"> Slightly better than Evergreen operations Does not affect interchange spacing 	<ul style="list-style-type: none"> Essentially worse operations than Black Lake and Hybrid Shortens interchange spacing in both directions 	<ul style="list-style-type: none"> Slightly better than Evergreen operations Shortens interchange spacing in one direction
	<i>Compatibility with Local Street Safety</i>	<ul style="list-style-type: none"> Essentially equal to other scenarios 	<ul style="list-style-type: none"> Essentially equal to other scenarios 	<ul style="list-style-type: none"> Essentially equal to other scenarios
	<i>Ability to Meet Design Standards</i>	<ul style="list-style-type: none"> Potential design deviation and more design issues 	<ul style="list-style-type: none"> No design deviations identified and fewer design issues 	<ul style="list-style-type: none"> Potential design deviation and more design issues
5. Transportation Benefits	<i>VMT and VHT</i>	<ul style="list-style-type: none"> Slightly less VMT and VHT 	<ul style="list-style-type: none"> Slightly more VMT and VHT 	<ul style="list-style-type: none"> Slightly less VMT and VHT
	<i>Compatibility with Freeway Operations</i>	<ul style="list-style-type: none"> Slightly better at key locations 	<ul style="list-style-type: none"> Slightly worse at key locations 	<ul style="list-style-type: none"> Slightly worse at key locations
	<i>Compatibility with Local System operations</i>	<ul style="list-style-type: none"> Essentially equal with other scenarios at key intersections 0 key intersections operating at LOS F 4 new turn pockets at key locations (“Triangle” intersections and coordinated system) 	<ul style="list-style-type: none"> Essentially equal with other scenarios at key intersections 1 key intersection operating at LOS F 4 new turn pockets at key locations (“Triangle” intersections and coordinated system) 	<ul style="list-style-type: none"> Essentially equal with other scenarios at key intersections 0 key intersections operating at LOS F 4 new turn pockets at key locations (“Triangle” intersections and coordinated system)

2.5.3 Identification of the Recommended Alternative

Concurrent with the evaluation process, WSDOT, the City of Olympia and TRPC conducted extensive coordination efforts to arrive at a recommended course of action. These recommendations were presented to the study Stakeholder Group on May 19, 2010.

- Eliminate the stand-alone Black Lake interchange alternative from further consideration; this recommendation is based on the projected high eastbound on-ramp traffic volume with a short weave section, high construction costs, and potential noise and aesthetic impacts to the Ken Lake neighborhood.
- Advance the Hybrid interchange into the next phase of project development which includes:

- Complete the Interchange Justification Report (IJR) process (Engineering and Operational Acceptability)
- Complete environmental documentation to comply with the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA), and
- Obtain final IJR approval in order to commence preliminary engineering.

In addition, phasing of the Hybrid Interchange was recommended, consisting of the following possible sequence of actions:

- Phase 1 – Kaiser on- and off-ramps: this would provide a cost-effective and

timely solution to current and future access and circulation needs, and serve existing land use and planned future development. These ramps are recommended to be the first phase of this long-term project because it provides both on- and off-ramp to US 101, as compared to the Yauger Way connection which would only provide an off-ramp. The recommended hybrid interchange improvements in the vicinity of Kaiser Road are illustrated in Figure 2-3.

- Phase 2 – Westbound Yauger Way off-ramp and flyover ramp connection from Black Lake Boulevard Interchange: this phase would allow even greater distribution of traffic serving both current commercial and future land uses as planned. It would further alleviate growing traffic volumes at the intersection of Black Lake Boulevard and Cooper Point Road, and potentially provide access and circulation to the proposed development at Friendly Village. The recommended hybrid interchange improvements in the vicinity of the Yauger Way extension (including the flyover ramp at Black Lake) are illustrated in Figure 2-4.
- Phase 3 – Evergreen eastbound on-ramp re-alignment: this was determined to be an independent project that could be constructed at any time depending on funding availability. This project would consist of improving the design speed and geometry for the eastbound on-ramp. The third phase of project development was not included in analysis conducted for this IJR. Further discussion of the Preferred Alternative is presented in Section 2.6.

2.6 HOW WAS THE 2010 HYBRID ALTERNATIVE REFINED AND THE PREFERRED ALTERNATIVE IDENTIFIED?

The 2010 West Olympia Access Study recommended that City of Olympia proceed with the next phase of implementation including an IJR, environmental documentation, and supporting design work to achieve formal approval to build new ramps to and from US 101. These tasks are the subject of this IJR report.

Since the 2010 Study was completed, there have been many changes in both the West Olympia community and its transportation system. The *Report on Traffic Sensitivity Analysis* (Appendix B) documents the changes in roadways, land use and traffic volumes that have occurred since the 2007 base year previously analyzed. This effort was undertaken to determine the usefulness of the prior analysis in moving forward with a preferred course of action, and/or to identify whether modifications to the prior analysis would be necessary. As described in more detail under Policy Point 1, the analysis concluded that there was no substantive change in land use, traffic volumes or travel forecasts, and that the conclusions of the prior study should be considered as a valid starting point for more refined interchange analysis.

2.6.1 Development of Initial Interchange Design Options

A key objective in the exploration of design options for the recommended alternative was to reduce project costs by considering the feasibility of an at-grade connection to the Yauger Way off-ramp and road extension through the US 101/Black Lake Boulevard interchange. The 2010 Study recommended that this movement be accommodated on a flyover ramp to minimize potential traffic impacts at the Black Lake Boulevard interchange. However, the

Figure 2-3. Hybrid Interchange Alternative – West End

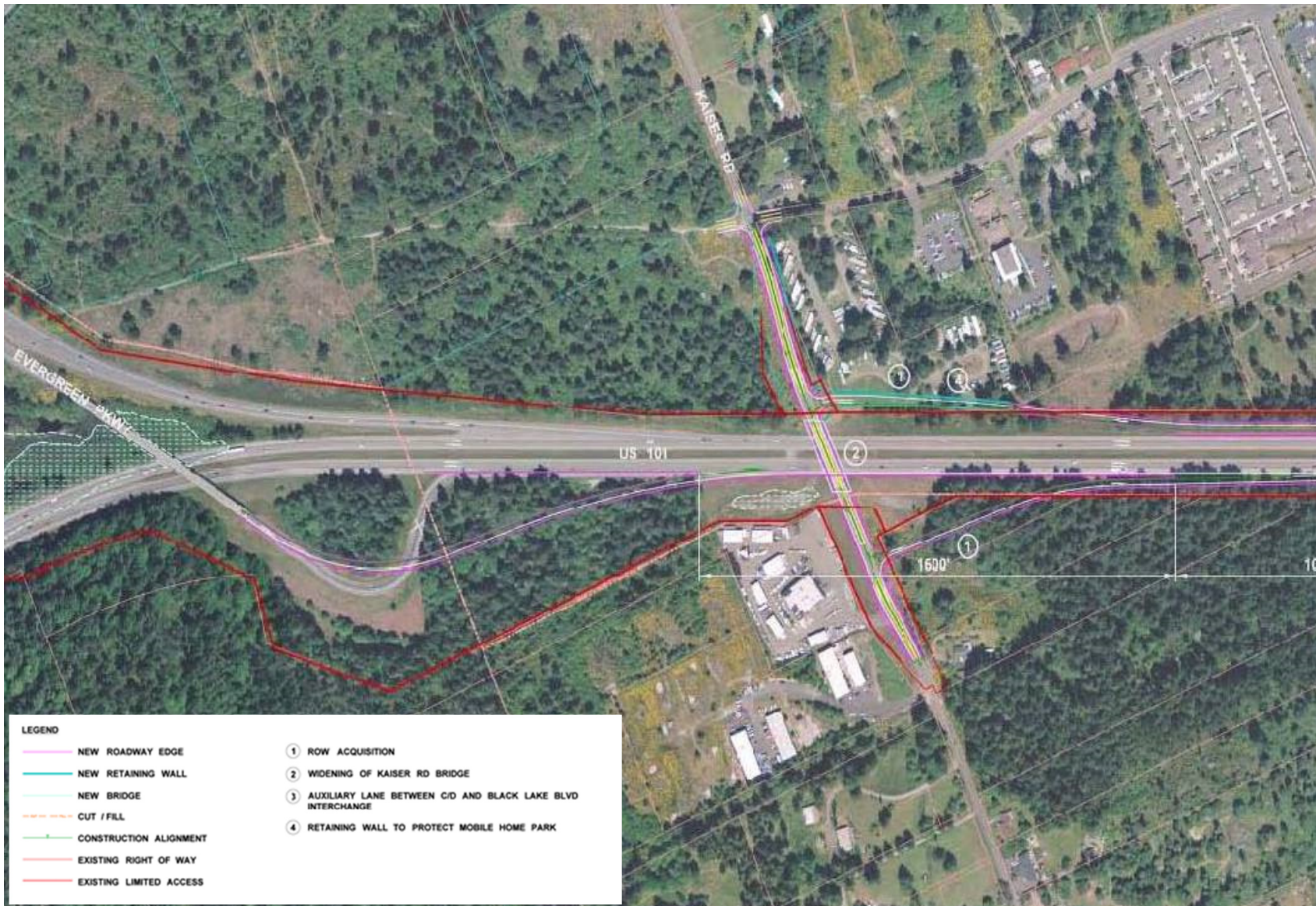


Figure 2-4. Hybrid Interchange Alternative – East End



flyover was very expensive and could be difficult to fund with existing financial resources.

The first question addressed by the updated analysis was whether there was a viable interchange concept that included an at-grade connection to Yauger Way. The goal of any modified design option was to incorporate all of the connections achieved by the Hybrid Alternative recommended at the end of the 2010 Study. These included access from westbound US 101 to both Yauger Way and Kaiser Road, and from Kaiser Road to eastbound US 101.

To explore the range of viable improvements, several specific interchange design options were developed and evaluated. These included:

- Yauger Way Flyover (this was the recommended alternative and was included in the analysis of design options for comparative purposes)
- Diverging Diamond Interchange that included a through movement to connect with Yauger Way
- Modified Single Point Urban Interchange (SPUI) that included a through movement to connect with Yauger Way

These three design options are described below.

Flyover Ramp Design Option

The flyover ramp design option was the recommended Hybrid Alternative and was included in this initial assessment of potential interchange modifications for comparative purposes. The general layout and context of this design option is illustrated in Figure 2-4 and shown in greater detail in Figure 2-5.

Diverging Diamond Interchange Design Option

Figure 2-6 illustrates the diverging diamond design option as it could be implemented at the US 101/Black Lake Boulevard interchange. This improvement would include an at-grade crossing providing access to Yauger Way. The diverging diamond interchange (DDI) is a

relatively new concept that requires traffic on the cross-street to cross-over from the right side of the road to the left as it passes through the interchange area. This allows both right and left turns onto and off of the freeway to be made while avoiding conflict with on-coming through-moving traffic. Cross-over points are signalized and operate together, thus increasing efficiency of the entire interchange.

Modified Single Point Urban Interchange with Through Lane (THRUI) Design Option

As illustrated in Figure 2-7, this design option would convert an existing westbound left turn lane to a westbound through lane at the existing SPUI interchange. This through lane would provide a direct connection to Yauger Way. For purposes of this IJR, a SPUI with a through lane is referred to as a THRUI.

2.6.2 Evaluation of Initial Interchange Design Options

The general feasibility of the initial interchange design options was tested to determine whether there were any viable concepts that could provide an at-grade direct connection to Yauger Way. Accordingly, analysis focused on the DDI and THRUI design options.

Diverging Diamond

A key challenge of this design option at the US 101/Black Lake Boulevard interchange was the very limited spacing between the two existing sets of directional ramps. DDI's typically have more widely-spaced ramps that provide longer space for traffic queues between ramp signals. At the US 101/Black Lake Boulevard interchange, the ramp signals would be approximately 180 feet apart which is a much shorter distance than is typical. WSDOT staff prepared a PM peak hour traffic operational simulation for the DDI using the Vissim software that clearly illustrated a problem with this limited vehicle storage.

Figure 2-5. US 101/Black Lake Boulevard Yaeger Flyover Ramp Design Option

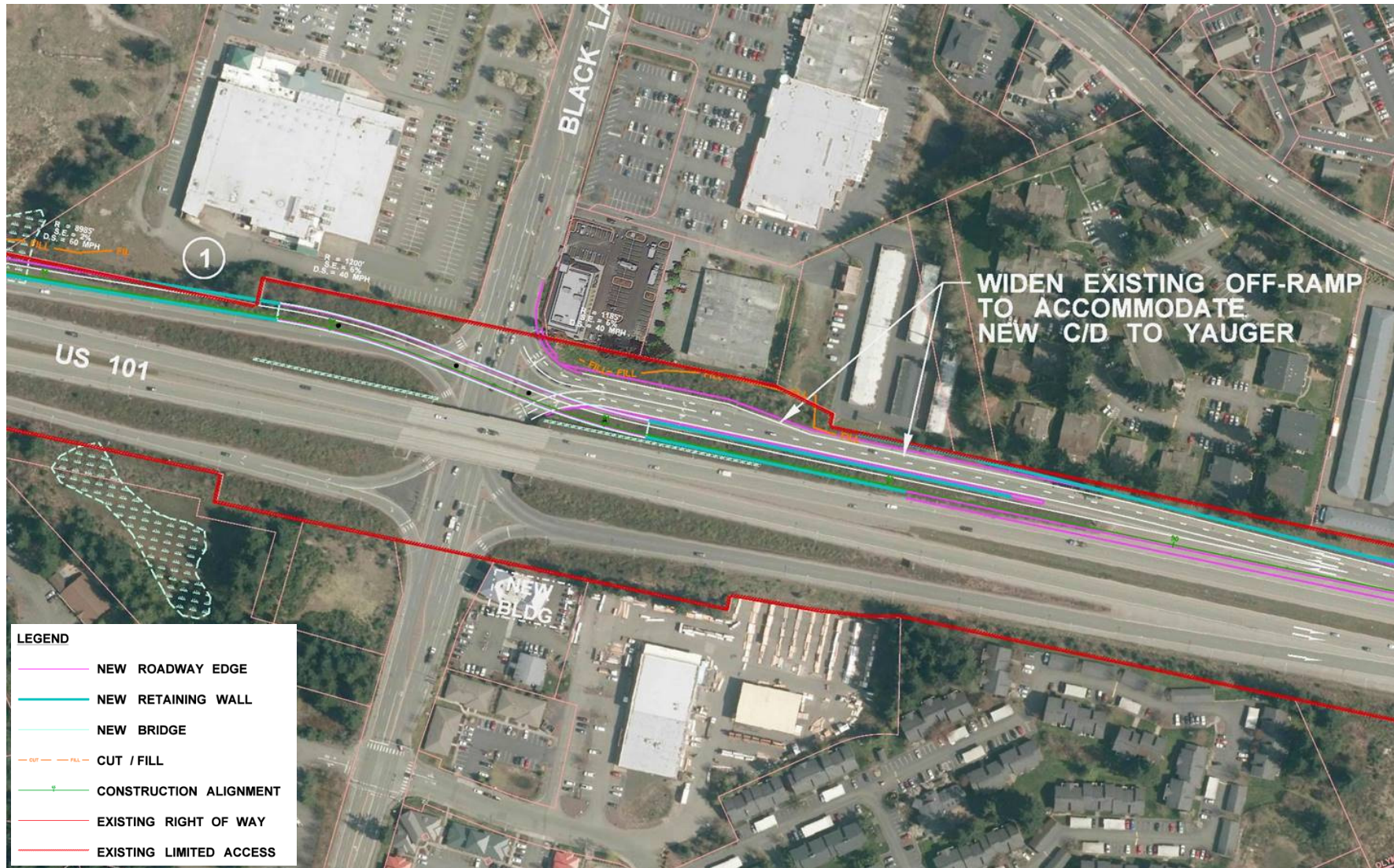


Figure 2-6. US 101/Black Lake Boulevard Modified Single Point Urban Interchange Design Concept (THRUI)

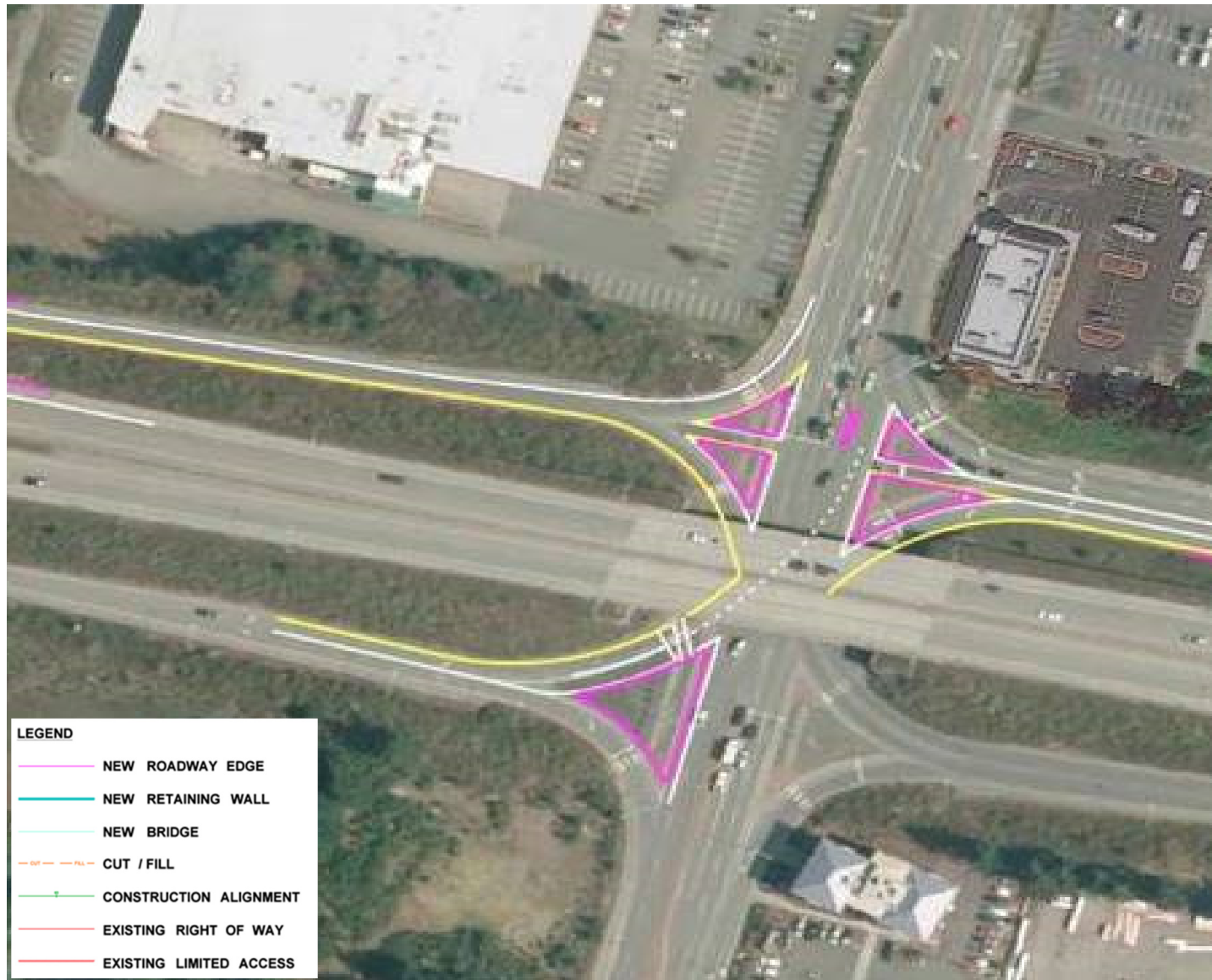
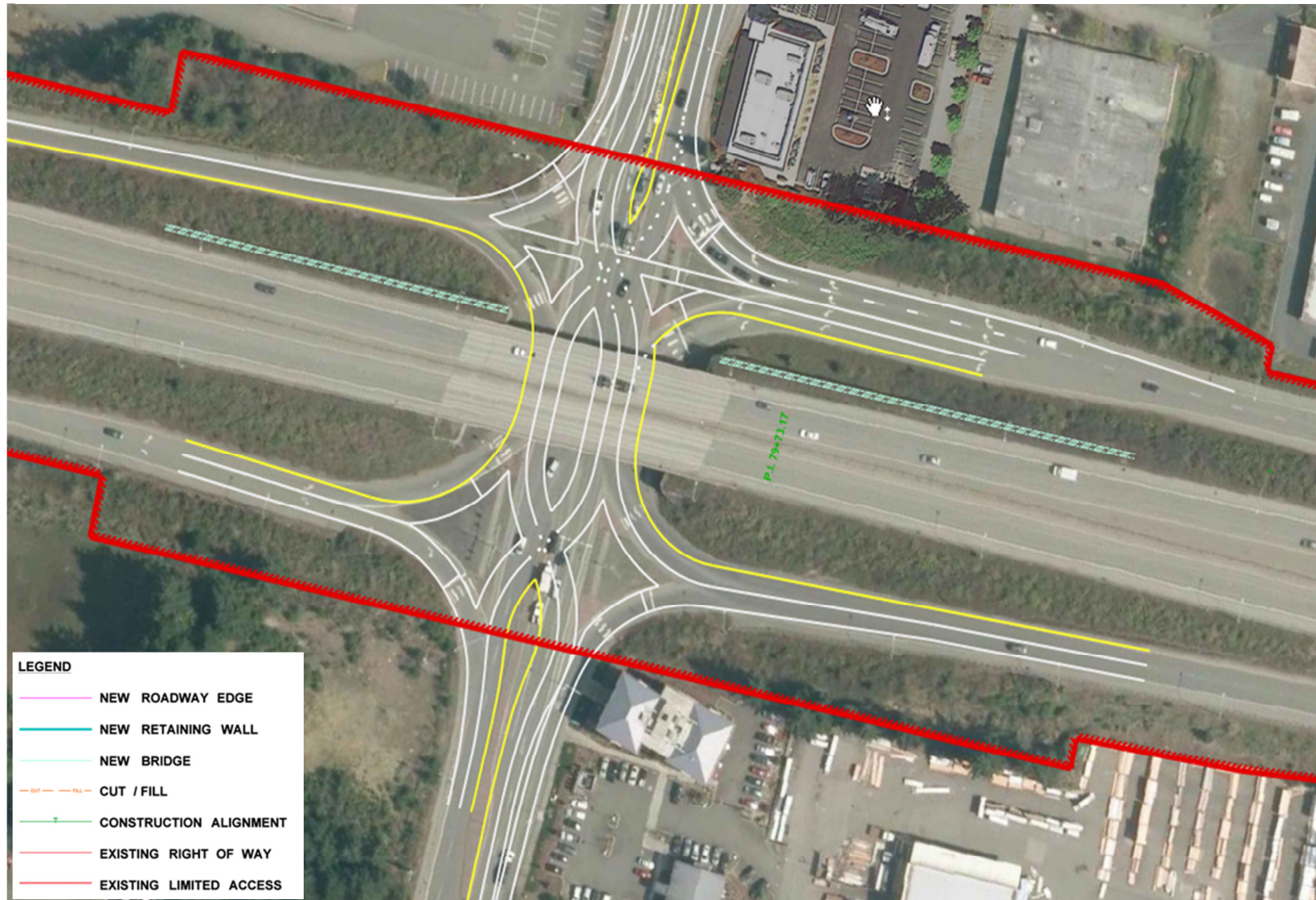


Figure 2-7. US 101/Black Lake Boulevard Diverging Diamond Interchange (DDI) Design Concept



Due to the short stacking distance for northbound traffic at the northerly cross-over signal, vehicles in this simulation regularly filled the entire space between the northerly and southerly cross-over signals, effectively limiting the ability of eastbound traffic to turn left off the freeway.

The short vehicle stacking distance between the two signals also raised concerns about accommodating large vehicles making the “crossing” maneuver.

Single Point Urban Interchange with Through Lane (THRUI)

Traffic operations analysis conducted for the THRUI design option indicated that this concept could be made to work successfully and could be designed to incorporate a pedestrian crossing of Black Lake Boulevard at the interchange.

Conclusions and Recommendations

Unlike the flyover design option, both the DDI and the THRUI design options would not require a significant reconstruction of the existing interchange and, thus, would have a relatively lower cost. However, for the DDI to operate successfully, it would be desirable to increase the vehicle stacking distance between the northern and southern cross-over signals. This could significantly increase the cost of this option, and would result in major property acquisition impacts. For this reason the DDI concept was eliminated from further consideration. It was recommended that both the THRUI and the flyover design options at the US 101/Black Lake Boulevard interchange advance for further design and analysis.

2.6.3 Development and Evaluation of Refined Design Options

Based on the analysis discussed above, two at-grade interchange design options were

identified for more detailed traffic operations analysis and for evaluation of overall system performance. These included:

- Option 1 – SPUI Modification (THRUI) included:
 - An at-grade westbound through lane from the Black Lake Boulevard off-ramp to a westbound collector/distributor road parallel to and along the north side of US 101 to Kaiser Road.
 - A westbound off-ramp from the collector/distributor road to access an extension of Yauger Way.
 - A westbound off-ramp from the collector/distributor road to access Kaiser Road.
 - A direct on-ramp from Kaiser Road to eastbound US 101.
- Option 2 – SPUI Modification (THRUI) included:
 - An at-grade westbound through lane from the Black Lake Boulevard off-ramp to a westbound collector/distributor road parallel to and along the north side of US 101 to an extension of Yauger Road.
 - A direct off-ramp to Kaiser Road from westbound US 101.
 - A direct on-ramp from Kaiser Road to eastbound US 101.

The details of Option 1 are presented in Figure 2-8, while the details of Option 2 are presented in Figure 2-9.

Figure 2-8. THRU I Concept Design Option 1

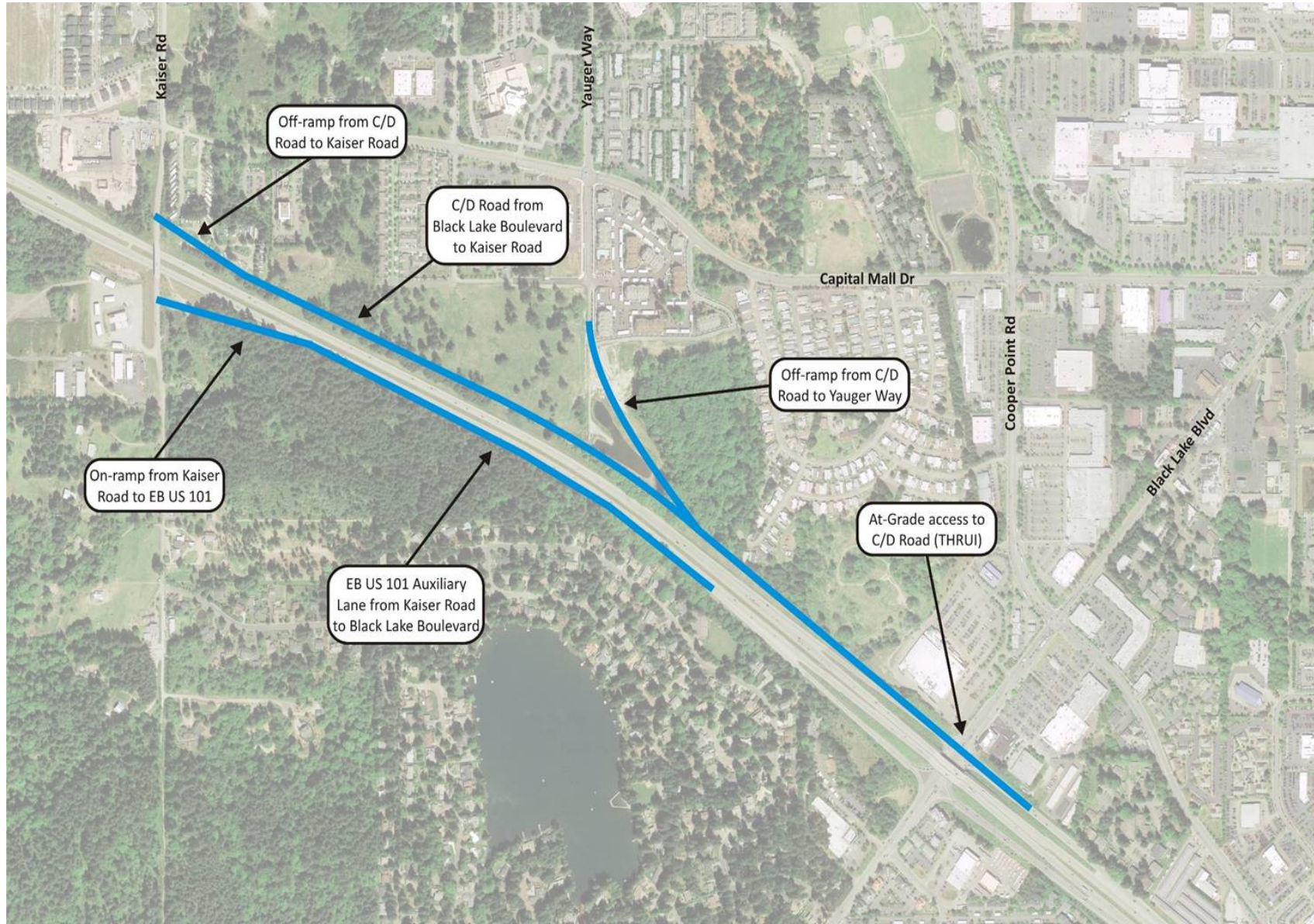
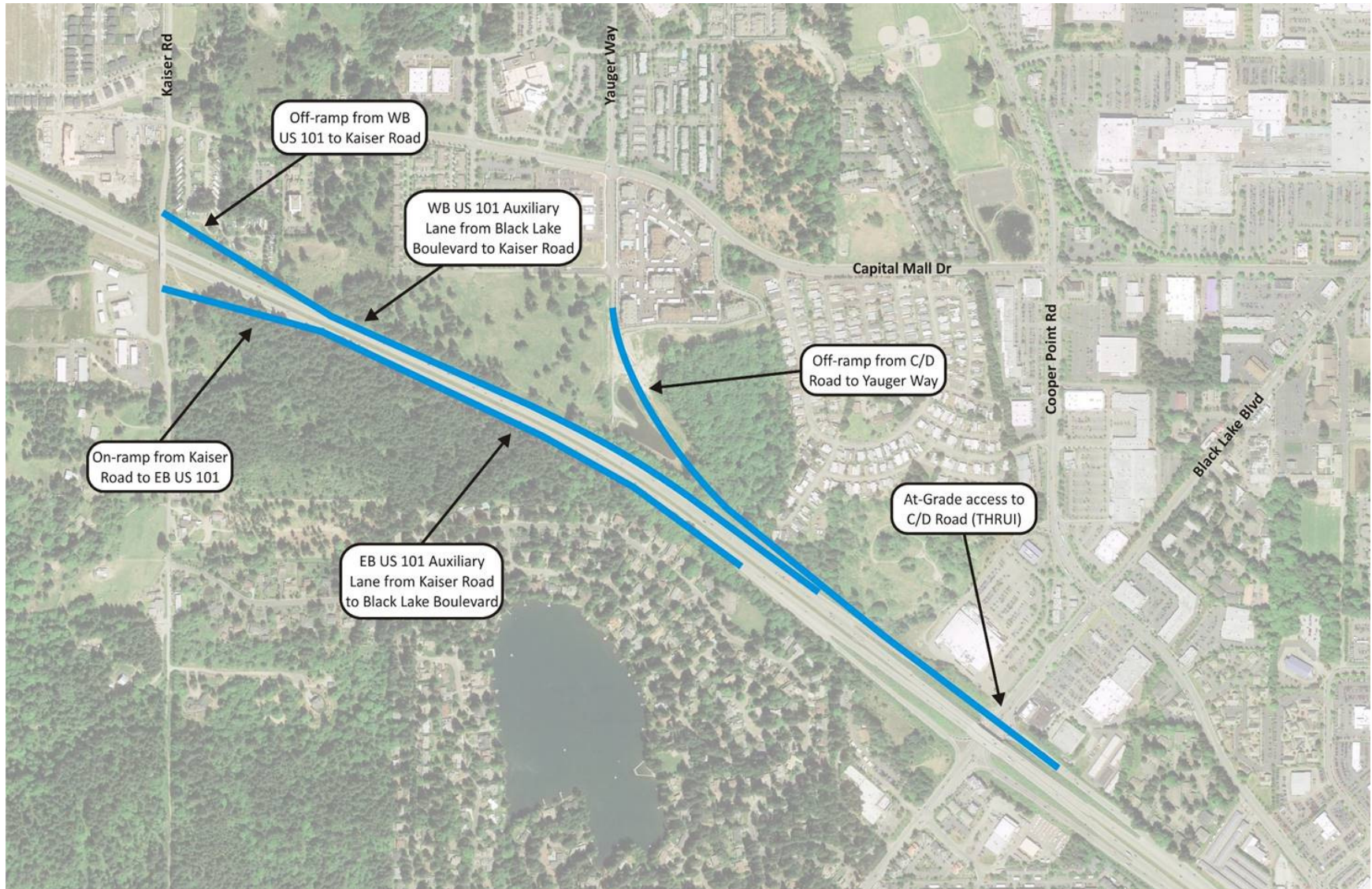


Figure 2-9. THRU Concept Design Option 2



Evaluation of Refined Design Options

Evaluation of the refined design options for the modified SPUI (THRU) concept was based primarily on traffic operational metrics including: levels of service, delay, volume-to-capacity (V/C) ratios, and vehicle queuing (back-ups from traffic signals). Other details that were considered included:

- Enhancements to overall roadway system accessibility including general shifts in traffic movement and effects on the intersection of Black Lake Boulevard at Cooper Point Road,
- Potential for pedestrian crossing(s), and
- Effects of traffic volume metering on the Black Lake interchange area by constraints at the Black Lake Boulevard/Cooper Point Road intersection.

Initial analysis was conducted using the Synchro/SimTraffic software tool. Where appropriate, the results of this analysis were confirmed using the more powerful Vissim microscopic simulation analysis tool. Analysis focused on the 2040 PM peak hour.

Analysis results are presented in Table 2-3. Conclusions are reflected in the right-hand column and labeled “Meets Objective”. This consensus-based finding indicates whether or not the option would provide all the desired connections to Yauger Way and Kaiser Road included in the recommended flyover option, and would operate acceptably. Acceptable operations are measured both in terms of intersection delay and levels of service, and traffic queuing impacts. Queuing impacts are expressed primarily as Pass/Fail based on the magnitude of the impact and its potential effects on the US 101 mainline and/or adjacent intersections.

Table 2-3. PM Peak Hour Traffic Operations Analysis Results – US 101/Black Lake Boulevard

Scenario	SimTraffic Analysis		Vissim Analysis		Meets Objective ¹
	Level of Service	Queuing	Level of Service	Queuing	
Existing 2014	C	Pass	D	Fail	Not Met
2040-Baseline	E	Pass	D	Pass	Not Met
2040-Option 1	F	Fail	NA	NA	Not Met
2040-Option 2	D	Pass	D	Pass	Met

¹ Provides identified access enhancements to Kaiser Road and Yauger Way, and maintains acceptable operations at US 101/Black Lake Boulevard interchange.

Based on the information in Table 2-3 and a discussion among project stakeholders, Option 2 was identified as the preferred improvement. This package has several benefits including:

- By adding direct ramps to Kaiser Road, the westbound through movement at the THRU would be reduced in comparison to Option 1 providing more

years of functionality at the interchange.

- The reduction in the at-grade through volume would likely result in the need for only one through lane at the interchange, minimizing weaving and merging conflicts at the westbound on-ramp.

- The option would reduce westbound diverging volumes at the Black Lake Boulevard interchange by moving traffic destined for Kaiser Road further west.

Consensus agreement on the THRUI option with westbound access to Yauger Way and direct connections to Kaiser Road was reached by project stakeholders at the March 18, 2015, IJR Support Group meeting. It was recommended that the study advance Option 2 for documentation in the IJR as the preferred alternative. Additionally, it was further recommended that design of the preferred alternative not preclude future development of a westbound flyover ramp at the US 101/Black Lake Boulevard interchange if this improvement should become necessary.

2.7 WHAT IMPROVEMENT CONCEPTS WERE CONSIDERED AND REJECTED?

Concepts that were considered and/or discussed but not advanced to the screening process included:

- Various changes at the US 101/Black Lake Boulevard interchange including a diverging diamond, closing the westbound off-ramp (and constructing an off-ramp to Yauger Way), creating a triple left turn onto Black Lake Boulevard eastbound onto US 101, and adding clover leaf ramps

- Various changes to the Crosby/Mottman interchange such as closing the westbound ramps, creating a SPUI at this location, and creating a split interchange with Crosby/Mottman Road and Black Lake Boulevard
- Changing Harrison and 4th Avenues to a one-way couplet
- Connecting Deschutes Parkway to the 4th Avenue roundabout

The various freeway interchange options were rejected for reasons that included inconsistency with WSDOT/FHWA policies to provide full directional movement, physical constraints, insufficient merge distance, or significant design conflicts. The Harrison/4th Avenue proposal was rejected as inconsistent with the City's *Comprehensive Plan* and vision. The 5th Avenue connection did not provide sufficient benefit.

