

**FERN VALLEY INTERCHANGE, UNIT 2A  
ENVIRONMENTAL ASSESSMENT PROJECT**

**PACIFIC HIGHWAY #1  
TRAFFIC ANALYSIS  
MP 24.00 to MP 25.00**

**Oregon Department of Transportation  
Transportation Development Division  
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# TABLE OF CONTENTS

<b>TABLE OF CONTENTS</b> .....	<b>i</b>
<b>TABLE OF FIGURES</b> .....	<b>iii</b>
<b>TABLE OF TABLES</b> .....	<b>v</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>1</b>
<b>BACKGROUND INFORMATION</b> .....	<b>5</b>
PERFORMANCE MEASURES .....	6
<b>YEAR 2004 EXISTING CONDITIONS</b> .....	<b>7</b>
CRASH ANALYSIS .....	7
30 <sup>TH</sup> HIGHEST HOUR TRAFFIC DEVELOPMENT .....	8
ANALYSIS RESULTS .....	8
<b>YEAR 2010 &amp; 2030 FUTURE NO-BUILD</b> .....	<b>17</b>
FUTURE VOLUME DEVELOPMENT .....	17
ANALYSIS RESULTS .....	17
<b>BUILD ALTERNATIVE DESCRIPTIONS</b> .....	<b>28</b>
<b>BUILD ALTERNATIVE RESULTS</b> .....	<b>31</b>
ALTERNATIVE FUTURE VOLUME DEVELOPMENT.....	31
ANALYSIS RESULTS COMMON TO BOTH ALTERNATIVES .....	31
FERN VALLEY THROUGH ANALYSIS RESULTS .....	33
NORTH PHOENIX THROUGH ANALYSIS RESULTS .....	40
<b>ALTERNATIVE COMPARISON &amp; SUMMARY</b> .....	<b>47</b>
CAPACITY & QUEUING .....	47
SPACING.....	49
SENSITIVITY ANALYSIS.....	50
FACILITY OPERATIONS.....	52
<b>RECOMMENDATION</b> .....	<b>54</b>
<b>APPENDIX A – CRASH HISTORY</b> .....	<b>A1</b>
I5 FERN VALLEY INTERCHANGE .....	A2
OR 99 - SOUTH STAGE ROAD TO 1 <sup>ST</sup> STREET .....	A2
<b>APPENDIX B – TRAFFIC DEVELOPMENT</b> .....	<b>B1</b>
TRAFFIC COUNTS .....	B2
30 <sup>TH</sup> HIGHEST HOUR TRAFFIC DEVELOPMENT .....	B2
FUTURE TRAFFIC DEVELOPMENT.....	B3
<b>APPENDIX C – YEAR 2004 EXISTING VOLUMES</b> .....	<b>C1</b>
<b>APPENDIX D – YEAR 2010 NO-BUILD VOLUMES</b> .....	<b>D1</b>

<b>APPENDIX E – YEAR 2030 NO-BUILD VOLUMES.....</b>	<b>E1</b>
<b>APPENDIX F – ALTERNATIVE SCREENING .....</b>	<b>F1</b>
OPTION RESULTS .....	F2
INTERCHANGE ALTERNATIVE RESULTS .....	F5
SOUTH STAGE ROAD SCENARIOS – JULY 2006 .....	F11
<b>APPENDIX G – ALTERNATIVES CONSIDERED BUT DISMISSED .....</b>	<b>G1</b>
DISMISSED MAY 2004 TO OCTOBER 2005.....	G2
DISMISSED OCTOBER 2006 .....	G8
DISMISSED NOVEMBER 2006 – FEBRUARY 2007.....	G19
<b>APPENDIX H – YEAR 2010 &amp; 2030 ALTERNATIVE DESIGN HOUR VOLUMES .....</b>	<b>H1</b>
<b>APPENDIX I – BUILD ALTERNATIVE DESIGN STORAGE LENGTHS .....</b>	<b>I1</b>
<b>APPENDIX J – ANALYSIS METHODOLOGIES.....</b>	<b>J1</b>
ANALYSIS METHODOLOGIES.....	J2
PRELIMINARY ADT TRAFFIC SIGNAL WARRANTS.....	J2
<b>APPENDIX K – NO-BUILD AIR/NOISE TRAFFIC DATA.....</b>	<b>K1</b>
<b>APPENDIX L – BUILD AIR/NOISE TRAFFIC DATA .....</b>	<b>L1</b>

## TABLE OF FIGURES

Figure 1: Vicinity Map.....	3
Figure 2: Study Area Map.....	4
Figure 3: 2004 30th Highest Hour 95th Percentile Queues .....	14
Figure 4: 2004 30th Highest Hour 95th Percentile Queues .....	15
Figure 5: 2004 30th Highest Hour 95th Percentile Queues .....	16
Figure 6: 2010 Future No-Build 95th Percentile Queues .....	22
Figure 7: 2010 Future No-Build 95th Percentile Queues .....	23
Figure 8: 2010 Future No-Build 95th Percentile Queues .....	24
Figure 9: 2030 Future No-Build 95th Percentile Queues .....	25
Figure 10: 2030 Future No-Build 95th Percentile Queues .....	26
Figure 11: 2030 Future No-Build 95th Percentile Queues .....	27
Figure 12: Fern Valley Through Alternative .....	29
Figure 13: North Phoenix Through Alternative.....	30
Figure 14: Fern Valley Through Alternative 95th Percentile Queues .....	37
Figure 15: 2010 Fern Valley Through Alternative 95th Percentile Queues .....	38
Figure 16: 2030 Fern Valley Through Alternative 95th Percentile Queues .....	39
Figure 17: North Phoenix Through Alternative 95th Percentile Queues.....	44
Figure 18: 2010 North Phoenix Through Alternative 95th Percentile Queues.....	45
Figure 19: 2030 North Phoenix Through Alternative 95th Percentile Queues.....	46
Figure B1: Fern Valley Interchange Generalized .....	B6
Figure B2: TAZ Population Percentage Change 2005-2030 .....	B7
Figure B3: TAZ Employment Percent Change 2005-2030 .....	B8
Figure C1: Year 2004 Existing 30 <sup>th</sup> Highest Hour Volumes .....	C2
Figure C2: Year 2004 Existing 30 <sup>th</sup> Highest Hour Volumes .....	C3
Figure C3: Year 2004 Existing 30 <sup>th</sup> Highest Hour Volumes .....	C4
Figure C4: Year 2004 Existing 30 <sup>th</sup> Highest Hour Volumes .....	C5
Figure D1: Year 2010 No-Build Volumes.....	D2
Figure D2: Year 2010 No-Build Volumes .....	D3
Figure D3: Year 2010 No-Build Volumes .....	D4
Figure D4: Year 2010 No-Build Volumes .....	D5
Figure E1: Year 2030 No-Build Volumes .....	E3
Figure E2: Year 2030 No-Build Volumes .....	E3
Figure E3: Year 2030 No-Build Volumes .....	E4
Figure E4: Year 2030 No-Build Volumes .....	E5
Figure G1: Table 1 SPUI w/TPAU; 2030 V/C Ratios & Queuing .....	G10
Figure G2: PBA Diamond 6-lane w/loop; 2030 V/C Ratios and Queuing .....	G12
Figure G3: TPAU Diamond 6-lane w/loop; 2030 V/C Ratios and Queuing .....	G13
Figure G4: PBA Diamond Back-to back Turn Bays; 2010 V/C Ratios and Queuing .....	G14
Figure G5: PBA Diamond Back-to back Turn Bays; 2030 V/C Ratios and Queuing.....	G15
Figure G6: PBA Diamond 8-lane; 2010 V/C Ratios and Queuing.....	G17
Figure G7: PBA Diamond 8-lane; 2030 V/C Ratios and Queuing.....	G18
Figure G8: Lowry SPUI w/TPAU west side; 2030 V/C Ratios and Queuing.....	G20
Figure G9: CAC Table 1 SPUI; 2030 V/C Ratios and Queuing.....	G21

Figure G10: 4 Lane CDI – Bolz West/ N Phoenix Thru East; 2030 V/C Ratios and Queuing ....	G22
Figure G11: PBA Diamond – 6 lane w/ SE loop; 2010 V/C Ratios and Queuing .....	G24
Figure G12: PBA Diamond – 6 lane w/ SE loop; 2030 V/C Ratios and Queuing .....	G25
Figure H1: Year 2010 – Common Year 2010 Build Alternative Volumes .....	H2
Figure H2: Year 2030 – Common Year 2030 Build Alternative Volumes .....	H3
Figure H3: Year 2010 – Fern Valley Through Alternative .....	H4
Figure H4: Year 2010 – North Phoenix Through Alternative .....	H5
Figure H5: Year 2030 – Fern Valley Through Alternative.....	H6
Figure H6: Year 2030 – North Phoenix Through Alternative .....	H7
Figure K1: No-build Noise Traffic Link Diagram.....	K4
Figure L1: Fern Valley Through Noise Traffic Data Link Diagram .....	L4
Figure L2: North Phoenix Through Noise Traffic Data Link Diagram.....	L16

## TABLE OF TABLES

Table 1: Year 2004 I5 Mainline and Merge/Diverge v/c ratios.....	9
Table 2: Year 2004 Unsignalized Intersection v/c ratios.....	9
Table 3: Year 2004 Signalized Intersection v/c ratios.....	9
Table 4: Year 2004 Significant Queue Blocking.....	11
Table 5: Spacing Standards Comparison.....	13
Table 6: Year 2010 and 2030 No-build I5 Mainline and Merge/Diverge v/c ratios.....	17
Table 7: Year 2010 & 2030 No-Build Unsignalized Intersection v/c ratios.....	18
Table 8: Year 2010 & 2030 No-Build Signalized Intersection v/c ratios.....	19
Table 9: Year 2010 & 2030 No-Build Significant Queue Blocking.....	20
Table 10: Future No-Build South Medford - Fern Valley Interchange spacing.....	21
Table 11: Year 2010 and 2030 I5 Mainline and Merge/Diverge v/c ratios.....	32
Table 12: Year 2010 & 2030 OR 99 Intersection v/c ratios.....	32
Table 13: Year 2010 & 2030 Intersection v/c ratios.....	33
Table 14: Year 2010 & 2030 Significant Queue Blocking.....	34
Table 15: Fern Valley Through 2030 Spacing Standards Comparison.....	35
Table 16: Year 2010 & 2030 Intersection v/c ratios.....	40
Table 17: Year 2010 & 2030 Significant Queue Blocking.....	41
Table 18: North Phoenix Through 2030 Spacing Standards Comparison.....	43
Table 19: Year 2030 Alternative Summary.....	48
Table 20: Year 2030 Simulation Measures of Effectiveness.....	52
Table A1: Types and Number of Crashes on OR 99 from South Stage Road to 1 <sup>st</sup> St.....	A3
Table A2 : Crash Severity Summary.....	A4
Table A3 : Fern Valley I5 Mainline & Interchange Crash Summary.....	A5
Table A4: OR 99 Crash Summary.....	A8
Table B1: Count Locations.....	B2
Table F1: Option Recommendations.....	F3
Table F2: Interchange Alternative Results.....	F6
Table F3: East-West Volume Comparison.....	F12
Table F4: Travel Time Comparison.....	F13
Table I1: Build Alternative Design Storage Bays Lengths.....	I2
Table K1: Year 2004 No-build Air Quality Traffic Data for Top 3 Intersections.....	K2
Table K2: Year 2010 No-build Air Quality Traffic Data for Top 3 Intersections.....	K2
Table K3: Year 2020 No-build Air Quality Traffic Data for Top 3 Intersections.....	K3
Table K4: Year 2030 No-build Air Quality Traffic Data for Top 3 Intersections.....	K3
Table K5: No-build Noise Traffic Data.....	K5
Table L1: 2010 Fern Valley Through Air Quality Traffic Data.....	L2
Table L2: 2020 Fern Valley Through Air Quality Traffic Data.....	L2
Table L3: 2030 Fern Valley Through Air Quality Traffic Data.....	L3
Table L4: Fern Valley Through Noise Traffic Data.....	L5
Table L5: 2010 North Phoenix Through Air Quality Traffic Data.....	L14
Table L6: 2020 North Phoenix Through Air Quality Traffic Data.....	L14
Table L7: 2030 North Phoenix Through Air Quality Traffic Data.....	L15
Table L8: North Phoenix Through Noise Traffic Data.....	L17

## EXECUTIVE SUMMARY

The Fern Valley Interchange Unit 2a Project's purpose is to address the safety and operation conditions at the I5 interchange with Fern Valley Road and along the Fern Valley Road corridor in the City of Phoenix (Figures 1 and 2) in southern Oregon. Continued growth in Phoenix and surrounding areas is causing increasing congestion at the Fern Valley Interchange. The current interchange does not meet design standards. Visibility is limited because of the grades on the overpass approaches. The sight distance between the I5 off-ramps and the Fern Valley Road overpass is substandard. In addition, there are no sidewalks or bike lanes. The Fern Valley Road Bridge that crosses Bear Creek is a narrow two-lane structure that is more than 50 years old. It is structurally and functionally deficient.