In addition to the improvements discussed and rejected in the 2010 *Study*, the Decatur Street SW connection, generally between Carriage Drive SW and 15th Avenue, was also rejected. Analysis showed that this project would not provide sufficient transportation benefits to meet the Purpose and Need of the *West Olympia Access Study*. Additionally, it was later determined to be inconsistent with the City's *Comprehensive Plan* that identified a need for additional study of potential connections to the Southwest Neighborhood.

3. POLICY POINT 3: OPERATIONAL AND COLLISION ANALYSIS

Policy Point 3 discusses the operational and safety impacts associated with the No Build and Preferred Alternatives along US 101 from west of I-5 to west of the Evergreen Parkway interchanges. Included is a summary of analysis methodologies and assumptions, key findings, and conclusions with respect to traffic operations on US 101 (including the mainline and merge/diverge/weaving areas) and key project study area intersections. Also included is a discussion of existing traffic crash experience, expected crash issues with the No Build Alternative and potential safety enhancements with the Preferred Alternative.

Overall, the analysis shows that the proposed interchange modifications at the US 101/Black Lake Boulevard interchange and the additional ramps connecting US 101 to both Yauger Way and Kaiser Road would improve the safety and operation of the freeway by reducing merging and weaving volumes at the Black Lake Boulevard interchange. The proposed improvements would also improve traffic operations at the Black Lake Boulevard/Cooper Point Road intersection by providing additional routing choices into the West Side from US 101

that would redirect traffic away from this location. The new interchanges, with associated highway widening, will generally maintain or improve both opening year (2020) and design year (2040) operating conditions.

3.1 WHAT ARE THE PROPOSED IMPROVEMENTS FOR WHICH ANALYSIS IS BEING CONDUCTED?

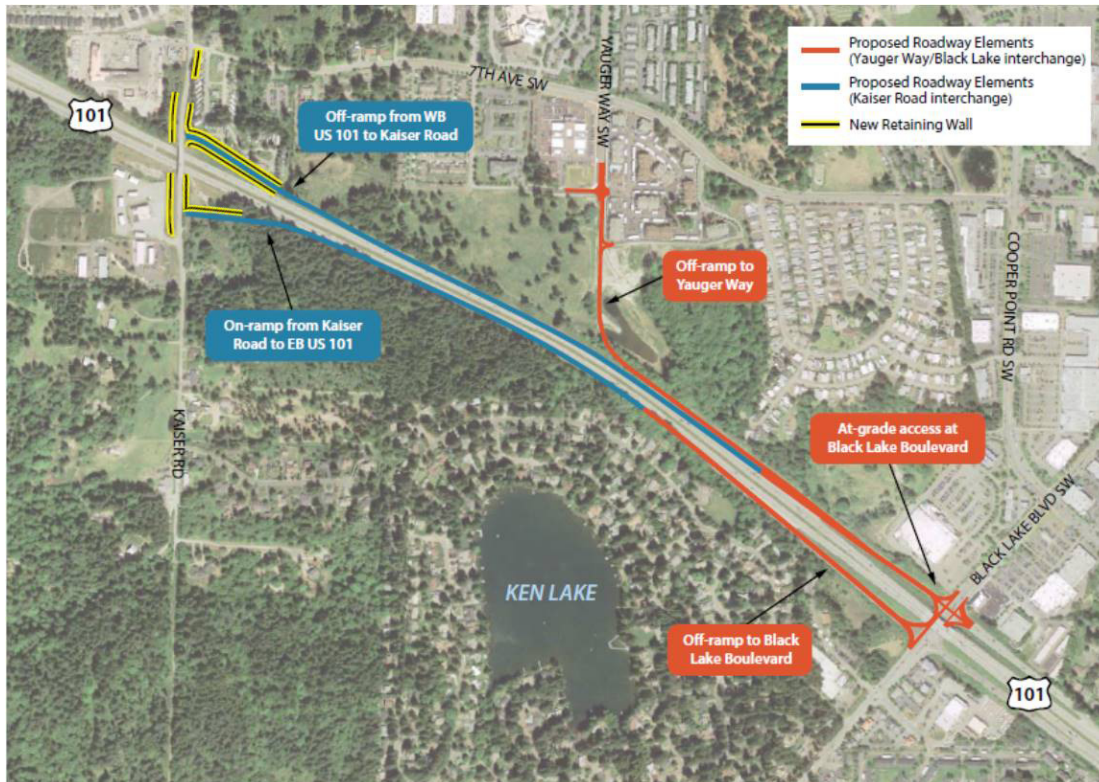
Table 3-1 describes the highway and local street improvements that are included in the Preferred Alternative. These improvements will include modifications to existing interchange configurations, installation of a new interchange, and local street improvements. These improvements are also illustrated in Figure 3-1.

More detailed discussion of the US 101 freeway access modifications is included in the Project Description chapter (PD) at the beginning of this IJR report, including Figure PD-2 (Black Lake Boulevard), Figure PD-3 (Yauger Way) and Figure PD-4 (Kaiser Road).

Table 3-1. US 101 West Olympia Access – Proposed Improvements

Location	Improvement
<u>Improvements to US 101</u>	
US 101 at Kaiser Road	Add westbound off-ramp and eastbound on-ramp, construct ramp termini intersections with stop sign control
US 101 between Kaiser Road and Black Lake Boulevard	Add eastbound and westbound auxiliary lanes to connect with new US 101 ramps
US 101 at Black Lake Boulevard	Modify existing SPUI to add a westbound through lane to connect to new frontage road and off-ramp to Yauger Way
<u>Improvements to Local Street System</u>	
Kaiser Road @ 7 th Avenue	Install traffic signal
Yauger Way @ Capital Mall Drive	Install traffic signal

Figure 3-1. Preferred Alternative Improvements



3.2 HOW WAS TRAFFIC ANALYSIS CONDUCTED?

Initial guidance for the development and use of various analysis methodologies and assumptions for this IJR was presented in the *Methods and Assumptions Report* prepared for the project in October, 2014. This report identified the project area and key analysis locations, it discussed how traffic safety and operations analysis would be conducted, it outlined the traffic forecasting approach including adjustments to the existing TRPC regional model related to land use and the roadway network, and it identified a preliminary list of evaluation factors or Measures of Effectiveness. The *Methods and Assumptions Report* also determined that traffic analysis would be conducted for both the morning (AM) and afternoon (PM) peak hours for existing (2014) conditions, project opening year (2020) and project design year (2040).

This section provides a more detailed summary of the traffic analysis tools, methodologies and assumptions used in preparing analysis for the No Build and Preferred Alternatives.

3.2.1 Analysis Assumptions

Key assumptions incorporated into the traffic analysis for this IJR include the following:

- Traffic analysis and forecasts were based on AM and PM peak hour traffic counts collected largely by the City of Olympia in 2013, 2014 and 2015. The individual peak hour at each study intersection was used for the basis for analysis. A systemwide peak hour was not developed or used.
- For all study intersections within the City of Olympia, a two-hour peak average factor was applied to peak hour volumes. This was done for consistency

with the City's existing Concurrency Ordinance. For intersections along US 101 and outside the City of Olympia, peak hour volumes were used. See Section 3.2.3 below for a discussion of the two-hour peak average methodology.

- US 101 mainline truck percentages were calculated using data received from WSDOT. The same truck percentage was used for all of the study ramps. Actual counted truck percentages for each approach leg were used at project area intersections. These truck percentages were held constant in all future (2020 and 2040) scenarios.
- The actual counted intersection average peak hour factor (PHF) was used for the existing (2014) analysis. For all future analysis, a peak hour factor of 0.95 was used at all locations.

3.2.2 Traffic Analysis Tools

Three analysis tools were used in conducting traffic operations analysis for this IJR. These tools were used to analyze different components of the transportation system based on the advantages of each tool and the recommendations of the *Methods and Assumptions Report*. These three tools included:

- Vissim (for traffic operations analysis at and in the vicinity of the US 101/Black Lake Boulevard interchange).
- HCS (for freeway operations)
- Synchro (for signalized and unsignalized intersections)

Vissim

Vissim is a microscopic traffic analysis tool used for signal systems, freeway systems or a combined signal and freeway system typically having complex conditions. Vissim was used extensively in the 2010 *West Olympic Access Study* to assess existing and expected future peak hour traffic operations along US 101

(mainline as well as merge, diverge and weaving areas). Analysis using Vissim identified impacts associated with a range of improvement scenarios leading to the recommended "Hybrid Alternative" at the conclusion of the 2010 Study. Results from the earlier analysis will be discussed in this IJR, particularly in relation to existing and future No Build and Preferred Alternative operations.

Vissim analysis conducted specifically for this IJR focused on the interchange of US 101 at Black Lake Boulevard. This analysis tool was used to help address a refinement to the 2010 "Hybrid" Alternative to ensure that freeway and interchange traffic operations would continue to function acceptably. Version 5.4 of Vissim was used for the analysis, building on the earlier work effort. WSDOT Vissim protocols were followed.

HCS

The Highway Capacity Software (HCS) was originally created by the FHWA and marketed through the Center for Microcomputers in Transportation (McTrans). McTrans is now a full service software support center associated with the University of Florida. For this IJR, HCS 2010 (Version 6.65) was used for all mainline and ramp analysis with a few exceptions. The US 101/Black Lake Boulevard westbound off-ramp diverge is classified as a major diverge because it has a drop lane accompanied by a second exit lane. The *Highway Capacity Manual*¹ (HCM) provides an equation to use for major diverge analysis, which was used instead of the HCS 2010 software. Additionally, the US 101/Black Lake Boulevard eastbound on-ramp merge is classified as a major merge because it provides an add lane and a second entry lane. HCM 2010 methodology does not provide a means of analyzing major merge areas and is indicated by N/A in the tables summarizing analysis results.

¹ *Highway Capacity Manual*, Fifth Edition, Transportation Research Board, 2010.

Freeway mainline analysis using HCS, tested for consistency with the earlier study where Vissim analysis was conducted for full corridor to identify a recommended alternative. This is discussed in Sections 3.4 and 3.5.

Synchro

Synchro is a macroscopic analysis and optimization software tool used to evaluate both signalized and unsignalized intersection traffic operations. Version 8.0 was used for the analysis conducted in this IJR to identify intersection delays, levels of service, and volume-to-capacity ratios at all locations using the HCM 2010 output. Signal timing assumptions inherent in the Synchro analysis of intersections included:

- Existing 2014 Analysis - Timing data received from the City of Olympia was used
- Projected 2020 No Build - The existing timing data was used
- Projected 2020 with Preferred Alt – Signal optimization was performed at impacted study intersections
- Projected 2040 No Build – All signal timings were optimized
- Projected 2040 With Preferred Alt – Additional optimization was performed for impacted study intersections

The signal timing optimization for the intersection of Black Lake Boulevard with Cooper Point Road and the immediately adjacent signals (i.e., Cooper Point Road at Haggan entrance and Black Lake Boulevard at US 101) prioritized traffic volumes travelling northbound on Black Lake Boulevard between US 101 and Cooper Point Road. By prioritizing this movement, signal optimization focused on minimizing the effect of vehicle queues that might spillback towards the upstream intersection with US 101, potentially resulting in impacts to the freeway mainline. Signal optimization used an iterative approach which balanced the priority movement against all

other movements at the intersection to minimize delay on all approach legs as much as possible.

SimTraffic is a simulation software analysis tool that was used to check Synchro results for intersection and ramp queuing at key locations including: the new Kaiser Road on- and off-ramps at US 101, the US 101/Black Lake Boulevard ramps, and the intersections of Cooper Point Road with Black Lake Boulevard and the Haggan entrance, Kaiser Road with 7th Avenue, and Yauger Way with Capital Mall Drive. Traffic queuing results were reported at the 95th percentile. An average of five SimTraffic simulations was used to produce traffic queuing results.

No further quantitative Measures of Effectiveness (MOEs) were used in this IJR as an in-depth analysis was conducted using a broad array of MOEs in the 2010 Study to identify the initial recommended improvement. Repetition of the full array of MOEs was not considered necessary for this IJR as analysis focused largely on a refinement to the 2010 Study's hybrid alternative. A discussion of the MOEs used to identify the recommended alternative as part of the 2010 Study is included under Policy Point 2 and presented in greater detail in the technical memoranda associated with the 2010 Study.

3.2.3 Two-Hour Peak Average Analysis

The analysis of study intersections was conducted using traffic volumes for a single peak hour except for intersections located on streets under the jurisdiction of the City of Olympia. Analysis at these locations used a process consistent with the City's existing concurrency ordinance. This process uses an average hourly vehicle traffic volume that would occur during the highest consecutive two-hour period to determine how intersection levels of service would be affected. This measurement was used as a screening tool at all intersections and along all roadway segments to determine if there are any system deficiencies.

Given the daily variation in traffic counts on streets and intersections throughout the Project Area, average rates that reflected general characteristics of the system as a whole were used to convert two hour volumes to single hour data that could be analyzed by Synchro. Rates were developed for both arterial and collector streets. Every intersection involving one or more arterial roadways, as defined by the City of Olympia's *Comprehensive Plan*, used a rate of 0.95 to adjust peak hour traffic counts to reflect a two-hour volume average. For intersections without an arterial, a rate of 0.90 was used.

Once the two-hour peak average rates were calculated, they were then applied to the existing 2014 count volumes. For all of the horizon volume scenarios (2020 and 2040), the projected traffic volume growth increment from the regional travel demand model was then added to these adjusted existing volumes. In this way, since the existing counts had been adjusted to be two-hour peak average volumes, the future volumes would also contain this adjustment. Intersections with US 101 ramps and intersections falling within the City of Tumwater's jurisdiction were not adjusted with a two-hour peak average rate.

The method of calculating the rate, the decision to consolidate to two rates for all the intersections and the list of intersections to apply the rates were all discussed with and approved by City of Olympia staff. These discussions occurred primarily during the week of August 24th – August 28th, 2015.

3.3 WHAT FUTURE TRAFFIC VOLUMES ARE EXPECTED WITH THE PREFERRED ALTERNATIVE?

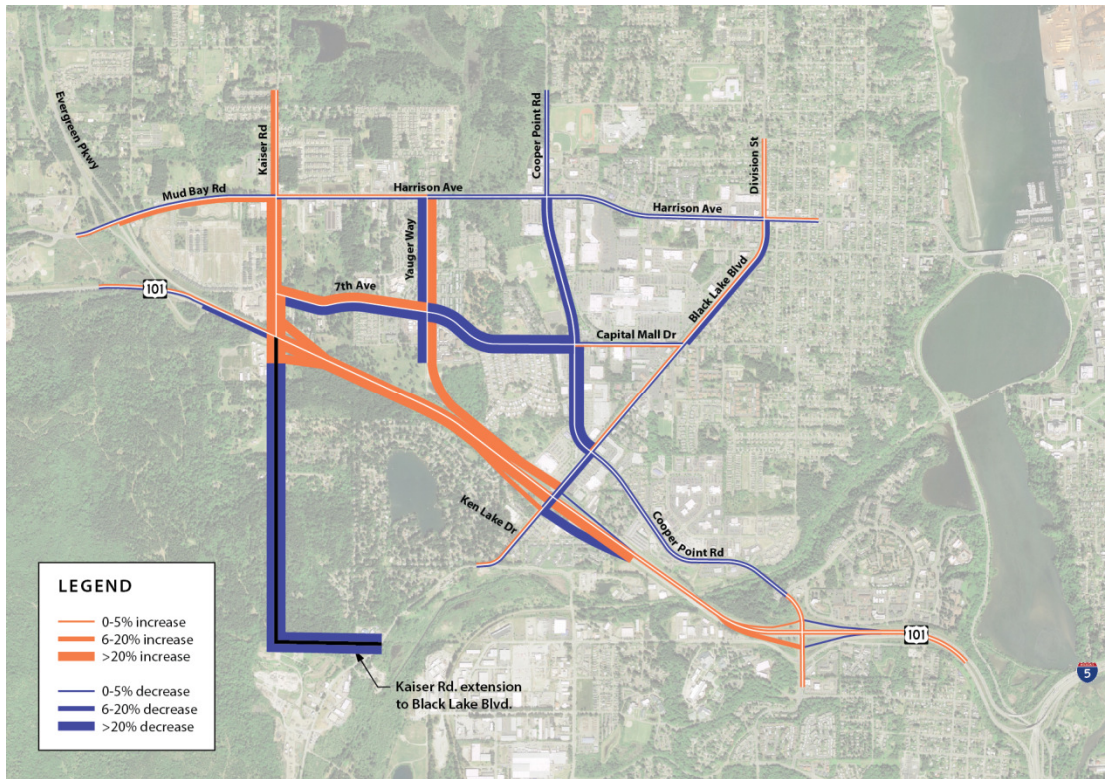
Peak hour traffic volumes for 2020 and 2040 with the Preferred Alternative were developed using the methodology described under Policy

Point #1 for the future No Build Alternative. The Preferred Alternative assumes the same land use and network that was used to estimate peak hour volumes for the No Build Alternative. This includes all of the same added projects that were incorporated into the 2035 TRPC regional travel demand model. See Appendix D for detailed spreadsheets showing the development and post-processing of these forecasts.

Figure 3-2 shows the expected shift in traffic with the Preferred Alternative in comparison with the No Build Alternative. Review of the information presented in this figure indicates that traffic patterns with the Preferred Alternative are expected to do precisely what they are intended to do. A key objective of the Preferred Alternative is to better balance travel to/from West Olympia between US 101 and the local street system by allowing some of the heavy volumes that currently travel on Cooper Point Road and Capital Mall Drive to remain on the highway longer. This shift provides significant benefit to the Black Lake Boulevard/Cooper Point Road intersection by moving traffic to the new ramps at Yauger Way and Kaiser Road. A traffic volume reduction is also expected on the Kaiser Road extension south of US 101. In the No Build Alternative this new local road would be used to access the US 101/Black Lake Boulevard interchange. With the Preferred Alternative, traffic can access eastbound US 101 directly at Kaiser Road.

This figure also shows that the addition of Preferred Alternative projections is expected to have very little impact on traffic movement at the edges of the project area, particularly to/from I-5. Traffic shifts are localized, generally between the Black Lake Boulevard and Kaiser Road interchanges. Consequently, the project is not expected to have any substantive impact on the interchange of I-5 and US 101.

Figure 3-2. 2040 PM Peak Hour Traffic Volume Shifts with the Preferred Alternative



3.4 WHAT ARE THE RESULTS OF TRAFFIC OPERATIONS ANALYSIS ON US 101?

This section describes the results of operations analysis for existing conditions, the No Build Alternative (for both 2020 and 2040), and the Preferred (Build) Alternative (also for 2020 and 2040 conditions). For US 101, analysis focused on the freeway mainline and merge/diverge and weaving areas. This analysis was based on procedures outlined in the 2010 Highway Capacity Manual (HCM) and used the 2010 Highway Capacity Software (HCS, version 6.65) except at the US 101/Black Lake Boulevard interchange as noted above under the discussion of HCS software. The HCM and HCS use density (number of vehicles per mile per lane) as a key measure to estimate freeway operating performance and determine levels of

service (LOS). For this IJR, LOS D or better along the freeway is considered acceptable.

To validate the freeway operational results, analysis developed for this IJR using HCS was compared with analysis conducted in the 2010 study for the No Build and Preferred Alternatives, which used the Vissim microsimulation software.

3.4.1 2014 Existing Conditions

Table 3-2 presents a summary of existing 2014 AM and PM peak hour traffic operations along various segments of US 101 in the project area. The peak hour traffic volumes upon which this analysis is based are presented in Figure 1-8. Operations analysis worksheets are included in Appendix E.

Table 3-2. 2014 AM and PM Peak Hour Freeway Operations

Mainline Segment	Segment Type	AM Peak Hour		PM Peak Hour	
		Density (pc/mi/ln)	LOS (HCM Equivalent)	Density (pc/mi/ln)	LOS (HCM Equivalent)
Eastbound US 101					
EB US 101 e/o Mud Bay Rd	Basic	19.9	C	8.3	A
EB US 101 Evergreen Pkwy On-Ramp	Merge	22.6	C	12.6	B
EB US 101 e/o Evergreen Pkwy	Basic	25.3	C	14.7	B
EB US 101 Black Lake Off-Ramp	Diverge	27.9	C	16.9	B
EB US 101 Black Lake On-Ramp	Merge	N/A	N/A	N/A	N/A
EB US 101 e/o Black Lake Blvd	Basic	20.5	C	16.7	B
EB US 101 Crosby Blvd Off-Ramp	Diverge	24.1	C	20.5	C
EB US 101 Crosby Blvd On-Ramp	Merge	17.0	B	19.9	B
EB US 101 e/o Crosby Blvd	Basic	25.2	C	26.1	D
Westbound US 101					
WB US 101 e/o Crosby Blvd	Basic	19.6	C	27.0	D
WB US 101 Crosby Blvd Off-Ramp	Diverge	25.7	C	31.0	D
WB US 101 Crosby Blvd On-Ramp	Merge	14.3	B	27.1	C
WB US 101 e/o Black Lake Blvd	Basic	11.6	B	21.4	C
WB US 101 Black Lake Blvd Off-Ramp	Diverge	11.3	B	20.8	C
WB Us 101 Black Lake Blvd On-Ramp	Merge	10.0	A	21.6	C
WB US 101 e/o Evergreen Pkwy	Basic	9.3	A	21.8	C
WB US 101 Evergreen Pkwy Off-Ramp	Diverge	11.5	B	24.4	C
WB US 101 e/o Mud Bay Rd	Basic	3.4	A	15.7	B

As indicated in the table, all locations are currently operating within acceptable mobility standards (i.e., LOS D or better). These results were compared to the US 101 operations analysis conducted using 2007 data for the 2010 *West Olympia Access Study*. Review of traffic volumes on US 101 indicates that there is little substantive difference between 2007 and 2014 volumes (see traffic sensitivity report in Appendix C), and that there is generally good correlation between analysis results using HCS (as presented above for this IJR) and those obtained using Vissim (as presented in the 2010 Study). This broad correlation supports the use of HCS as an analysis tool for evaluating future conditions along US 101 with the No Build and Preferred Alternatives.

Based on 2014 volumes, the heaviest congestion is currently being experienced in the PM peak hour on both eastbound and westbound US 101 immediately west of I-5. HCS shows Level of

Service (LOS) D conditions in both directions. This correlates with LOS D results obtained using 2007 data as presented in the 2010 Study.

In the eastbound direction, the Vissim analysis identified LOS D conditions during the 2007 PM peak hour. This is consistent with results using HCS based on 2014 PM peak hour volumes, leading to the conclusion that the HCS software is providing a reasonable assessment of existing eastbound PM peak hour traffic operations in the critical highway segment between Crosby Boulevard and I-5.

In the westbound direction, Vissim identified LOS E conditions on the freeway mainline east of Crosby Boulevard during the 2007 PM peak hour. This compares with LOS D conditions using HCS for the 2014 PM peak hour. Vissim also identified LOS F conditions on the westbound off-ramp at Crosby Boulevard which is calculated as a fairly poor LOS D using HCS in the 2014 PM peak hour. Congestion near the westbound

Crosby Boulevard interchange is related to several factors, including high traffic volumes, weaving, horizontal curves, and steep grades. As Vissim is a more powerful operational analysis tool that can consider more variables than HCS, the effects of these factors may help to explain the differences in analysis results. Analysis of future conditions for this IJR using HCS in this highway segment should be based on a comparison between the No Build and Preferred Alternatives.

3.4.2 Comparison of 2020 No-Build and Preferred Alternatives

Table 3-3 presents a summary of projected 2020 (opening year) AM peak hour traffic operations along various segments of US 101 in the project area. The peak hour traffic volumes upon which this analysis is based are presented in Figure 1-11 (for the No Build Alternative) and Figure 3-3 (for the Preferred Alternative). Operations analysis worksheets for the No Build Alternative are included in Appendix F, while worksheets for the Preferred Alternative are included in Appendix G.

Table 3-3. 2020 AM Peak Hour Freeway Operations - No Build and Preferred Alternatives

Mainline Segment	Segment Type	No Build		Preferred	
		Density (pc/mi/ln)	LOS (HCM Equivalent)	Density (pc/mi/ln)	LOS (HCM Equivalent)
Eastbound US 101					
EB US 101 e/o Mud Bay Rd	Basic	21.9	C	21.9	C
EB US 101 Evergreen Pkwy On-Ramp	Merge	24.6	C	24.0	C
EB US 101 e/o Evergreen Pkwy	Basic	27.5	D	26.8	D
EB US 101 Kaiser Rd On-Ramp	Weave	--	--	23.1	C
EB US 101 e/o Kaiser Rd	Basic	--	--	19.5	C
EB US 101 Black Lake Off-Ramp	Weave ⁽¹⁾	30.2	D	23.1	C
EB US 101 Black Lake On-Ramp	Merge	N/A	N/A	N/A	N/A
EB US 101 e/o Black Lake Blvd	Basic	22.5	C	22.8	C
EB US 101 Crosby Blvd Off-Ramp	Diverge	25.9	C	26.3	C
EB US 101 Crosby Blvd On-Ramp	Merge	18.9	B	18.8	B
EB US 101 e/o Crosby Blvd	Basic	27.5	D	27.5	D
Westbound US 101					
WB US 101 e/o Crosby Blvd	Basic	20.5	C	20.7	C
WB US 101 Crosby Blvd On-Ramp	Diverge	26.7	C	26.7	C
WB US 101 Crosby Blvd Off-Ramp	Merge	15.9	B	16.7	B
WB US 101 e/o Black Lake Blvd	Basic	13.0	B	13.7	B
WB US 101 Black Lake Blvd Off-Ramp	Diverge	12.6	B	13.3	B
WB Us 101 Black Lake Blvd On-Ramp	Weave ⁽¹⁾	11.6	B	9.2	A
WB US 101 e/o Kaiser Rd	Basic	--	--	8.3	A
WB US 101 Kaiser Rd Off-Ramp	Weave	--	--	9.2	A
WB US 101 e/o Evergreen Pkwy	Basic	11.0	A	9.6	A
WB US 101 Evergreen Pkwy Off-Ramp	Diverge	13.3	B	11.9	B
WB US 101 e/o Mud Bay Rd	Basic	4.7	A	4.6	A

Note: The No Build Alternative reflects existing lane configurations and includes none of the improvements associated with the Preferred Alternative.

(1) With No Build Alternative at US 101/Black Lake, eastbound off-ramp is a diverge and westbound on-ramp is a merge.

As indicated in Table 3-3, the heaviest congestion is expected in the eastbound

direction immediately west of I-5 and east of Evergreen Parkway. Level of Service (LOS) D

conditions are expected with either the No Build or Preferred Alternatives. The diverging movement to the eastbound Black Lake Boulevard off-ramp is expected to improve with the Preferred Alternative due to the addition of an eastbound auxiliary lane between the Kaiser Road and Black Lake Boulevard interchanges.

Table 3-4 presents a summary of projected 2020 (opening year) PM peak hour traffic operations along various segments of US 101 in the project area. The peak hour traffic volumes upon which this analysis is based are also presented in Figure 1-9 (for the No Build Alternative) and Figure 3-3 (for the Preferred Alternative).

Table 3-4. 2020 PM Peak Hour Freeway Operations - No Build and Preferred Alternatives

Mainline Segment	Segment Type	No Build		Preferred	
		Density (pc/mi/ln)	LOS (HCM Equivalent)	Density (pc/mi/ln)	LOS (HCM Equivalent)
Eastbound US 101					
EB US 101 e/o Mud Bay Rd	Basic	9.6	A	9.3	A
EB US 101 Evergreen Pkwy On-Ramp	Merge	13.9	B	12.9	B
EB US 101 e/o Evergreen Pkwy	Basic	16.1	B	15.1	B
EB US 101 Kaiser Rd On-Ramp	Weave	--	-	14.7	B
EB US 101 e/o Kaiser Rd	Basic	--	-	19.1	C
EB US 101 Black Lake Off-Ramp	Weave ⁽¹⁾	18.4	B	14.7	B
EB US 101 Black Lake On-Ramp	Merge	N/A	N/A	N/A	N/A
EB US 101 e/o Black Lake Blvd	Basic	18.1	C	18.8	C
EB US 101 Crosby Blvd Off-Ramp	Diverge	21.9	C	22.6	C
EB US 101 Crosby Blvd On-Ramp	Merge	20.8	C	20.7	C
EB US 101 e/o Crosby Blvd	Basic	27.3	D	27.5	D
Westbound US 101					
WB US 101 e/o Crosby Blvd	Basic	28.1	D	28.3	D
WB US 101 Crosby Blvd Off-Ramp	Diverge	32.1	D	32.2	D
WB US 101 Crosby Blvd On-Ramp	Merge	29.7	D	29.8	D
WB US 101 e/o Black Lake Blvd	Basic	23.3	C	23.6	C
WB US 101 Black Lake Blvd Off-Ramp	Diverge	22.6	C	23.0	C
WB US 101 Black Lake Blvd On-Ramp	Weave ⁽¹⁾	24.0	C	20.3	C
WB US 101 e/o Kaiser Rd	Basic	--	-	17.4	B
WB US 101 Kaiser Rd Off-Ramp	Weave	--	-	20.3	C
WB US 101 e/o Evergreen Pkwy	Basic	24.4	C	23.9	C
WB US 101 Evergreen Pkwy Off-Ramp	Diverge	27.0	C	26.5	C
WB US 101 e/o Mud Bay Rd	Basic	18.4	C	18.4	C

Note: The No Build Alternative reflects existing lane configurations and includes none of the improvements associated with the Preferred Alternative.

(1) With No Build Alternative, US 101/Black Lake eastbound off-ramp is a diverge & westbound on-ramp is a merge.

As indicated in Table 3-4, the heaviest congestion is expected in both the eastbound and westbound directions immediately west of I-5. Level of Service (LOS) D conditions are expected with either the No Build or Preferred

Alternatives. It should be noted that no substantive difference is anticipated between the No Build and Preferred Alternatives.

3.4.3 Comparison of 2040 No-Build and Preferred Alternatives

Table 3-5 presents a summary of projected 2040 (design year) AM peak hour traffic operations along various segments of US 101 in the project area. The peak hour traffic volumes upon which this analysis is based are presented in Figure 1-14 (for the No Build Alternative) and Figure 3-4 (for the Preferred Alternative). Operations analysis worksheets for the No Build Alternative are included in Appendix H, while worksheets for the Preferred Alternative are included in Appendix I.

As indicated in Table 3-5, the heaviest congestion is expected in the eastbound direction immediately west of I-5 and east of Evergreen Parkway. Level of Service (LOS) E conditions are expected with either the No Build or Preferred Alternatives. The movement to the eastbound Black Lake Boulevard off-ramp is expected to improve with the Preferred Alternative due to the addition of an eastbound auxiliary lane between the Kaiser Road and Black Lake Boulevard interchanges.

Table 3-5. 2040 AM Peak Hour Freeway Operations - No Build and Preferred Alternatives

Mainline Segment	Segment Type	No Build		Preferred	
		Density (pc/mi/ln)	LOS (HCM Equivalent)	Density (pc/mi/ln)	LOS (HCM Equivalent)
Eastbound US 101					
EB US 101 e/o Mud Bay Rd	Basic	29.0	D	28.6	D
EB US 101 Evergreen Pkwy On-Ramp	Merge	31.4	D	30.1	D
EB US 101 e/o Evergreen Pkwy	Basic	37.4	E	35.0	E
EB US 101 Kaiser Rd On-Ramp	Weave	--	-	30.3	D
EB US 101 e/o Kaiser Rd	Basic	--	-	24.4	C
EB US 101 Black Lake Off-Ramp	Weave ⁽¹⁾	37.6	E	30.3	D
EB US 101 Black Lake On-Ramp	Merge	N/A	N/A	N/A	N/A
EB US 101 e/o Black Lake Blvd	Basic	29.2	D	29.5	D
EB US 101 Crosby Blvd Off-Ramp	Diverge	31.6	D	31.7	D
EB US 101 Crosby Blvd On-Ramp	Merge	25.3	C	25.2	C
EB US 101 e/o Crosby Blvd	Basic	35.2	E	35.2	E
Westbound US 101					
WB US 101 e/o Crosby Blvd	Basic	24.5	C	24.9	C
WB US 101 Crosby Blvd Off-Ramp	Diverge	29.9	D	30.1	D
WB US 101 Crosby Blvd On-Ramp	Merge	21.6	C	22.7	C
WB US 101 e/o Black Lake Blvd	Basic	17.4	B	18.6	C
WB US 101 Black Lake Blvd Off-Ramp	Diverge	16.9	B	18.1	C
WB US 101 Black Lake Blvd On-Ramp	Weave ⁽¹⁾	17.0	B	15.0	B
WB US 101 e/o Kaiser Rd	Basic	--	-	13.0	B
WB US 101 Kaiser Rd Off-Ramp	Weave	--	-	15.0	B
WB US 101 e/o Evergreen Pkwy	Basic	16.8	B	14.8	B
WB US 101 Evergreen Pkwy Off-Ramp	Diverge	19.3	B	17.1	B
WB US 101 e/o Mud Bay Rd	Basic	8.9	A	8.8	A

Note: The No Build Alternative reflects existing lane configurations and various roadway network improvements planned for implementation before 2040 by the City of Olympia. It does not include any of the improvements associated with the Preferred Alternative.

(1) With No Build Alternative, US 101/Black Lake eastbound off-ramp is a diverge & westbound on-ramp is a merge.

Table 3-6 presents a summary of projected 2040 PM peak hour traffic operations for various segments of US 101 in the project area. The peak hour traffic volumes used in this analysis are presented in Figure 1-14 (for No Build) and Figure 3-4 (for the Preferred Alternative).

The heaviest congestion is expected in both the eastbound and westbound directions west of I-5 through the Crosby Boulevard interchange and

in the vicinity of Evergreen Parkway. Level of Service (LOS) D/E conditions are expected in this location with either the No Build or Preferred Alternatives. No substantive difference is anticipated between the No Build and Preferred Alternatives. The Preferred Alternative would add an auxiliary lane between the Black Lake on-ramp and the Kaiser Road off-ramp to help accommodate the new weaving movement.

Table 3-6. 2040 PM Peak Hour Freeway Operations - No Build and Preferred Alternatives

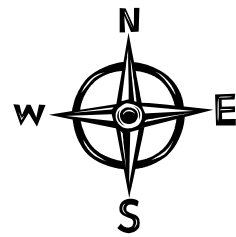
Mainline Segment	Segment Type	No Build		Preferred	
		Density (pc/mi/ln)	LOS (HCM Equivalent)	Density (pc/mi/ln)	LOS (HCM Equivalent)
Eastbound US 101					
EB US 101 e/o Mud Bay Rd	Basic	14.1	B	13.9	B
EB US 101 Evergreen Pkwy On-Ramp	Merge	18.4	B	17.3	B
EB US 101 e/o Evergreen Pkwy	Basic	20.9	C	19.6	C
EB US 101 Kaiser Rd On-Ramp	Weave	--	-	21.6	C
EB US 101 e/o Kaiser Rd	Basic	--	-	26.3	D
EB US 101 Black Lake Off-Ramp	Weave ⁽¹⁾	23.4	C	21.6	C
EB US 101 Black Lake On-Ramp	Merge	N/A	N/A	N/A	N/A
EB US 101 e/o Black Lake Blvd	Basic	22.6	C	23.4	C
EB US 101 Crosby Blvd Off-Ramp	Diverge	26.2	C	26.9	C
EB US 101 Crosby Blvd On-Ramp	Merge	23.8	C	24.0	C
EB US 101 e/o Crosby Blvd	Basic	31.4	D	31.8	D
Westbound US 101					
WB US 101 e/o Crosby Blvd	Basic	34.0	D	34.4	D
WB US 101 Crosby Blvd Off-Ramp	Diverge	35.6	E	35.7	E
WB US 101 Crosby Blvd On-Ramp	Merge	38.1	E	38.4	E
WB US 101 e/o Black Lake Blvd	Basic	29.6	D	30.3	D
WB US 101 Black Lake Blvd Off-Ramp	Diverge	28.5	D	29.1	D
WB US 101 Black Lake Blvd On-Ramp	Weave ⁽¹⁾	31.9	D	30.9	D
WB US 101 e/o Kaiser Rd	Basic	--	-	24.4	C
WB US 101 Kaiser Rd Off-Ramp	Weave	--	-	30.9	D
WB US 101 e/o Evergreen Pkwy	Basic	34.2	D	34.9	D
WB US 101 Evergreen Pkwy Off-Ramp	Diverge	35.8	E	36.2	E
WB US 101 e/o Mud Bay Rd	Basic	27.1	D	27.5	D

Note: The No Build Alternative reflects existing lane configurations and various roadway network improvements planned for implementation before 2040 by the City of Olympia. It does not include any of the improvements associated with the Preferred Alternative.

(1) With No Build Alternative, US 101/Black Lake eastbound off-ramp is a diverge & westbound on-ramp is a merge.

To ensure that proposed modifications to the existing US 101 interchange at Black Lake Boulevard would not adversely impact the freeway, a Vissim simulation was conducted to supplement the SimTraffic analysis at this location. Vehicle queuing estimates are shown in

Figure 3-5 which indicates that results are similar using either analysis tool except for the eastbound off-ramp. Traffic queuing projections using Vissim show a somewhat longer queue than projections using SimTraffic.