Today, standing queues are seen along the majority of Fern Valley Road during peak periods. The volumes on Fern Valley Road have increased to the point that it is difficult at times to turn onto the ramps even with the protected/permitted phasing that was installed in the Fern Valley Interchange Unit 1 project in 2002. The northbound off ramp queue extends all the way back to the diverge point with I5. The I5 ramp terminal intersections and the intersection of Fern Valley Road and North Phoenix Road are either at or over capacity. Queuing on OR 99 is minimal in 2004. However, the number of accesses and closely spaced streets cause a number of conflicts between turning and through vehicles. The section of OR 99 in the project area has crashes more than double the statewide urban arterial published crash rate.

By 2030, the queuing conditions worsen in many areas. Queuing becomes a problem along OR 99 by 2030 and the majority of the intersections and the ramp connections to and from I5 are over standard.

The project development team (PDT) and the Citizens Advisory Committee (CAC) considered over 40 different alternatives and options for potential solutions for the project. Two final alternatives consisting of the remaining westside, interchange and eastside options were combined and forwarded into the EA and called the Fern Valley Through and the North Phoenix Through.

Both of these alternatives widen and improve Fern Valley Road from OR 99 to I5 with additional through and turn lanes. East of OR 99, Fern Valley Road and East Bolz Lane form a mini-couplet with westbound traffic on Fern Valley and eastbound traffic on Bolz which join together just west of Bear Creek. Fern Valley Road then crosses Bear Creek on a new four or five-lane bridge. The west side of the alternatives is the limiting factor for future growth, as it is sized to fit in the existing OR 99 corridor area with limited right-of-way impacts. These limitations have a serious implication for the future functionality of the interchange. The sensitivity analysis indicated that when the OR 99 & Fern Valley Road intersection reaches capacity, the alternatives will fail, because of queues from this intersection extending through the interchange area.

The interchange type in both alternatives is a new type of diamond interchange, a diverging diamond interchange (DDI, a.k.a. “Crossing Diamond Interchange” or CDI by Region 3), which moves traffic to the opposite side of the road across the I5 overpass structure to eliminate the need for left turn lanes on the structure and the ramps. The resulting effect is the operational benefit of an interchange that can handle more than 20 years of growth without more extensive improvements that would be necessary with a conventional interchange.

One drawback for the DDI in this location is the ramp terminals are more spread out which reduces the spacing between the ramp terminals and the adjacent intersections. While this is not too much of a concern on the east side, the west side is critically short. Queuing in 2030 extends most if not all the way between the two intersections which will contribute to operational problems in the interchange. By 2030, the spacing to the Luman Road intersection is too short.

The alternatives differ on how the main flow of traffic accesses North Phoenix Road east of I5. The Fern Valley Through Alternative (Figure 12) has traffic traveling on a slightly northerly realigned roadway paralleling the original Fern Valley Road alignment which is used as a frontage road for the Petro Stopping Centers truck stop. The realigned Fern Valley Road intersects North Phoenix in a similar configuration to the existing alignment by which through traffic must turn left to go onto North Phoenix Road. The North Phoenix Through Alternative (Figure 13) realigns North Phoenix Road to connect directly to the east end of the I5 interchange. South Phoenix Road is extended to the north and west to connect to North Phoenix Road to allow for access to the Petro truck stop, adjacent residential areas, and the east end of Fern Valley Road.

The North Phoenix Through Alternative is the recommended build alternative in this report. While the two alternatives have similar overall volume to capacity ratios and west side limitations, the North Phoenix Through Alternative has a much longer lifespan, is less sensitive to future growth beyond what was forecasted, and is more operationally efficient. The alternative will also allow for more future growth than the other build alternative assuming that the west side issues can be mitigated.

However, the final selection of the Preferred Build Alternative will be made by the Project Development Team following release of the Draft Environmental Assessment. The selection will be based on several factors, including: (1) how well the alternative satisfies the Purpose and Need, (2) how well the alternative addresses the community-based Goals and Objectives, (3) adverse impacts of the alternative, and (4) Citizens Advisory Committee and City Council recommendations, as well as public comments and testimony received.

Figure 1: Vicinity Map

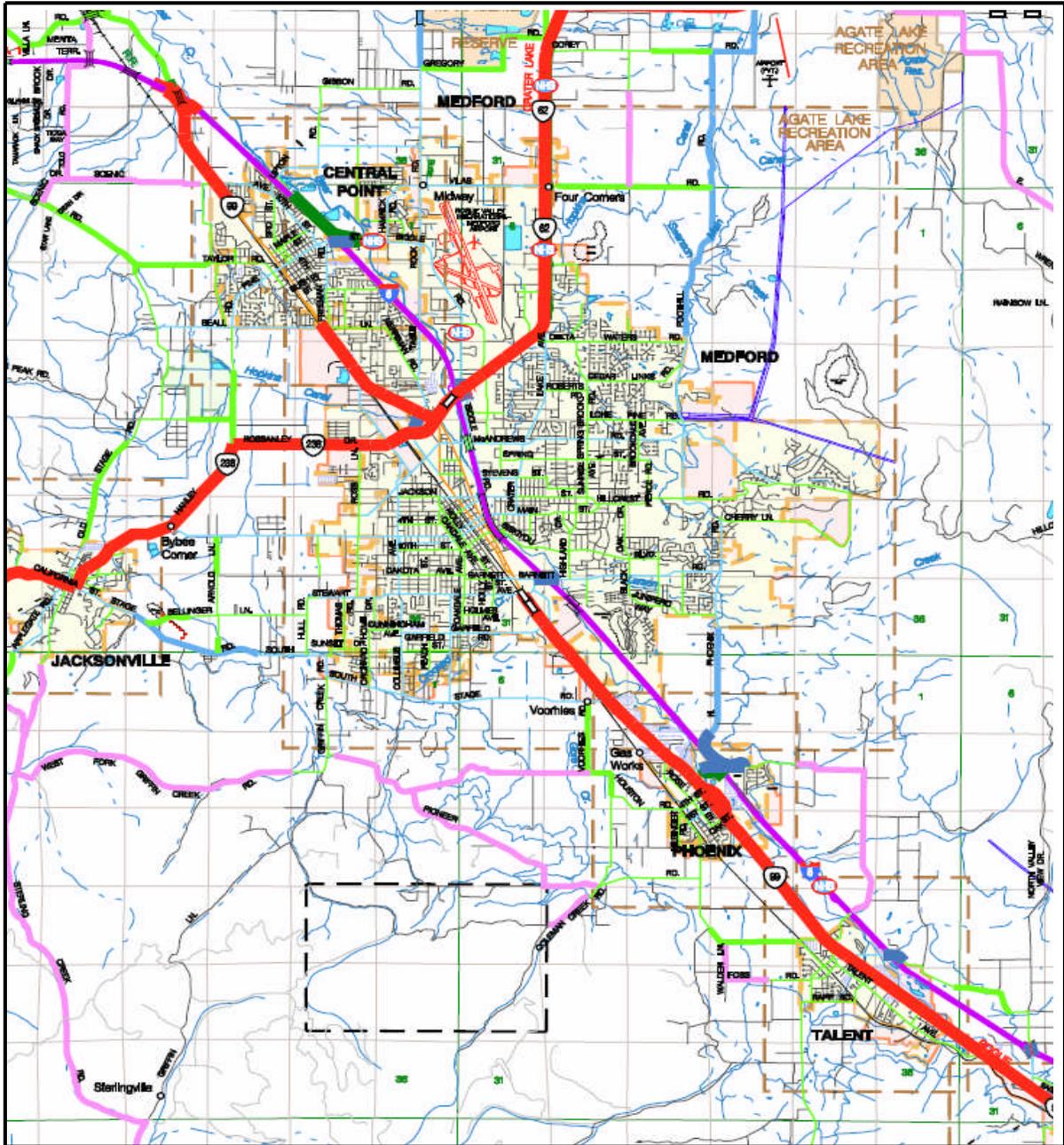
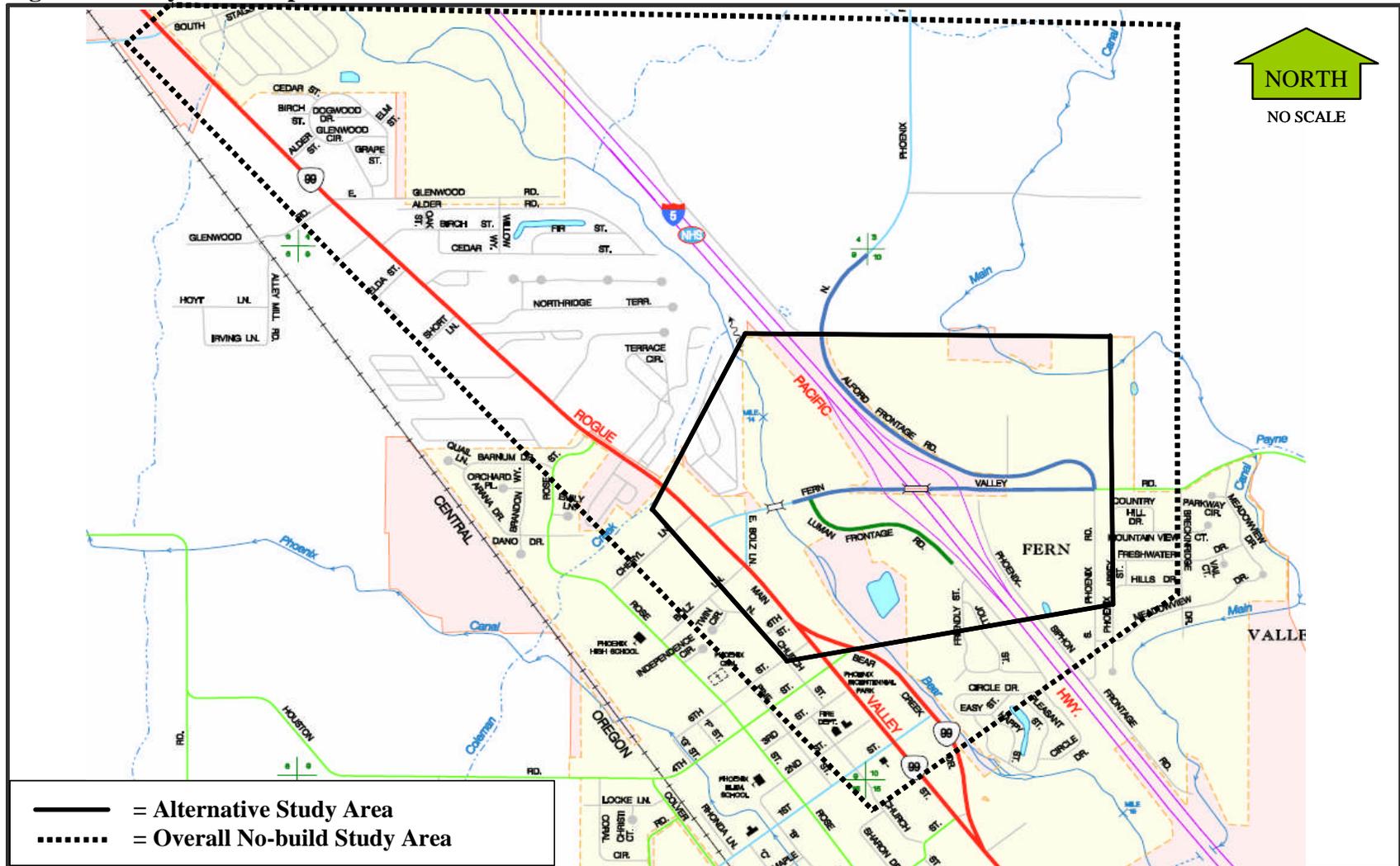


Figure 2: Study Area Map



## BACKGROUND INFORMATION

The Fern Valley Interchange Unit 2a Project's purpose is to reduce congestion and improve the operational conditions at the I5 interchange with Fern Valley Road, the Fern Valley Road corridor in the City of Phoenix, and on OR 99 near the its intersection with Fern Valley Road. Continued growth in Phoenix and surrounding areas is causing increasing congestion at the Fern Valley Interchange. The interchange is surrounded by commercial land-uses with many parcels developing or yet to be developed. Figure B1 in Appendix B show the current comprehensive plan map of the Phoenix area. The current interchange does not meet design standards. Visibility is limited due to the steepness of the inclines of the overpass. The sight distance between the I5 off-ramps and the Fern Valley Road overpass is substandard. In addition, there are no sidewalks or bike lanes. The Fern Valley Road Bridge that crosses Bear Creek is a narrow 2-lane structure that is more than 50 years old. It is structurally and functionally deficient.

Today, standing queues are seen along the majority of Fern Valley Road. The volumes on Fern Valley Road have increased to the point that it is hard to turn onto the ramps even with the protected/permitted phasing that was installed in the Fern Valley Interchange Unit 1 project in 2002. The northbound off ramp queue extends all the way back to the diverge point with I5. The I5 ramp terminal intersections and the intersection of Fern Valley Road and North Phoenix Road are either at or over capacity.

Queuing on OR 99 is minimal in 2004 however the number of accesses and closely spaced streets cause a number of conflicts between turning and through vehicles. The section of OR 99 in the project area has crashes more than double the statewide urban arterial published crash rate.

By 2030 all of these conditions still exist, but worsen in many areas. Queuing becomes a problem along OR 99 by 2030. In 2030, the majority of the intersections are over standard, as are most of the ramp connections to and from I5.

Interstate 5 (I5) is the primary route through the Rogue Valley. It is four lanes through the interchange area, is classified as an urban interstate and a freight route. OR 99, Rogue Valley Highway #63, between South Stage Road and 1<sup>st</sup> Street is a District-level four-lane highway, with a functional class of principal arterial.

Fern Valley Road connects all of the important north-south routes into the project area: OR 99, I5, and North Phoenix Road and is a two-lane minor arterial from OR 99 to North Phoenix Road. Fern Valley Road east of North Phoenix Road is an urban collector. The East Bolz Lane connector roadway between OR 99 and Fern Valley Road, South Stage Road, and 1<sup>st</sup> Street are two-lane minor arterials. North Phoenix Road provides an alternate north-south route on the east side of I5 between Phoenix and Medford, and is a two-lane urban collector. Other two-lane urban collector roadways in the study area are 4<sup>th</sup> Street, and Luman Road.

## **Performance Measures**

When evaluating maximum acceptable Volume to Capacity (v/c) Ratios for the existing and future No Build conditions, the 1999 Oregon Highway Plan (OHP) mobility standards for a Metropolitan Planning Organization (MPO) area were used. The maximum acceptable v/c ratio for I5 is 0.80. For the ramp terminals the v/c ratio should not exceed 0.85. OR 99 outside of the downtown area has a maximum acceptable v/c ratio of 0.90. Fern Valley Road, North Phoenix Road and all other local roads within the City of Phoenix's urban growth boundary have a maximum v/c ratio of 0.90. OR 99 within the downtown special transportation area (STA) has a maximum v/c ratio of 0.95. A v/c ratio of 1.0 represents an intersection that is at capacity.

For the future build alternatives, the 2003 Highway Design Manual (HDM) design v/c's were used for an MPO area. The HDM design v/c for I5 and the interchange ramp terminals is 0.75. Fern Valley Road, OR 99, and all other local roads have an HDM v/c of 0.85. If the HDM v/c's cannot be met then a design exception must be applied for and approved by Technical Services.

In addition to v/c ratios, 95<sup>th</sup> percentile queue lengths were also obtained to better understand the operation of the system. The v/c calculation methods do not generally take the full impact of adjacent intersections into account, so it is possible to have queues that back through upstream intersections without having reported high v/c ratios. Excessively long queues are often seen in areas where v/c ratios exceed standards. The 95<sup>th</sup> percentile queue is the accepted measure for the design of turning lane storage bays.

## **YEAR 2004 EXISTING CONDITIONS**

### **Crash Analysis**

The text below provides a summary of the crash history for both the I5 Fern Valley Interchange and OR 99 from South Stage Road to 1<sup>st</sup> Street. Detailed information on the crash analysis is in Appendix A.

#### **Fern Valley Road and the I5/ Fern Valley Interchange**

The majority of the crashes are occurring at the ramp terminal intersections. Rear-end collisions are caused by motorists following too close or traveling too fast on the ramps and on Fern Valley Road. Turning movement collisions are being caused by motorists taking improper (too-short) gaps in the traffic stream, to get onto the ramps. Heavy traffic on Fern Valley Road is limiting available gaps. The crashes on the I5 mainline do not follow any particular crash pattern or type.

There was total of 40 crashes in this area between 1999 and 2003 with crashes increasing over time with a large jump in 2003. This increase may be a result of the installation of the traffic signals at the ramp terminals. This section of I5 is not a SPIS (Safety Priority Index System) site and the crash rate is less than the statewide primary urban freeway rate.

#### **OR 99 - South Stage Road to 1<sup>st</sup> Street**

A large portion of the crashes are either turning movement related or rear end collisions. The turning movement collisions are caused by drivers taking improper gaps in the traffic. Appropriate gaps are limited because of heavy traffic combined with closely spaced streets and access points. The offset driveways and close intersection spacing create numerous overlapping conflict points. The rear-end collisions are occurring throughout the project area on OR 99 especially near the traffic signals. Long queues extending away from the Fern Valley Road intersection are one cause of a number of rear-end collisions away from the OR 99/ Fern Valley Road intersection.

There were a total of 143 crashes between South Stage Road and 1<sup>st</sup> Street on OR99 between the years 1999-2003. The number of crashes is relatively consistent over the five year period, varying between 25 and 30 crashes per year. The section of OR 99 between the north city limits and Bolz Lane is a SPIS (Safety Priority Index System) site. In addition, the crash rate for this section is more than double the 2003 statewide urban principal arterial rate. All other sections within the project area are below the statewide average.

### **30<sup>th</sup> Highest Hour Traffic Development**

The 2004 30<sup>th</sup> Highest Hour Volumes used in this analysis were developed using 14-hour manual counts mainly taken in 2004 or factored to 2004. The peak hour for the study area was found to be 4:00 to 5:00 pm. The 30<sup>th</sup> Highest Hour Volume occurs in the month of July. The counts were seasonally adjusted to 30<sup>th</sup> Highest Hour Volumes using two local Automatic Traffic Recorders (ATR). The Talent ATR, #15-014, was used for counts on OR 99, Fern Valley Road, N. Phoenix/S. Phoenix Road, and the Fern Valley Interchange on-ramps. The Medford Viaduct ATR, #15-019, was used to adjust the counts at the Fern Valley off-ramps and for I5. Appendix B has more detailed traffic development information. The 2004 30<sup>th</sup> highest hour volumes and lane configurations are shown in Appendix C.

### **Analysis Results**

All of the I5 segment, merge, and diverge sections meet the OHP v/c standards as shown in Table 1. The I5 ramp terminal intersections and the intersection of Fern Valley Road and North Phoenix Road exceed the maximum acceptable v/c ratios as shown in Table 2 and 3. At Fern Valley and N. Phoenix Road, the v/c ratio is 1.84, well over capacity. This high v/c is caused by northbound left turning vehicles being unable to find appropriate gaps in traffic. The north and south ramp terminal intersections have v/c ratios of 1.06 and 0.99 respectively. The problem is the same for both intersections. Fern Valley Road is at capacity which will cause long delays for vehicles trying to make left turns onto the on-ramps. There are no left turn bays, and even with permitted/protected signal phasing, there is too much through volume and it is difficult for motorists to find gaps to turn in the heavy stream of traffic. All other intersections within the project area are operating within mobility standards.

Preliminary Signal Warrant (PSW) criteria were analyzed for all of the unsignalized intersections included in the study area. None of the study area intersections meet PSW's in 2004. PSW's are from the Manual of Uniform Traffic Control Devices (MUTCD) Warrant #1 Case A and B. Case A and B deal primarily with high volumes on the minor street and high volumes on the major street respectively. Meeting PSW's does not guarantee that a traffic signal will be installed. Region Traffic staff will need to perform a traffic signal investigation in which the Region Traffic Engineer will forward the recommendation to the State Traffic Engineer's office. Traffic signal warrants must be met and the State Traffic Engineer's approval obtained before a traffic signal will be installed on a state highway.

**Table 1: Year 2004 I5 Mainline and Merge/Diverge v/c ratios**

Section	Direction	
	NB	SB
Mainline north of interchange	0.44	0.49
Mainline between interchange ramps	0.35	0.38
Mainline south of interchange	0.47	0.49
On-Ramp Merge	0.47	0.51
Off-Ramp Diverge	0.50	0.49

**Table 2: Year 2004 Unsignalized Intersection v/c ratios**

Intersection	v/c Ratio <sup>1</sup>	Critical Movement
OR 99 & East Glenwood Rd	0.36	NBT
OR 99 & Northridge Terr	0.34	NBT
OR 99 & Cheryl Ln	0.33	SBT
OR 99 & Bolz Ln	0.45	SBT
OR 99 SB & 4 <sup>th</sup> St	0.45	EB
OR 99 SB & 1 <sup>st</sup> St	0.53	EB
OR 99 NB & 4 <sup>th</sup> St	0.32	NBT
OR 99 NB & 1 <sup>st</sup> St	0.36	EBL
Fern Valley Rd & Bolz Ln	0.46	NBR
Fern Valley Rd & Pear Tree Ln	0.04	NBR
Fern Valley Rd & N/S Phoenix Rd	<b>1.84</b>	NBL

<sup>1</sup>Black-shaded cells indicate that the 1999 OHP maximum v/c ratio of 0.90 has been exceeded.

**Table 3: Year 2004 Signalized Intersection v/c ratios**

Intersection	v/c Ratio <sup>1,2</sup>
OR 99 & South Stage Rd	0.57
OR 99 & Fern Valley Rd	0.77
Fern Valley Rd & Luman Rd	0.50
Fern Valley Rd & SB Ramp Terminal	<b>0.99</b>
Fern Valley Rd & NB Ramp Terminal	<b>1.06</b>

<sup>1</sup>Black-shaded cells indicate that the ramp terminal 1999 OHP maximum v/c ratio of 0.85 has been exceeded.

<sup>2</sup>The v/c ratios in this table are for the existing timing. Only the ramp terminal signals are coordinated. If the system was coordinated (as in 2010 and 2030), the OR 99 & Fern Valley Rd intersection would be 0.75, Luman Road would be 0.47, the SB ramp terminal would be 0.76, and the northbound ramp terminal would be 0.89. Because of these differences and use of future peak hour factors, the 2004 v/c's in this table are higher than the 2010 optimized system shown in Table 7.

## Traffic Queuing

In 2004, queues extend almost the whole length of Fern Valley Road from OR 99 to North Phoenix Rd. There is constant queuing in both directions between both ramp terminals as the through vehicles are delayed by left turning vehicles trying to turn on the left-turn permitted phase. These queues also cause long queues on the northbound off-ramp, sometimes extending to the gore point. Queues that extend into the deceleration point of a ramp create serious safety problems as the potential for a high-speed rear-end collision is greatly increased. Queues also are propagating back down Fern Valley Road from the OR 99 intersection. Queues typically extend through the Luman Road intersection, and at times may reach the southbound ramp terminal intersection.

Substantial queuing on OR 99 is limited to the OR 99/Fern Valley Road intersection. Queues will regularly block the Cheryl Lane intersection making the right turns difficult (a median barrier prevents left turns). Frequently, vehicles that would use Cheryl Lane to turn left on Fern Valley Road cut through the Ray's Food Place parking lot to access the signal. Queuing on OR 99 is minimal in 2004. Queue lengths for all intersections within the project area can be seen in Figures 3 through 5 at the end of this section.

An additional measure for queuing is the percent time blocked for turn storage bays and intersections. The queuing figures show the extent of the queuing and the percent time blocked shows how much of the peak hour that these queues block significant transportation elements. Blocking percentages of five percent or greater are considered significant as these levels can have a measurable effect on an intersection's operation. Table 4 shows the percent time blocked for the 2004 existing conditions.

**Table 4: Year 2004 Significant Queue Blocking<sup>1</sup>**

<b>Intersection</b>	<b>Approach</b>	<b>Blocked Turn Bay</b>	<b>Blocked Intersection</b>	<b>Average Percent Time Blocked</b>
OR 99 & South Stage Rd	SB	SBL		10
	NB	NBL		5
OR 99 & Fern Valley Rd	SB	SBL	Cheryl Ln	35
	WB		Bolz Ln	25
		WBL		
OR 99 & Bolz Ln	NB	NBR		15
Fern Valley Rd & Luman Rd	WB	WBL		5
	EB		Bolz Ln	10
		EBL		15
Fern Valley Rd & SB Ramp Terminal	EB		Luman Rd	10
		EBR		15
Fern Valley Rd & NB Ramp Terminal	WB	WBR		25
	EB		SB Ramp Terminal	5
Fern Valley Rd & North/South Phoenix Rd	SB	SBLT		45
	NB	NBL		5

<sup>1</sup>Significant blocking times are five percent or greater as these levels can have a measurable effect on intersection operation.

In 2004, the westbound left turn lane from Fern Valley Road to OR 99 and the southbound left turn lane from OR 99 to Fern Valley Road are blocked a third of the peak hour. Other large blocking times include the westbound right turn lane at the northbound I5 ramp terminal at over a quarter of the peak hour and the southbound through-left lane at the Fern Valley Road and North Phoenix Road intersection which is blocked almost half of the peak hour.

### **Access Management Standards**

The OHP has developed spacing standards for public road approaches and private accesses to be used in the planning process. The following spacing standards apply to the Fern Valley Interchange:

- Interchange-to-interchange; three miles for an urban interstate based on cross-road spacing. This standard is for the planning of new interchanges on the Interstate system.
- Ramp-to-Ramp; one mile between the taper sections of adjacent on and off-ramps between two interchanges.

- Next intersection adjacent to ramp terminal; 1320 feet for a two lane crossroad in an urban area to the next full intersection. If area is completely built out then standard can be 750 feet to the nearest intersection if the intersection is a right-in-right-out. This only applies to Fern Valley Road.
- Street/Access spacing; 500 feet for accesses at 45 mph; 350 feet for accesses at 35 mph or less and the existing block spacing for public streets. Minimum driveway spacing is 175 feet or mid-block if block spacing is less than 350 feet. This only applies to OR 99.