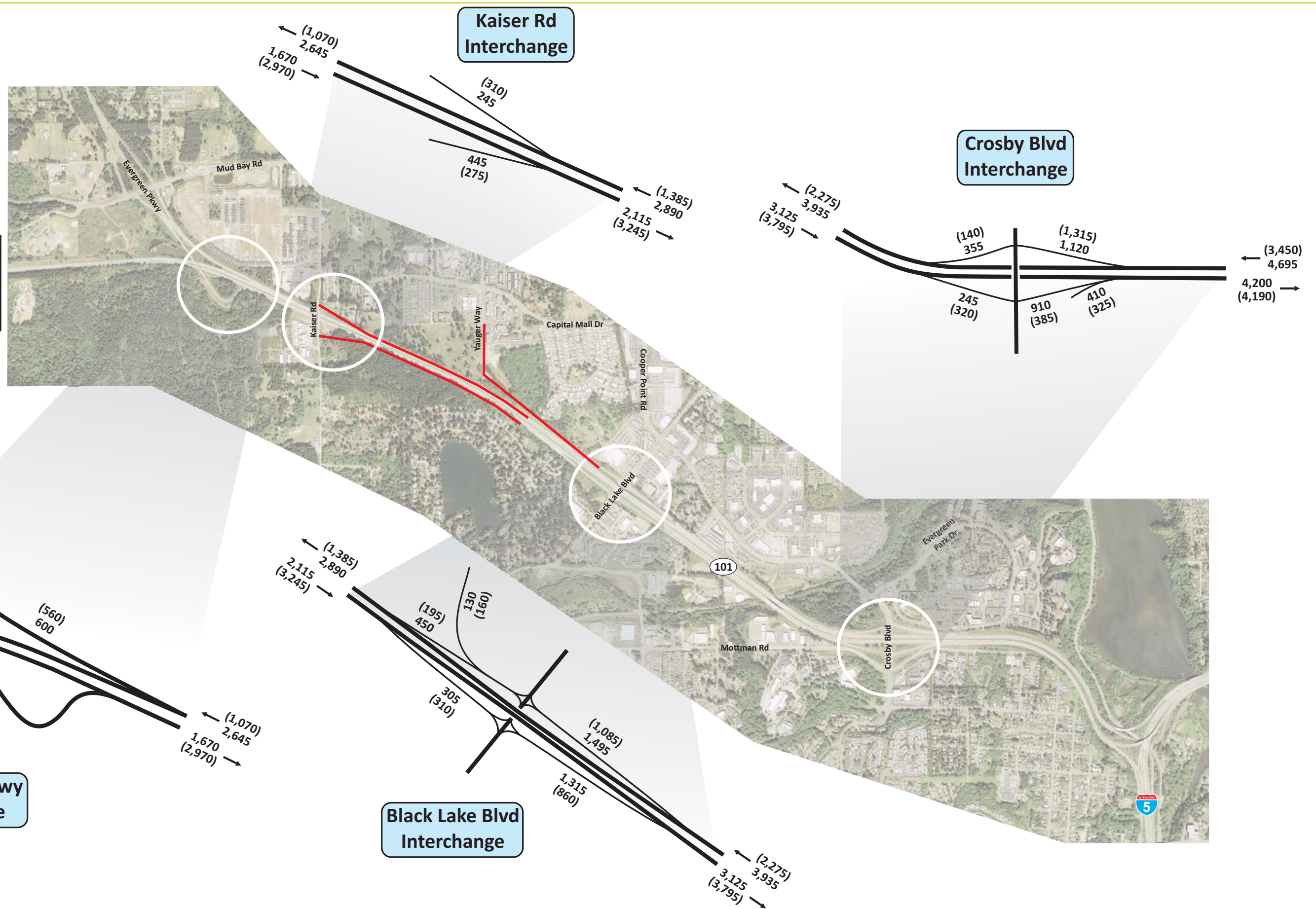


Legend

XXX → PM Peak Hour Volume
 (XXX) ← AM Peak Hour Volume

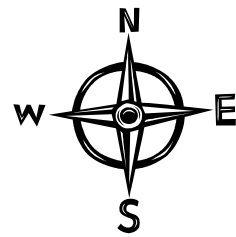
Note

Volumes were calculated to the single digit then rounded to the nearest five. Rounding may result in a five vehicle discrepancy between locations.



US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 3-3
 2020 Peak Hour Traffic Volumes
 on US 101 - Preferred Alternative

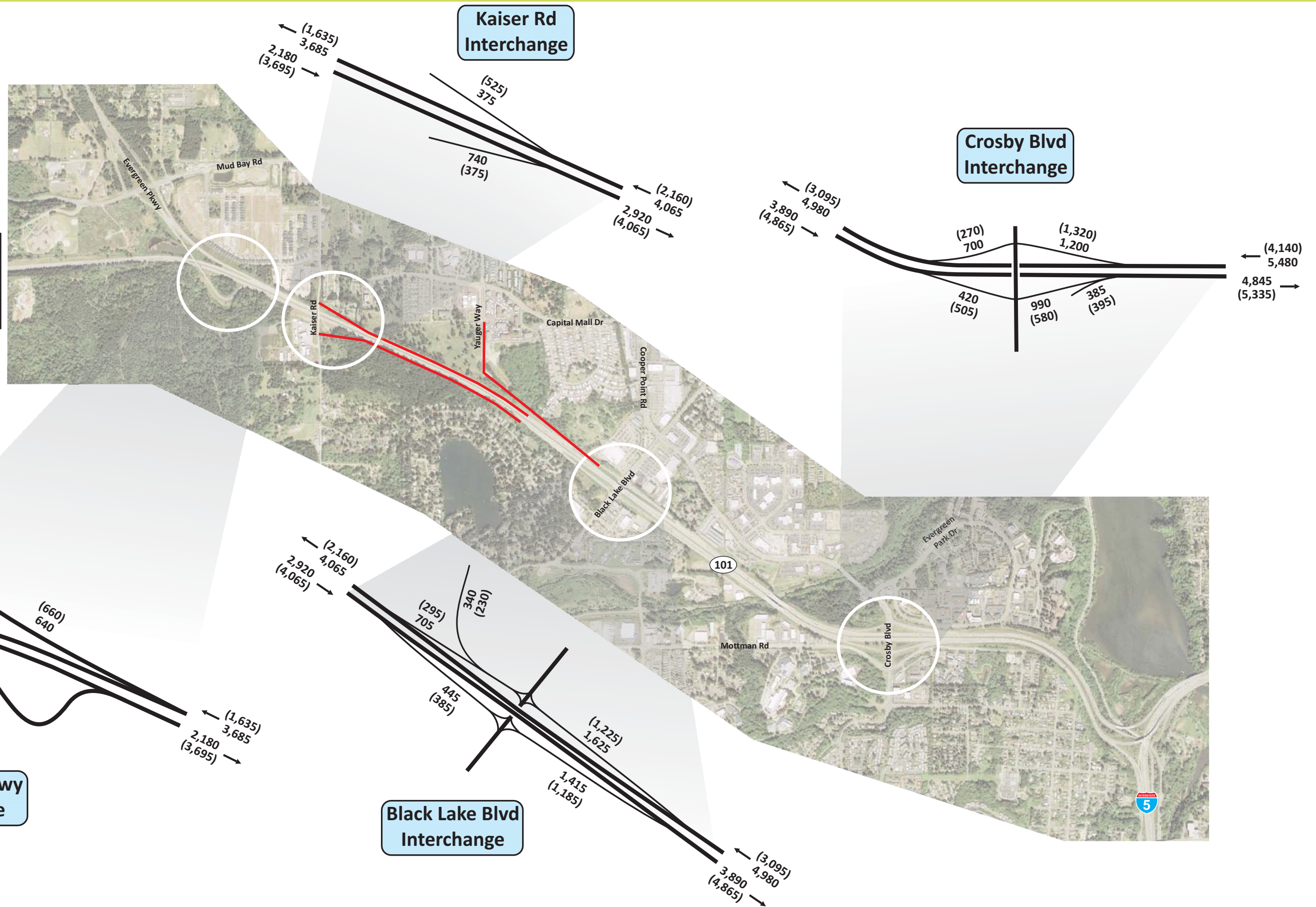


Legend

XXX → PM Peak Hour Volume
 (XXX) → AM Peak Hour Volume

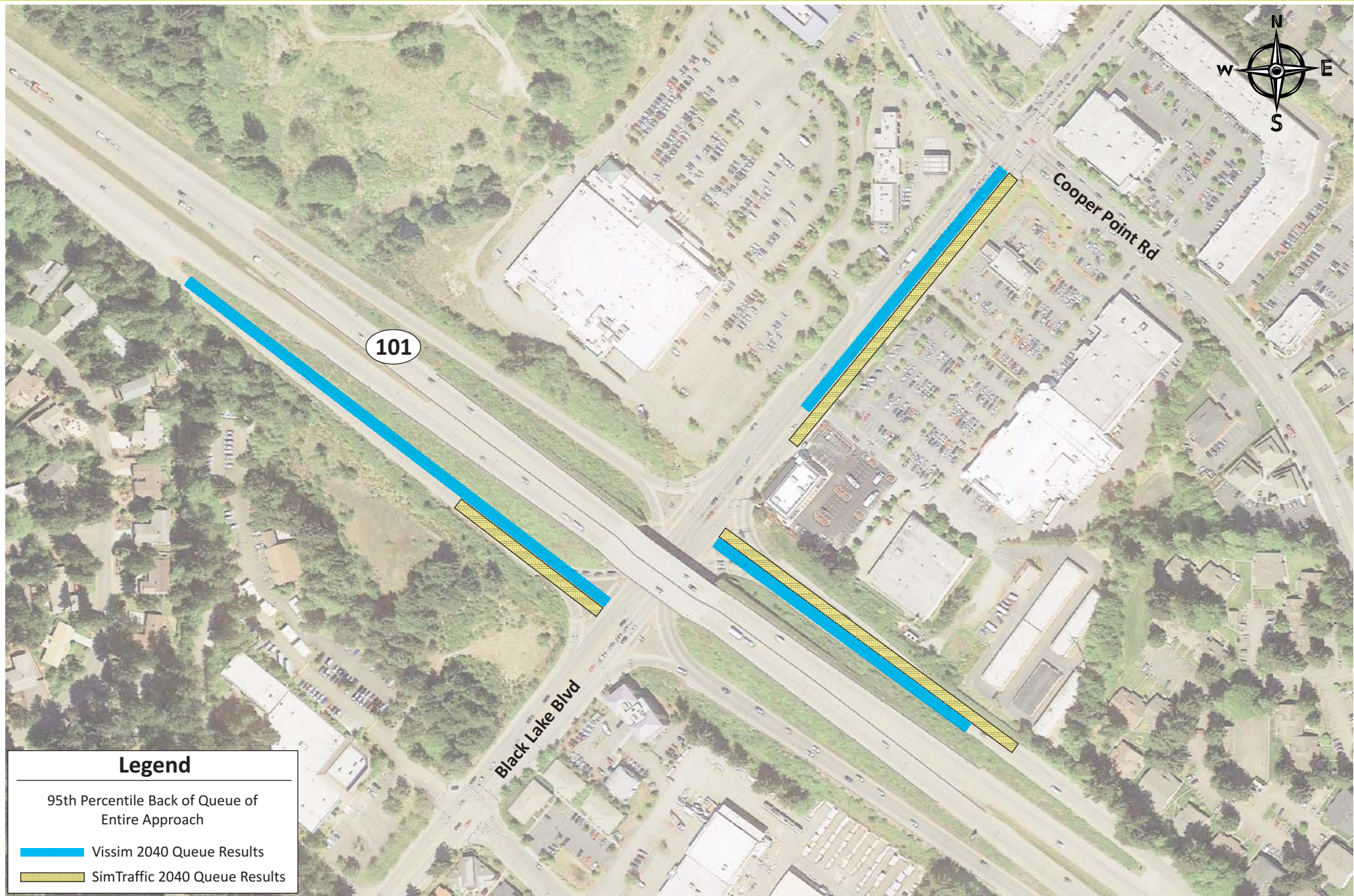
Note

Volumes were calculated to the single digit then rounded to the nearest five. Rounding may result in a five vehicle discrepancy between locations.



US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 3-4
 2040 Peak Hour Traffic Volumes
 on US 101 - Preferred Alternative



As traffic volumes, signal timing and lane geometric assumptions were the same for both analyses, differences are likely due to the specific attributes of each tool. Additionally, while eastbound right turning traffic will occasionally be blocked by eastbound left turns, it was not assumed that these vehicles would use the shoulder to bypass the left-turning queue. This may happen in real life and thus reduce the queues that are actually experienced. In either case, traffic queues are not expected to reach the highway mainline and impact through traffic movement on the freeway

3.5 HOW WAS TRAFFIC ANALYSIS CONDUCTED AT LOCAL STREET INTERSECTIONS?

This section presents the results of intersection operations analysis which includes interchange ramp termini and other project area intersections as identified in *Methods and Assumptions Report* (October 2014). Analysis was conducted using the Synchro analysis software (Version 8 per the requirements of WSDOT) to determine average delay and levels of service, and SimTraffic to estimate queue

lengths. An operations model using the Vissim software was used to assess traffic operations for various design concepts of the preferred alternative and to confirm ramp lengths for the preliminary design of the proposed improvements focusing on the US 101 interchange at Black Lake Boulevard.

3.5.1 2014 Existing Conditions

Intersection Levels of Service

Table 3-7 presents a summary of existing (2014) AM and PM peak hour traffic operations at all project area intersections including interchange ramp termini. Analysis is based on the traffic volumes presented in Figure 1-9 and Figure 1-10, for the AM and PM peak hours, respectively. As indicated in the table, all intersections are currently operating within their adopted mobility standards with the one exception. The stop-controlled intersection of the Evergreen Parkway northbound ramps and Mud Bay Road is operating at LOS E during the PM peak hour which is worse than its mobility standard of LOS D. This location is indicated by bold shading in the table. Figure 3-6 provides a graphic illustration of these analysis results.

Table 3-7. 2014 Existing Peak Hour Intersection Operations

No.	Intersection	Intersection Control	Mobility Standard	AM Peak Hour		PM Peak Hour	
				LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
1a	Evergreen Pkwy SB Off-Ramp/Mud Bay Rd	Stop Sign	D	B (12)	0.05	C (19)	0.14
1b	Evergreen Pkwy SB On-Ramp/Mud Bay Rd	Stop Sign	D	B (11)	0.28	B (10)	0.32
2	Evergreen Pkwy NB Ramps/Mud Bay Road	Stop Sign	D	C (20)	0.27	E (36)	0.36
3	Kaiser Road/Harrison Avenue	Signal	D	B (16)	0.80	B (18)	0.78
4	Harrison Avenue/McPhee Road	Stop Sign	D	B (13)	0.06	C (16)	0.16
5	Yauger Way/Harrison Avenue	Signal	D	B (13)	0.45	B (13)	0.56
6	Cooper Point Road/Harrison Avenue	Signal	≤E	C (24)	0.81	D (36)	0.89
7	Harrison Avenue/Kenyon Street	Signal	≤E	A (8)	0.56	B (12)	0.77
8	Division Street/Harrison Avenue	Signal	≤E	C (25)	0.78	D (36)	0.87
9	Black Lake Blvd/Capital Mall Entrance	Signal	≤E	A (8)	0.66	A (9)	0.72
10	Kaiser Road/7 th Avenue	Stop Sign	D	A (10)	0.04	B (11)	0.15
11	Yauger Way/Capital Mall Drive	Stop Sign	D	B (11)	0.09	B (14)	0.26

Table 3-7 Continued. 2014 Existing Peak Hour Intersection Operations

No.	Intersection	Intersection Control	Mobility Standard	AM Peak Hour		PM Peak Hour	
				LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
12	Cooper Point Road/Capital Mall Drive	Signal	≤E	B (14)	0.81	C (20)	0.79
13	Black Lake Blvd/Capital Mall Drive	Signal	≤E	B (16)	0.79	C (22)	0.84
14	Cooper Point Road/Haggen Entrance	Signal	≤E	A (8)	0.61	B (13)	0.72
15	Black Lake Blvd/Cooper Point Road	Signal	F	D (54)	1.09	E (75)	1.25
16	Black Lake Blvd/US 101 Ramps	Signal	≤E	D (41)	0.85	C (45)	0.87
17	Cooper Point Road-Auto Mall Drive/Evergreen Park Drive	Signal	≤D	C (20)	0.83	C (26)	0.92
18	Crosby Blvd/US 101 WB Ramps	Signal	≤D	C (24)	0.87	B (19)	0.84
19	Crosby Blvd/US 101 EB Ramps	Signal	≤D	B (13)	0.84	A (7)	0.77
20	Crosby Blvd/Mottman Road	Signal	D	A (8)	0.79	B (11)	0.63
21	Crosby Blvd/Irving Street	Signal	D	A (6)	0.43	A (6)	0.47
22	Lakeridge Drive/Deschutes Pkwy	Stop Sign	D	C (18)	0.39	C (22)	0.57

Note 1: Mobility Standards based on City of Olympia Transportation 2030. For Urban Corridors LOS E will be acceptable. For Strategy Corridors LOS may fall below adopted standards. This is indicated by the ≤ symbol in the table.

Note 2: All City of Olympia surface street intersections were evaluated using an average of the two highest consecutive peak hours as described in Section 3.2.3.

shading indicates location(s) where mobility standard is not being met.

Intersection Traffic Queuing

Table 3-8 presents the results of traffic queuing analysis for the existing 2014 AM and PM peak hours for key movements at project area intersections. One location is currently experiencing traffic queues that spill back beyond the available vehicle storage space

during the PM peak hour. This location is the northbound to westbound left turn lane on Black Lake Boulevard at the US 101 interchange. Operations and queuing analysis worksheets are included in Appendix E.

Table 3-8. 2014 Existing Peak Hour Traffic Queuing at Key Locations

No.	Intersection	Movement	Vehicle Storage	Vehicle Queues	
				AM Peak Hour	PM Peak Hour
10	Kaiser Road/7th Avenue	NB Thru/Left	550 ft	--	--
		NB Right	150 ft	--	--
		SB All	1,650 ft	--	--
		WB Left	300 ft	29 ft	48 ft
11	Yauger Way/Capital Mall Drive	NB Left	100 ft	15 ft	6 ft
		NB Thru/Right	850 ft	45 ft	47 ft
15	Black Lake Blvd/Cooper Point Road (1)	NB Left	450 ft	241 ft	297 ft
		NB Thru	900 ft	174 ft	386 ft
		WB Thru	2,050 ft	130 ft	274 ft
		EB Right	1,900 ft	174 ft	959 ft
		SB Thru	2,350 ft	197 ft	1,533 ft

Table 3-8 Continued. 2014 Existing Peak Hour Traffic Queuing at Key Locations

No.	Intersection	Movement	Vehicle Storage	Vehicle Queues	
				AM Peak Hour	PM Peak Hour
16	Black Lake Blvd/US 101 Ramps (1)	WB Left	400 ft	110 ft	205 ft
		WB Thru	2,250 ft	--	--
		WB Right	2,250 ft	240 ft	332 ft
		EB Left	300 ft	165 ft	196 ft
		SB Left	450 ft	190 ft	234 ft
		SB Thru	900 ft	89 ft	120 ft
		NB Left	175 ft	143 ft	181 ft
		NB Thru	425 ft	214 ft	202 ft
23	US 101 WB Off-Ramp @ Kaiser Road	WB Left	150 ft	--	--
		WB Right	1,050 ft	--	--
24	US 101 EB On-Ramp @ Kaiser Road	SB Left	150 ft	--	--

Note 1: Traffic queuing analysis conducted using SimTraffic.

Note 2: All City of Olympia surface street intersections were evaluated using an average of the two highest consecutive peak hours as described in Section 3.2.3.

NB/SB refers to traffic on Black Lake Boulevard; EB/WB refers to traffic on US 101 or Cooper Point Road

Bold results indicate locations where existing traffic queues may exceed available vehicle storage

3.5.2 Comparison of 2020 No Build and Preferred Alternatives

Traffic operations in the expected project opening year of 2020 focused on AM and PM peak hours, and compared analysis results with both the No Build and Preferred Alternatives. As described below, comparative results are discussed by time period and summarized both in tables and representative graphics.

Preferred Alternative improvements affecting project area intersections include:

- Signalization at the intersection of Kaiser Road and 7th Avenue (to accommodate the increase in traffic anticipated with the ramp connections to and from US 101 at this location)
- Signalization of Yauger Way and Capital Mall Drive (also to accommodate an expected increase in traffic accompanying the new Yauger Way ramps)
- Reconstruction of the US 101 ramp terminal intersection at Black Lake

Boulevard to allow westbound through movements (currently a SPUI)

- Construction of a new interchange on US 101 at a southerly extension of Kaiser Road including the addition of two ramp termini (for westbound off and eastbound on traffic)

AM Peak Hour

Intersection Levels of Service

Table 3-9 illustrates expected AM peak hour traffic operations for the No Build and Preferred (Build) Alternatives in the 2020 project opening year. Analysis is based on the traffic volumes presented in Figure 1-12 for the No Build Alternative and Figure 3-7 for the Preferred Alternative. This analysis assumes that existing intersection lane configurations will remain unchanged between 2014 and 2020 except for improvements associated with the project.

As indicated in Table 3-9, all intersections are expected to operate within their adopted

performance standard. Two intersections are expected to operate at LOS D for the No Build condition – Black Lake Boulevard at Cooper

Point Road and Black Lake Boulevard at the US 101 ramps. This is not substantively different than conditions in the 2014 AM peak hour.

Table 3-9. 2020 AM Peak Hour Intersection Operations - No Build and Preferred Alternatives

No.	Intersection (1)	Intersection Control	Mobility Standard	No Build		Preferred	
				LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
1a	Evergreen Pkwy SB Off-Ramp/Mud Bay Rd	Stop Sign	D	B (13)	0.07	B (13)	0.07
1b	Evergreen Pkwy SB On-Ramp/Mud Bay Rd	Stop Sign	D	B (12)	0.31	B (11)	0.20
2	Evergreen Pkwy NB Ramps/Mud Bay Rd	Stop Sign	D	C (23)	0.44	C (21)	0.24
3	Kaiser Road/Harrison Avenue	Signal	D	B (17)	0.79	B (16)	0.74
4	Harrison Avenue/McPhee Road	Stop Sign	D	B (14)	0.08	B (15)	0.09
5	Yauger Way/Harrison Avenue	Signal	D	B (13)	0.48	B (13)	0.48
6	Cooper Point Road/Harrison Avenue	Signal	≤E	C (22)	0.80	C (22)	0.80
7	Harrison Avenue/Kenyon Street	Signal	≤E	A (8)	0.59	A (8)	0.59
8	Division Street/Harrison Avenue	Signal	≤E	C (24)	0.80	C (24)	0.78
9	Black Lake Blvd/Capital Mall Entrance	Signal	≤E	A (8)	0.70	A (8)	0.70
10	Kaiser Road/7 th Avenue (a)	Stop Sign	D	A (10)	0.04	A (7)	0.50
11	Yauger Way/Capital Mall Drive (a)	Stop Sign	D	B (13)	0.14	A (9)	0.58
12	Cooper Point Road/Capital Mall Drive	Signal	≤E	B (16)	0.81	B (13)	0.67
13	Black Lake Blvd/Capital Mall Drive	Signal	≤E	B (17)	0.79	B (17)	0.79
14	Cooper Point Road/Haggen Entrance	Signal	≤E	A (8)	0.61	C (26)	0.77
15	Black Lake Blvd/Cooper Point Road	Signal	F	D (51)	1.17	D (38)	0.84
16	Black Lake Blvd/US 101 Ramps (b)	Signal	≤E	D (36)	0.90	C (33)	0.84
17	Cooper Point Road-Auto Mall Drive/Evergreen Park Drive	Signal	≤D	C (20)	0.84	C (21)	0.84
18	Crosby Blvd/US 101 WB Ramps	Signal	≤D	C (24)	0.84	C (24)	0.85
19	Crosby Blvd/US 101 EB Ramps	Signal	≤D	B (16)	0.88	B (13)	0.86
20	Crosby Blvd/Mottman Road	Signal	D	A (9)	0.75	A (9)	0.73
21	Crosby Blvd/Irving Street	Signal	D	A (6)	0.42	A (6)	0.42
22	Lakeridge Drive/Deschutes Pkwy	Stop Sign	D	C (19)	0.44	C (19)	0.43
23	US 101 WB Off-ramp/Kaiser Rd (c)	Stop Sign	D	--	--	C (15)	0.59
24	US 101 EB On-ramp/Kaiser Rd (c)	Stop Sign	D	--	--	A(9)	0.26

Note 1: Mobility Standards based on City of Olympia Transportation 2030. For Urban Corridors LOS E will be acceptable. For Strategy Corridors LOS may fall below adopted standards. This is indicated by the < symbol in the table.

Note 2: All City of Olympia surface street intersections were evaluated using an average of the two highest consecutive peak hours as described in Section 3.2.3.

Bold shading indicates location(s) where mobility standard is not being met.

Note 3: Intersection improvements that are part of the preferred alternative.

(a) Install traffic signal (could also be a roundabout)

(b) Construct at-grade crossing to Yauger Way

(c) Construct intersection

Note 4: All other intersections assume existing configuration

With the Preferred Alternative, AM peak hour traffic operations at the intersection of US 101 with Black Lake Boulevard are expected to improve to LOS C. Operations at the intersection of Black Lake Boulevard with Cooper Point Road are expected to achieve a better LOS D and to experience less delay than in the No Build Alternative. The intersections of Kaiser Road at 7th Avenue and Yauger Way at Capital Mall Drive would also improve slightly with the Preferred Alternative in comparison to No Build.

Figure 3-8 presents a graphic comparison of expected 2020 AM peak hour intersection performance with both the No Build and Preferred Alternatives.

Intersection Traffic Queuing

Table 3-10 summarizes the results of traffic queuing analysis for the 2020 AM peak hour for key movements at project area intersections. As indicated in the table, no locations are expected to experience traffic queues that spill back beyond the available vehicle storage space. This is not substantively different from conditions in the 2014 AM peak hour.

Operations and queuing analysis worksheets are included in Appendix F for the No Build Alternative and Appendix G for the Preferred Alternative.

Table 3-10. 2020 AM Peak Hour Traffic Queuing at Key Locations – No Build and Preferred Alternatives

No.	Intersection	Movement	Vehicle Storage	Vehicle Queues	
				No Build	Preferred
10	Kaiser Road/7th Avenue	NB Thru/Left	550 ft	--	32 ft
		NB Right	150 ft	--	46 ft
		SB All	1,650 ft	--	78 ft
		WB Left	300 ft	29 ft	46 ft
11	Yauger Way/Capital Mall Drive	NB Left	100 ft	17 ft	16 ft
		NB Thru/Right	850 ft	49 ft	71 ft
15	Black Lake Blvd/Cooper Point Road (1)	NB Left	450 ft	298 ft	190 ft
		NB Thru	900 ft	194 ft	229 ft
		WB Thru	2,050 ft	161 ft	105 ft
		EB Right	1,900 ft	188 ft	144 ft
		SB Thru	2,350 ft	240 ft	182 ft
16	Black Lake Blvd/US 101 Ramps (1)	WB Left	400 ft	126 ft	149 ft
		WB Thru	2,250 ft	--	175 ft
		WB Right	2,250 ft	287 ft	127 ft
		EB Left	300 ft	178 ft	108 ft
		SB Left	450 ft	256 ft	168 ft
		SB Thru	900 ft	102 ft	68 ft
		NB Left	175 ft	170 ft	149 ft
		NB Thru	425 ft	268 ft	39 ft
23	US 101 WB Off-Ramp @ Kaiser Road	WB Left	150 ft	--	45 ft
		WB Right	1,050 ft	--	133 ft
24	US 101 EB On-Ramp @ Kaiser Road	SB Left	150 ft	--	79 ft

Note: Traffic queuing analysis conducted using SimTraffic

(1) NB/SB refers to traffic on Black Lake Boulevard; EB/WB refers to traffic on US 101 or Cooper Point Road

PM Peak Hour

Intersection Levels of Service

Table 3-11 illustrates expected PM peak hour traffic operating conditions for the No Build and Preferred (Build) Alternatives in the 2020 project opening year. Analysis is based on the traffic volumes presented in Figure 1-13 for the No Build Alternative and Figure 3-9 for the Preferred Alternative. This analysis assumes that existing intersection lane configurations will remain unchanged between 2014 and 2020 except for improvements associated with the project.

As indicated by the bold shading in Table 3-11, one intersection is expected to exceed its adopted mobility standard with either the No Build or Preferred Alternatives. This is the intersection of the Evergreen Parkway northbound ramps and Mud Bay Road which is currently controlled by a stop sign on the Mud Bay Road approach. This intersection is expected to operate at LOS F with the No Build Alternative and LOS E with the Preferred Alternative. The intersection is currently operating at LOS E during the PM peak hour.

Table 3-11. 2020 PM Peak Hour Intersection Operations - No Build and Preferred Alternatives

No.	Intersection (1)	Intersection Control	Mobility Standard	No Build		Preferred	
				LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
1a	Evergreen Pkwy SB Off-Ramp/Mud Bay Rd	Stop Sign	D	C (22)	0.17	C (22)	0.17
1b	Evergreen Pkwy SB On-Ramp/Mud Bay Rd	Stop Sign	D	B (11)	0.31	B (10)	0.19
2	Evergreen Pkwy NB Ramps/Mud Bay Rd	Stop Sign	D	F (52)	0.48	E (45)	0.44
3	Kaiser Road/Harrison Avenue	Signal	D	C (20)	0.79	B (19)	0.79
4	Harrison Avenue/McPhee Road	Stop Sign	D	C (20)	0.29	C (19)	0.27
5	Yauger Way/Harrison Avenue	Signal	D	B (13)	0.60	B (13)	0.59
6	Cooper Point Road/Harrison Avenue	Signal	≤E	D (41)	0.90	D (35)	0.88
7	Harrison Avenue/Kenyon Street	Signal	≤E	B (13)	0.77	B (13)	0.77
8	Division Street/Harrison Avenue	Signal	≤E	D (45)	0.89	D (41)	0.88
9	Black Lake Blvd/Capital Mall Entrance	Signal	≤E	A (9)	0.70	A (9)	0.69
10	Kaiser Road/7 th Avenue (a)	Stop Sign	D	B (11)	0.25	B (10)	0.71
11	Yauger Way/Capital Mall Drive (a)	Stop Sign	D	C (17)	0.32	B (10)	0.61
12	Cooper Point Road/Capital Mall Drive	Signal	≤E	C (25)	0.84	C (21)	0.79
13	Black Lake Blvd/Capital Mall Drive	Signal	≤E	C (25)	0.85	C (25)	0.84
14	Cooper Point Road/Haggen Entrance	Signal	≤E	B (14)	0.73	C (26)	0.83
15	Black Lake Blvd/Cooper Point Road	Signal	F	F (88)	1.36	D (38)	0.84
16	Black Lake Blvd/US 101 Ramps (b)	Signal	≤E	D (43)	0.88	C (32)	0.95
17	Cooper Point Road-Auto Mall Drive/Evergreen Park Drive	Signal	≤D	C (26)	0.90	C (25)	0.87
18	Crosby Blvd/US 101 WB Ramps	Signal	≤D	C (22)	0.84	C (23)	0.87
19	Crosby Blvd/US 101 EB Ramps	Signal	≤D	B (10)	0.78	B (10)	0.79
20	Crosby Blvd/Mottman Road	Signal	D	B (11)	0.73	B (12)	0.75
21	Crosby Blvd/Irving Street	Signal	D	A (6)	0.48	A (6)	0.49
22	Lakeridge Drive/Deschutes Pkwy	Stop Sign	D	C (18)	0.47	C (18)	0.47

Table 3-11 Continued. 2020 PM Peak Hour Intersection Operations - No Build and Preferred Alternatives

No.	Intersection (1)	Intersection Control	Mobility Standard	No Build		Preferred	
				LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
23	US 101 WB Off-ramp/Kaiser Rd (c)	Stop Sign	D	--	--	B (13)	0.25
24	US 101 EB On-ramp/Kaiser Rd (c)	Stop Sign	D	--	--	A (8)	0.29

Note 1: Mobility Standards based on City of Olympia Transportation 2030. For Urban Corridors LOS E will be acceptable. For Strategy Corridors LOS may fall below adopted standards. This is indicated by the < symbol in the table.

Note 2: All City of Olympia surface street intersections were evaluated using an average of the two highest consecutive peak hours as described in Section 3.2.3.

Bold shading indicates location(s) where mobility standard is not being met.

Note 3: Intersection improvements that are part of the preferred alternative.

(a) Install traffic signal (could also be a roundabout)

(b) Construct at-grade crossing to Yauger Way

(c) Construct intersection

Note 4: All other intersections assume existing configuration

Intersection operational improvements are expected at several locations with the Preferred Alternative in comparison to the No Build condition. The intersection of Cooper Point Road with Harrison Avenue NW is expected to improve from LOS D with No Build, to LOS C with the Preferred Alternative. 2020 PM peak hour traffic operations at the intersections of Black Lake Boulevard with the US 101 ramps and with Cooper Point Road would both improve with the Preferred Alternative. The physical improvements with associated traffic volume shifts and signal timing modifications would result in a better balance of traffic movement at both intersections.

Figure 3-10 presents a graphic comparison of expected 2020 PM peak hour intersection performance with both the No Build and Preferred Alternatives.

Intersection Traffic Queuing

Table 3-12 summarizes the results of traffic queuing analysis for the 2020 PM peak hour at project area intersections. As indicated in the table, two movements at one intersection are expected to experience traffic queues that would spill back beyond the available vehicle storage space with the No Build Alternative. These are the northbound left turn movement on Black Lake Boulevard at Cooper Point Road and the southbound through movement at the same intersection. The Preferred Alternative improves both of these movements.

Operations and queuing analysis worksheets are included in Appendix F for the No Build Alternative and Appendix G for the Preferred Alternative.

Table 3-12. 2020 PM Peak Hour Traffic Queuing at Key Locations – No Build and Preferred Alternatives

No.	Intersection	Movement	Vehicle Storage	Vehicle Queues	
				No Build	Preferred
10	Kaiser Road/7th Avenue	NB Thru/Left	550 ft	--	65 ft
		NB Right	150 ft	--	46 ft
		SB All	1,650 ft	--	98 ft
		WB Left	300 ft	77 ft	121 ft
11	Yauger Way/Capital Mall Drive	NB Left	100 ft	20 ft	47 ft
		NB Thru/Right	850 ft	50 ft	68 ft
15	Black Lake Blvd/Cooper Point Road (1)	NB Left	450 ft	506 ft	269 ft
		NB Thru	900 ft	774 ft	356 ft
		WB Thru	2,050 ft	277 ft	343 ft
		EB Right	1,900 ft	1,557 ft	730 ft
		SB Thru	2,350 ft	2,608 ft	476 ft
16	Black Lake Blvd/US 101 Ramps (1)	WB Left	400 ft	256 ft	375 ft
		WB Thru	2,250 ft	--	287 ft
		WB Right	2,250 ft	387 ft	217 ft
		EB Left	300 ft	199 ft	122 ft
		SB Left	450 ft	330 ft	322 ft
		SB Thru	900 ft	132 ft	141 ft
		NB Left	175 ft	183 ft	204 ft
		NB Thru	425 ft	240 ft	213 ft
23	US 101 WB Off-Ramp @ Kaiser Road	WB Left	150 ft	--	40 ft
		WB Right	1,050 ft	--	68 ft
24	US 101 EB On-Ramp @ Kaiser Road	SB Left	150 ft	--	67 ft

Note: Traffic queuing analysis conducted using SimTraffic.

(1) NB/SB refers to traffic on Black Lake Boulevard; EB/WB refers to traffic on US 101 or Cooper Point Road

Bold results indicate locations where existing traffic queues may exceed available vehicle storage

3.5.3 Comparison of 2040 No Build and Preferred Alternatives

As noted in Section 1.5.2, the City of Olympia has identified a series of needed transportation facilities to support *Comprehensive Plan* land uses and the expected long-term travel demand associated with these uses. Planned transportation improvements expected to be in place before 2040 are listed below. These projects are assumed in all of the intersection operations analysis conducted for both the 2040 No Build and Preferred Alternatives.

- Evergreen Parkway/US 101 Southbound Ramps – install signal (Thurston County project located outside Olympia city

limits). This improvement could also be a roundabout.

- Evergreen Parkway/US 101 Northbound Ramps – install signal (Thurston County project located outside Olympia city limits). This improvement could also be a roundabout.
- Harrison Avenue/McPhee Road – install signal (needed beyond 2040 plan horizon year). This improvement could also be a roundabout.
- Harrison Avenue/Cooper Point Road – 2nd northbound and westbound left lanes

- Division Street/Harrison Avenue – change northbound and southbound lane geometrics
- Black Lake Boulevard/Capital Mall Drive – add southbound right turn lane
- Black Lake Boulevard/Cooper Point Road – add 2nd eastbound right with extension through the Haggen entrance intersection as a through lane
- Cooper Point Road-Auto Mall Drive/Evergreen Park Drive – add southwest right
- Deschutes Parkway/Lakeridge Drive – install signal. This improvement could also be a roundabout.

Preferred Alternative analysis also assumes the project-specific improvements will be completed.

Similar to the analysis of opening year 2020 traffic operations, analysis of 2040 design year conditions focused on AM and PM peak hours, and compared analysis results with both the No Build and Preferred Alternatives. As described below, comparative results are discussed by time period and summarized both in tables and representative graphics.

AM Peak Hour

Intersection Levels of Service

Table 3-13 illustrates expected AM peak hour traffic operating conditions for the No Build and Preferred (Build) Alternatives in the 2040 project design year. Analysis is based on the traffic volumes presented in Figure 1-15 for the No Build Alternative and Figure 3-11 for the Preferred Alternative. Both the No Build improvements planned by the City and improvements that are part of the Preferred

Alternative are highlighted in the footnotes of this table.

As indicated in Table 3-13, all intersections are expected to operate within their adopted performance standard. One intersection is expected to operate at LOS E for both the No Build and Preferred Alternatives – US 101 eastbound ramps at Crosby Boulevard. This is a substantive increase in congestion in comparison to 2020 AM peak hour conditions. Average delay is expected to be higher with the Preferred Alternative, largely as a result of an increase in eastbound off-ramp traffic. However, it should be noted that LOS E is within the City's adopted mobility standard for this strategy corridor. All other intersections are expected to operate at LOS D or better during the 2040 AM peak hour.

Figure 3-12 presents a graphic comparison of expected 2040 AM peak hour intersection performance with both the No Build and Preferred Alternatives.

Intersection Traffic Queuing

Table 3-14 summarizes the results of traffic queuing analysis for the 2040 AM peak hour at project area intersections. As indicated in the table, three traffic movements at one intersection are expected to experience traffic queues that spill back beyond the available vehicle storage space. These include northbound through, left and right turn movements on Black Lake Boulevard at the intersection with US 101 ramps. This represents an increase in congestion impacts in comparison to 2020 AM peak hour conditions. However, there would be no substantive difference between the No Build and Preferred Alternatives related to this impact.

Table 3-13. 2040 AM Peak Hour Intersection Operations - No Build and Preferred Alternatives

No.	Intersection (1)	Intersection Control	Mobility Standard	No Build		Preferred	
				LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
1	Evergreen Pkwy SB Ramps/Mud Bay Rd (1)	Signal	D	B (13)	0.74	B (13)	0.74
2	Evergreen Pkwy NB Ramps/Mud Bay Rd (1)	Signal	D	C (22)	0.85	C (20)	0.76
3	Kaiser Road/Harrison Avenue	Signal	D	C (30)	0.91	C (30)	0.90
4	Harrison Avenue/McPhee Road (1)	Signal	D	A (3)	0.60	A (3)	0.60
5	Yauger Way/Harrison Avenue	Signal	D	A (7)	0.52	A (8)	0.53
6	Cooper Point Road/Harrison Avenue (2)	Signal	≤E	D (38)	0.88	C (34)	0.87
7	Harrison Avenue/Kenyon Street	Signal	≤E	A (9)	0.77	A (9)	0.77
8	Division Street/Harrison Avenue (3)	Signal	≤E	C (29)	0.86	C (29)	0.86
9	Black Lake Blvd/Capital Mall Entrance	Signal	≤E	A (9)	0.65	A (9)	0.65
10	Kaiser Road/7 th Avenue (a)	Stop Sign	D	B (12)	0.07	A (8)	0.66
11	Yauger Way/Capital Mall Drive (a)	Stop Sign	D	D (32)	0.50	B (12)	0.76
12	Cooper Point Road/Capital Mall Drive	Signal	≤E	C (25)	0.89	B (17)	0.80
13	Black Lake Blvd/Capital Mall Drive (4)	Signal	≤E	B (19)	0.80	B (19)	0.81
14	Cooper Point Road/Haggen Entrance (5)	Signal	≤E	B (19)	0.73	C (24)	0.74
15	Black Lake Blvd/Cooper Point Road (5)	Signal	F	C (32)	0.95	D (38)	0.90
16	Black Lake Blvd/US 101 Ramps (b)	Signal	≤E	D (43)	0.99	D (41)	0.95
17	Cooper Point Road-Auto Mall Drive/Evergreen Park Drive (6)	Signal	≤D	C (29)	0.93	C (29)	0.93
18	Crosby Blvd/US 101 WB Ramps	Signal	≤D	C (23)	0.89	C (22)	0.88
19	Crosby Blvd/US 101 EB Ramps	Signal	≤D	E (73)	1.25	E (70)	1.25
20	Crosby Blvd/Mottman Road	Signal	D	B (11)	0.68	B (13)	0.64
21	Crosby Blvd/Irving Street	Signal	D	B (11)	0.60	B (11)	0.60
22	Lakeridge Drive/Deschutes Pkwy (1)	Signal	D	A (9)	0.73	A (8)	0.73
23	US 101 WB Off-ramp/Kaiser Rd (c)	Stop Sign	D	--	--	C (15)	0.59
24	US 101 EB On-ramp/Kaiser Rd (c)	Stop Sign	D	--	--	A (9)	0.26

Note 1: Mobility Standards based on City of Olympia Transportation 2030. For Urban Corridors LOS E will be acceptable. For Strategy Corridors LOS may fall below adopted standards. This is indicated by the < symbol in the table.

Note 2: All City of Olympia surface street intersections were evaluated using an average of the two highest consecutive peak hours as described in Section 3.2.3.

Bold shading indicates location(s) where mobility standard is not being met.

Note 3: Intersection improvements that are part of the preferred alternative.

(a) Install traffic signal (could also be a roundabout)

(b) Construct at-grade crossing to Yauger Way

(c) Construct intersection

Note 4: All other improvements assumed to be in place are planned for implementation by the City of Olympia.

(1) Install traffic signal or roundabout

(2) Install 2nd northbound and westbound left turn lanes

(3) Convert northbound approach to left/through/right and southbound approach to left/through/through-right lanes

(4) Add southbound right turn lane

(5) Add 2nd eastbound right turn lane and continue improvement through Cooper Point/Haggen intersection as a through lane.

(6) Add southwest bound right turn lane

Table 3-14. 2040 AM Peak Hour Traffic Queuing at Key Locations – No Build and Preferred Alternatives

No.	Intersection	Movement	Vehicle Storage	Vehicle Queues	
				No Build	Preferred
10	Kaiser Road/7th Avenue	NB Thru/Left	550 ft	--	67 ft
		NB Right	150 ft	--	59 ft
		SB All	1,650 ft	--	119 ft
		WB Left	300 ft	38 ft	61 ft
11	Yauger Way/Capital Mall Drive	NB Left	100 ft	43 ft	31 ft
		NB Thru/Right	850 ft	111 ft	120 ft
15	Black Lake Blvd/Cooper Point Road (1)	NB Left	450 ft	369 ft	232 ft
		NB Thru	900 ft	237 ft	223 ft
		WB Thru	2,050 ft	229 ft	188 ft
		EB Thru	1,900 ft	289 ft	255 ft
		SB Thru	2,350 ft	301 ft	323 ft
16	Black Lake Blvd/US 101 Ramps (1)	WB Left	400 ft	154 ft	243 ft
		WB Thru	2,250 ft	--	377 ft
		WB Right	2,250 ft	351 ft	209 ft
		EB Left	300 ft	251 ft	132 ft
		SB Left	450 ft	274 ft	224 ft
		SB Thru	900 ft	115 ft	136 ft
		NB Left	175 ft	255 ft	243 ft
		NB Thru	425 ft	493 ft	434 ft
23	US 101 WB Off-Ramp @ Kaiser Road	NB Right	225 ft	335 ft	338 ft
		WB Left	150 ft	--	45 ft
24	US 101 EB On-Ramp @ Kaiser Road	WB Right	1,050 ft	--	139 ft
		SB Left	150 ft	--	69 ft

Note: Traffic queuing analysis conducted using SimTraffic.

(1) NB/SB refers to traffic on Black Lake Boulevard; EB/WB refers to traffic on US 101 or Cooper Point Road

Bold results indicate locations where existing traffic queues may exceed available vehicle storage.

Operations and queuing analysis worksheets for the No Build Alternative are included in Appendix H, while worksheets for the Preferred Alternative are included in Appendix I.

PM Peak Hour

Intersection Levels of Service

Table 3-15 illustrates expected PM peak hour traffic operating conditions for the

No Build and Preferred (Build) Alternatives in the 2040 project design year. Analysis is based on the traffic volumes presented in Figure 1-16 for the No Build Alternative and Figure 3-13 for the Preferred Alternative. Both the No Build improvements planned by the City and improvements that are part of the Preferred Alternative are highlighted in the footnotes of this table.

Table 3-15. 2040 PM Peak Hour Intersection Operations - No Build and Preferred Alternatives

No.	Intersection	Intersection Control	Mobility Standard	No Build		Preferred	
				LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
1	Evergreen Pkwy SB Ramps/Mud Bay Rd (1)	Signal	D	A (9)	0.71	A (9)	0.70
2	Evergreen Pkwy NB Ramps/Mud Bay Rd (1)	Signal	D	B (14)	0.87	B (13)	0.80
3	Kaiser Road/Harrison Avenue	Signal	D	D (49)	1.02	D (52)	1.04
4	Harrison Avenue/McPhee Road (1)	Signal	D	A (8)	0.83	A (8)	0.81
5	Yauger Way/Harrison Avenue	Signal	D	B (12)	0.72	B (12)	0.69
6	Cooper Point Road/Harrison Avenue (2)	Signal	≤E	E (70)	0.99	E (71)	1.13
7	Harrison Avenue/Kenyon Street	Signal	≤E	C (23)	0.81	C (23)	0.81
8	Division Street/Harrison Avenue (3)	Signal	≤E	E (57)	0.93	D (53)	0.91
9	Black Lake Blvd/Capital Mall Entrance	Signal	≤E	B (12)	0.75	B (12)	0.75
10	Kaiser Road/7 th Avenue (a)	Signal	D	F (124)	1.16	B (17)	0.87
11	Yauger Way/Capital Mall Drive (a)	Signal	D	F (56)	0.76	B (13)	0.79
12	Cooper Point Road/Capital Mall Drive	Signal	≤E	E (66)	1.05	D (38)	0.89
13	Black Lake Blvd/Capital Mall Drive (4)	Signal	≤E	D (44)	0.91	D (43)	0.92
14	Cooper Point Road/Haggen Entrance (5)	Signal	≤E	C (32)	0.87	D (41)	0.84
15	Black Lake Blvd/Cooper Point Road (5)	Signal	F	F (109)	1.34	E (77)	1.18
16	Black Lake Blvd/US 101 Ramps (b)	Signal	≤E	E (55)	1.08	E (66)	1.04
17	Cooper Point Road-Auto Mall Drive/Evergreen Park Drive (6)	Signal	≤D	D (38)	0.92	D (36)	0.89
18	Crosby Blvd/US 101 WB Ramps	Signal	≤D	D (47)	1.02	D (54)	1.14
19	Crosby Blvd/US 101 EB Ramps	Signal	≤D	F (90)	1.35	F (101)	1.57
20	Crosby Blvd/Mottman Road	Signal	D	B (16)	0.81	B (17)	0.91
21	Crosby Blvd/Irving Street	Signal	D	A (9)	0.56	A (8)	0.56
22	Lakeridge Drive/Deschutes Pkwy (1)	Stop Sign	D	A (7)	0.64	A (7)	0.64
23	US 101 WB Off-ramp/Kaiser Rd (c)	Stop Sign	D	--	--	D (30)	0.44
24	US 101 EB On-ramp/Kaiser Rd (c)	Stop Sign	D	--	--	B (12)	0.57

Note 1: Mobility Standards based on City of Olympia Transportation 2030. For Urban Corridors LOS E will be acceptable. For Strategy Corridors LOS may fall below adopted standards. This is indicated by the < symbol in the table.

Note 2: All City of Olympia surface street intersections were evaluated using an average of the two highest consecutive peak hours as described in Section 3.2.3.

Bold shading indicates location(s) where mobility standard is not being met.

Note 3: Intersection improvements that are part of the preferred alternative.

- (a) Install traffic signal (could also be a roundabout)
- (b) Construct at-grade crossing to Yauger Way
- (c) Construct intersection

Note 4: All other improvements assumed to be in place are planned for implementation by the City of Olympia.

- (1) Install traffic signal (this improvement could also be a roundabout)
- (2) Install 2nd northbound and westbound left turn lanes
- (3) Convert northbound approach to left/through/right lane and southbound approach to left/through/through-right lane
- (4) Add southbound right turn lane
- (5) Add 2nd eastbound right turn lane and continue improvement through Cooper Point/Haggen intersection as a through lane.
- (6) Add southwest bound right turn lane

As indicated in Table 3-15, two intersections are expected to exceed their adopted performance standard with the No Build Alternative. These include: Kaiser Road at 7th Avenue and Yauger Way at Capital Mall Drive. Both are expected to operate at LOS F for stop-controlled side street traffic during the 2040 PM peak hour. With the addition of US 101 ramps at these two locations and traffic signals under the Preferred Alternative, intersection operations are expected to improve to LOS B. All other intersections are expected to operate within their adopted mobility standards.

Traffic operations are expected to improve to LOS D at the intersection of Black Lake Boulevard and Harrison Avenue with the Preferred Alternative in comparison to LOS E with the No Build Alternative.

Traffic operations would also improve at the intersection of Black Lake Boulevard and Cooper Point Road from LOS F to LOS E. Traffic with the Preferred Alternative is expected to experience slightly more delay at the intersection of the US 101 ramps at Black Lake Boulevard than with the No Build Alternative. In both instances at both locations, signal timing was optimized with the specific goal of minimizing traffic queuing between the US 101 interchange and the Black Lake Boulevard/Cooper Point Road intersection. This was done to avoid creating adverse traffic impacts at the interchange that could potentially affect the freeway mainline. As a result, a better balance of traffic movement occurs with the Preferred Alternative than can be achieved with the No Build condition.

The intersection of the US 101 eastbound ramps at Crosby Boulevard is expected to operate at LOS F for both the No Build and Preferred Alternatives. This represents an increase in congestion in comparison to 2020 PM peak hour conditions which are expected to be LOS E. Average delay is expected to be higher with the Preferred Alternative, largely as a result of an

increase in eastbound off-ramp traffic. However, it should be noted that LOS F is within the City's adopted mobility standard for this strategy corridor where traffic conditions can exceed LOS E and still be acceptable.

At the intersection of the US 101 westbound ramps with Crosby Boulevard, both the No Build and Preferred Alternatives are expected to operate at LOS D during the 2040 PM peak hour. The Preferred Alternative is expected to experience greater average delay as a result of increased northbound left turning traffic (i.e., from Crosby Boulevard to the westbound freeway). In comparison to the No Build Alternative, these left turns represent a shift in northbound traffic from through movements to lefts which have a greater impact on traffic performance.

Figure 3-14 presents a graphic comparison of expected 2040 PM peak hour intersection performance with both the No Build and Preferred Alternatives.

Intersection Traffic Queuing

Table 3-16 summarizes the results of traffic queuing analysis for the 2040 PM peak hour at project area intersections. As indicated in the table, several traffic movements at three intersections are expected to experience vehicle queues that spill back beyond the available vehicle storage space. These include:

- Black Lake Boulevard at Cooper Point Road - westbound through, eastbound through/right and southbound through movements on Cooper Point Road are all expected to exceed available space with either the No Build or Preferred Alternatives. The northbound queue would be accommodated within the available storage space to minimize impacts at the US 101/Black Lake Boulevard interchange.

Table 3-16. 2040 PM Peak Hour Traffic Queuing at Key Locations – No Build and Preferred Alternatives

No.	Intersection	Movement	Vehicle Storage	Vehicle Queues	
				No Build	Preferred
10	Kaiser Road/7th Avenue	NB Thru/Left	550 ft	--	165 ft
		NB Right	150 ft	--	58 ft
		SB All	1,650 ft	--	288 ft
		WB Left	300 ft	297 ft	275 ft
11	Yauger Way/Capital Mall Drive	NB Left	100 ft	40 ft	95 ft
		NB Thru/Right	850 ft	77 ft	133 ft
15	Black Lake Blvd/Cooper Point Road (1)	NB Left	450 ft	438 ft	355 ft
		NB Thru	900 ft	471 ft	415 ft
		WB Thru	2,050 ft	3,164 ft	2,722 ft
		EB Thru	1,900 ft	2,535 ft	1,930 ft
		SB Thru	2,350 ft	4,943 ft	2,375 ft
16	Black Lake Blvd/US 101 Ramps (1)	WB Left (2)	400 ft	351 ft	499 ft
		WB Thru	2,250 ft	--	983 ft
		WB Right	2,250 ft	633 ft	465 ft
		EB Left	300 ft	382 ft	346 ft
		SB Left (3)	450 ft	351 ft	440 ft
		SB Thru (3)	900 ft	162 ft	366 ft
		NB Left	175 ft	253 ft	227 ft
		NB Thru (2)	425 ft	635 ft	931 ft
23	US 101 WB Off-Ramp @ Kaiser Road	WB Left	150 ft	--	60 ft
		WB Right	1,050 ft	--	101 ft
24	US 101 EB On-Ramp @ Kaiser Road	SB Left	150 ft	--	154 ft

Note: Traffic queuing analysis conducted using SimTraffic.

- (1) NB/SB refers to traffic on Black Lake Boulevard; EB/WB refers to traffic on US 101 or Cooper Point Road
- (2) The No Build Alternative assumes the existing dual left turn lanes, a single lane would be provided with the Preferred Alternative. If a single lane were provided with the No Build Alternative the cumulative left turn storage requirement would be 577 feet, which exceeds the storage requirement for the Preferred Alternative.
- (3) Estimated vehicle queues for the Preferred Alternative are expected to be longer than with the No Build Alternative. This results from the addition of a westbound through traffic movement to the intersection. This new movement will require some additional signal green time to accommodate expected traffic volumes and, thus, reducing available green time for certain other movements.

Bold results indicate locations where existing traffic queues may exceed available vehicle storage.

- Black Lake Boulevard at US 101 ramps - eastbound left turns (on the eastbound off-ramp) and northbound left, through and right movements (on Black Lake Boulevard) are all expected to exceed available vehicle storage with either the No Build or Preferred Alternatives. With the Preferred Alternative westbound left turns (on the westbound off-ramp) are also expected to exceed available storage. As noted in footnote (1) to the

table, dual left turn lanes currently exist and are assumed to be in place with the No Build Alternative. The storage requirement shown in the table is for the longest queue in one of these two lanes. Aggregated storage required for both lanes is 577 feet. This exceeds the storage requirement of the single left turn lane in the Preferred Alternative which is 499 feet.

In response to this analysis of potential traffic queuing impacts, the initial layout of the Preferred Alternative was modified to add an additional 75 to 100 feet of storage space for the eastbound left turn lane, and an additional 100 to 200 feet of storage space for the westbound left turn lane. In neither instance would expected traffic queues impact US 101 mainline traffic operations.

- Kaiser Road at US 101 ramps with the Preferred Alternative: southbound left turn lane may slightly exceed available storage. This condition is expected to occur with limited duration and to temporarily block southbound through movements when it occurs.

As noted earlier under the discussion of freeway mainline operations, a Vissim simulation was conducted for the US 101 interchange at Black Lake Boulevard to ensure that proposed modifications would not adversely impact the mainline. A comparison was conducted of 2040 PM peak hour traffic queuing using both SimTraffic (as presented in Table 3-16 for northbound and southbound movements) and Vissim analysis software (summarized in Table 3-17 for eastbound and westbound movements). A graphic illustration that compares queuing estimates for both software packages is presented in Figure 3-5.

As indicated in Figure 3-5 results are similar using either analysis tool except for the eastbound off-ramp from US 101 to Black Lake Boulevard. Traffic queuing projections using Vissim show a somewhat longer queue than projections using SimTraffic. However, under either case traffic queues are not expected to reach the highway mainline and impact through traffic movement. These differences are

primarily attributable to the unique attributes of each analysis tool. The value of including and comparing both the Vissim and SimTraffic queuing results for the US 101/Black Lake Boulevard interchange is to ensure that, based on all reasonable analysis methods, no adverse traffic impact to the freeway mainline would be anticipated.

Table 3-17 also shows expected traffic queuing for the critical roadway segment of Black Lake Boulevard between US 101 and Cooper Point Road. There is approximately 900 feet of available queue storage today between these two intersections and this will not substantively change with the Preferred Alternative. Review of the **bold** highlighted numbers for the northbound movement at the Black Lake Boulevard/Cooper Point Road intersection, and the southbound movement at the US 101/Black Lake Boulevard intersection shows the 2040 PM peak hour traffic queuing estimates obtained from various Vissim simulations.

For the northbound movement at Black Lake Boulevard/Cooper Point Road the existing PM peak hour vehicle queue completely fills this space. This is also expected to be true for the 2040 PM peak hour with the No Build Alternative. With the Preferred Alternative, the northbound vehicle queue is expected to drop to approximately 600 feet.

In the southbound direction at US 101/Black Lake Boulevard the existing and 2040 No Build PM peak hour traffic queues are expected to be approximately 700 feet long. With the Preferred Alternative, traffic queues are expected to fill the 900-foot space. This change results from the emphasis in increasing the balance in traffic operational performance between the two intersections while avoiding potential adverse impacts on the freeway off-ramps and mainline.

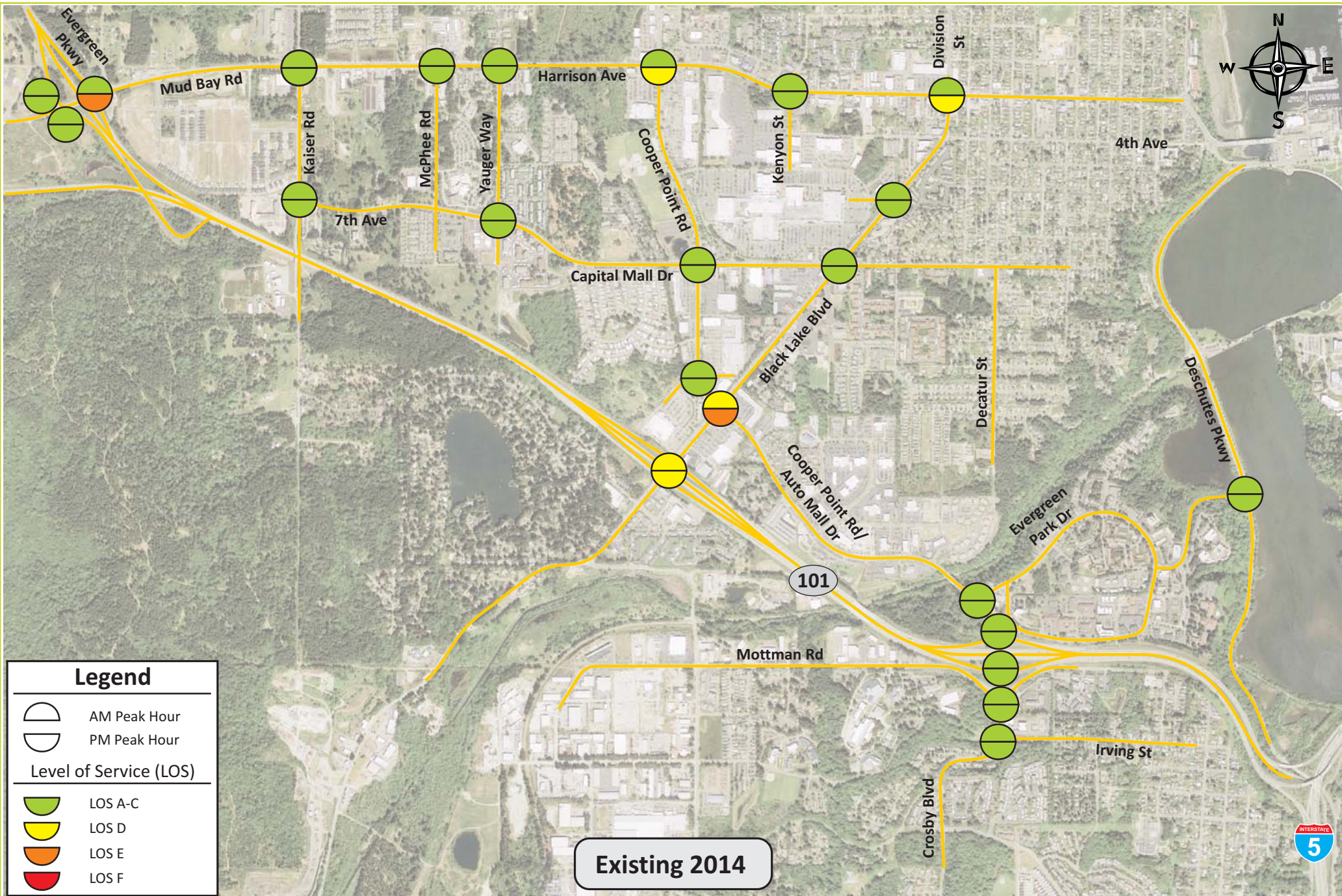
Table 3-17. 2040 PM Peak Hour Traffic Queuing on Black Lake Boulevard – Vissim Simulation Results

Intersection/Movement	PM Peak Hour Vehicle Queues		
	2014	2040 No Build	2040 Preferred
<i>Black Lake Blvd/Cooper Point Road</i>			
Eastbound	1,300 ft	1,200 ft	900 ft
Westbound	300 ft	2,100 ft	2,100 ft
Northbound	900 ft	900 ft	600 ft
Southbound	700 ft	2,400 ft	2,300 ft
<i>US 101 Ramps/Black Lake Blvd</i>			
Eastbound (off-ramp)	200 ft	600 ft	1,000 ft
Westbound (off-ramp)	1,100 ft	800 ft	700 ft
Northbound	200 ft	500 ft	600 ft
Southbound	700 ft	700 ft	900 ft

Note: Data refers to the back of the longest queue for the directional movement specified. The **bolded** text highlights the critical link between the Black Lake Boulevard/Cooper Point Road intersection and the US 101/Black Lake Boulevard interchange.

Operations and queuing analysis worksheets for the No Build Alternative are included in

Appendix H, while worksheets for the Preferred Alternative are included in Appendix I.



Legend	
	AM Peak Hour
	PM Peak Hour
Level of Service (LOS)	
	LOS A-C
	LOS D
	LOS E
	LOS F

Existing 2014

Figure 3-6
 Existing 2014 Intersection
 Level of Service

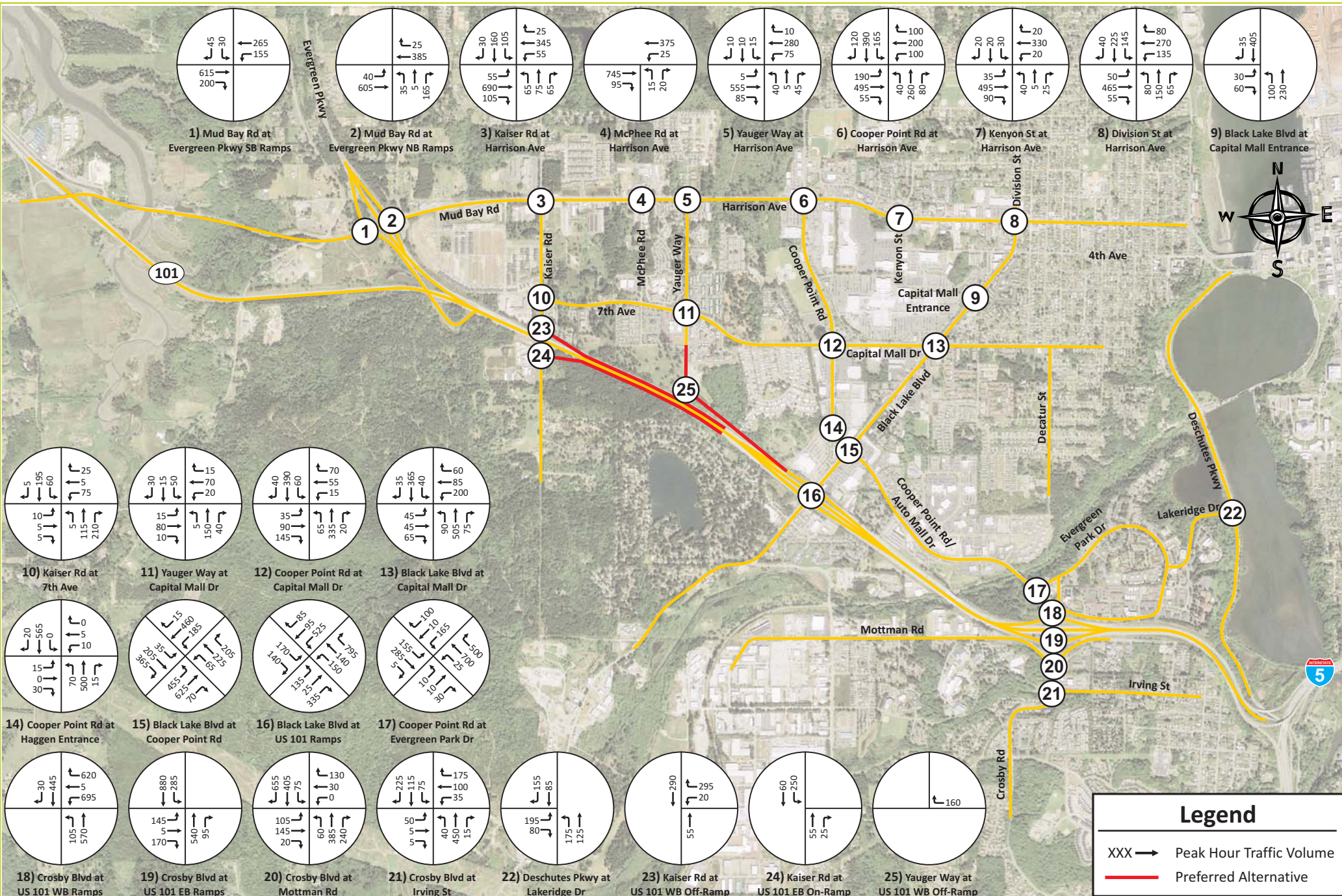
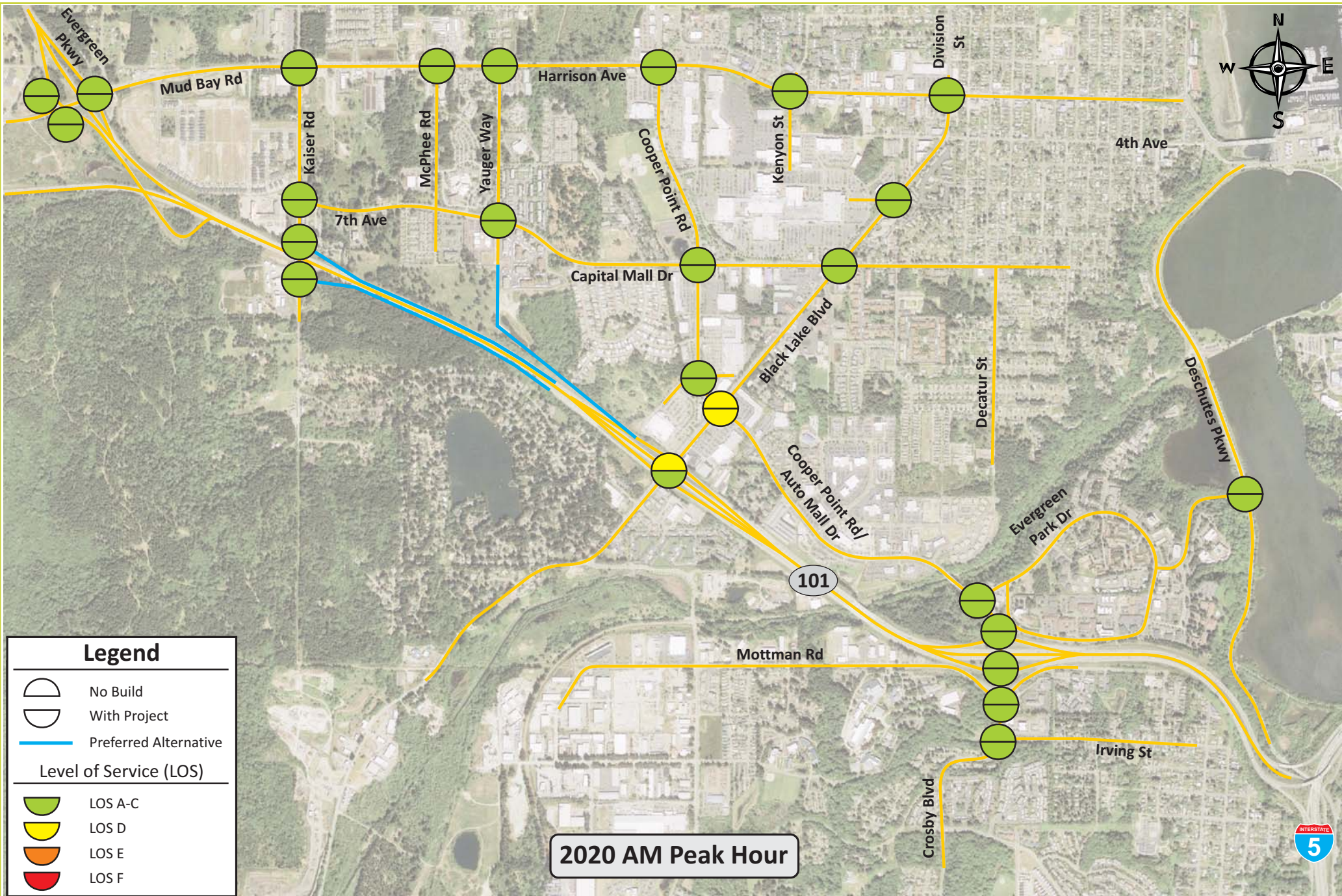


Figure 3-7
2020 AM Peak Hour Intersection
Traffic Volumes - Preferred Alternative



US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 3-8
 2020 AM Peak Hour
 Intersection Level of Service

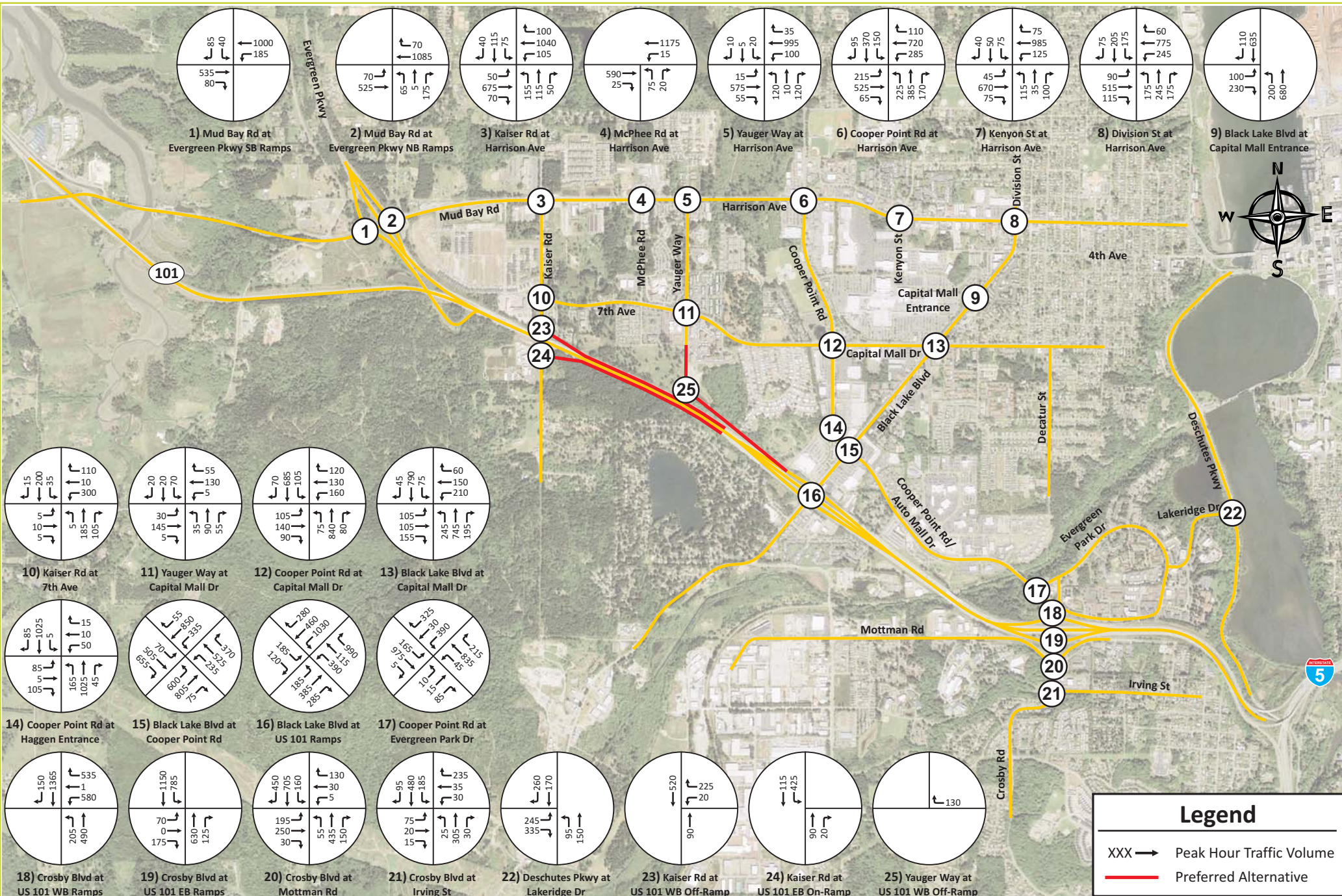


Figure 3-9
2020 PM Peak Hour Intersection
Traffic Volumes - Preferred Alternative