The interchange spacing standards based on cross-road and ramp spacing are met with the current road network. The Unit 1 project increased intersection spacing from the ramp terminals to the maximum extent possible even though standards are not met, especially on the west side of the interchange. The Luman Road intersection location is limited by the adjacent restricted Bear Creek riparian zone. On the east side, the North Phoenix Road intersection location was moved as far east as possible without impacting the existing residential development. The 70 foot gap between the standard and the new spacing was thought to be acceptable and essentially met the standard with the PDT at that time. Table 5 shows the comparison between major road segments and their appropriate spacing standard.

Street spacing along OR 99 exceeds the spacing standards north of Northridge Terrace and generally is equal to the standards in the transition zone between Northridge Terrace and Rose Street (close to the northern city limits). In the city proper, the street spacing standards are generally met except between Cheryl Lane and Fern Valley Road where the intersection spacing is only about 210 feet. However, through the approximate two-mile long section of OR 99 in the project area, there are about 100 private access points on both sides of the highway which averages out to about 200' which does not meet the standard. Driveway spacing generally varies from a few driveways spaced in excess of 300 feet with many driveways less than 100 feet apart.

**Table 5: Spacing Standards Comparison**

Roadway	Segment	Spacing Standard	Existing Conditions <sup>1</sup>
I5	Barnett Rd Overcrossing – Fern Valley Rd Overcrossing	3 miles	3.2 miles
	Barnett Rd SB On-ramp – Fern Valley Rd SB Off-ramp	1 mile	2.6 miles
	Fern Valley Rd NB On-ramp – Barnett Rd NB Off-ramp	1 mile	2.6 miles
	Fern Valley Rd Overcrossing – West Valley View Rd Overcrossing	3 miles	3.2 miles
	Fern Valley Rd SB On-ramp – West Valley View Rd SB Off-ramp	1 mile	2.6 miles
	West Valley View Rd NB On-ramp - Fern Valley Rd NB Off-ramp	1 mile	2.8 miles
Fern Valley Rd	SB ramp terminal – Luman Rd	1320'	<b>690'</b>
	NB ramp terminal – 1 <sup>st</sup> Petro right-in/right-out driveway	750'	<b>620'</b>
	NB ramp terminal – North/South Phoenix Rd	1320'	<b>1250'</b>
OR 99	South Stage Rd - Northridge Terr	500'	<b>2110' ave. street/ 175' ave. access</b>
	Northridge Terr – Rose St	500'	<b>490' ave. street/ 220' ave. access</b>
	Rose St- 6 <sup>th</sup> St (approximate couplet start)	350'	<b>660' ave. street/ 220' ave. access</b>
	6 <sup>th</sup> St – 1 <sup>st</sup> St	320' <sup>2</sup>	<b>320' ave. street/ 140' ave. access</b>

<sup>1</sup>Black-shaded cells mean that the street/access spacing is less than the corresponding standard.

<sup>2</sup>Block spacing in the central core is 320', so the minimum driveway spacing is mid-block or 160'.

Figure 3: 2004 30th Highest Hour 95th Percentile Queues

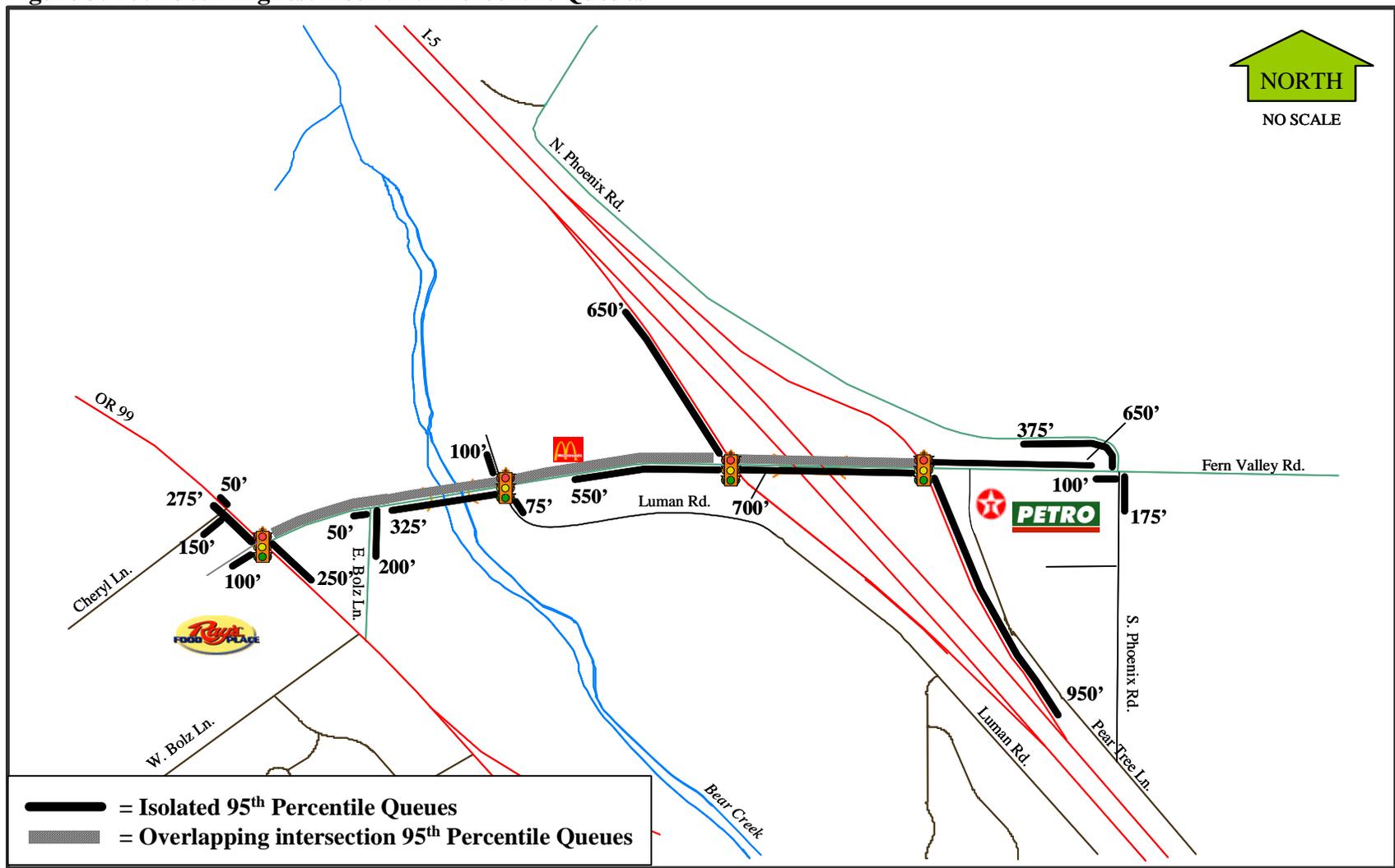
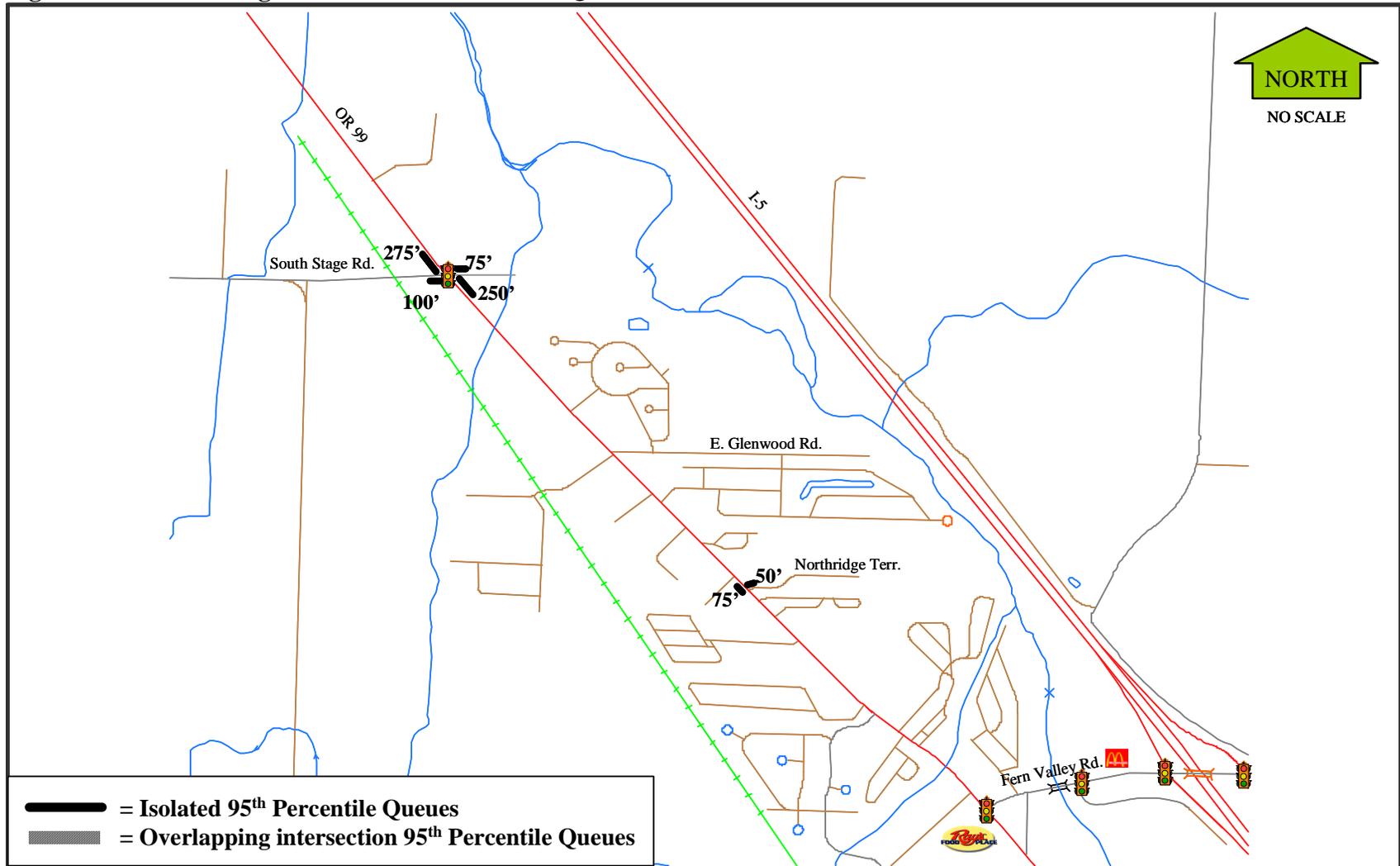
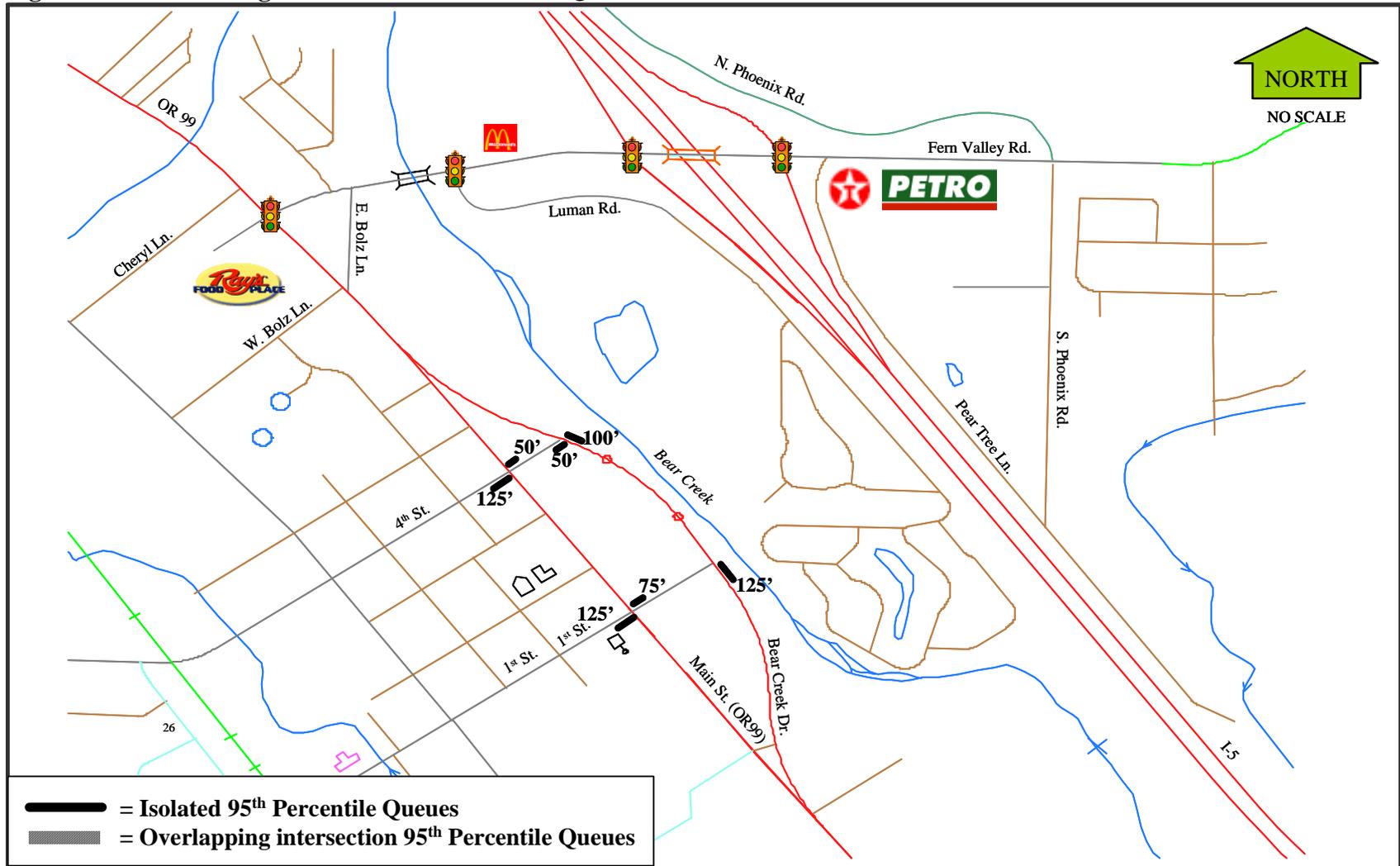


Figure 4: 2004 30th Highest Hour 95th Percentile Queues



**Figure 5: 2004 30th Highest Hour 95th Percentile Queues**



## YEAR 2010 & 2030 FUTURE NO-BUILD

### Future Volume Development

In order to create future year 2030 volumes, the Rogue Valley Council of Governments (RVCOG) travel demand model was used. The model is based on the current comprehensive plans of Jackson County, Central Point, Medford and Phoenix (Appendix B). Growth beyond the current comprehensive plan will result in higher impacts than what is shown here. The volumes were post-processed using procedures from the National Cooperative Highway Research Council (NCHRP) Report 255. Model base and future year volumes are compared to develop a relative difference between scenarios. This difference was applied to the existing 2004 30<sup>th</sup> highest hour volumes to arrive at the 2030 no-build volumes used in the analysis. The 2010 no-build volumes were created separately following the same procedure used for 2030. Appendix B has more detailed traffic volume development information. The 2010 Future No-build volumes are shown in Appendix D and the 2030 Future No-Build Volumes are shown in Appendix E.

### Analysis Results

Preliminary Signal Warrant criteria were analyzed for all of the unsignalized intersections included in the study area. None of the study area intersections meet PSW's in 2010 or 2030. The intersection of North/South Phoenix Road and Fern Valley Road was temporarily signalized in 2006 as the only practical mitigation for the period until Unit 2a is constructed. This signal would be removed after the project is completed. This was for the Home Depot development located in the northeast quadrant of the interchange.

In 2010, all of the I5 mainline segments and on and off-ramps meet the standard. In 2030, the mainline segments north and south of the interchange are approaching the OHP v/c standard, the southbound on and off-ramps are just below the standard, and the northbound off-ramp is slightly over the 0.80 standard (in Table 6).

**Table 6: Year 2010 and 2030 No-build I5 Mainline and Merge/Diverge v/c ratios**

Section	v/c Ratio <sup>1</sup>			
	NB		SB	
	2010	2030	2010	2030
Mainline north of interchange	0.53	0.71	0.57	0.74
Mainline between interchange ramps	0.42	0.58	0.46	0.61
Mainline south of interchange	0.55	0.76	0.56	0.78
On-Ramp Merge	0.54	0.72	0.58	0.79
Off-Ramp Diverge	0.59	<b>0.81</b>	0.61	0.79

<sup>1</sup>Black-shaded cells indicate that the 1999 OHP maximum v/c ratio of 0.80 for I5 has been exceeded.

In 2010, the northbound ramp terminal intersection is over standard. The North Phoenix/Fern Valley Road intersection is signalized so the high v/c in 2004 for the North Phoenix Road approaches has been improved.

By 2030, half of the intersections within the project area are over standard, many are over capacity. See Tables 7 and 8 for the unsignalized and signalized intersection results. The intersections of Fern Valley Road and OR 99, N. Phoenix Road, and the two ramp terminal intersections, and the Southbound OR 99/1<sup>st</sup> Street intersection all have a v/c over 1.0. Both ramp terminals will have exceeded capacity around 2015. The ability of vehicles trying to turn out of side streets such as Glenwood Road and Northridge Terrace will be very limited as volumes on OR 99 increase especially after 2020. The North/South Phoenix Road intersection with Fern Valley is just below the OHP v/c standard in 2030 but will start having significant problems after 2030.

It should be noted that the 2010 v/c ratios reported in Table 8 are actually lower than the 2004 existing condition v/c's in Table 3. The reason is in the existing conditions, the v/c's are reflecting the existing signal timing rather than a fully optimized system for the 2010 volumes. Only the ramp terminal signals are tied together in 2004, whereas in 2010 the whole Fern Valley Road corridor is tied together as a system. Also, some of the difference can be attributed to the use of future peak hour factors (PHF) which reflect increasing congestion instead of the existing year factors. These timing and PHF differences are usually included in any project analysis, but in this case the growth in traffic volumes between 2004 and 2010 is relatively low which does not make up for the differences.

**Table 7: Year 2010 & 2030 No-Build Unsignalized Intersection v/c ratios**

Intersection	v/c Ratio <sup>1</sup>		Critical Movement	Year Std. Exceeded <sup>3</sup>	Year Capacity Exceeded <sup>3</sup>
	2010	2030			
OR 99 & East Glenwood Rd	0.36	<b>1.12</b>	EB	2024	2026
OR 99 & Northridge Terr	0.35	<b>1.51</b>	WB	2019	2021
OR 99 & Cheryl Ln	0.35	0.52	SBT		
OR 99 & Bolz Ln	0.39 <sup>2</sup>	0.47	SBT		
OR 99 SB & 4 <sup>th</sup> St	0.51	0.84	EB	2033	2039
OR 99 SB & 1 <sup>st</sup> St	0.69	<b>1.12</b>	EB	2019	2024
OR 99 NB & 4 <sup>th</sup> St	0.35	0.48	NBT		
OR 99 NB & 1 <sup>st</sup> St	0.41	0.61	EBL		
Fern Valley Rd & Bolz Ln	0.53	0.81	NBR	2036	
Fern Valley Rd & Pear Tree Ln	0.07	0.16	NBR		

<sup>1</sup>Black-shaded cells indicate that the 1999 OHP maximum v/c ratio of 0.90 has been exceeded.

<sup>2</sup>The v/c for 2004 is 0.45 because of differences in peak hour factors used between the existing year and accepted ODOT future year peak hour factors.

<sup>3</sup>Shaded cells in these columns indicate the OHP standard and/or capacity is not reached until beyond 2040.

If Fern Valley Road in 2004 was a system, then the actual v/c's would be lower than in Table 3 as shown in the Table 8 footnote. This shows that in 2004 the existing operation is rather inefficient, especially at the ramp terminals, but even with the system adjustments, the overall operation would still be at or over standard.

**Table 8: Year 2010 & 2030 No-Build Signalized Intersection v/c ratios**

Intersection	v/c Ratio <sup>1</sup>		Year Std. Exceeded <sup>3</sup>	Year Capacity Exceeded <sup>3</sup>
	2010 <sup>2</sup>	2030		
OR 99 & South Stage Rd	0.58	<b>0.92</b>	2028	2034
OR 99 & Fern Valley Rd	0.77	<b>0.98</b>	2022	2031
Fern Valley Rd & Luman Rd	0.60	0.71		
Fern Valley Rd & SB Ramp Terminal	0.85	<b>1.37</b>	2011	2016
Fern Valley Rd & NB Ramp Terminal	<b>0.87</b>	<b>1.38</b>	2010	2015
Fern Valley Rd & N/S Phoenix Rd	0.54	0.88	2031	2037

<sup>1</sup>Black-shaded cells indicate that the ramp terminal 1999 OHP maximum v/c ratio of 0.85 or the OR 99 and Fern Valley Rd v/c of 0.90 has been exceeded.

<sup>2</sup>The v/c ratios in this table are for optimized timing with all of the Fern Valley Road signals coordinated together. Because of this, the 2010 v/c's in this table are actually lower than the 2004 v/c's in Table 3 which reflect existing timing. If the system was coordinated in 2004, the OR 99 & Fern Valley Rd intersection would be 0.75, Luman Road would be 0.47, the SB ramp terminal would be 0.76, and the northbound ramp terminal would be 0.89.

<sup>3</sup>Shaded cells in these columns indicate the OHP standard and/or capacity is not reached until beyond 2040.

## Traffic Queuing

In 2010, most of the Fern Valley Road corridor is heavily congested. The I5 on-ramp queues spill back into the I5 mainline, creating a serious safety issue with the potential of high-speed rear-end crashes. Many turn bays at the ramp terminals are blocked for substantial portions of the peak hour (Table 9).

Substantial queues exist at the North/South Phoenix Road & Fern Valley Road intersection. The northbound left lane is blocked 21% of the time and the southbound through-left is blocked 39% of the time hampering access in and out of the southeast interchange quadrant. The queue northbound on South Phoenix Road may block the outbound Freshwater Drive access from the Petro truck stop which may cause more trucks to go around to the southern end of South Phoenix Road increasing out-of-direction travel.

OR 99 queuing is limited to the Fern Valley Road to Cheryl Lane section with some slowing northbound just south of the East Bolz Lane turnoff. Queue blockages southbound on OR 99 at the Fern Valley Road intersection are over 40% of the peak hour. Figures 6 through 8 show the 95<sup>th</sup> percentile queues for the 2010 no-build conditions.

**Table 9: Year 2010 & 2030 No-Build Significant Queue Blocking<sup>1</sup>**

Intersection	Approach	Blocked Turn Bay	Blocked Intersection	Average Percent Time Blocked	
				2010	2030
OR 99 & South Stage Rd	SB	SBL			45
	NB	NBL			10
	EB	EBL			10
OR 99 & Glenwood Dr	SB	SBRT			10
OR 99 & Northridge Terr	SB	SBRT			35
OR 99 & Fern Valley Rd	SB	SBL	Cheryl Ln	20	85
	WB		Bolz Ln	40	40
		WBL			40
OR 99 & Bolz Ln	NB	NBR			25
OR 99 NB & 4 <sup>th</sup> St	EB		OR 99 SB		25
OR 99 NB & 1 <sup>st</sup> St	EB		OR 99 SB		15
Fern Valley Rd & Luman Rd	SB	SBR			10
	WB		SB Ramp Terminal	65	80
		WBL			20
	EB		Bolz Ln		25
		EBL			10
Fern Valley Rd & SB Ramp Terminal	SB	SBL		60	70
	WB		NB Ramp Terminal	10	30
	EB		Luman Rd	5	25
		EBR			15
Fern Valley Rd & NB Ramp Terminal	WB		North Phoenix Rd	25	60
		WBR		30	60
	NB	NBL		50	50
	EB		SB Ramp Terminal		5
Fern Valley Rd & North/South Phoenix Rd	SB	SBLT		40	90
	NB	NBL		20	100
	EB	EBL		10	30

<sup>1</sup>Significant blocking times are five percent or greater as these levels can have a measurable effect on intersection operation.

By 2030, the transportation system is not functioning properly because of many near and over-capacity intersections. Fern Valley Road is completely congested and queuing now spills onto the connecting roadways. Most queuing blockages extend for 30% to over 80% of the peak hour. The northbound and southbound off-ramp queues still extend back onto the I5 mainline.

The southbound queue at North Phoenix Road is over one-half mile long. The northbound queue on South Phoenix Road now extends most of the roadway length as there is no room for trucks to turn onto Fern Valley Road. The condition observed before Unit 1 was constructed is likely to occur here with trucks creeping out into the intersection and blocking other movements.

Since Fern Valley Road is over capacity, lengthy northbound queues on OR 99 can be seen extending south beyond 1<sup>st</sup> Street. Substantial queues exist on 1<sup>st</sup> and 4<sup>th</sup> Streets between the OR 99 roadways. North of Fern Valley Road, OR 99 southbound experiences queuing to the north of South Stage Road. Side streets such as Glenwood Road and Northridge Terrace also have long queues which indicate the difficulty of turning left from them. Figures 9 through 11 show the 95<sup>th</sup> percentile queues for the 2030 no-build conditions.