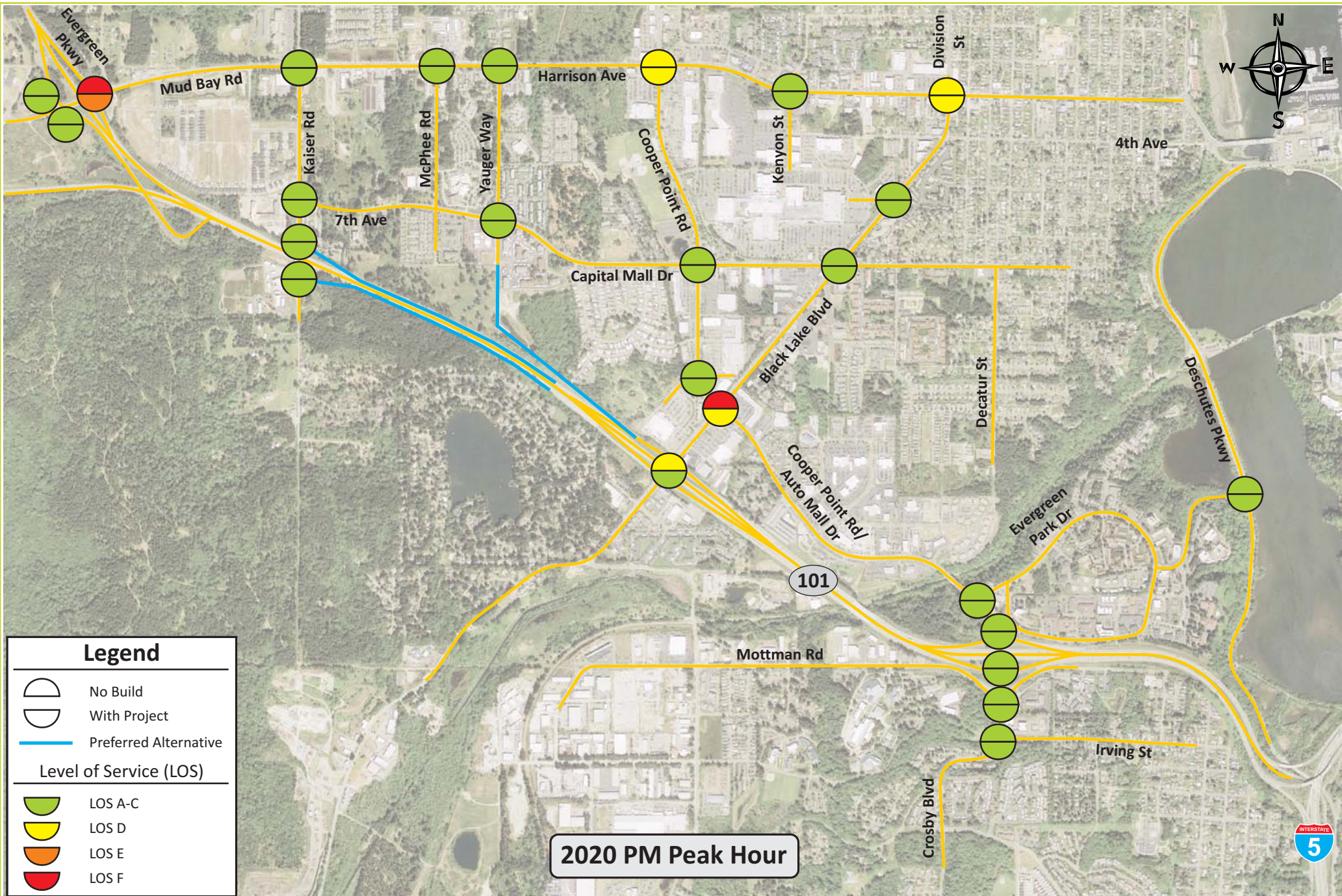


Figure 3-10
 2020 PM Peak Hour
 Intersection Level of Service

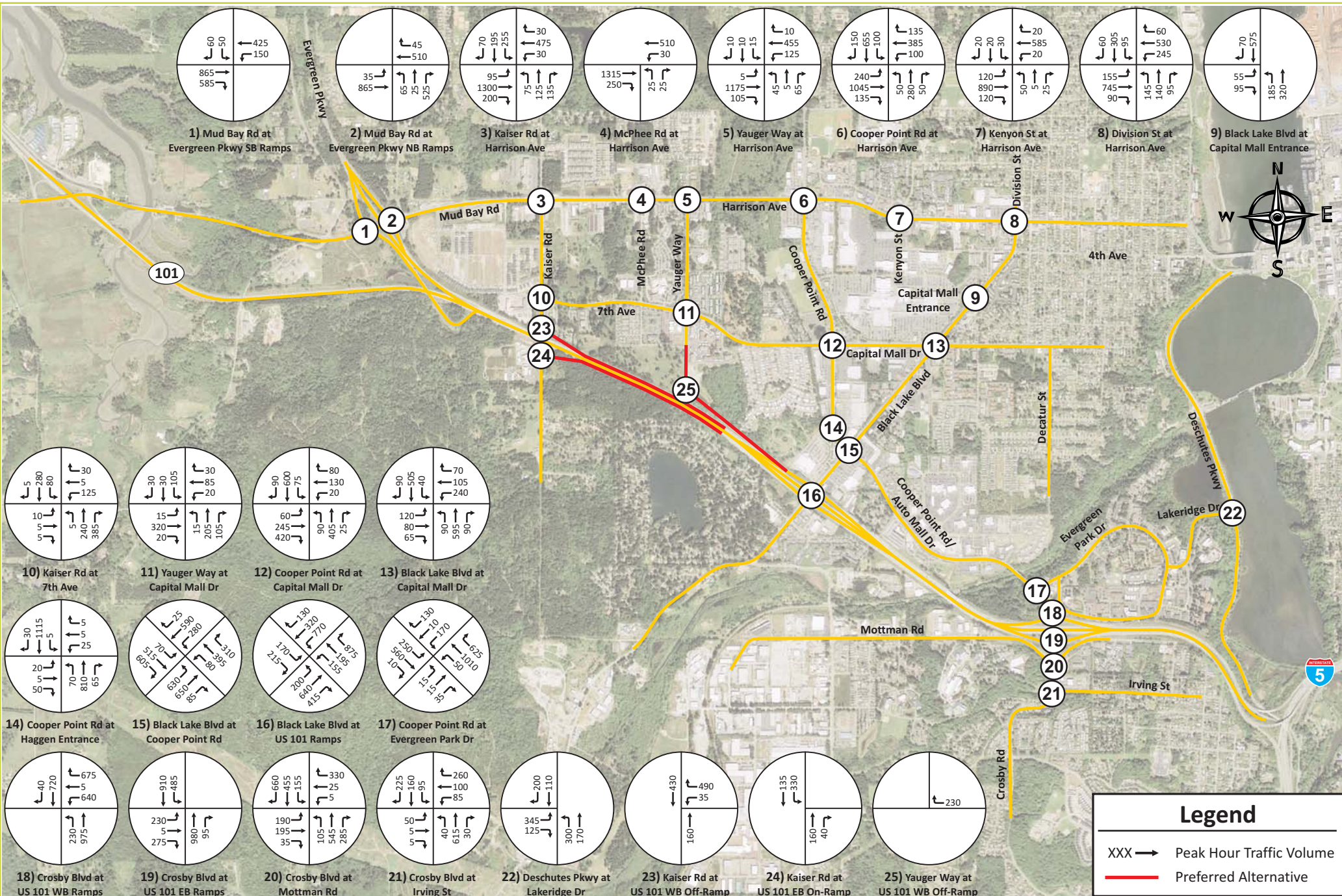


Figure 3-11
2040 AM Peak Hour Intersection
Traffic Volumes - Preferred Alternative



Figure 3-12
2040 AM Peak Hour
Intersection Level of Service

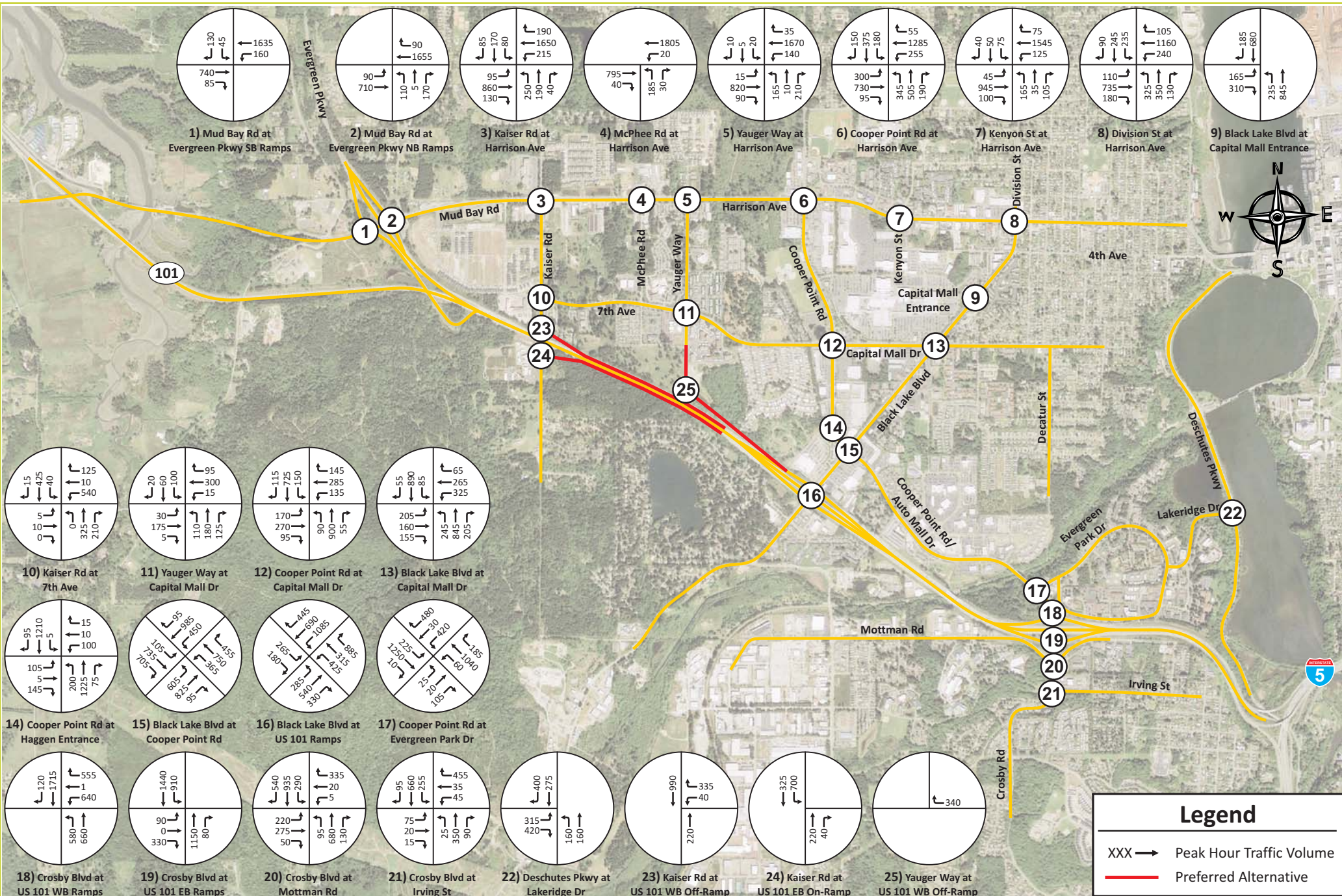
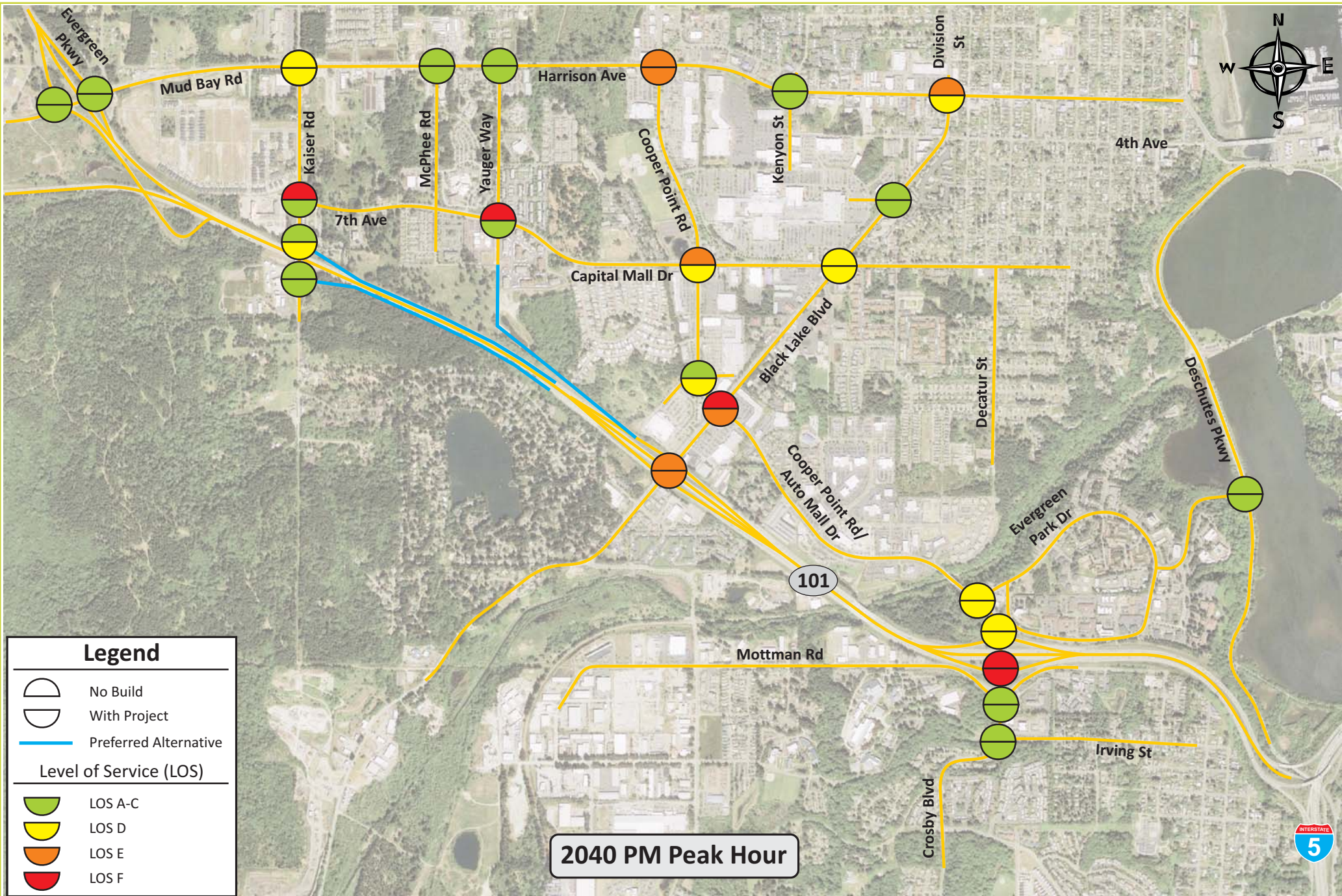


Figure 3-13
2040 PM Peak Hour Intersection
Traffic Volumes - Preferred Alternative



US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 3-14
 2040 PM Peak Hour
 Intersection Level of Service

3.6 WHAT IS THE CRASH EXPERIENCE IN THE PROJECT AREA?

As noted at the beginning of this chapter, the crash experience and safety analysis included in Policy Point 3 was addressed extensively in earlier studies. Crash data and analysis has been updated as part of this IJR to reflect the most recently available information. This section includes a discussion of:

- Crash data resources and analysis methods
- Crash history along US 101 including the freeway mainline, interchange ramps, and ramp termini intersections. Also included is an assessment of crashes in comparison with similar facilities in the state
- Crash history at key project study area intersections on the local street system
- Predictive analysis of expected crashes in 2020 and 2040 for both the No Build and Preferred Alternatives

Crash data is included in Appendix J, while crash analysis results are included in Appendix K.

3.6.1 What was the Process used to Evaluate Crashes in the Project Area?

What Locations were Studied?

The analysis in this section focuses primarily on US 101 including the freeway mainline between milepost 364.2 (just east of the Evergreen Parkway interchange) and milepost 367.4 (just west of I-5), as well as the ramps and termini for the existing Black Lake Boulevard and Crosby Boulevard/Cooper Point Road-Automall Drive interchanges. Future conditions analysis with the Preferred Alternative also includes an assessment of the new Kaiser Road interchange.

Intersections for which crash safety analysis was conducted include the same locations for which traffic operations analysis was conducted. These

locations are shown in Figure 3-21 later in this section.

What Information was Collected and Evaluated?

Crash data was obtained and compiled for a five-year period between January 1, 2010 and December 31, 2014. This information was obtained from the Washington State Department of Transportation's Crash Data and Reporting Branch and the City of Olympia (traffic data only).

What Analysis Methods and Tools Were Used?

A statistical analysis was conducted of the 5-year traffic crash data to identify typical crash patterns and magnitude. Data was evaluated separately for the US 101 mainline and ramps, and for project study area intersections. Data analysis included identification of:

- Crash location and frequency
- Crash type (i.e., rear-end, sideswipe, turning, etc.)
- Severity of crashes (i.e. fatal, serious injury, evident injury, possible injury and non-injury or property damage only)
- Contributing causes of crashes

“Under Section 409 of Title 23 of the United States Code, collision data is prohibited from use in any litigation against state, tribal, or local government that involves the location(s) mentioned in the collision data.”

In addition to the statistical assessment of crashes along US 101, an assessment was made of crash history using the predictive features of AASHTO's HSM Freeway Predictive Model based on the ISATe application spreadsheet. Expected crashes were estimated for US 101 for 2020 and 2040 with both the No Build and Preferred Alternatives. A comparison of expected crashes with and without the Project provides an

indication of potential safety-related benefits or impacts associated with the proposed action.

For study area intersections, including both those directly affected by the US 101 ramps and those elsewhere in West Olympia, crash rate calculations were developed and reviewed.

3.6.2 What is the Existing Crash Experience for US 101?

Five Year Crash Summary

Over the five-year analysis period there were 328 reported crashes along the 3.2 mile section of US 101 located within the project area. During this five-year period, approximately 21 percent of all US 101-related crashes occurred on the highway mainline, while 79 percent occurred on the ramps and at ramp termini intersections. Figure 3-15 illustrates the pattern of crashes along the mainline in comparison to the ramps and limited access cross-streets/intersections for each year during the five-year period.

Figure 3-16 presents a summary of crashes along US 101 by location

and direction of travel for the five-year period. As indicated in the graphic, the highest crash experience along US 101 in the project vicinity are located in the area approaching (eastbound) or departing (westbound) from I-5 interchange. For purposes of the information in this report, increasing mileage along US 101 is referred to as eastbound, while decreasing mileage is referred to as westbound. Other noted crash locations are at the eastbound on-ramp from the Crosby Boulevard/Cooper Point Road Automall Drive interchange (which leads directly to the split to northbound or southbound I-5) and at the eastbound on-ramp from the Evergreen Parkway.

Figure 3-15. US 101 Crashes by Year, 2010-2014

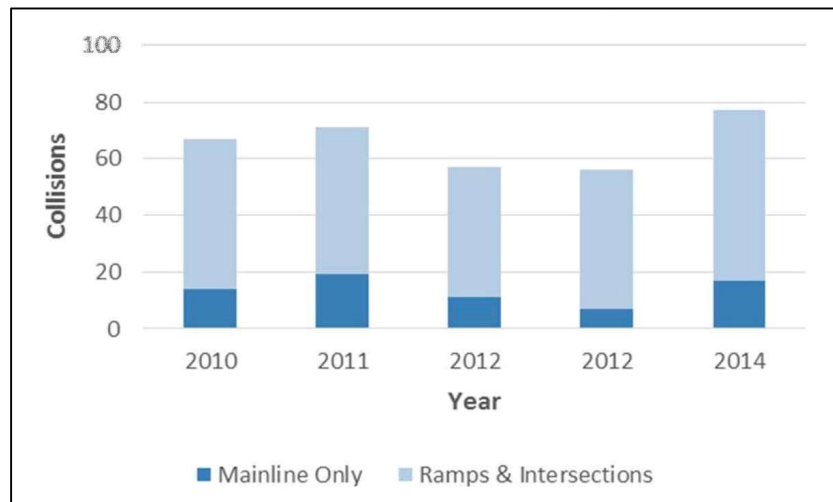


Figure 3-16. 2010-2014 Crashes on US 101 by Location and Direction of Travel

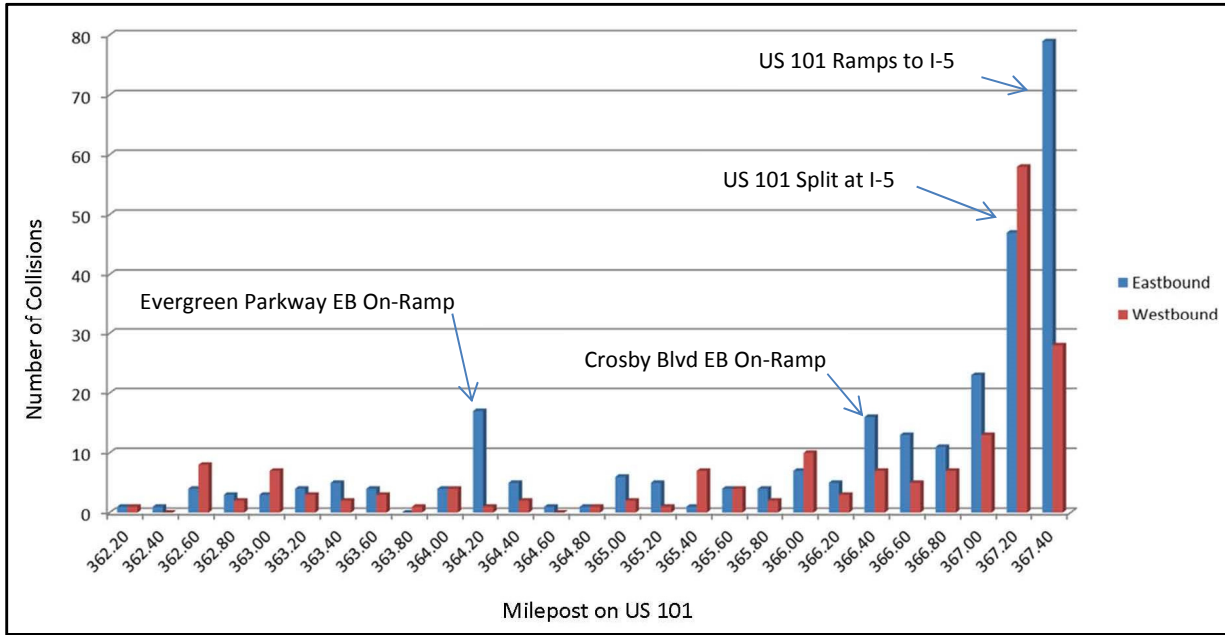
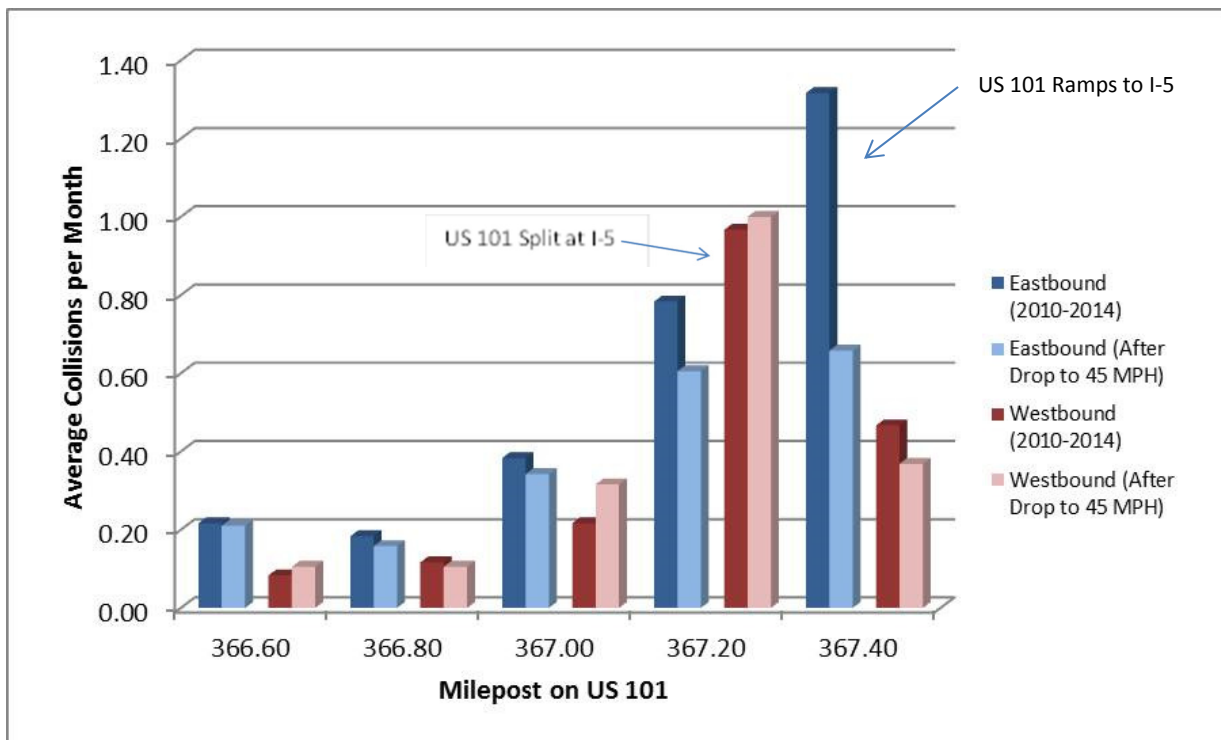


Figure 3-17 shows the effect of reducing the 60 mph speed limit to 45 mph in October of 2011 in the eastbound direction starting at about

milepost 367.0. Eastbound crashes approaching I-5 have dropped substantially.

Figure 3-17. Crashes on US 101 per Month East of Crosby Interchange Before and After Speed Limit Drop to 45 MPH



Crashes by Type

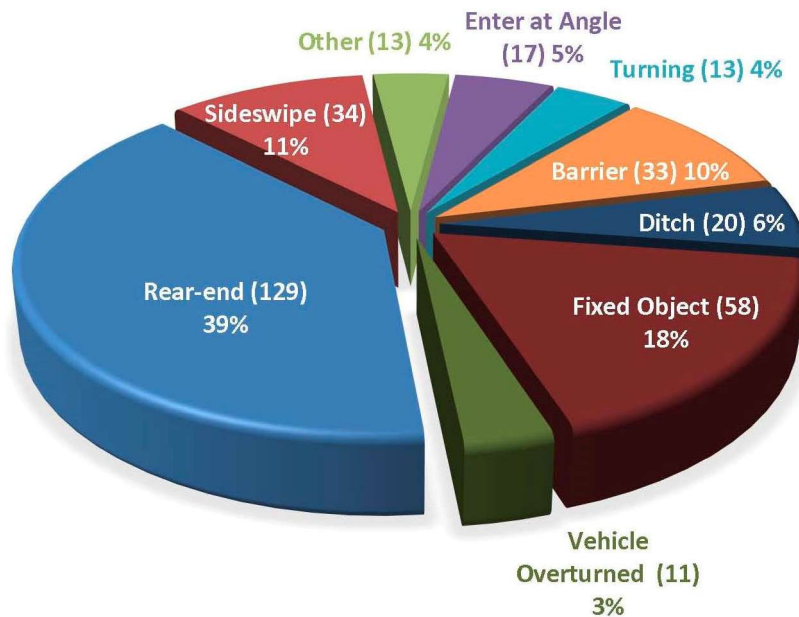
Table 3-18 summarizes recent crash experience along US 101 in the project area by type and year covering a five year period from 2010 to 2014. Data for the total five year period is also shown in table and illustrated graphically in Figure 3-18. As indicated, nearly 40 percent of total crashes in the project area involved rear

end incidents, 18 percent involved hitting fixed objects, and a further 10 percent each included sideswipe crashes or incidents involving hitting railings or barriers. The rear end and sideswipe crashes are a common occurrence in congested stop-and-go conditions, which occur in areas with significant weaving activity like US 101 near I-5.

Table 3-18. US 101 Crashes by Type, 2010-2014

Type	Crashes by Year					5-Year Totals	
	2010	2011	2012	2013	2014	Crashes	Percent
Rear-end	24	29	19	27	30	129	39%
Sideswipe	4	7	11	6	6	34	11%
Angle	5	2	3	5	2	17	5%
Turning	0	3	0	2	8	13	4%
Barrier	7	6	6	5	9	33	10%
Ditch	7	6	4	0	3	20	6%
Fixed Object	14	9	11	8	16	58	18%
Overturn	3	3	1	2	2	11	3%
Other	3	6	2	1	1	13	4%
Total	67	71	57	56	77	328	100%

Figure 3-18. US 101 Crashes by Type, 2010-2014



Crashes by Severity

A summary of the annual crashes by severity along US 101 and at its ramps and ramp termini intersections is shown in Table 3-19. This table also includes a five year total which is illustrated in Figure 3-19. These numbers include recorded crashes along the I-5 mainline, ramps and all

cross-streets and interchanges within the limited access area.

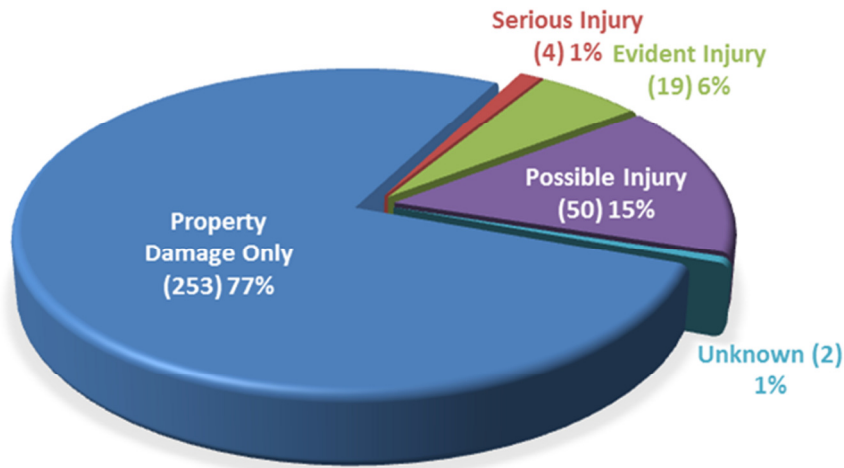
Crashes involving property damage only (no injuries) make up the majority (over 77 percent) of all crashes. 15 percent involved possible injuries and 7 percent involved evident or serious injuries. There were no fatalities in the project area during the five year analysis period.

Table 3-19. US 101 Crashes by Severity, 2010-2014

Type	Crashes by Year					5-Year Totals	
	2010	2011	2012	2013	2014	Crashes	Percent
Fatal	0	0	0	0	0	0	0%
Serious Injury	2	0	1	0	1	4	1%
Evident Injury	4	5	4	2	4	19	6%
Possible Injury	7	9	7	13	14	50	15%
Non-Injury (PDO)	54	56	45	41	57	253	77%
Unknown	0	1	0	0	1	2	1%
Total	67	71	57	56	77	328	100%

Note: PDO means Property Damage Only

Figure 3-19. US 101 Crashes by Severity, 2010-2014



Crashes by Contributing Factors

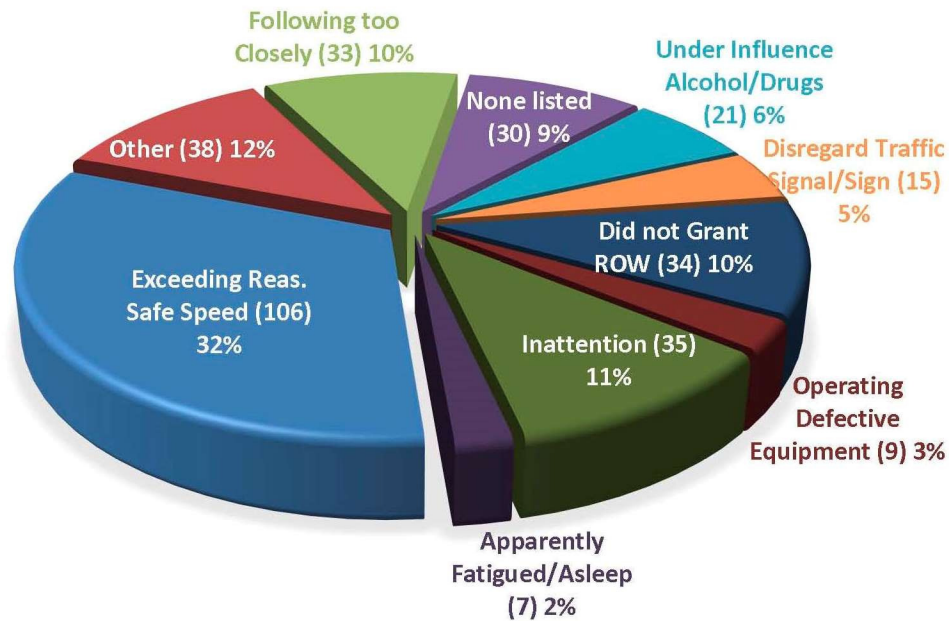
Based on existing crash data, there are several circumstances that contribute to the crashes along the US 101 corridor in the project area, as shown in Table 3-21 and Figure 3-20. Exceeding

reasonable speeds, following too closely, driver inattention, and failure to yield right-of-way (ROW) are four factors that contribute to over 63 percent of the crashes that have occurred along this section of US 101.

Table 3-20. US 101 Crashes by Contributing Factors, 2010-2014

Type	Crashes by Year					5-Year Totals	
	2010	2011	2012	2013	2014	Crashes	Percent
Speeding	27	30	13	15	21	106	32%
Following too Closely	10	5	9	5	4	33	10%
Under the Influence	2	6	5	1	7	21	6%
Disregard Signal	4	2	0	4	5	15	5%
Did not Yield ROW	6	6	10	5	7	34	10%
Defective Equipment	0	3	2	2	2	9	3%
Inattention	3	2	4	12	14	35	11%
Fatigue	2	1	1	1	2	7	2%
Other	5	9	8	8	8	38	12%
None Listed	8	7	5	4	6	30	9%
Total	67	71	57	57	76	328	100%

Figure 3-20. US 101 Crashes by Contributing Factors, 2010-2014



3.6.3 What is the Existing Crash Experience for Project Area Intersections?

In addition to assessing crash history along the US 101 corridor through the project area, analysis was also conducted of crashes at the same intersections evaluated for traffic

performance as described earlier in this chapter. Figure 3-21 depicts the location of intersections for which five years of crash data (2010 through 2014) was collected and analyzed. A summary of five-year crash data and an associated crash rates for each intersection is presented in Table 3-21.

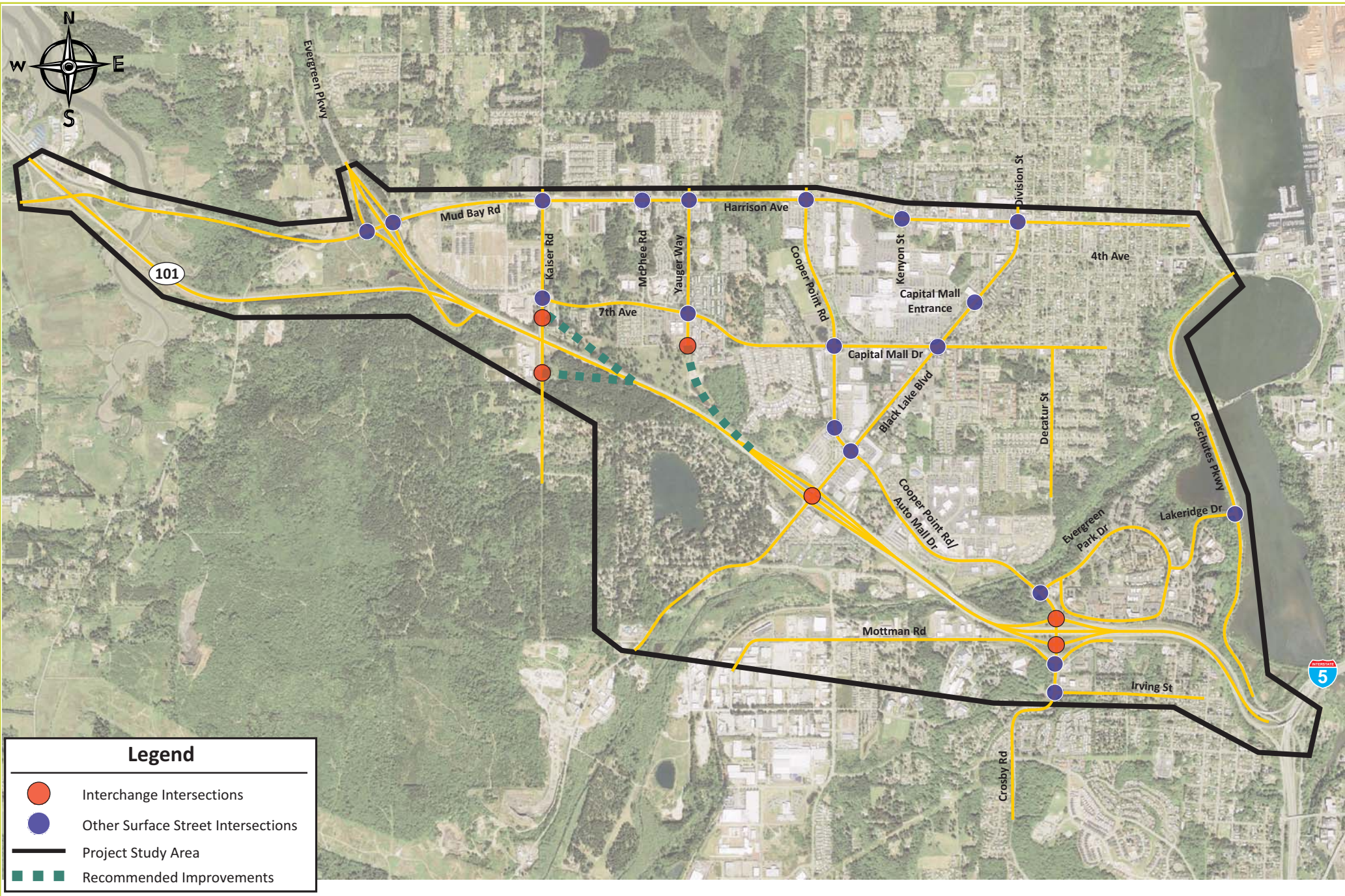
As noted in the table, all project area intersections are currently experiencing less than 1 crash per year per million entering vehicles (MEV) with the exception of the intersection of Black Lake Boulevard and Cooper

Point Road. For planning purposes a threshold of 1.0 crashes per MEV is commonly used to identify locations with potential safety concerns. However, existing safety issues at this intersection are considered to be negligible.

Table 3-21. Existing Intersection Crash Rate Analysis (1/1/2010 to 12/31/14)

No.	Intersection	Five-Year Total Crashes	Daily Entering Volume	Five-Year Crash Rate (1)
1	Evergreen Pkwy SB Ramps/Mud Bay Road	5	17,550	0.16
2	Evergreen Pkwy NB Ramps/Mud Bay Road	5	19,550	0.14
3	Kaiser Road/Mud Bay Road	1	21,700	0.03
4	Harrison Avenue/McPhee Road	3	16,200	0.10
5	Yauger Way/Harrison Avenue	16	18,750	0.47
6	Cooper Point Road/Harrison Avenue	39	34,450	0.62
7	Harrison Avenue/Kenyon Street	25	22,650	0.65
8	Division Street/Harrison Avenue	47	31,250	0.83
9	Black Lake Blvd/Capital Mall Entrance	7	18,250	0.21
10	Kaiser Road/7th Avenue	1	2,500	0.22
11	Yauger Way/Capital Mall Drive	3	6,950	0.24
12	Cooper Point Road/Capital Mall Drive	51	33,100	0.84
13	Black Lake Blvd/Capital Mall Drive	44	29,500	0.82
14	Cooper Point Road/Haggen Entrance	16	32,350	0.27
15	Black Lake Blvd/Cooper Point Road	115	56,100	1.12
16	Black Lake Blvd at US 101 Ramps	65	49,350	0.72
17	Cooper Point Road-Auto Mall Drive/Evergreen Park Drive	34	29,850	0.62
18	Crosby Blvd/US 101 WB Ramps	12	37,450	0.18
19	Crosby Blvd/US 101 EB Ramps	8	31,900	0.14
20	Crosby Blvd/Mottman Road	23	22,800	0.55
21	Crosby Blvd at Irving Street	14	13,450	0.57
22	Lakeridge Drive/Deschutes Pkwy	5	11,250	0.24

(1) Crash rate is expressed as the number of crashes in the analysis period per million vehicles entering the intersection.



US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 3-21
 Crash Analysis Intersections

3.7 HOW ARE CRASH RATES EXPECTED TO CHANGE OVER THE PLANNING PERIOD?

This section presents an assessment of how the number and type of crashes along US 101 in the project area are expected to change over time, particularly in relation to variations in traffic volumes and modifications to the street and highway system as proposed by the Preferred Alternative in comparison to the No Build condition. The predictive features of AASHTO's HSM Freeway Predictive Model using the ISATe application spreadsheet has been used to conduct this analysis. ISATe (the Enhanced Interchange Safety Analysis Tool) provides design and safety engineers with an automated tool for assessing the safety effects of basic geometric design at a typical existing interchange and the adjacent roadway network. ISATe can also be used to predict the safety performance of design alternatives for new interchanges and the effects of reconstructing existing interchanges.

The primary outputs from an analysis using ISATe include: the number of predicted crashes for the entire interchange area, the number of predicted crashes by interchange element type, the number of predicted crashes by year, and the number of predicted crashes by type. This output is used to compare predicted safety impacts associated with both the No Build and Preferred Alternatives.

For the crash analysis in this IJR, the HSM model using the ISATe modeling tool was built upon observed crashes and existing/future traffic volumes to:

- Determine if the existing safety performance of the highway is normal given its existing configuration in comparison to other locations that are similar.
- Identify and document predicted safety performance for the Preferred Alternative including proposed access point revisions for each element of the

corridor such as the freeway section, speed change lanes, ramps, auxiliary lanes, ramp termini intersections, and the adjacent affected local surface system, including roadway segments and intersections.

The goal of this analysis is to determine if the Preferred Alternative would have a significant adverse impact on the safety of the freeway or the adjacent affected local surface street system. If an adverse impact is identified, the modeling tool will also help to establish a list of potential mitigation measures that could address these impacts.

3.7.1 How was the ISAT Model Developed for US 101 in the Project Area?

The ISATe spreadsheet is based on a series of linked Excel files. Data inputs to the model are organized into a series of segments and other locations along the US 101 corridor consistent with the graphic presented in Figure 3-22. Data inputs include crashes, average daily traffic volumes, and roadway geometrics (including horizontal curvature; shoulder, median and travel lane widths; barriers; length of ramps, speed change lanes and tapers; and ramp termini lane configurations). Documentation of the development of this model is included in Appendix K.

Model Assumptions

Assumptions developed for the US 101/West Olympia Access Project HSM freeway model using ISATe were reviewed and discussed with WSDOT prior to completion of an existing conditions model. This model was developed to explore existing crash experience on the various highway mainline segments, ramps and ramp termini intersections to better understand how existing crash experience in the project area compares with expected experience both for US 101 and for similar facilities. The existing conditions model was then used as the basis for evaluating future project and non-project conditions.

All inputs to the model correlated with existing design and operations characteristics of the highway with two exceptions. These exceptions are described in the bullet points below and resulted from limitations to the model’s input parameters.

- For analysis of the eastbound on-ramp at Crosby Boulevard, the mainline was coded at 50 mph to reflect the highway speed reduction that exists in this area. The actual highway speed is posted as 45 mph, but the HSM freeway model is limited to a lowest speed of 50 mph.
- The HSM freeway model cannot analyze a single point urban interchange (SPUI) so the interchange of US 101 at Black Lake Boulevard was assessed with a diamond interchange configuration with a distance between the ramps of 0.05 miles (consistent with existing conditions). The diamond interchange configuration most closely reflects the characteristics of the actual interchange.

As shown in Table 3-22, there is a good correlation between existing crashes at the ramp termini intersections of Black Lake Boulevard and the estimated collisions. This correlation validates the analysis approach.

Assessment of Existing Conditions

Results of the existing conditions modeling effort are presented in Table 3-22. This table provides the actual crash data, the predicted ISATe crashes per year for study facilities and the Predicted ISATe crashes per year for similar facilities. As indicated in the table, the modeling effort shows a good overall correlation between existing and predicted PDO crashes, while it anticipates a higher level of fatal/injury crashes relative to observed crashes. Overall, the actual crashes per year are lower than the predicted ISATe crashes for this facility, and lower still than the predicted ISATe crashes for similar facilities. This indicates that US 101 has better overall crash tendencies than normal for a facility of its type.

Table 3-22. Existing Crashes on US 101 in Project Area

Highway Location	2010-2014 Crashes per Year		Predicted (ISATe) 2015 Crashes per Year		Predicted (ISATe) 2015 Crashes per Year for Similar Facilities	
	Injury/Fatal	PDO	Injury/Fatal	PDO	Injury/Fatal	PDO
<i>US 101 Mainline</i>						
1-MP 366.22-365.87	1.0	4.0	1.84	4.62	2.41	5.72
2-MP 365.87-365.10	1.0	4.4	2.06	5.04	2.56	6.10
3-MP 365.10-364.64	0.8	1.4	1.49	2.72	1.93	4.15
4-MP 364.64-365.25	0.4	1.2	1.28	2.38	1.78	3.76
Total Mainline Crashes/Year	3.2	11.0	6.67	14.76	8.68	19.73
Difference from Actual			+108%	+34%	+171%	+79%
<i>Westbound Ramps</i>						
Off-ramp to Crosby Rd	2.4	4.0	0.53	1.30	0.43	0.67
On-ramp from Crosby Rd	0.2	0.0	0.13	0.11	0.11	0.13
Off-ramp to Black Lake Bl	2.2	6.6	0.93	2.58	1.13	1.79
On-ramp from Black Lake Bl	0.0	0.4	0.22	0.34	0.26	0.35
Off-ramp to Evergreen Pwy	0.2	0.6	0.40	0.57	0.49	0.62

Table 3-22 Continued. Existing Crashes on US 101 in Project Area

Highway Location	2010-2014 Crashes per Year		Predicted (ISATe) 2015 Crashes per Year		Predicted (ISATe) 2015 Crashes per Year for Similar Facilities	
	Injury/Fatal	PDO	Injury/Fatal	PDO	Injury/Fatal	PDO
<i>Eastbound Ramps</i>						
On-ramp from Evergreen Pky	1.4	6.2	1.63	5.19	1.74	2.61
Off-Ramp to Black Lake Bl	0.4	1.6	0.13	0.32	0.16	0.20
On-ramp from Black Lake Bl	0.6	5.4	0.55	3.02	0.62	1.35
Off-ramp to Crosby Rd	0.2	1.2	0.11	0.13	0.14	0.14
On-ramp from Crosby Rd	0.2	1.2	0.56	1.37	0.77	1.53
Total Ramp Crashes/Year	7.8	27.2	5.19	14.93	5.85	9.39
Difference from Actual			-33%	-45%	-25%	-65%
<i>Ramp Termini Intersections</i>						
Crosby Rd westbound ramps	0.4	2.0	1.31	2.73	2.13	5.21
Crosby Rd eastbound ramps	0.6	1.0	1.03	1.64	1.26	2.84
Black Lake Bl WB ramps	1.2	7.4	2.18	7.73	3.70	9.25
Black Lake Bl EB ramps	1.4	3.0	1.48	3.25	1.51	3.68
Total Termini Crashes/Year	3.6	13.4	6.00	15.35	8.60	20.98
Difference from Actual			67%	+15%	+139%	+57%
Total Crashes/Year	9.6	40.0	18.04	45.03	23.13	52.65
Difference from Actual			+88%	+13%	+141%	+25%

Note: Analysis in this table is based on 2010-2014 crash data, 2014 traffic volumes, and the predictive features of AASHTO's HSM Freeway Predictive Model using the ISATe application spreadsheet.

3.7.2 How do Predicted Crashes with No Build and Preferred Alternatives Compare?

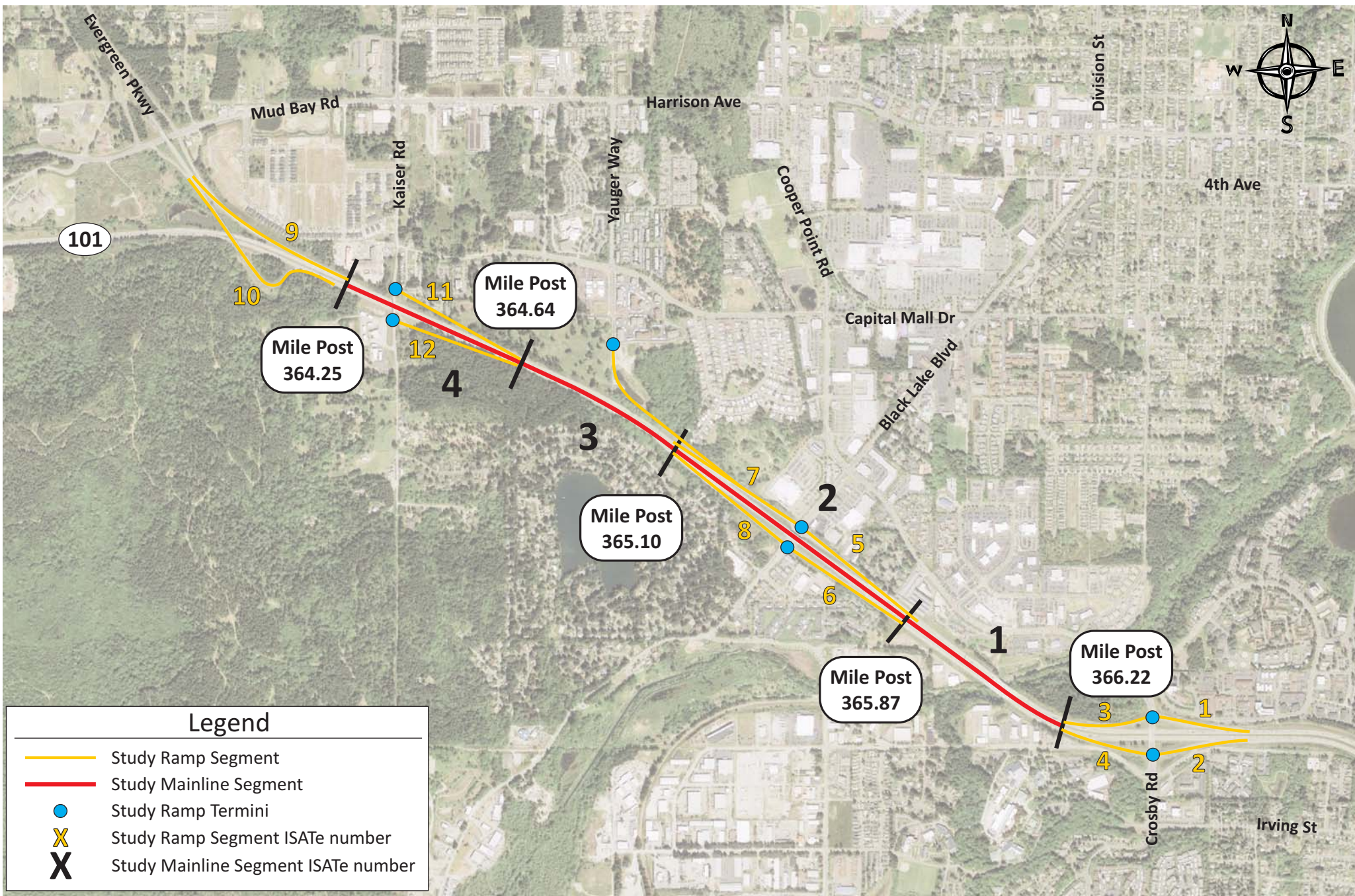
ISATe was used to predict potential crashes for future conditions including both the No Build and Preferred Alternatives. Similar to the existing conditions evaluation, analysis included freeway sections, ramps, speed change and auxiliary lanes, ramp termini intersections and the adjacent affected street system. Analysis was conducted for both the 2020 and 2040 time periods.

The purpose of this analysis is to determine whether the Preferred Alternative would cause any significant adverse impacts on the safety of the freeway or the affected local street system. The measurement of safety impacts includes changes in the total estimated number of

injury/fatal crashes and the total number of Property Damage Only (PDO) crashes for each analysis area.

Comparison of Predicted Crashes in 2020

Table 3-23 presents the results of predictive crash analysis for 2020 and compares the No Build and Preferred Alternatives. Data is presented in the table for each of four segments along the US 101 mainline (see Figure 3-22 for an illustration of these segments) and then totaled for the entire freeway between milepost 364.25 and 366.22. The percent increase or decrease of the Preferred Alternative in comparison to that of the No Build Alternative is also provided.



US 101/West Olympia Access Project
 at Kaiser Road and Yauger Way
 Olympia, Washington

Figure 3-22
 ISATe Safety Analysis
 Freeway Segments,
 Ramps and Ramp Termini

Table 3-23. 2020 Predicted Crashes on US 101 in Project Area – No Build and Preferred Alternatives

Highway Location	Predicted 2020 Crashes per Year – No Build Alternative		Predicted 2020 Crashes per Year – Preferred Alternative	
	Injury/Fatal	PDO	Injury/Fatal	PDO
<i>US 101 Mainline</i>				
1-MP 365.87-366.22	2.66	6.28	2.75	6.52
2-MP 365.10-365.87	2.82	6.75	3.23	7.49
3-MP 364.64-365.10	2.17	4.60	2.25	4.73
4-MP 364.25-364.64	2.00	4.18	1.86	3.95
Total Mainline Crashes/Year	9.65	21.81	10.09	22.69
Preferred Alternative vs. No Build Alternative for Mainline			+5%	+4%
<i>Westbound Ramps</i>				
Off-ramp to Crosby Bl	0.44	0.68	0.43	0.67
On-ramp from Crosby Bl	0.14	0.17	0.14	0.18
Off-ramp to Black Lake Bl	1.15	1.82	1.13	1.78
On-ramp from Black Lake Bl	0.27	0.36	0.32	0.43
Off-ramp to Kaiser Road	-	-	0.12	0.16
Off-ramp to Evergreen Pwy	0.49	0.61	0.45	0.57
<i>Eastbound Ramps</i>				
On-ramp from Evergreen Pwy	1.76	2.63	1.59	2.38
On-ramp to Kaiser Road	-	-	0.13	0.20
Off-ramp to Black Lake Bl	0.17	0.21	0.19	0.23
On-ramp from Black Lake Bl	0.67	1.43	0.58	1.26
Off-ramp to Crosby Bl	0.16	0.16	0.17	0.17
On-ramp from Crosby Bl	0.78	1.53	0.74	1.47
Total Ramp Crashes/Year	6.03	9.60	5.99	9.50
Preferred Alternative vs. No Build Alternative for Ramps			-1%	-1%
<i>Ramp Termini Intersections</i>				
Crosby Bl WB ramps	2.31	5.67	2.26	5.59
Crosby Bl EB ramps	1.39	3.09	1.37	3.02
Black Lake Bl WB ramps	3.97	9.80	3.71	9.49
Black Lake Bl EB ramps	1.68	4.11	1.67	3.99
Yauger Way WB/Forestbrooke	-	-	0.04	0.06
Kaiser Road westbound ramp	-	-	0.22	0.44
Kaiser Road eastbound ramp	-	-	0.26	0.47
Total Termini Crashes/Year	9.35	22.67	9.53	23.06
Preferred Alternative vs. No Build Alternative for Termini			+2%	+2%
Total Crashes/Year	25.03	54.08	25.61	55.25
Preferred Alternative vs. No Build Alternative for All Locations			+2%	+2%

Note: Analysis in this table is based 2020 traffic volumes, and the predictive features of AASHTO's HSM Freeway Predictive Model using the ISATe application spreadsheet.

The table also includes total predicted crashes for each project area freeway ramp (separated into westbound and eastbound) and each ramp termini intersection. Data for all ramps is totaled and percent change with the Preferred Alternative in comparison to the No Build is

shown. Predicted crashes are also shown for each ramp termini intersection, which are totaled and compared in the same way as the freeway mainline and the ramps.

At the bottom of the table, a summary comparison of total predicted crashes by type

(i.e., injury/fatal and PDO) between the Preferred and No Build Alternatives is presented.

Review of the predicted crashes in Table 3-23 indicates the following:

1. The total number of crashes is predicted to slightly increase with the Preferred Alternative in comparison to the No Build condition. Injury and fatal crashes are predicted to increase by 2 percent (approximately half a crash) and PDO crashes are also predicted to increase by 2 percent (approximately one crash). This overall increase largely has to do with the increase in traffic predicted for the freeway segment west of the Crosby Boulevard/Cooper Point Road Automall Drive interchange and the addition of new ramp segments and ramp termini, which add additional locations of analysis to what was contained in the No Build condition.
2. On the freeway mainline, predicted injury/fatal crashes are expected to increase by 5 percent with the Preferred Alternative, while PDOs are estimated to increase by 4 percent. This difference is almost solely related to the increase in traffic volumes west of Crosby Boulevard/Cooper Point Road Automall Drive. This traffic increase is a result of the added access points at Yauger Way and Kaiser Road consistent with the Project's purpose of providing a better distribution of traffic to medical and business facilities, and away from heavily congested portions of Black Lake Boulevard and Cooper Point Road.
3. Predicted crashes for the project area freeway ramps are expected to slightly drop with the Preferred Alternative, even with the addition of new ramps to and from Kaiser Road. When considering existing crash tendencies, it is interesting to note that the predicted number of crashes for the four ramps that are currently experiencing the highest number of crashes will all be improved with the project. These four ramps include: the westbound off-ramps to Crosby Boulevard/Cooper Point Road Automall Drive and Black Lake Boulevard, and the eastbound on-ramps from Evergreen Parkway and Black Lake Boulevard.
4. Predicted crashes at the ramp termini intersections are expected to drop at all existing locations, but to slightly increase overall due to the addition of three new ramp termini intersections, including: Yauger Way at Forestbrooke Way, Kaiser Road at the westbound off-ramp and Kaiser Road at the eastbound on-ramp.

Comparison of Predicted Crashes in 2040

Table 3-24 presents predicted crashes for 2040, and compares results for the No Build and Preferred Alternatives. The predicted patterns of these crashes was similar to that observed for 2020; however, the increases in percentage with the Preferred Alternative in comparison to No Build are generally slightly higher. For the sum of all locations evaluated, injury and fatal crashes are predicted to increase by 6 percent (approximately two crashes) and PDO crashes are also predicted to increase by 6 percent (approximately four and a half crashes).

Table 3-24. 2040 Predicted Crashes on US 101 in Project Area – No Build and Preferred Alternatives

Highway Location	Predicted 2040 Crashes per Year – No Build Alternative		Predicted 2040 Crashes per Year – Preferred Alternative	
	Injury/Fatal	PDO	Injury/Fatal	PDO
<i>US 101 Mainline</i>				
1-MP 365.87-366.22	3.53	8.74	3.64	9.08
2-MP 365.10-365.87	3.89	10.04	4.65	11.85
3-MP 364.64-365.10	3.04	6.87	3.27	7.60
4-MP 364.25-364.64	2.80	6.20	2.66	6.01
Total Mainline Crashes/Year	13.26	31.85	14.22	34.54
Preferred Alternative vs. No Build Alternative for Mainline			+7%	+8%
<i>Westbound Ramps</i>				
Off-ramp to Crosby Bl	0.47	0.72	0.46	0.71
On-ramp from Crosby Bl	0.23	0.30	0.24	0.31
Off-ramp to Black Lake Bl	1.25	1.96	1.21	1.91
On-ramp from Black Lake Bl	0.30	0.42	0.45	0.63
Off-ramp to Kaiser Road	-	-	0.17	0.22
Off-ramp to Evergreen Pwy	0.47	0.59	0.47	0.60
<i>Eastbound Ramps</i>				
On-ramp from Evergreen Pky	1.82	2.73	1.61	2.42
On-ramp to Kaiser Road	-	-	0.20	0.30
Off-ramp to Black Lake Bl	0.23	0.29	0.25	0.31
On-ramp from Black Lake Bl	0.88	1.76	0.63	1.36
Off-ramp to Crosby Bl	0.23	0.24	0.25	0.26
On-ramp from Crosby Bl	0.79	1.55	0.77	1.53
Total Ramp Crashes/Year	6.67	10.56	6.71	10.56
Preferred Alternative vs. No Build Alternative for Ramps			+1%	0%
<i>Ramp Termini Intersections</i>				
Crosby Bl WB ramps	3.10	7.61	3.04	7.50
Crosby Bl EB ramps	2.00	4.18	1.99	4.17
Black Lake Bl WB ramps	5.06	12.02	4.93	11.79
Black Lake Bl EB ramps	2.41	6.04	2.33	5.91
Yauger Way WB/Forestbrooke	-	-	0.23	0.18
Kaiser Road westbound ramp	-	-	0.52	0.98
Kaiser Road eastbound ramp	-	-	0.61	1.03
Total Termini Crashes/Year	12.57	29.85	13.65	31.56
Preferred Alternative vs. No Build Alternative for Termini			+9%	+6%
Total Crashes/Year	32.50	72.26	34.58	76.66
Preferred Alternative vs. No Build Alternative for All Locations			+6%	+6%

Note: Analysis in this table is based 2040 traffic volumes, and the predictive features of AASHTO's HSM Freeway Predictive Model using the ISATe application spreadsheet.

Review of the predicted crashes in Table 3-24 indicates the following:

1. As with the 2020 evaluation, the primary difference between the No Build and Preferred Alternatives is related to traffic

volume changes. Predicted 2040 traffic volumes on US 101 west of Crosby Boulevard are higher for the Preferred Alternative than for the No Build condition. This is particularly evident in the crash predictions along the US 101

mainline where the Preferred Alternative is expected to result in 7 percent more injury/fatal crashes and 8 percent more PDO crashes. Estimated traffic volumes increase with the Preferred Alternative in every segment of US 101 except for Segment 4, which lies between Evergreen Parkway and the new Kaiser Road ramps. Volumes are predicted to drop in Segment 4 with the Preferred Alternative, and predicted crashes also dropped.

2. As with the 2020 analysis, there is almost no difference between predicted crashes with the No Build and Preferred Alternatives for the freeway ramps. Also similar to 2020, the ramps with the greatest existing safety problems would be improved with the Preferred Alternative.
3. Similar to 2020, predicted crashes at the ramp termini intersections are expected to drop at all existing locations, but to slightly increase overall due to the addition of three new ramp termini intersections, including: Yauger Way at Forestbrooke Way, Kaiser Road at the westbound off-ramp and Kaiser Road at the eastbound on-ramp.

Impact of Proposed US 101 Auxiliary Lanes

A significant element of the Preferred Alternative is the construction of auxiliary lanes between the existing ramps on the west side of the Black Lake Boulevard interchange and the proposed ramps at Kaiser Road. Due to the close proximity of these facilities, it was determined that the merge and diverge movements would be better accommodated and safer with the addition of auxiliary lanes. The predictive crash analysis described above includes these auxiliary lanes. An additional predictive analysis was conducted to determine if the addition of these auxiliary lanes would provide a safety benefit. Table 3-25 presents predicted crashes for 2020 and 2040 along freeway Segment 3 (which includes the auxiliary lanes). Data in the table compares safety results for the Preferred Alternative with and without the auxiliary lanes.

Review of the predicted crashes in Table 3-25 indicates that the inclusion of auxiliary lanes between the Kaiser Road and Black Lake Boulevard interchanges (one in each direction) is expected to reduce overall crash totals by approximately 10% (approximately one total crash in both 2020 and 2040) in that location.

Table 3-25. 2020 and 2040 Predicted Crashes on US 101 between Black Lake Boulevard and Kaiser Road – With and Without Auxiliary Lanes

Highway Location	Predicted Crashes per Year – Preferred Alternative without Auxiliary Lane		Predicted Crashes per Year – Preferred Alternative with Auxiliary Lane	
	Injury/Fatal	PDO	Injury/Fatal	PDO
<u>2020 US 101 Mainline</u>				
3-MP 364.64-365.10	2.46	5.42	2.25	4.73
No Auxiliary Lanes vs Auxiliary Lanes			-9%	-13%
<u>2040 US 101 Mainline</u>				
3-MP 364.64-365.10	3.74	8.39	3.27	7.60
No Auxiliary Lanes vs Auxiliary Lanes			-13%	-9%

Note: Preferred Alternative includes one auxiliary lane eastbound and one westbound.

3.7.3 Conclusions

Conclusions of the Crash Rate Analysis

Crash rates were calculated for all of the surface street intersections in the study area. The only project area intersection currently experiencing more than 1 crash per year per million entering vehicles (MEV) is the intersection of Black Lake Boulevard and Cooper Point Road. Improving the operations of this intersection is a major goal of the Preferred Alternative and this intersection will experience less volume and congestion in the future with the Preferred Alternative. This should have a positive impact to overall safety at this location versus the No Build condition.

Conclusions of the ISATe Predictive Analysis

Below are the major conclusions from the ISATe predictive analysis:

1. In general, existing mainline and ramp facilities currently operate with fewer crashes per year than predicted given the geometric conditions and existing volumes using these facilities. Two of the ramp segments in the westbound direction and four ramp segments in the eastbound direction currently experience a higher total number of crashes per year than is predicted using the ISATe analysis tool, but the ramp termini and the mainline segments all have a lower number of crashes per year than predicted.
2. The 2020 and 2040 comparison between the No Build and Preferred Alternatives both show a slight increase in number of predicted crashes per year with the Preferred Alternative. Contributing to this condition are the higher traffic volumes along US 101 west of Crosby Boulevard with the Preferred Alternative in comparison to No Build. As a result of its increased accessibility, the Preferred Alternative

generally causes more traffic to enter and exit US 101 near the western end of the project study area, increasing both predicted traffic volumes and the likely number of crashes along the mainline facility. In addition, the Preferred Alternative also introduces several new facility elements (two new ramp segments and three new ramp termini), which contribute to predictive crashes in the overall analysis.

3. The increase of crashes along the US 101 mainline with the Preferred Alternative represents the majority of the overall system increase. This increase is reduced with the Preferred Alternative's inclusion of auxiliary lanes between Kaiser Road and Black Lake Boulevard which can help mitigate the predictive crashes for the merge/diverge areas.
4. As noted in #1 above, the existing predictive analysis highlighted several ramp segments that are currently experiencing a higher number of crashes per year than would be predicted based on the ISATe analysis. Predicted crashes for the project area freeway ramps are expected to remain basically unchanged with the Preferred Alternative, even with the addition of new ramps to and from Kaiser Road. This is the case because the four existing ramps that are currently experiencing the highest number of crashes are predicted to see a reduction in collisions with the project. These four ramps include: the westbound off-ramps to Crosby Boulevard/Cooper Point Road Automall Drive and Black Lake Boulevard, and the eastbound on-ramps from Evergreen Parkway and Black Lake Boulevard.

Overall Safety Conclusions

The overall result from ISATe predictive analysis provides a good understanding of how safety

performance in the corridor compares between the No Build and Preferred Alternatives. Based on this analysis, the Preferred Alternative is predicted to result in a slight increase in crashes per year along the highway mainline east of the Evergreen Parkway on and off-ramps in comparison to the No Build Alternative. This increase would include approximately a 7 percent increase in injury/fatal crashes and an 8 percent increase in PDO crashes along the total length of the corridor in the project study area.

There would be virtually no difference between predictive crashes at the on- and off-ramps between the No Build and Preferred Alternatives.

Crash predictions for the existing ramp termini intersections would show a drop with the Preferred Alternative compared to No Build. However, with the addition of three new ramp termini intersections (at westbound Yauger Way

and Kaiser Road and eastbound Kaiser Road) a slight increase in the total number of crashes for all ramp termini intersections combined was predicted with the Preferred Alternative.

As discussed in the earlier sections of this Policy Point chapter, the overall traffic volumes and congestion experienced along Black Lake Boulevard and Cooper Point Road in the vicinity of US 101 are predicted to drop with the Preferred Alternative. Given the existing congestion issues along Black Lake Boulevard and their occasional impacts to US 101 due to ramp queuing and spill-over effects, this improvement is anticipated to provide positive benefits to US 101 in the project area as the community continues to develop. These operational benefits would outweigh any slight increase in the predictive crashes estimated by ISATe for certain segments of the highway.

4. POLICY POINT 4: ACCESS CONNECTIONS AND DESIGN

Policy Point 4 addresses design considerations for the proposed access connection focusing on whether the connection will provide fully directional connections to public streets, and whether it is spaced appropriately and designed to meet WSDOT full design level geometric design criteria.

4.1 WILL THE US 101/WEST OLYMPIA ACCESS PROJECT PROVIDE FULLY DIRECTIONAL INTERCHANGES CONNECTED TO PUBLIC ROADS?

Fully directional interchanges provide access between a public street and a limited access highway in all directions. This includes providing both on-ramps and off-ramps in both directions of travel. Interchanges that are not fully directional lack one or more of these movements. The sections below identify where and how full interchange directionality will be provided (at Black Lake Boulevard) and identifies those locations where full directionality will not be provided (at Yauger Way and Kaiser Road).

4.1.1 What are the Proposed Black Lake Boulevard Modifications?

The proposed modifications to the interchange of US 101 at Black Lake Boulevard will continue to provide fully directional access that is connected to the public street system at Black Lake Boulevard. These modifications are illustrated in Figure 4-1. All ramps will continue to connect at Black Lake Boulevard via the existing Single Point Urban Interchange (SPUI). In addition to these connections, the project provides an added westbound connection from the highway into West Olympia via Yauger Way SW, a City of Olympia major collector street. This added connection is provided by modifying the existing dual westbound left turn lanes at the Black Lake SPUI to provide a single left turn lane and a single through lane. This through lane will connect to an extension of Yauger Way SW that

exits from the westbound Black Lake Boulevard on-ramp approximately 1,000 feet west of Black Lake Boulevard. The final configuration of the US 101 westbound off-ramp would be one left-turn lane, one through lane, and two right-turn lanes. All ramp and turn lane storage lengths will be designed based on the latest traffic analysis for the appropriate design year.

The traffic signals at the SPUI interchange would be modified to accommodate the new westbound through movement by including a new signal phase. This would reduce the amount of green signal time to the existing US 101 eastbound off-ramp. A second left-turn pocket would be added to the eastbound off-ramp approaching the left turn signal to provide additional capacity and minimize the impact of the new signal phase.

4.1.2 What is Proposed for the New Yauger Way Ramp?

As noted in Section 4.1.1, a new westbound off-ramp would be built from US 101 to Yauger Way SW by allowing through movement at the existing westbound ramps of the Black Lake Boulevard interchange. The existing westbound on-ramp from Black Lake Boulevard would be reconfigured to separate existing westbound on-ramp movements to US 101 from the new off-ramp movement to Yauger Way. This separation of movements would occur approximately 1,000 feet west of Black Lake Boulevard where the new off-ramp starts to turn north to connect to Yauger Way SW at the intersection with Forestbrooke Way SW. Per WSDOT standard practice for new interchange ramps, full-control limited access that prohibits new intersecting roadways or driveways would extend along both sides of the off ramp 300 feet north and east of the new intersection with Forestbrooke Way SW, where the off-ramp becomes an urban street.