### Access Management Standards

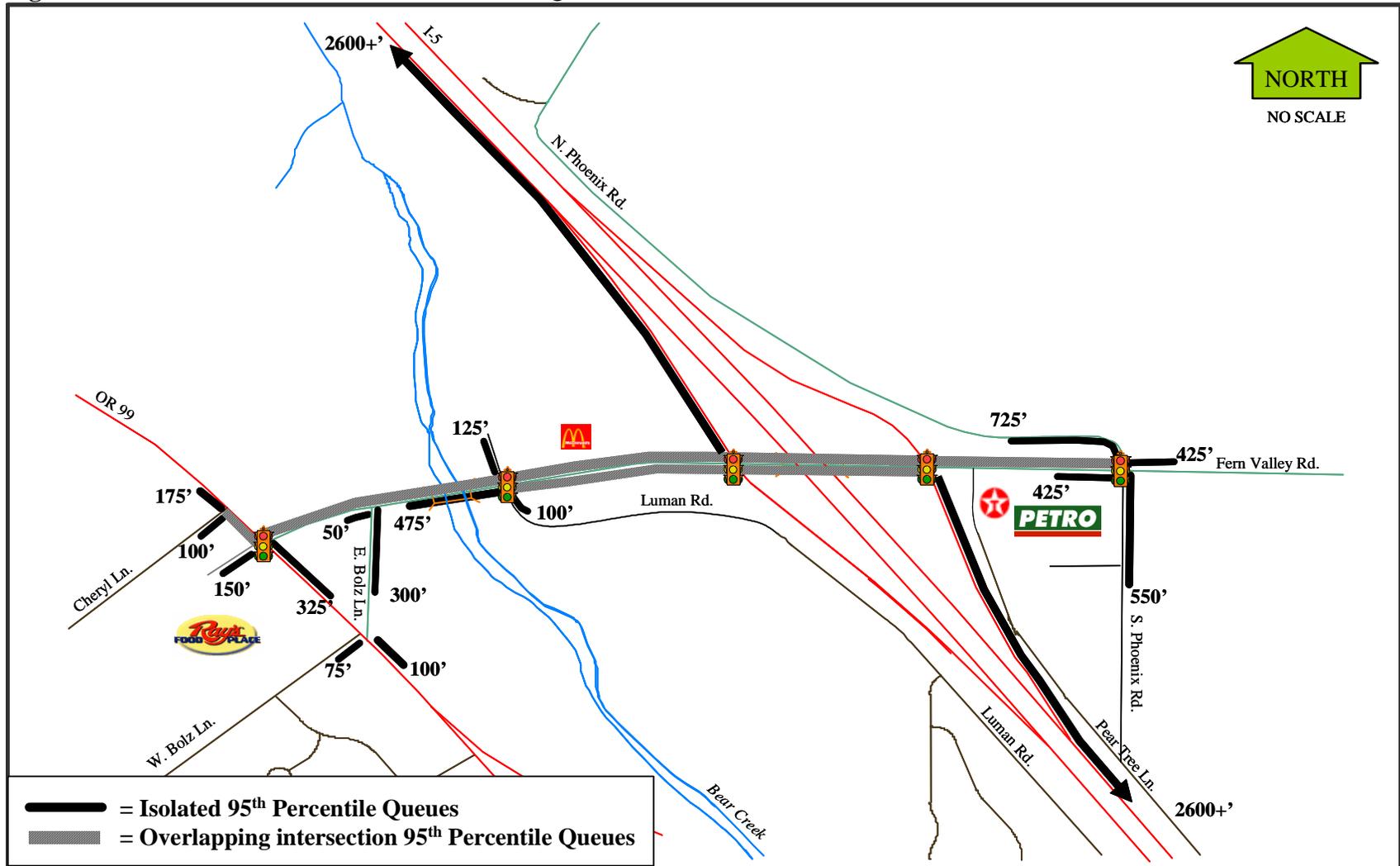
The applicable access management standards are the same as the 2004 standards for the future no-build conditions. However, by 2010, the new South Medford Interchange will be completed. This new project moves the interchange crossroad approximately 1900 feet south from Barnett Road to an extension of Highland Drive. This change will result in an interchange crossroad-to-crossroad spacing of less than the standard as shown in Table 9 but was deemed acceptable in the South Medford Interchange project. In addition, the end of the southbound on-ramp and the beginning of the northbound on-ramp will be closer to the Fern Valley interchange. All other spacing remains the same.

**Table 10: Future No-Build South Medford - Fern Valley Interchange spacing**

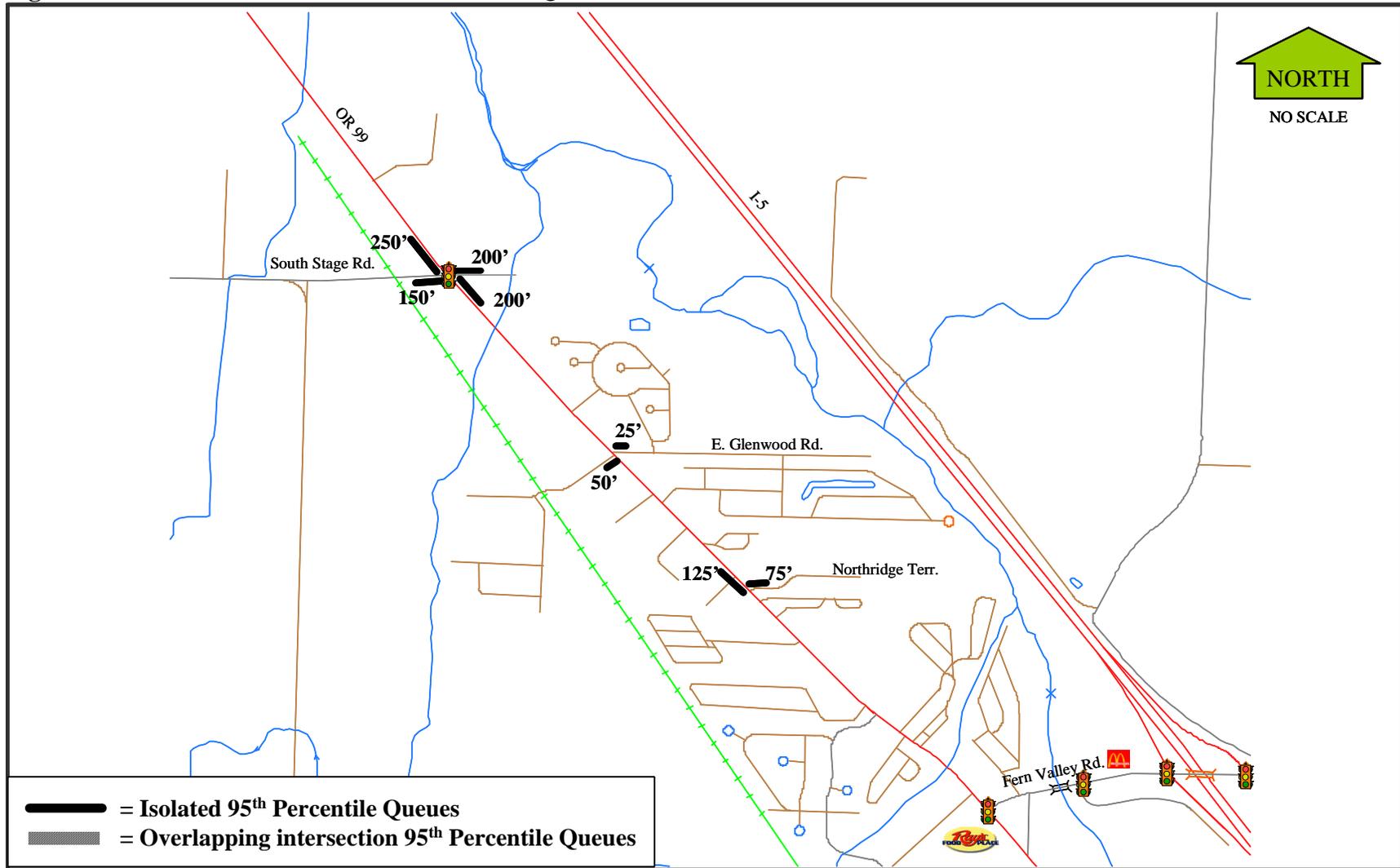
Roadway	Segment	Spacing Standard	Existing Conditions	2010 <sup>1</sup>
I5	Barnett Rd Overcrossing – Fern Valley Rd Overcrossing	3 miles	3.2 miles	<b>2.8 miles</b>
	Barnett Rd SB On-ramp – Fern Valley Rd SB Off-ramp	1 mile	2.6 miles	2.1 miles
	Fern Valley Rd NB On-ramp – Barnett Rd NB Off-ramp	1 mile	2.6 miles	2.2 miles

<sup>1</sup>Black-shaded cells mean that the interchange spacing is less than the corresponding OHP standard.

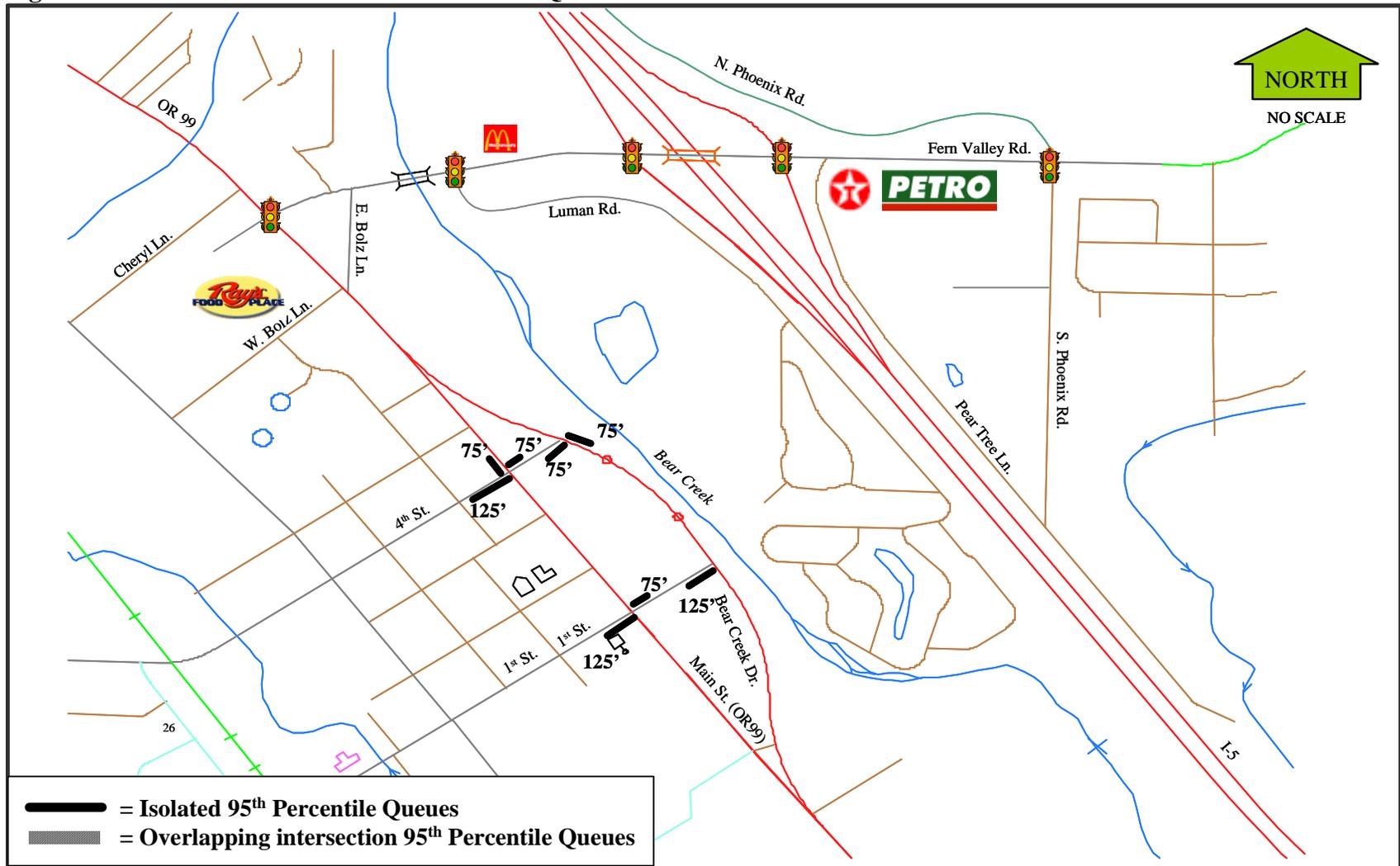
Figure 6: 2010 Future No-Build 95th Percentile Queues