Figure 4-1. Conceptual Layout for Black Lake Boulevard Interchange

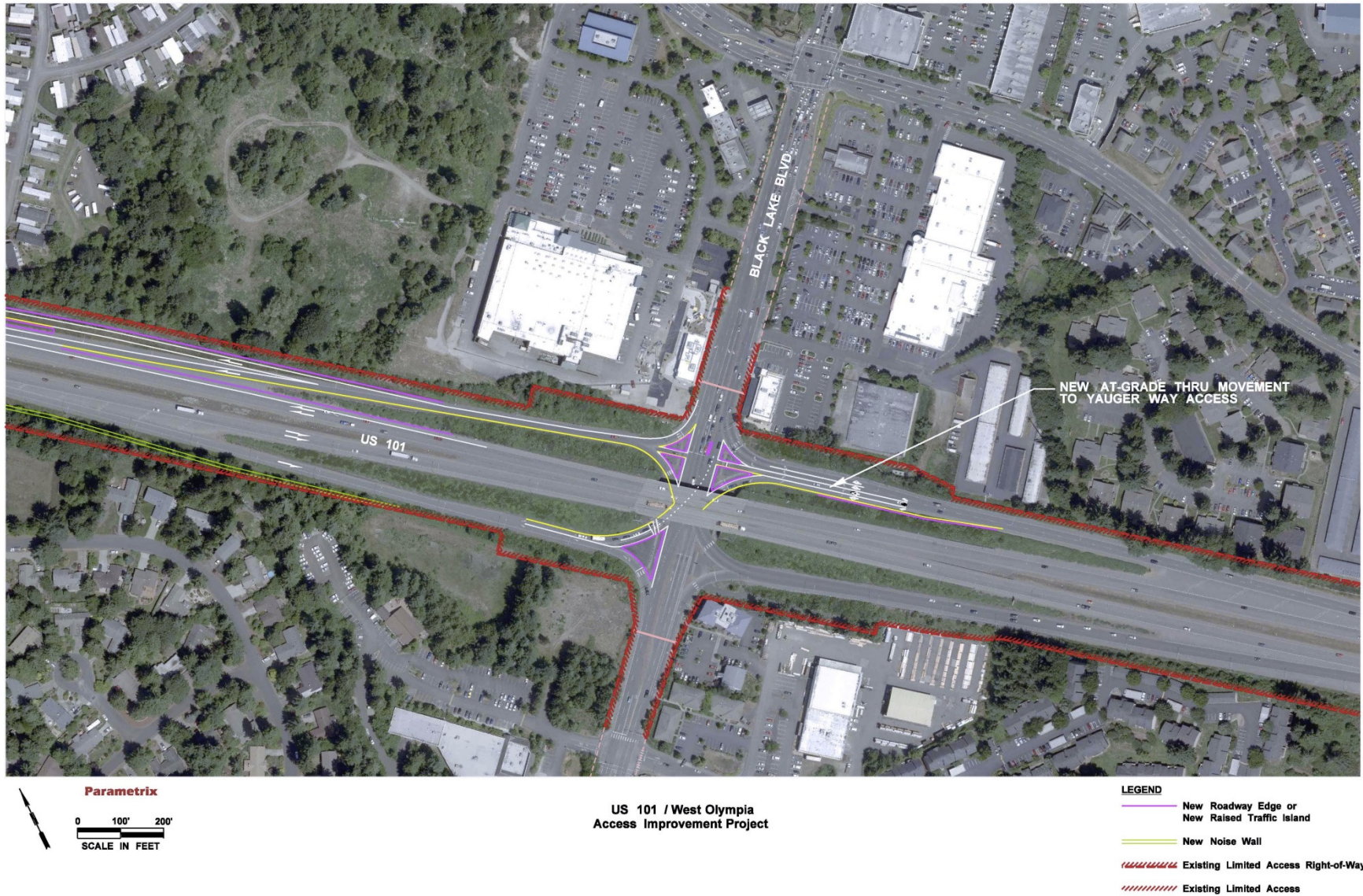
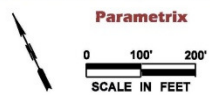


Figure 4-2. Conceptual Layout for Yauger Way Interchange

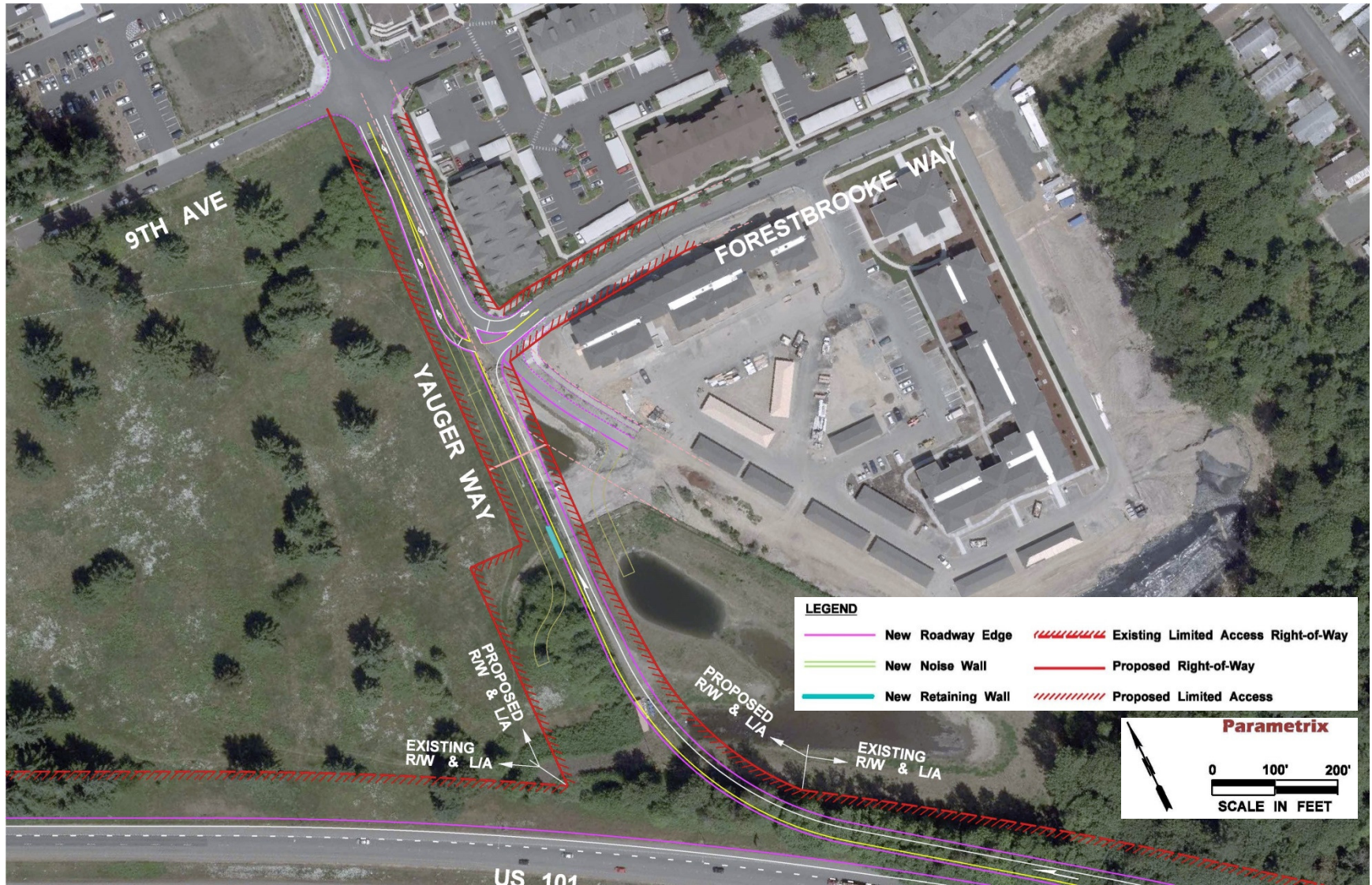


US 101 / West Olympia
Access Improvement Project

LEGEND

- New Roadway Edge
- New Noise Wall
- New Retaining Wall
- - - - - Existing Limited Access Right-of-Way
- Proposed Right-of-Way
- - - - - Proposed Limited Access

Figure 4-3. Enlargement of Conceptual Plan for Yauger Way Ramp



South of Forestbrooke Way SW, Yauger Way SW would be one-way northbound. Southbound traffic on Yauger Way SW could turn right onto 9th Avenue SW or continue south into a left turn onto Forestbrooke Way SW. This channelization prevents vehicles from traveling the wrong direction into the opposing off-ramp from US 101.

The channelization of the ramp termini intersection will be designed based on the latest traffic analysis for the appropriate design year. One initial concept for the Yauger ramp connection is illustrated in Figure 4-2. An enlargement of the ramp termini area is presented in Figure 4-3 including location of proposed limited access limits. This intersection could also be designed as a roundabout. The preferred intersection concept will be addressed during final design.

4.1.3 What is Proposed at the New Kaiser Road Interchange?

Kaiser Road currently spans US 101 via a two-lane bridge but does not provide access to the state highway. The project would construct a half-diamond interchange on the east side of Kaiser Road, with the westbound off-ramp to the north of US 101 and the eastbound on-ramp to the south of the highway. The westbound off-ramp would be a one-lane roadway as it exits from US 101, then widen to two lanes near the intersection with Kaiser Road. The eastbound on-ramp would be one lane. No access will be provided at this location to and from the west due to the proximity of the existing US 101 interchange with Evergreen Parkway. As the primary traffic movement in this area is to and from the east, the limitations of this connection are appropriate. The interchange will connect with Kaiser Road, a City of Olympia major collector facility. The proposed improvements are presented in Figure 4-4.

This project would also construct improvements along Kaiser Road from 7th Avenue SW to about 500 feet south of the bridge over US 101. The west side of the existing Kaiser Road bridge

would be widened by approximately 27 feet. The widened bridge would allow for new 5-foot-wide bicycle lanes and 8-foot-wide sidewalks on the bridge. Kaiser Road would be widened primarily on the west side. Retaining walls (no higher than 30 feet) would be built, where needed, to minimize right-of-way acquisition at the new interchange.

Retaining walls would be constructed along a majority of the west side of Kaiser Road, both sides of the new westbound off-ramp as it approaches Kaiser Road, at the intersection of the new eastbound on-ramp with Kaiser Road, and on the east side of Kaiser Road near its intersection with 7th Avenue SW. The retaining walls along the westbound off-ramp would be a maximum of 30 feet high at Kaiser Road, and would minimize noise and property impacts on the abutting Coach Post Mobile Home Park.

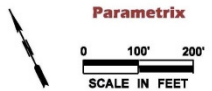
Kaiser Road would have two through lanes (one in each direction) with new left-turn pockets at the new eastbound on-ramp to US 101 and to 7th Avenue SW. The 5-foot-wide bicycle lanes would traverse the length of the Kaiser Road improvements. There would be 10-foot-wide sidewalks with tree planters north of the bridge, 6-foot-wide sidewalks with 8-foot-wide planter strips south of the bridge, and 8-foot wide sidewalks on the bridge.

All ramp lengths and turn lanes will be designed based on the latest traffic analysis for the appropriate design year and WSDOT design criteria.

4.1.4 What Modifications would be Made to the US 101 Mainline?

This project also would widen US 101 to create westbound and eastbound auxiliary lanes between the Kaiser Road and Black Lake Boulevard interchanges. These auxiliary lanes are needed due to the short distance between the new Kaiser Road interchange ramps and existing Black Lake Boulevard interchange ramps.

Figure 4-4. Conceptual Layout for Kaiser Road Interchange



US 101 / West Olympia
Access Improvement Project

LEGEND

- New Roadway Edge
- Bridge Widening
- New Retaining Wall
- New Noise Wall
- Existing Limited Access Right-of-Way
- Proposed Right-of-Way
- Proposed Limited Access

4.2 WILL THE MODIFIED AND NEW INTERCHANGES BE SPACED ACCORDING TO GUIDELINES?

Per the WSDOT Design Manual, interchange spacing is one mile in urban areas and is measured between the overpass bridges of adjacent interchanges. Interchange spacing with the Project is:

- Evergreen Parkway to Kaiser Road – 0.40 miles
- Kaiser Road to Black Lake Boulevard – 1.08 miles

The Evergreen Parkway to Kaiser Road spacing is less than a mile, but both these interchanges are half interchanges to direct traffic to and from the east, so there would be no interaction of weaving traffic. Based on the ramp spacing guidelines in the Design Manual, the desirable minimum is 1000 feet between two consecutive on-ramps or two consecutive off-ramps. Along the highway segment between the Evergreen Parkway interchange and the proposed Kaiser Road interchange, there would be 2,350 feet between the eastbound on-ramps and 2,170 feet between the westbound off-ramps. Thus, both would exceed the 1,000-foot ramp spacing guideline.

Between the Kaiser Road and Black Lake Boulevard interchanges a weaving (auxiliary) lane is proposed. Based on the Design Manual, the desirable spacing between weaving ramps is 1,600 feet. Both the eastbound and westbound ramps would have approximately 3,500 feet of ramp spacing. Thus the guideline would also be met in this location.

4.3 WILL THE MODIFIED AND NEW INTERCHANGES BE DESIGNED TO PRECLUDE VARIANCES FROM STANDARDS?

No deviations from WSDOT design standards are anticipated. However, several potential design justifications are expected. These would include:

- Development of full control limited access limits – proposed limits are shown for each interchange in Figures 4-1, 4-2, 4-3 and 4-4. For the westbound Yauger Way off-ramp two alternative design concepts have been identified for consideration. Option 1 includes a southbound jug-handle intersection at the ramp termini with Forestbrooke Way. Figure 4-2 and Figure 4-3 (enlargement) show this concept, which meets WSDOT’s limited access criteria. Option 2 was developed at the request of WSDOT staff and includes a roundabout ramp termini intersection at this location. Both layouts and their respective access limits will be reviewed by WSDOT prior to final design.
- Non-typical design of the Yauger Way off-ramp – this ramp takes its access from US 101 through the Black Lake Boulevard interchange and then directly from the Black Lake Boulevard westbound on-ramp. West of the interchange, on-ramp traffic must choose whether to continue west and enter the US 101 mainline or to keep right and then exit the Black Lake Boulevard on-ramp via a separate connection to Yauger Way. This is a non-typical configuration that will require design justification.

At the end of the 2010 *West Olympia Access Study*, the Yauger Way off-ramp was recommended to be grade-separated from the Black Lake Boulevard interchange and the westbound on-ramp (see Figure 2-4 for an illustration of this concept). This configuration would have added traffic-carrying capacity to the interchange area and would have been generally consistent with driver expectations for making two separate off-ramp movements. This concept is illustrated in Figure 2-4 under Policy Point 2. This grade-separation was very expensive

relative to the proposed project and was not considered financially-feasible in the near-term.

Based on the additional analysis of interchange design options conducted as part of this IJR, an at-grade configuration for the interchange was developed including the Yauger Way off-ramp. This at-grade option requires that the Black Lake Boulevard westbound on-ramp be shared between traffic entering westbound on to the freeway and traffic exiting to Yauger Way. Through the consensus-based decision-making process of the IJR, this concept (Option 2 as illustrated in Figure 2-9) was determined to be feasible and is recommended for implementation. Design of this improvement should not preclude the long-term implementation of a flyover ramp to Yauger Way should future traffic conditions indicate the need.

- Signal timing for the modified SPUI (THRUI) at Black Lake Boulevard – initial signal timing has been developed for this non-traditional intersection as part of the traffic operations analysis discussed under Policy Point 3. As final design for this improvement is completed, additional traffic analysis will be necessary to fine-tune a signal timing plan in advance of the switch-over from the existing signal system and timing plan.

- Cut and fill slope rates – a key project design parameter has been to remain within the existing highway right-of-way to the maximum extent practical. In certain locations, this requires cut and fill slopes to be steeper than the desirable slope rates for certain cut or fill heights, particularly in the vicinity of the Yauger Way ramp. Prior to completion and acceptance of the IJR and as part of documentation for the preliminary design effort, typical highway sections showing these cut and fill areas will be prepared for WSDOT review.

4.4 WHAT ARE THE CONCEPTUAL SIGNING PLANS FOR THE NEW OR MODIFIED INTERCHANGES?

The conceptual layout and signing plans for the project area are illustrated in Figure 4-5, Figure 4-6 and Figure 4-7, running consecutively from the west end of the project area to the east end. Figure 4-5 presents the US 101/Kaiser Road interchange and the Yauger Way ramps. Figure 4-6 shows the US 101/Black Lake Boulevard interchange. Figure 4-7 presents the east end of the project area approaching the Black Lake Boulevard interchange.

These conceptual drawings show the proposed lane arrangement and signing plans to direct drivers through the revised interchanges. These plans will be revised during the design phase of the project.

5. POLICY POINT 5: LAND USE AND TRANSPORTATION PLANS

Policy Point 5 addresses the question of whether the proposed access point revisions are compatible with the relevant land use and transportation plans for the area. This includes both local and regional land use plans, as well as local, regional and statewide transportation plans and planning requirements.

5.1 IS THE PROPOSED ACCESS POINT REVISION COMPATIBLE WITH LAND USE PLANS FOR THE AREA?

The proposed access revisions along US 101 with Black Lake Boulevard and the establishment of a new access point at Kaiser Road are consistent with the affected local and countywide land use plans. Thurston County and the City of Olympia have prepared land use plans that comply with the Washington State Growth Management Act (GMA) (Revised Code of Washington (RCW), Chapter 36.70A).

These plans include:

- City of Olympia, *Comprehensive Plan*, 2014
- Thurston County *Comprehensive Plan*, 2007

Compatibility with applicable land use plans is measured in two ways:

- Plans call for continued urban development in West Olympia and the larger Olympia urban growth area which the preferred alternative supports.
- These plans provide the basis from which travel forecasts were developed and used in evaluating the need for access revisions and in identifying the preferred alternative. Travel forecasts are based on household and employment projections that are consistent with Comprehensive Plan land uses. This data was used by the

Thurston Regional Planning Council (TRPC) in developing the regional travel demand model employed to prepare travel forecasts.

Following is a short discussion of the land use plans, highlighting elements that support the proposed access point revisions.

5.1.1 Olympia Comprehensive Plan

The Olympia *Comprehensive Plan* is a 20-year plan that provides the framework for how Olympia should grow while still maintaining and enhancing a high quality of life and environment (City of Olympia 2014). The plan guides the City's decisions on where to locate new jobs and housing, how to improve the transportation system, and how to invest to support future growth.

The General Land Use and Design Element, and Transportation Element of the City's *Comprehensive Plan* specify goals and policies that are relevant to the US 101/West Olympia Access Project. In addition, Appendix A of the Plan's Transportation Element outlines a history of transportation planning in the City and includes specific reference to the US 101/West Olympia Access Project. This inclusion demonstrates the City's consideration of this project in the development of the policies and goals of the *Comprehensive Plan*.

In addition, the Olympia *Comprehensive Plan* includes goals and policies for the unincorporated Urban Growth Areas (UGAs) located adjacent to Olympia city limits as part of a joint plan with Thurston County. The project study area contains an unincorporated UGA near to the southeast of Kaiser Road and south of US 101; it is land that is located in Thurston County. The overarching goal of the Olympia/Thurston County Joint Plan is to plan for and concentrate growth of high enough density to support urban public services and to

provide affordable housing choices in designated UGAs.

5.1.2 Thurston County Comprehensive Plan

The Thurston County *Comprehensive Plan* is a 20-year plan that provides the framework for how Thurston County should grow while still maintaining and enhancing a high quality of life, achieving the benefits of growth, and minimizing the negative side effects (Thurston County 2007).

In addition to county-wide comprehensive planning, Thurston County is also responsible for designating the location of UGAs outside cities or towns if the areas are characterized by urban growth or adjacent to areas of existing urban growth. As mentioned above, the City of Olympia and Thurston County have established a joint plan to promote consistent, planned development in the UGAs around the city.

5.2 IS THE PROPOSED ACCESS REVISION CONSISTENT WITH STATE, REGIONAL AND LOCAL PLANS?

The proposed improvements to US 101, access modifications at the Black Lake Boulevard interchange and the development of a new interchange at Kaiser Road are consistent with state, regional and local transportation plans. These plans include:

- *Washington Transportation Plan (WTP) 2035*
- *Washington State Highway System Plan (HSP) 2007-2026*
- *Thurston Regional Transportation Plan (RTP) 2025, as amended to 2035*
- *Thurston County, Transportation Plan*
- *City of Olympia Transportation Element of the Comprehensive Plan*
- *City of Olympia, Transportation Mobility Strategy, 2009*

Following is a short discussion of the transportation plans, highlighting elements that support the proposed access point revisions.

5.2.1 Washington Transportation Plan, 2035

The *Washington Transportation Plan 2035* establishes a 20-year vision for the state's transportation system and recommends statewide transportation policies and strategies to the legislature and Governor. This Plan provides broad policy-level support for improvements that enhance transportation mobility and support economic vitality such as the US 101/West Olympia access project.

5.2.2 Washington State Highway System Plan, 2007-2026

The *Highway System Plan (HSP)* addresses current and future forecasted state highway needs based on the investment options articulated in the *Washington Transportation Plan*. The HSP identifies the on-going effort to evaluate US 101 access needs between Mud Bay Road and I-5, and to identify potential improvements that will enhance the economic vitality of Olympias west side². The HSP also identifies the east end of the US 101 corridor as it approaches I-5 as a significant bottleneck or chokepoint.³

5.2.3 Thurston Regional Transportation Plan (RTP) 2025

The *Thurston Regional Transportation Plan (RTP) 2025* was adopted by the Thurston Regional Planning Council (TRPC) in 2004 and amended annually to provide strategic guidance for the region's transportation system while maintaining a 20-year time horizon. TRPC is the Metropolitan Planning Organization for the

² *Washington State Highway System Plan 2007-2026*, Appendix K: Solutions that Require Further Analysis, WSDOT, ppK-24.

³ *Washington State Highway System Plan 2007-2026*, Appendix I, WSDOT, pp.I-3.

Thurston region with responsibilities for areawide transportation planning as required by Title 23 of the Code of Federal Regulations, Part 450, and the Regional Transportation Planning Organization as designated under RCW (Revised Code of Washington) Title 47, Chapter 80.020.

The RTP establishes a regional transportation vision and recommends project-specific studies and strategies that have regional significance—particularly large projects that add substantial capacity to the system, create major changes in access, or add new programs and services. Compatibility of the project with the RTP is evidenced by the list of recommended actions taken from that document and described as follows:

- *Project A 11: Yauger Way Extension* – this project incorporates key elements of the preferred alternative as it was understood at the time of the 2011 RTP amendment. Final limits and design of this facility will be determined based on the results of the *US 101/West Olympia Access Project Interchange Justification Report* (S 23). Yauger Way is identified as a two-lane road that will connect to US 101 west of the Black Lake Boulevard interchange via a westbound off-ramp, enabling through traffic to bypass the Black Lake/Cooper Point Road intersection in getting from US 101 and improving overall access to and circulation within the West Olympia area.
- *Project A 19: Kaiser Road Connection* – this project involves the extension of Kaiser Road south and east to Black Lake Boulevard. Based on analysis conducted for this IJR, this project has been modified to add a new interchange on US 101 at Kaiser Road.
- *Project S 4: West Olympia Access Study (completed)* - this project, completed in 2010, funded development of a strategy and pre-plan for routing through traffic around the Black Lake

Boulevard/Cooper Point Road intersection between US 101 and Yauger Way. This study was identified as a prerequisite for the Yauger Way Extension project (A 11) and is related to project O 10 on the RTP’s list of improvements due to WSDOT’s role in the study.

It should be noted that the Thurston region is an attainment area for carbon monoxide and ozone which are the primary pollutants related to transportation facilities. Air quality conformity analysis of projects included in the RTP and the Regional Transportation Improvement Program (RTIP) focuses on a VMT-based approach to identifying potential impacts associated with PM10. The eastern portion of the project study area is included in the PM10 air quality limited maintenance area. Appendix H of the RTP documents that the Plan conforms with requirements of the State Implementation Plan for particulate matter 10 microns in size or less (PM10), and with the Thurston County PM10 Maintenance Plan.

5.2.4 Thurston County Comprehensive Plan, Transportation Element

Amended in 2004, the *Transportation Element* of the County’s *Comprehensive Plan* describes the County’s multimodal transportation system and provides policy guidance for managing and improving this system. The plan relies on the travel forecasting process managed by TRPC and is coordinated with county and city land use plans. It includes regionally coordinated level of service (LOS) standards for state highways and local roads, identifies an improvement program and establishes a multi-year transportation financing strategy. The Plan also notes that there is a memorandum of understanding between the County and each of its cities to conduct joint planning efforts in the unincorporated areas surrounding each city.

5.2.5 Olympia Comprehensive Plan, Transportation Element

The Transportation Element of the City’s Comprehensive Plan was adopted with the land use portion discussed previously. The focus of the Transportation Element is on moving people and not just cars, while creating vibrant urban areas, reducing environmental impacts and conserving limited financial and energy resources. Greater emphasis in this plan is placed on an increase in walking, biking and transit.

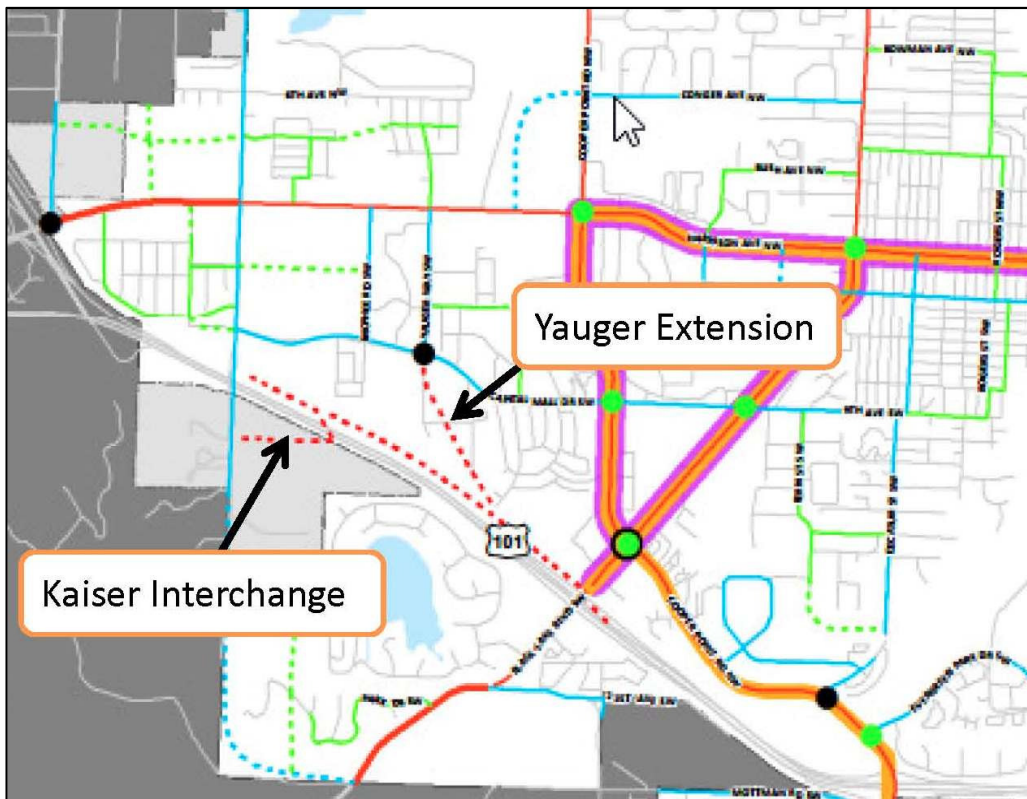
The Transportation Element (otherwise known as Olympia Transportation 2030) takes direction from a number of state, regional and local plans, policies and guidelines including: the Washington State Growth Management Act, the Washington Transportation Plan, TRPC’s Regional Transportation Plan, and the Olympia Transportation Mobility Strategy. In addition the Transportation Element is influenced by a wide range of prior past plans and studies that were

prepared to address specific issues. The Transportation Element specifically references the Preferred Alternative in its list of “Street Connection” and “Other” projects including:

- Yauger Way Extension to Haggens
- Kaiser Road Connection to Black Lake Boulevard)
- Yauger Way (US 101 off-ramp) roundabout or traffic signal
- West Olympia Access to US 101: Interchange Justification Report
- West Olympia Access to US 101: Phase I Kaiser Road on and off ramps
- West Olympia Access to US 101: Phase 2 Yauger Way off ramp (beyond 2030 planning horizon

These facilities are illustrated in the Olympia Transportation 2030 map for the Westside and Downtown area, an excerpt of which is in Figure 5-1.

Figure 5-1. Olympia Transportation 2030 Westside Improvements



5.2.6 Olympia Mobility Strategy

The purpose of the Olympia Mobility Strategy is to recommend a multimodal transportation strategy that is consistent with, and helps achieve, the City's vision and policies in the Comprehensive Plan. Consistent with the Plan, the City seeks to develop a transportation system with a balanced approach to all people

and all modes of travel. This goal is articulated through the City's Comprehensive Plan transportation policies, which direct the City to reduce dependence on motor-vehicle use and support bicycle, pedestrian, and transit use. The Transportation Mobility Strategy was accepted by the Olympia City Council on August 4, 2009.

6. POLICY POINT 6: FUTURE INTERCHANGES

Policy Point 6 addresses whether the proposed access point revisions at the US 101/Black Lake Boulevard and US 101/Kaiser Road interchanges are compatible with a comprehensive network plan and with other known new access points and/or revisions to existing access points in the project vicinity.

6.1 ARE THE PROPOSED ACCESS POINT REVISIONS COMPATIBLE WITH OTHER FUTURE INTERCHANGE IMPROVEMENTS?

Review of the current WSDOT *State Highway System Plan (2007-2026)*, indicates that there are no new interchanges proposed on the US 101 corridor within five miles of the project area. However, the system plan identifies a number of freeway and /or interchange

modifications that were reviewed for consistency with the proposed improvements.

The *Highway System Plan (HSP)* organizes projects into three tiers and also identifies projects that require further analysis. These levels are as follows:

- **Tier I:** Low cost projects with a high return on investment and short delivery schedules
- **Tier II:** Moderate to Higher cost projects with potential network benefits
- **Tier III:** Higher cost projects with corridor-wide benefits
- **Solutions that Require Further Analysis:** This section of the HSP lists other projects that require further analyses before a recommendation can be made

Study area projects listed in the HSP are summarized in Table 6-1.

Table 6-1. Projects from WSDOT’s Highway System Plan

Projects	Improvement	Consistent with IJR
Tier II Solutions		
US 101/SR 8 interchange	Highway-to-highway ramp widening to two lanes in eastbound and westbound directions; auxiliary lane between Mud Bay Road interchange and SR 8 interchange	Yes, no significant change in volumes with Project
US 101/Mottman interchange to I-5	Westbound auxiliary lane/climbing lane from I-5 to Mottman interchange; eastbound auxiliary lane between Mottman/Cooper Point on-ramp and I-5 southbound/2 nd Avenue off-ramp	Yes, no significant change in volumes with Project
I-5/N 2 nd Avenue off-ramp	Install stop signs on local arterials (De Soto and N 2 nd Avenue) to create 3-way stop	Yes, no significant change in volumes with Project
US 101/Mud Bay interchange to I-5	Identify improvements between Mud Bay interchange and I-5	The US 101/West Olympia Access Project is the identified improvement in this segment of US 101
Solutions Requiring Further Analysis		
US 101/SR 8 interchange	Evaluate design alternatives for interchange to supplement interim strategies identified as Tier II Solutions	Yes, no significant change in volumes with Project
I-5, Tumwater city limits to SR 510	Urban feasibility study to consider HOV lanes and/or collector-distributor system	Yes

Table 6-1 Continued. Projects from WSDOT’s Highway System Plan

Projects	Improvement	Consistent with IJR
Solutions Requiring Further Analysis		
I-5/Trosper Road interchange to Pierce County line	Urban ITS Master Plan	Yes
I-5/N 2 nd Avenue off-ramp	Signalize with acceleration lane or other alternative at Desoto/N 2 nd Avenue/YUS 101 off-ramp and I-5 off-ramp to N 2 nd Avenue to improve operations	Yes, no significant change in volumes with Project

In addition to the Highway System Plan, the *Thurston Regional Transportation Plan 2025*, as amended was also reviewed to identify and assess compatibility with any potential

interchange improvements in the project vicinity. These improvements are discussed in Table 6-2.

Table 6-2. Projects from the Thurston Regional Transportation Plan

ID	Projects	Improvement	Consistent with IJR
O4	US 101/SR 8 interchange Retrofit	Retrofit and expansion of the interchange to improve mobility and enhance safety including expansion of on/off ramps from one lane to two, and bridge replacement	Yes, no significant change in volumes with Project
L14	US 101/Crosby Boulevard interchange	Identifies the need for further study	Yes, study will assume US 101/West Olympia Access Project improvements are implemented in the future
O5	I-5 Corridor Mobility Strategy	Develop mobility strategy, consider HOV lane, dedicated freight lane, high capacity transit or other strategy	Yes, strategy will need to consider I-5/US 101 interchange area
O9	Freeway Management Strategy	Expand/enhance management system for I-5 and US 101 including access points	Yes, strategy will need to consider I-5/US 101 interchange area

Based on the planned projects described in Table 6-1 and Table 6-2, the proposed improvements to US 101 discussed in this IJR are

consistent with other existing interchanges and with other proposed freeway improvements in the project vicinity.

7. POLICY POINT 7: COORDINATION

Policy Point 7 addresses whether all projects and actions needed to successfully implement the proposed access point revisions at the US 101/Black Lake Boulevard and US 101/Kaiser Road interchanges have been programmed and funded. The policy point also requires documentation of all agencies, groups or other bodies that have been contacted regarding potential projects, and any past or planned public outreach.

7.1 HOW HAVE THE PROPOSED IMPROVEMENTS BEEN COORDINATED WITH OTHER IMPROVEMENT PROJECTS IN THE AREA?

The preparation of this IJR has been closely coordinated with a stakeholder committee (IJR Support Team) comprised of all affected local, regional, state and federal agencies. Membership included:

- City of Olympia, Public Works and Planning Staff
- City of Tumwater
- Thurston County
- Washington State Department of Transportation (WSDOT) Olympia Region and Headquarters
- Thurston Regional Planning Council (TRPC)
- Intercity Transit
- Federal Highway Administration

This committee has reviewed the development and evaluation of improvement options and alternatives for the Project, including identification of local projects that support and/or are coordinated with the proposed US 101 access improvements. The City of Olympia and Thurston County have either implemented or plan to implement projects that support the Project. As noted under Policy Point 1, these projects include:

- **Widening of Kaiser Road NW** to add a two-way left turn lane and a southbound bicycle lane, between the intersections with 5th Way SW and 7th Avenue SW (completed) – this project is closely related to and helps facilitate implementation of the new US 101/Kaiser Road interchange.
- **Extension of Yauger Way NW** southward from Capital Mall Drive SW (completed) – this project is closely related to and helps facilitate implementation of the Yauger Way extension from the US 101/Black Lake Boulevard interchange.
- **Widening of Mud Bay Road/Harrison Avenue NW** between Evergreen Parkway NW and Yauger Way NW from a two/three-lane cross-section to a four/five lane cross-section with a new traffic signal at Kaiser Road NW (completed) – this project provides needed roadway capacity to accommodate added traffic resulting from the new interchange at US 101/Kaiser Road and the Yauger Way extension from the US 101/Black Lake Boulevard interchange.
- **Evergreen Parkway/Mud Bay Road Southbound Ramps** – install signal (Thurston County project located outside Olympia city limits). This improvement could also be a roundabout (before 2040 per *Comprehensive Plan*). While the proposed US 101 West Olympia access improvements are not dependent on this improvement, this project does provide added capacity to an adjacent interchange.
- **Evergreen Parkway/Mud Bay Road Northbound Ramps** – install signal (Thurston County project located outside Olympia city limits). This

improvement could also be a roundabout (before 2040 per *Comprehensive Plan*). While the proposed US 101 West Olympia access improvements are not dependent on this improvement, this project does provide added capacity to an adjacent interchange.

- **Black Lake Boulevard/Cooper Point Road** – add 2nd eastbound right with extension through the Haggen entrance intersection as a through lane (before 2040 per *Comprehensive Plan*). This planned improvement is closely related to the access improvements at the US 101. Programming and funding for this improvement should be obtained as improvements are necessary in the future. The City of Olympia will work cooperatively with WSDOT to pursue funding for this improvement, as well as the interchange modification. Upon implementation, the signal timing of this intersection should be coordinated with the signal timing at the US 101/Black Lake Boulevard interchange to minimize traffic queuing impacts on the interchange, particularly at the eastbound and westbound off-ramp intersections.

- Submittal of written comments
- Three public newsletters
- City Council briefings and workshops

As noted in Chapter 2, between November 2006 and March 2007, substantial public input was obtained that focused both on understanding the nature of the problem to be addressed and identifying a wide range of possible solutions. Two public workshops were held in March of 2007 to kick-off the study effort. Additionally, wide distribution of the first project newsletter identified input opportunities including the March workshops. As a result of these workshops, approximately 200 suggestions were obtained and compiled. Suggested solutions to existing and expected future US 101 access and West Olympia circulation issues included land use policy and regulatory changes, transit, roadway, bicycle, pedestrian, intersection and interchange ideas.

Public open houses were held in June of 2008 to provide information to the public about the development and screening of improvement alternatives and to solicit input on the scenario development process, technical analyses, and study findings to date. Extensive comments were received at these open houses and through subsequent phone conversations and written/email communications. The second public newsletter was published in May of 2008. It provided information about the study process to date and noted the upcoming opportunities for public engagement.

Near the end of 2008, the public was provided with the opportunity to view and comment on

7.2 WHAT PUBLIC OUTREACH ACTIVITIES WERE UNDERTAKEN?

7.2.1 Activities Undertaken as Part of the 2010 West Olympia Access Study

As noted under Policy Points 1 and 2, this study is closely coordinated with and provides an update to the original *West Olympia Access Study* completed in 2010. Public outreach activities undertaken during the *2010 Study* included:

- Stakeholder interviews
- Public workshops



the preferred package of improvements to address the access and traffic circulation needs in West Olympia. Additionally, several briefings were held with the Olympia City Council prior to acceptance of the preferred recommendations. The third project newsletter was published in December 2008 and provided a summary of study conclusions.

A final public open house was hosted in the summer of 2009 to allow interested parties to review the preferred alternatives and discuss next steps.

7.2.2 Activities Undertaken as Part of the 2015/2016 IJR

Public outreach activities for the IJR picked up from where the 2010 *Study* left off. In the fall of 2014, focus group meetings were held with key stakeholders including the City of Olympia, WSDOT, and the West Olympia Business Association (WOBA) at the outset of this effort. These focus group meetings were held to provide information and solicit feedback on project elements such as potential environmental impacts, mitigation measures, or community perspectives on project components.

A City Council briefing and a second meeting with the WOBA were held in April of 2015, to discuss initial conclusions from the preliminary design, operations and


environmental analyses conducted over the winter of 2014/2015. Initial meetings related to environmental analysis were also conducted.

On June 22, 2015, a meeting was held with the Lakemoor community (located in the vicinity of Ken Lake immediately south of US 101 and west of Black Lake Boulevard). On June 24th, a NEPA scoping meeting and public Open House was held to solicit input on the Preferred Alternative and to identify potential issues that should be addressed in the IJR and environmental documentation. A summary handout was prepared and distributed and the City's website was updated to support the Open House.

Approximately 50 people attended the Open House, all of whom were given a combined questionnaire and comment form to fill out. Going forward, responses received were used to focus IJR efforts into areas known to be of concern to neighbors of this project and other stakeholders. In addition, comments received through the project website and via e-mails sent directly to project staff were considered in the study planning and design effort.



Figure 7-1. June 2015 Open House Handout

 **US 101/West Olympia Access Project at Kaiser Road and Yaeger Way**
June 2015

Proposed New Highway Access from US 101 to Kaiser Road and Yaeger Way.

In 2010, the City and Washington State Department of Transportation (WSDOT) developed a concept to help relieve congestion at the intersection of Black Lake Boulevard and Cooper Point Road on Olympia's west side. The selected alternative adds new access ramps to/from US 101 at Kaiser Road, and a new off ramp from US 101 to Yaeger Way. This concept was planned to be built in two phases and included a bridge structure to provide access to Yaeger Way.

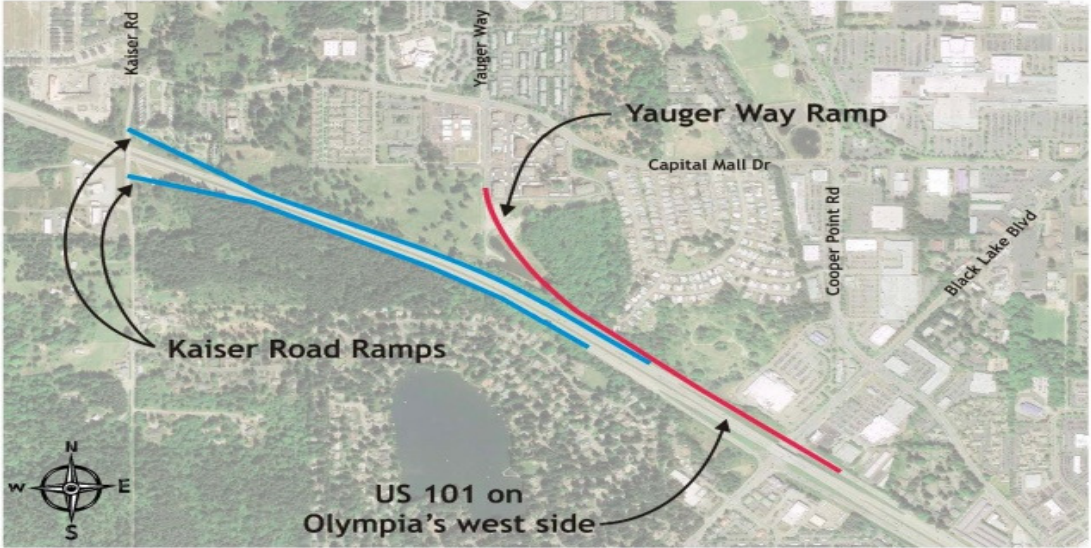
In 2014, the City moved forward with the next phase of work, which included a review of the previous design concepts. The review generated a new design variation that maintains the same access points to US 101 and connections to Kaiser Road and Yaeger Way, and allows the Yaeger Way ramp to be constructed without the need for a new bridge. The updated concept may reduce the overall project cost by about half.

Public Meeting

The public is invited to attend an informational open house regarding this project on **Wednesday, June 24, 2015.**

**South Puget Sound Community College,
Student Union Building (#27)
2011 Mottman Rd SW, Olympia**

**6:00 p.m. - 8:00 p.m.
Presentation 6:00 p.m. - 6:30p.m.**



olympiawa.gov/WestOlyAccess

Feedback from the June 2015 Open House included the following:

- Potential noise impacts on nearby residents
- Existing congestion levels and possible air pollution levels resulting from stalled traffic
- Stormwater runoff from the project and its potential impacts on Ken Lake water quality and possible flooding
- Potential for impacts to or displacement of wildlife. The presence of large wetland complexes that adjoin and are crossed by Kaiser Road was noted.

- Potential traffic congestion issues at the US 101/Black Lake Boulevard interchange resulting from the addition of the westbound through lane (THRU), and the need for additional road improvements on Kaiser Road and 7th Avenue, including bike lanes, where the existing cross-section is narrow.
- Safety concerns at several intersections in the vicinity of the Project.
- Improve the attractiveness of US 101 through the project area with landscaping, public art and/or attractive hardscape. Additionally, consider improving the vegetative buffer between US 101 and Ken Lake.
- Several suggestions for additional travel lanes at various locations. Concern was expressed about the ability of the Preferred Alternative to solve long-term congestion problems, balanced by recognition that the Preferred Alternative is a good solution that maximizes current resources and infrastructure.
- Mixed reactions to the support of the Project for West Olympia economic development versus stimulating additional west side growth.

On December 1, 2015, a project briefing was held with the Olympia City Council. On January 21, 2016, a meeting was held with the Lakemoor community to address concerns and issues affecting this area with a primary focus on water quality and noise. The meeting was well-attended and a range of comments and questions were addressed. Further information about this meeting, including a copy of the presentation, is available on the City of Olympia's project website.

8. POLICY POINT 8: ENVIRONMENTAL PROCESSES

This policy point highlights the required environmental process for the improvements described in this IJR. The IJR is intended to result in a “finding of engineering and operational acceptability” and will be approved at the same time as a formal decision on the SEPA environmental document that is being prepared concurrently with the IJR.

A preliminary screening of potential environmental impacts was conducted as a part of the *West Olympia Access Study (WOAS)*, and was used as a foundation for the environmental analysis performed to investigate possible impacts associated with the design options considered during the IJR process. Environmental review for the Preferred Alternative focused on disciplines for which potential impacts were anticipated. Highlights of the analysis approach, key findings, conclusions and any mitigation recommendations for each discipline are discussed in the remainder of this chapter. This information is a summary of the more detailed technical memoranda prepared to support the SEPA environmental review process. Transportation and land use assumptions inherent in these technical memoranda are consistent with assumptions made for this IJR.

8.1 WHAT TYPE OF ENVIRONMENTAL DOCUMENT WILL BE PREPARED FOR THE PROJECT?

A SEPA Checklist will be prepared for the project based on the findings and conclusions of several discipline-specific reports that document impacts and/or benefits associated with:

- Ecosystem Resources including wetlands, terrestrial species and habitat, and aquatic species and habitat. If there is a federal nexus for the project in the future (i.e., federal funding) compliance

with the Endangered Species Act will be pursued

- Water Resources
- Visual Quality
- Noise
- Land Use
- Social and Environmental Justice
- Cultural Resources (Compliance with Washington State Governor’s Executive Order 05-05). If there is a federal nexus for the project in the future compliance with Section 106 of the National Historic Preservation Act will be pursued.

If or when a federal funding nexus occurs for the project, it is expected that FHWA will either adopt the SEPA checklist to fulfill the requirements of NEPA or a NEPA Documented Categorical Exclusion (DCE) will be prepared. A Categorical Exclusion is defined as “a category of actions which do not individually or cumulatively have a significant effect on the human environment...and...for which, therefore, neither an environmental assessment nor an environmental impact statement is required.” (40 CFR 1508.4).

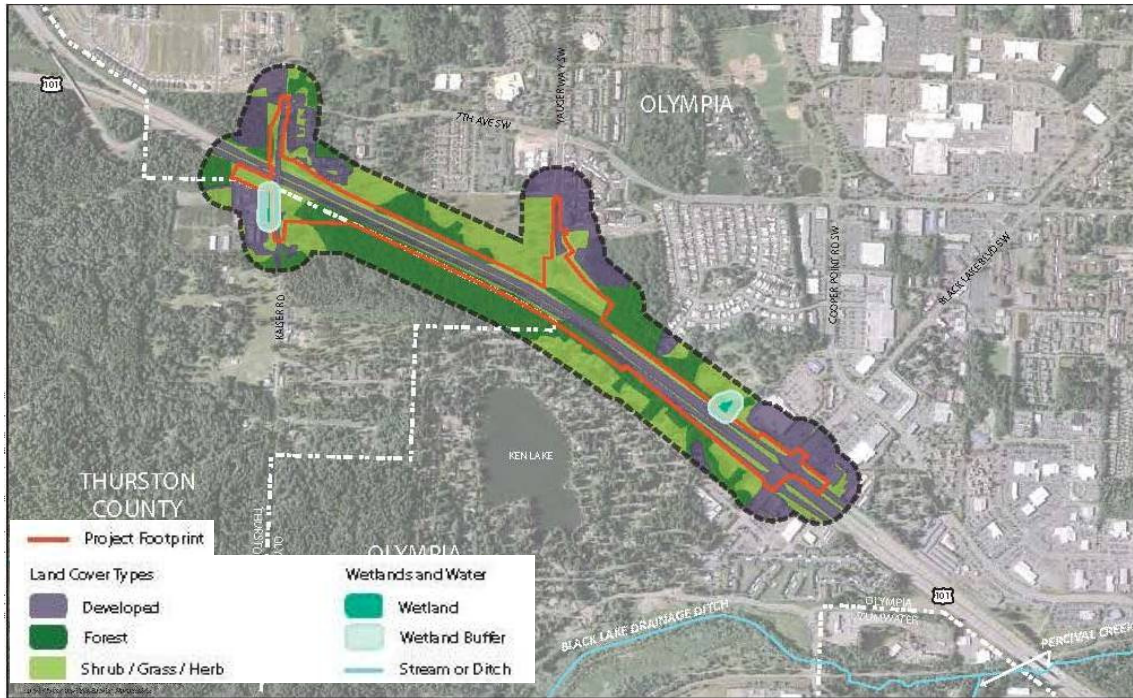
8.2 ECOSYSTEM RESOURCES

Ecosystem resources addressed in this analysis include wetlands, terrestrial species and habitat, and aquatic species and habitat. The study area for ecosystem resources includes the area within 300 feet of the project footprint as illustrated in Figure 8-1. Analysis also considered the sensitive locations of special-status species (defined as species that are listed as endangered or threatened under the Endangered Species Act, or that are on the Washington State list of endangered, threatened, and sensitive species) within 1,000 feet of the project footprint. More detailed information about ecosystems is included in the *Ecosystem Resources Technical Memorandum* (Parametrix, Inc., December 1, 2015).

Two wetlands were identified in the project area as shown in Figure 8-1. Wetland 1 is approximately 0.06 acre, located south of US 101 and west of Kaiser Road in the public right-

of-way. Wetland 2 is approximately 0.13 acre, located north of US 101 and west of Black Lake Boulevard on a City of Olympia-owned parcel.

Figure 8-1. Existing Wetlands and Land Cover Types



Terrestrial habitats in and near the study area vary considerably in availability and suitability as habitat for wildlife. The study area is bordered on the east by densely developed residential and commercial areas with low habitat quality. Higher-quality habitat is found on undeveloped parcels with forest cover throughout much of the southern and western portions of the study area. No special-status or Washington Department of Fish and Wildlife (WDFW) priority species or habitats have been documented within 1,000 feet of the proposed project features (WDFW 2015a).

No permanent streams have been identified in the study area. None of the ditches or other drainage features in the study area has a surface connection to any watercourses that contain potential fish habitat. Thus, no habitat for special-status fish species is present in the study

area. However, there may be some seasonal discharge into waterbodies known to contain listed species.

Construction Impacts – Construction-related impacts on ecosystem resources would be temporary and limited to the period during and immediately following project construction. Wetland buffers could experience temporary impacts. There would be an increase noise and human activity that could displace terrestrial species. No construction-related impacts are expected for aquatic species or habitat.

Operational Impacts – Operational impacts would be long term and would derive from the conversion of vegetated areas (including vegetated portions of the wetland buffers) to impervious surfaces or other features (such as for stormwater facilities). Portions of the regulatory buffer for Wetland 1 and Wetland 2

would be affected. Approximately 0.43 acre (18,833 square feet) of the regulatory buffer on Wetland 1 would be converted to impervious surfaces, as would approximately 0.25 acre (10,814 square feet) of the regulatory buffer on Wetland 2. Both affected buffer areas are within maintained road right-of-way (US 101 and Kaiser Road) that have minimal vegetative diversity. The proposed project is not expected to result in any substantial adverse effects on terrestrial habitats and species; however, increased traffic volumes on roadways within and near the study area may affect certain species such as amphibians. There would be no long-term adverse effects on aquatic species and habitat by the proposed project because no watercourses are present in the study area.

Mitigation – The project would use a mitigation sequencing approach based on a hierarchy of avoiding and minimizing adverse impacts through careful design, rectifying temporary impacts, and compensating for unavoidable adverse impacts. The proposed project would comply with standard Best Management Practices (BMPs) and applicable federal, state, and local mitigation requirements during design, construction, and post-construction activities. Where impacts cannot be avoided, a conceptual mitigation plan will be developed to include mitigation measures that are intended to minimize, rectify, or compensate for adverse impacts on ecosystem resources. Potential mitigation measures might include: enhancement of degraded buffers, tree restoration, minimize harm to migratory birds during breeding season, signs or other measures to warn of migrating amphibians.

8.3 WATER RESOURCES

Most of the US 101/West Olympia Access Project would be located in the highway right-of-way and the immediate vicinity. However, the study area also includes natural waterbodies, stormwater infrastructure, diverse land uses,

state-designated shorelines⁴, and groundwater protection areas. More detailed information about water resources and potential impacts attributable to the project is included in the *Draft Water Resources Technical Memorandum* (Parametrix, Inc., November 30, 2015). Highlights from that memorandum are presented below.

Natural Water Bodies: The dominant natural surface waterbody in the study area, Ken Lake, is fed by groundwater, the municipal storm drain system, and several intermittent watercourses. Ken Lake is approximately 25 acres in surface area and approximately 13 feet at its maximum depth. During winter conditions with above-average precipitation, Ken Lake overflows through two parallel 36-inch culverts beneath Lakemoor Drive, which connect to the downstream municipal storm drain system and discharge to the Black Lake Drainage Ditch and, ultimately, into Budd Inlet in Puget Sound. The water quality of the Black Lake Drainage Ditch has been identified as being impaired for dissolved oxygen, pH, and temperature.

Stormwater Infrastructure: Stormwater in the project footprint is collected by the drainage system associated with the US 101 highway that was built by WSDOT. The highway drainage connects to the existing municipal conveyance system in a series of pipes, culverts, and open conveyance channels that drain to Ken Lake or the Black Lake Drainage Ditch. Downstream of the proposed project footprint, Ken Lake is known to have existing drainage and flooding issues. The two-celled WSDOT stormwater facility located on the southwest and southeast sides of Kaiser Road SW and US 101 was built in 1989. This facility was constructed to replace a

⁴ While there are no state designated shorelines in the project footprint area, the water resources study area is a larger geographical area. It includes the surface water drainage subbasins where the project would be located, water resources within those subbasins, and the immediate downstream receiving waters to which the subbasins in the project footprint drain.

detention area removed by installation of the existing Kaiser Road roadway embankment. The facility was designed to collect and infiltrate offsite flows, though it currently may not be functioning up to its original design capacity. Soils in the study area are predominately sandy loam, loamy sand and gravelly silt loam that are generally well-drained.

Groundwater: The project lies within a designated wellhead protection area for the Allison Springs drinking water source. This area is regulated by the City of Olympia Critical Areas Code, OMC 18.32, which limits and regulates activities that can be performed in designated groundwater protection areas to prevent contamination of the drinking water supply.

Construction Impacts – Construction activities that could affect surface water and groundwater resources include:

- Earthwork, trench work, stockpiling and material transport that could cause localized erosion, dust and/or transport of soil by construction vehicles.
- Concrete work and paving that could alter the pH in surface water to impact fish and wildlife if runoff comes in contact with process water or slurry from this work.
- Leaks or spills from construction machinery or stored materials.

Operational Impacts – Most of the proposed project would be located within the existing WSDOT right-of-way, which is predominantly pollution-generating impervious surface (PGIS), with grassy shoulders. New ramps and connections to frontage roads included in the project would expand beyond the WSDOT right-of-way into undeveloped land. The project would convert approximately 5.2 acres of existing pervious area into 4.8 acres of PGIS and 0.4 acres of non-pollution generating impervious surface (NPGIS). Removing vegetation and/or adding impervious surface can change stormwater runoff characteristics from the study area, increasing the volume of surface runoff

and the peak flow rate generated by a storm event. In addition, impervious areas subject to vehicular traffic can accumulate metals, oil, and grease that are transported to waterbodies by stormwater runoff and could affect water quality in the receiving waters in the study area.

Mitigation – Stormwater management throughout the project footprint would be based on the requirements of WSDOT's *Highway Runoff Manual* and supplemented with requirements from the City of Olympia and Thurston County where they are more stringent. Construction-related impacts on water resources would be prevented or minimized by complying with the NPDES Construction Stormwater General Permit, the WSDOT *Temporary Erosion and Sediment Control Manual*, and the City of Olympia's *Drainage Design and Erosion Control Manual for Olympia*.

Based on the *Highway Runoff Manual* requirements, runoff from new PGIS must be collected and treated with water quality BMPs to avoid impacts on water quality in downstream receiving waters, including groundwater. Stormwater management would be achieved by installing new water quality treatment facilities, such as Compost Amended Vegetated Filter Strip (CAVFS) and Compost Amended Bio-filtration Swale (CABS), within the project footprint; installing new flow control facilities, such as infiltration ponds and trenches; and replacing some existing WSDOT basic water quality treatment detention ponds with enhanced runoff treatment and infiltration flow control facilities. In addition to stormwater management of runoff from new PGIS, the WSDOT *Highway Runoff Manual* would also require water quality treatment and flow control retrofit for runoff from some areas of existing and replaced impervious surfaces that are currently unmanaged. As a result, the project would apply enhanced stormwater treatment to approximately 4.8 acres of existing and replaced PGIS, and flow control through infiltration to approximately 4.8 acres of existing and replaced impervious surfaces. Based on the mitigation proposed for the project, pavement runoff is

expected to be as clean as or cleaner than existing conditions, with as much or more groundwater recharge and stream protection.

8.4 VISUAL QUALITY

The visual quality assessment evaluates the visual setting of the proposed project, as well as the perceived aesthetic fit between the project and its setting. The assessment also considers the expected perceptions of those viewing the proposed project elements, and the policy context for visual aesthetics. US 101 is a state-designated scenic byway for which a *Scenic Byways Corridor Management Plan* has been prepared. From the traveler's point of view, the project location is a transition area between urban and rural landscapes. West of the project area the regional landscape is more rural and open, while east of the project area the landscape is densely developed. More detailed information about the visual environment and potential impacts attributable to the project is included in the *Visual Quality Technical Memorandum* (Parametrix, Inc., December 1, 2015). Highlights from that memorandum are presented below.

Construction Impacts – The majority of construction would occur within the highway right-of-way, especially in the roadside of US 101. Construction would include clearing and grading, use of staging areas and operation of large equipment all of which would detract from the natural character of the roadside.

Operational Impacts – Overall, two aspects of the project are likely to result in substantial changes to the visual character of the project area:

- The potential removal of approximately 400 trees with a diameter of 8 inches or more from the roadside along US 101 between Yauger Way and Kaiser Road would change the character of the highway through the project area, opening views to surrounding land uses, widening the perceived footprint of the roadway in the landscape, and reducing

the sense of fit between the highway and its setting.

- Extensive retaining walls related to the reconstruction of Kaiser Road would be prominent in the views from adjacent residents, particularly residents of the Coach Post mobile home park.



Mitigation – The most effective method for mitigating impacts on mature trees along the roadside of US 101 is avoidance. Where tree removal cannot be avoided, the WSDOT *Roadside Policy Manual* (WSDOT 2015) will be used to provide guidance for replanting. The City and WSDOT will develop a replanting plan, which will mitigate for the project's tree impacts. Replanting will include native trees and shrubs, and grasses that are conducive to pollinators. Visual impacts associated with the Kaiser Road retaining walls can include a variety of strategies related to wall design and screening to lessen perception of the impact. The City of Olympia would minimize the visual impact of the new retaining wall at Kaiser Road on the residents of the Coach Post Mobile Home Park by using aesthetically pleasing patterns/impressions in the wall surface.

8.5 NOISE

This project qualifies as a Type 1 project because it includes the addition of a through-traffic lane, as defined in Section 2 of the WSDOT *Traffic*

Noise Policy and Procedures. Type 1 projects require a traffic noise analysis.

The study area for the noise analysis includes the entire length of the improvements between Kaiser Road and Black Lake Boulevard, and approximately 350 feet north and south of the highway. However, some noise receivers and roadways outside of the 350-foot boundary were included to ensure the noise model captured the entire projected area of impacts within the study area. Land uses within this area include a mix of residential, commercial, retail, industrial, and public services. More detailed information about the noise environment and potential impacts attributable to the project is included in the *Noise Technical Memorandum* (Parametrix, Inc., December 1, 2015). Highlights from that memorandum are presented below.

To determine the existing noise levels throughout the study area, 50 receivers were evaluated. These receivers were chosen based on proximity to the project roadways, representativeness of the other receivers (i.e., land use category and distance from roadways), and areas of frequent human use. The receivers are a mix of residential and commercial/office land use categories.

Construction Impacts – Construction noise effects are temporary and cease after the project has been completed. During construction of the roadway improvements, noise levels would temporarily increase in the affected environment due to the use of heavy equipment and the hauling of construction materials. The increase in noise levels would depend on the type of equipment being used and the duration of time it is in use.

Operational Impacts – Operational noise levels were projected for impact analysis under the FHWA criteria. The validated noise model used existing 2014 and future 2040 traffic volume data from the IJR transportation analysis.

With the project, noise levels are expected to decrease up to 7 dBA (Receiver 4) or increase up to 9 dbA depending on the receiver, compared

to 2014 existing noise levels. Thirteen of the 50 receivers are predicted to exceed their respective NAC in 2040. These 13 receivers represent 21 residential units. Most of the affected receivers are located in the Lakemoor community, with one located west near Kaiser Road in the Coach Post Mobile Home Park.

Mitigation – WSDOT policy requires that noise abatement be considered for receivers that are expected to exceed their respective assessment criteria. For this project, abatement was considered for those residential receivers exceeding the criteria in 2040. To mitigate for noise impacts, two barrier walls are proposed – Wall A and Wall B. Wall A is located on the north side of US 101 adjacent to Coach Post Mobile Home Park and would benefit nine mobile homes. This wall would be about 350 feet long and range in height from 8 to 14 feet. Wall B is located on the south side of US 101 near the Lakemoor community and would benefit 12 homes. This wall would be approximately 1,900 feet long and would be 6 feet in height. Figure 8-2 and Figure 8-3, respectively show the locations of the proposed noise barriers.

8.6 LAND USE

This analysis discusses the current land use and zoning designations in the project area and evaluates the US 101/West Olympia Access Project's potential impacts on surrounding land uses, including potential acquisitions and displacements. Analysis also discusses whether the project is consistent with local and regional land use plans. More detailed information about land use and potential impacts attributable to the project is included in the *Land Use Technical Memorandum* (Parametrix, Inc., December 1, 2015). Highlights from that memorandum are presented below.

The study area for land use is ½ mile from the edge of the project footprint. The types of land uses allowed in a given area are largely determined by the parcel zoning designation established by the City of Olympia. The study area comprises a variety of land uses including

Figure 8-2. Proposed Noise Wall A - Kaiser Off-Ramp Area

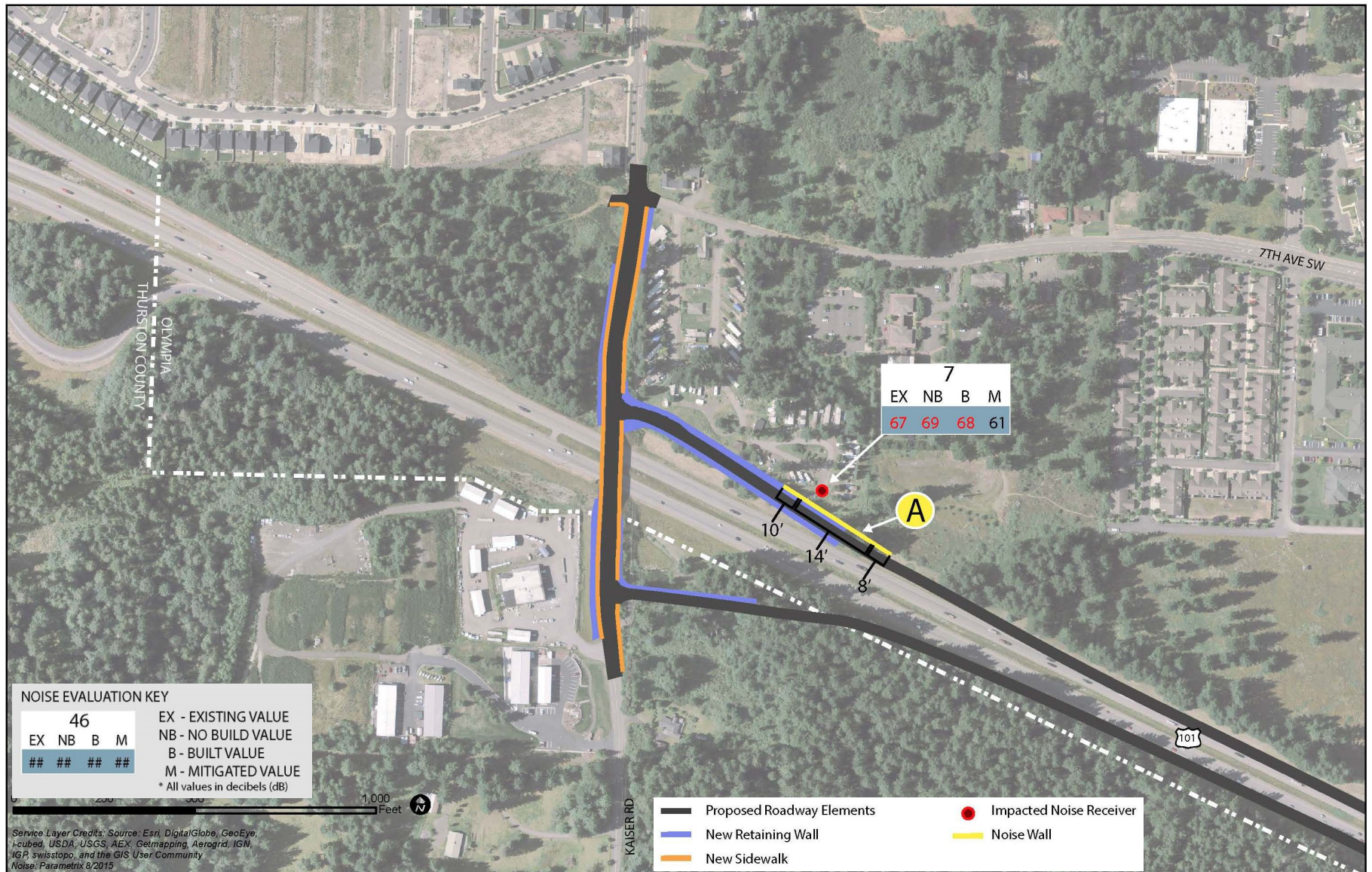
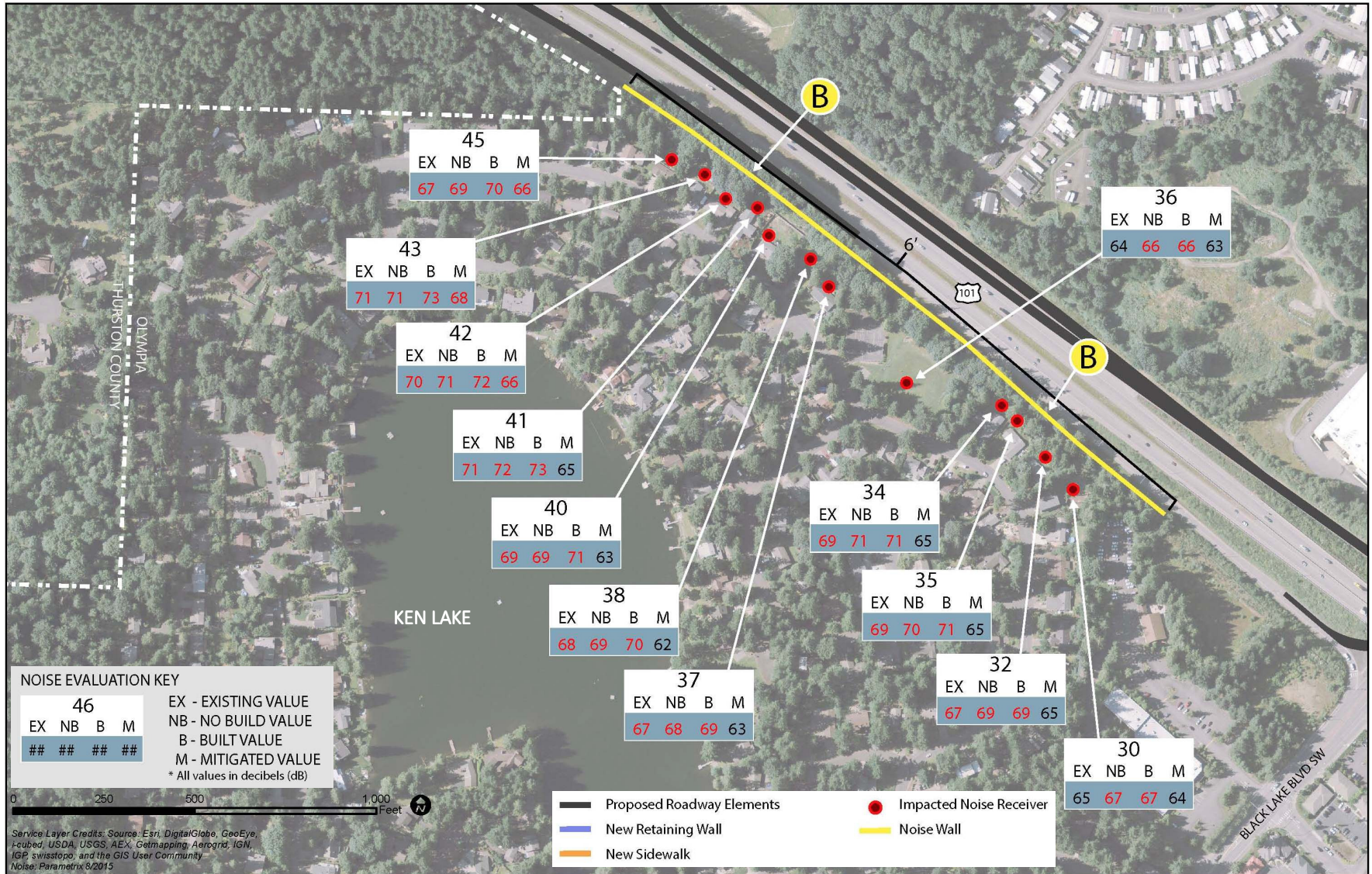


Figure 8-3. Proposed Noise Wall B – Ken Lake Area



single-family residential (approximately 20 percent), vacant and undeveloped land (approximately 18 percent), retail (approximately 10 percent), multi-family residential (approximately 9 percent), and park and open space (approximately 8 percent).

Construction Impacts – Much of the construction would take place in the WSDOT right-of-way at a distance from residential properties or businesses. However, the construction activities at Kaiser Road and Yauger Way SW would both be located in residential areas. These residential properties would experience some degree of temporary, construction-related impacts, such as noise, dust, and traffic due to construction detours.

Operational Impacts – Land use would be affected where property is acquired for the project. This project would not have any full acquisitions, but would have several small partial acquisitions. These partial acquisitions would be mostly minor strips of private property necessary to create adequate right-of-way for the project. The one exception would be the Coach Post Mobile Home Park where the new Kaiser Road off-ramp would take part of the property, converting a residential land use to a transportation land use. No displacements or relocations would occur as a result of the partial acquisitions. The small amount of partial acquisitions would not have negative impacts on land use in the area, and would not promote different land uses than planned for the area.

The US 101/West Olympia Access Project and other planned transportation and development projects would help achieve local and regional goals set forth in the applicable regional transportation plan and comprehensive plans. While the purpose of this project is to support the existing development and planned growth in West Olympia, this project could attract other development projects to the area, accelerating the rate of development. However, any new development project would be subject to the City's zoning and land use codes, which ensure

that appropriate development occurs in the areas where the City has planned for it.

Mitigation – The City of Olympia expects the project to be consistent with adopted land use plans. No adverse operational impacts are expected; therefore, no operational mitigation measures are necessary. The City of Olympia will compensate the owners of properties partially acquired for right-of-way in accordance with Washington's relocation and property acquisition law and regulations (RCW 8.26).

8.7 SOCIAL AND ENVIRONMENTAL JUSTICE

This analysis evaluates the US 101/West Olympia Access Project's potential impacts on social resources, community facilities, and neighborhoods near the project area. This section also discusses whether this project would result in any disproportionately high and adverse impacts on environmental justice populations, defined as minority and/or low-income populations. More detailed information about potential social and environmental justice impacts attributable to the project is included in the *Social Resources Technical Memorandum* (Parametrix, Inc., December 1, 2015). Highlights from that memorandum are presented below.

The social resources study area is defined as within ½ mile of the proposed project footprint. Within this area there are five identified residential neighborhoods in the City of Olympia and two within the City of Tumwater. The various neighborhoods include a mix of single family, multi-family and mobile home resources. The study area contains community resources commonly found in residential neighborhoods such as schools, churches, and recreational facilities including developed parks and nature preserves. Yauger Park and Black Lake Meadows are notable examples of these facilities. There are also grocery stores, drugstores, and physical fitness businesses in the area, along with one of the two major hospitals in Olympia – the Capital Medical Center

Construction Impacts – The construction-related impacts from this project would be localized and temporary. Much of the project construction involves new roadways that can be constructed without affecting existing roads until existing and new elements need to be connected. Some lane closures and/or detours could occur on Kaiser Road during the bridge-widening and on Black Lake Boulevard near the interchange with US 101. Construction noise and dust could affect residents who live near project construction areas, including those at the Coach Post Mobile Home Park at Kaiser Road and 7th Avenue SW near the new off-ramp, the residents of apartments near the new off-ramp at Yauger Way, and those in the Lakemoor neighborhood near where US 101 would be widened for the new auxiliary lane.

Operational Impacts – Access to community resources and amenities within and near the study area would improve with the project and congestion would decrease. The residential communities along Kaiser Road and Yauger Way SW may experience higher levels of traffic noise due to the increase in traffic on these roadways. In some locations higher noise exposure would require noise abatement. Local air quality may improve slightly along the arterials that become less congested. The retaining walls associated with the new Kaiser Road/US 101 ramps would be prominent in the views from adjacent residences, particularly for residents of the Coach Post Mobile Home Park. The potential removal of many mature trees along US 101 between Yauger Way SW and Kaiser Road for the new ramps would change the character of the highway through the project area.

No full acquisitions or relocations would be required for the project. The project is located along US 101, which already bisects the City of Olympia. Therefore, the project would not create any new divisions among Olympia's neighborhoods. Rather, the project would provide better connections and access to the West Olympia neighborhoods.

Mitigation – The City of Olympia would implement mitigation measures during construction to reduce potential impacts related to noise, dust, or traffic on the surrounding community. Specific mitigation measures will be established as part of the required construction management plan, and would meet the City of Olympia's regulatory and permit requirements.

Environmental Justice Evaluation – To determine the presence of minority, low-income, and limited-English proficiency residents within the study area, the project analyst reviewed 2010 census, 2008-2012 ACS Summary Report, and Office of Superintendent Public Instruction (OSPI) data. The demographic data show that there are minority, low-income, and limited-English proficiency people living within the study area. However, the project's construction and operational impacts would affect everyone in the study area. For example, both the Coach Post Mobile Home Park, which has a low income population, and the Lakemoor community, which does not, would experience noise impacts from the project. Mitigation would be provided for both communities. No disproportionately high and adverse effects are expected to be borne by low-income or minority populations.

8.8 CULTURAL RESOURCES

The assessment of potential cultural resource impacts attributable to the project was based on an archaeological and architectural inventory conducted within the project's Area of Potential Effects (APE)⁵. This inventory and the resulting conclusions about potential impacts have undergone review by the Washington State Department of Archaeology and Historic Preservation (DAHP) and concurrence was received. Opportunities to review findings have also been provided to affected local tribes.

⁵ DRAFT—*Cultural Resources Inventory for the US-101/West Olympia Access Project, City of Olympia, Thurston County, Washington*, Historical Research Associates, Inc., January 2016.

The APE for the project was defined in a work plan memorandum dated September 1, 2015 that was sent by the City to WSDOT and the Washington Department of Archaeology and Historic Preservation (DAHP). DAHP concurred with the APE definition in a letter dated October 23, 2015.

Historical Research Associates (HRA) completed archival and background research, and conducted fieldwork to identify cultural resources within the Area of Potential Effects (APE) for the Project. HRA visually inspected all accessible portions of the APE and excavated 36 subsurface shovel probes. No archaeological sites or isolates were observed. The overall condition of the APE was found to be disturbed by the construction and on-going use of US 101, and adjacent residential and commercial

developments (i.e. the Coach Post Mobile Home Park, Simmons (Ken) Lake and stores).

HRA's architectural historian conducted a reconnaissance-level survey of buildings and structures older than 45 years of age located on two parcels within the APE, as per DAHP guidelines. Two parcels were inventoried for architectural resources and evaluated at a reconnaissance level, including the Coach Post Mobile Home Park and two buildings located at 3644 7th Avenue (Ave) SW. These properties were recorded on Historic Property Inventory (HPI) forms and evaluated under the National Register of Historic Places (NRHP) Criterion C. They are recommended to be classified as not eligible for listing on the NRHP. No further cultural resources studies are recommended for the project.