**Figure 7: 2010 Future No-Build 95th Percentile Queues**



**Figure 8: 2010 Future No-Build 95th Percentile Queues**



**Figure 9: 2030 Future No-Build 95th Percentile Queues**

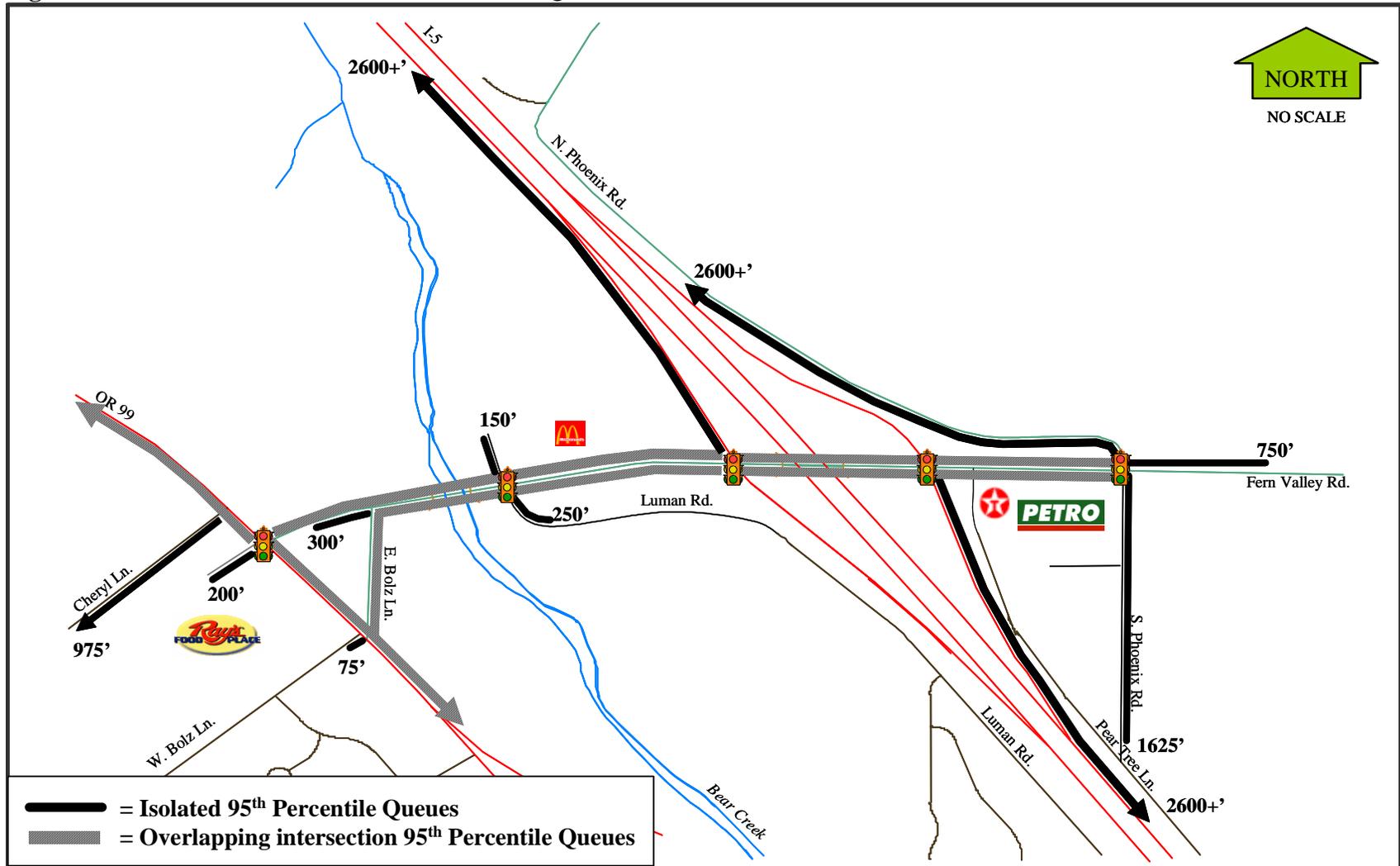
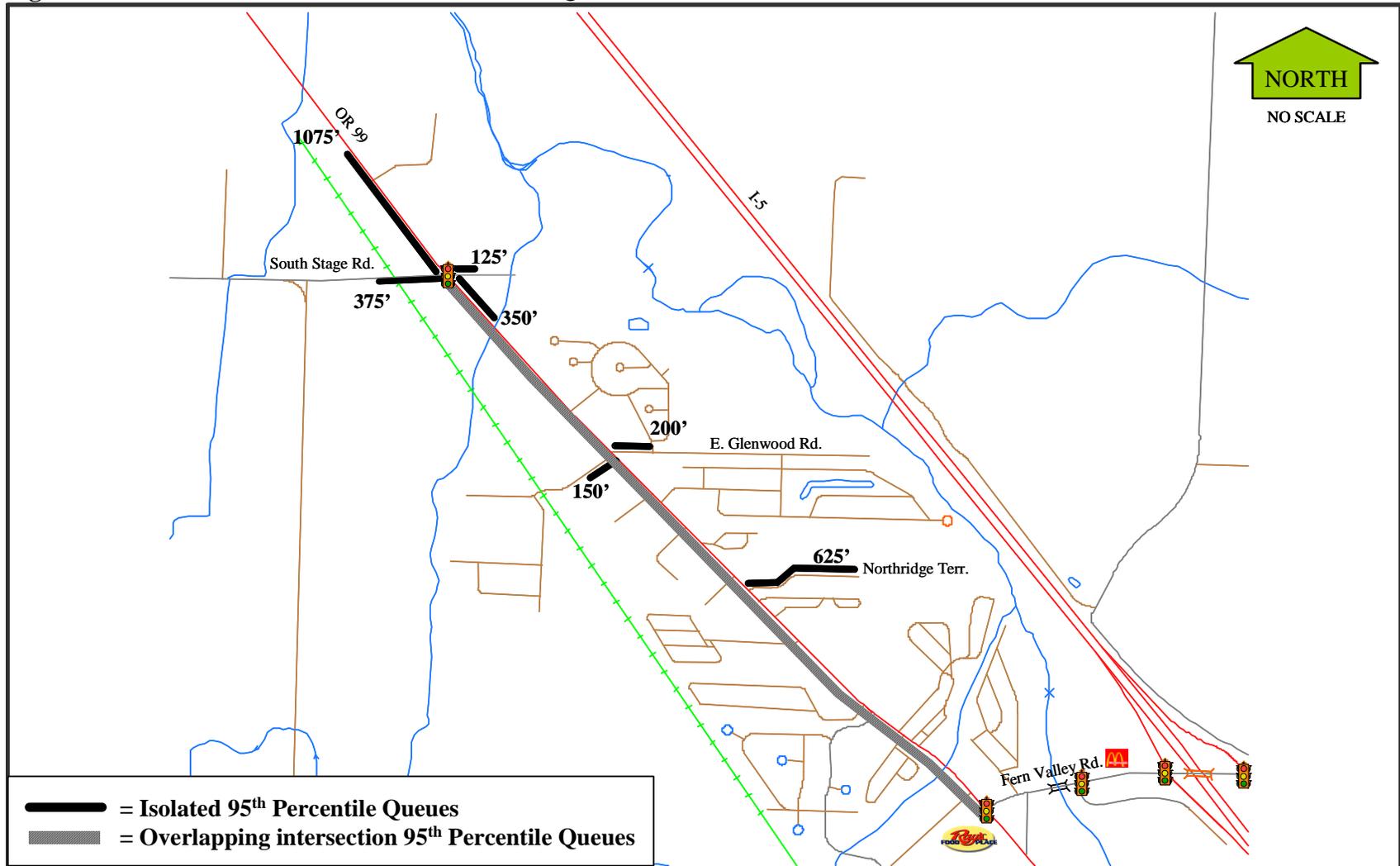
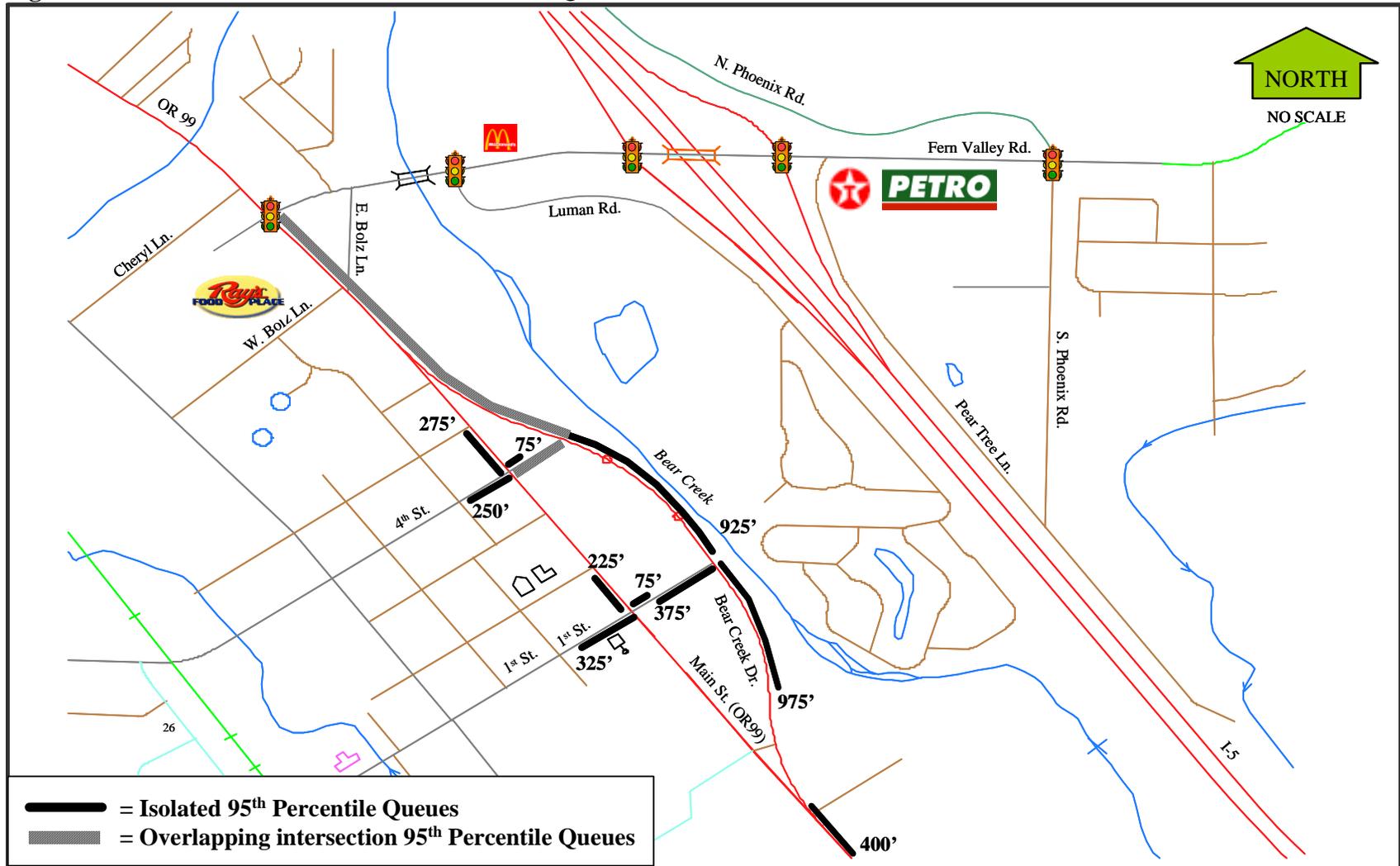


Figure 10: 2030 Future No-Build 95th Percentile Queues



**Figure 11: 2030 Future No-Build 95th Percentile Queues**



## **BUILD ALTERNATIVE DESCRIPTIONS**

The project development team (PDT) and the Citizens Advisory Committee (CAC) considered over 40 different alternatives and options for potential solutions for the project. Appendix F covers the preliminary alternative analysis and Appendix G covers the dismissed options and alternatives. Two final alternatives, consisting of the remaining westside, interchange, and eastside options were combined and forwarded into the EA and called the Fern Valley Through (Figure 12) and the North Phoenix Through (Figure 13). See Appendix H for the 2010 and 2030 design hour volumes.

Both of these alternatives widen and improve Fern Valley Road from OR 99 to I5 with additional through and turn lanes. The section of OR 99 in the alternative area goes from Coleman Creek just north of Cheryl Lane south to the start of the downtown couplet section. On OR 99, Fern Valley Road and East Bolz Lane form a mini-couplet with westbound traffic on Fern Valley and Eastbound traffic on Bolz which join together just west of Bear Creek to cross on a new four or five-lane bridge. The west side of the alternatives are the limiting factor for future growth as it is sized to fit in the existing OR 99 corridor area with limited right-of-way impacts. A raised median on OR 99 between Fern Valley Road and Bolz Lane is necessary to protect the dual left turn bays at the OR 99 & Bolz Lane intersection. The left turn bays go about three-quarters of the way between the two intersections.

The interchange type in both alternatives is a new type of diamond interchange, a diverging diamond interchange (DDI, a.k.a. "Crossing Diamond or CDI by Region 3) which moves traffic to the opposite side of the road across the I5 overpass structure to eliminate the need for left turn lanes on the structure and the ramps. The resulting effect is to have an interchange that can handle more than 20 years of growth with the operational benefits of more expensive and extensive improvements. The I5 on-ramps start as two lanes at the ramp terminals and taper down to a single lane before merging with I5. Conversely, the off-ramps start as a single lane and widen out to two lanes at the ramp terminals.

The alternatives differ on how the main flow of traffic accesses North Phoenix Road east of I5. The Fern Valley Through Alternative has traffic traveling on a slightly northerly realigned roadway paralleling the original Fern Valley Road alignment which is used as a frontage road for the Petro Stopping Centers truck stop. The realigned Fern Valley Road intersects North Phoenix in a similar configuration to the existing alignment by which through traffic must turn left to go onto North Phoenix Road. An additional signalized intersection is required for the Home Depot in this alternative.

The North Phoenix Through Alternative realigns North Phoenix Road to connect directly to the east end of the I5 interchange. South Phoenix Road is extended to the north and west to connect to North Phoenix Road to allow for access to the Petro truck stop, adjacent residential areas, and the east end of Fern Valley Road. The Home Depot access is connected to the west side of the intersection, opposite of South Phoenix Road.

**Figure 12: Fern Valley Through Alternative**

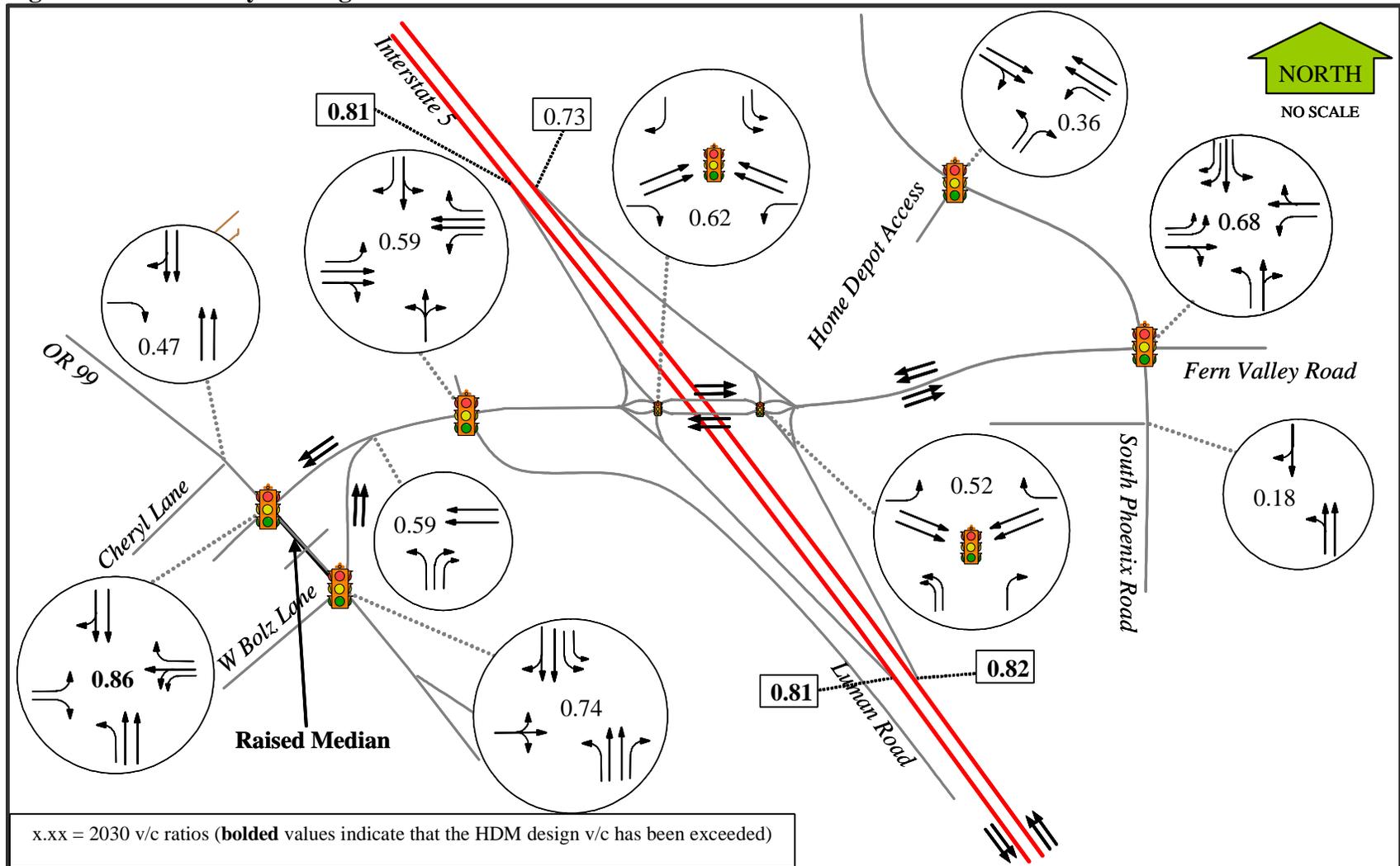
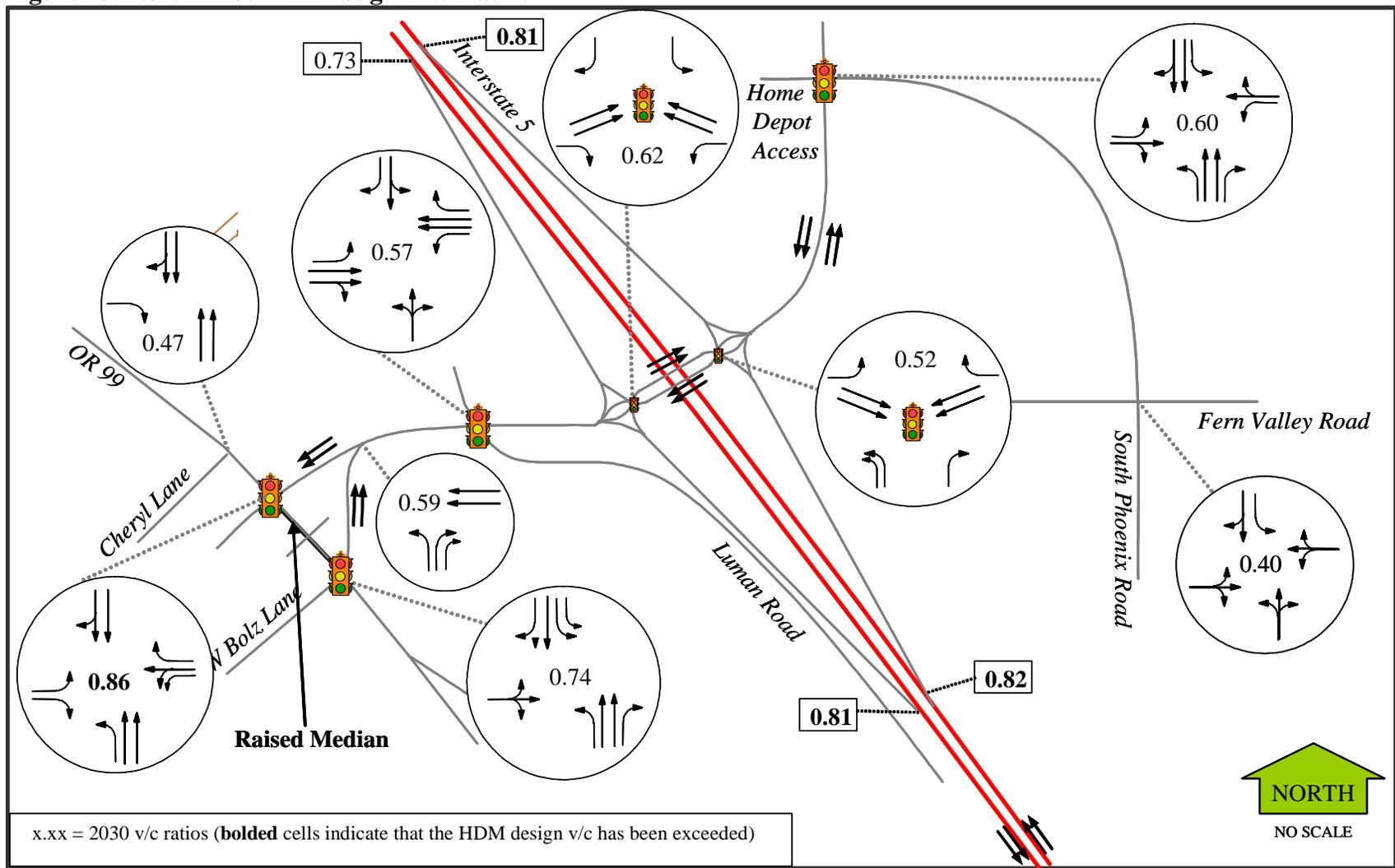


Figure 13: North Phoenix Through Alternative



## **BUILD ALTERNATIVE RESULTS**

### **Alternative Future Volume Development**

The alternative screening analysis using the RVCOG model, summarized in Appendix D, found that improving the Fern Valley Road corridor to four lanes (similar to Tier 1-level improvements) caused the volumes on Fern Valley Road to increase 27%. This increase was relatively consistent across all alternatives tested. There is a large amount of traffic in the future that is diverting to other routes that upon an improvement to Fern Valley Road will return. This diversion also causes volumes on OR 99 to increase in 2010 over the no-build but by 2030, will be actually less than the 2030 no-build. Volumes on I5 increase slightly as well. The impacts of these volume changes can be seen in comparisons of the no-build and build v/c tables.

Model runs with the widened corridor were used to develop the 2010 and 2030 build future volumes. The volumes were post-processed using procedures from the National Cooperative Highway Research Council (NCHRP) Report 255. Model base and future year volumes are compared to develop a relative difference between scenarios. Both alternative build year 2010 and the 2030 design hour volumes and lane configurations are shown in Appendix H.

### **Analysis Results Common to Both Alternatives**

The OR 99 & West Bolz Lane intersection meets Preliminary Signal Warrants (PSW) as part of the build alternatives. All of the other remaining unsignalized intersections in the study area were analyzed and none of them meet PSW's in 2010 or 2030.

Interstate 5 through the study area is common to both alternatives as the design hour volumes and the basic geometric layouts are the same. There are some minor geometric differences in ramp length, acceleration distance, and ramp spacing, but these do not affect the overall results. All mainline sections, merges and diverges are well under the HDM design v/c threshold in 2010 as shown in Table 10. Around 2030, the southbound direction north of the interchange and both directions south of the interchange are over the HDM design v/c of 0.75. The northbound on-ramp merge section, the southbound on-ramp merge section, and the southbound off-ramp diverge sections are all over the HDM design v/c which is a reflection of the over standard mainline sections.

These conditions will require HDM design exceptions for v/c ratio unless I5 is widened to three lanes in each direction through the interchange area and/or lanes are added to the on and off-ramps. Ramp meters are another potential solution, however the addition of ramp meters will not decrease the overall v/c ratio of a merge section, but they will likely increase the v/c on the ramp itself as ramp traffic is delayed. The purpose of a ramp meter

is to even out flows reaching the mainline lanes thus decreasing delay and travel time and increasing speeds.

**Table 11: Year 2010 and 2030 I5 Mainline and Merge/Diverge v/c ratios**

Section	Direction			
	NB		SB	
	2010	2030	2010	2030
Mainline north of interchange	0.50	0.72	0.55	<b>0.76</b>
Mainline between interchange ramps	0.39	0.54	0.43	0.60
Mainline south of interchange	0.54	<b>0.77</b>	0.57	<b>0.80</b>
On-Ramp Merge	0.51	0.73	0.58	<b>0.81</b>
Off-Ramp Diverge	0.57	<b>0.82</b>	0.58	<b>0.81</b>

<sup>1</sup>Black-shaded cells indicate that the Interstate highway HDM design v/c of 0.75 has been exceeded and design exceptions will be required.

OR 99 from South Stage Road through the downtown couplet is common to both alternatives. OR 99 in the project area has lanes narrowed to 11' to help accommodate the dual left turn lanes at the Bolz Lane intersection without impacting adjacent right-of-way too much. The v/c ratios for the segments north of Fern Valley Road and south of Bolz Lane are identical in both alternatives and are outside the design alternative impact area. The 2010 and 2030 intersection v/c's for these common segments are shown in Table 11. Figures H1 and H2 in Appendix H show the 2010 and 2030 design hour volumes for these segments. Only the unsignalized intersections of OR 99 with Northridge Terrace and OR 99 southbound and 1<sup>st</sup> Street have capacity issues mainly within the latter half of the 20-year study horizon.

**Table 12: Year 2010 & 2030 OR 99 Intersection v/c ratios<sup>1</sup>**

Intersection	v/c Ratio		Critical Movement	Year Std. Exceeded <sup>2</sup>	Year Capacity Exceeded <sup>2</sup>
	2010	2030			
OR 99 & South Stage Rd	0.47	0.65	Signalized		
OR 99 & East Glenwood Rd	0.40	0.72	NBT; EB (2030)	2035	2040
OR 99 & Northridge Terr	0.44	<b>1.25</b>	WB	2020	2023
OR 99 SB & 4 <sup>th</sup> St	0.52	0.71	EB		
OR 99 SB & 1 <sup>st</sup> St	0.71	<b>1.08</b>	EB	2017	2025
OR 99 NB & 4 <sup>th</sup> St	0.35	0.48	NBT		
OR 99 NB & 1 <sup>st</sup> St	0.44	0.58	EB		

<sup>1</sup>Black-shaded cells indicate that the HDM design v/c ratio of 0.85 has been exceeded and design exceptions will be required.

<sup>2</sup>Shaded cells in these columns indicate the HDM design v/c ratio and/or capacity is reached beyond 2040.

## Fern Valley Through Analysis Results

All of the intersections in the Fern Valley Through Alternative meet the HDM design v/c's in 2010 as shown in Table 12. In 2030, only the OR 99 & Fern Valley Road intersection is slightly over the HDM standard. The OR 99 & Fern Valley intersection is the limiting intersection on the west side. Any additional growth in the study area on west or east sides of I5 above what was assumed in the current comprehensive plan will impact this intersection and cause the life of this alternative to be reduced. Potential mitigation for this additional growth will likely be along the lines of the original higher-impact westside alternatives shown in Appendix G.

**Table 13: Year 2010 & 2030 Intersection v/c ratios<sup>1</sup>**

Intersection	v/c Ratio		Critical Movement	Year Std. Exceeded <sup>2</sup>
	2010	2030		
OR 99 & Cheryl Ln	0.39	0.47	SBT	
OR 99 & Fern Valley Rd	0.68	<b>0.86</b>	Signalized	2028
OR 99 & Bolz Ln	0.57	0.74	Signalized	
Fern Valley Rd & Bolz Ln	0.40	0.59	NBR	
Fern Valley Rd & Luman Rd	0.43	0.59	Signalized	
Fern Valley Rd & SB Ramp Terminal	0.41	0.62	Signalized	
Fern Valley Rd & NB Ramp Terminal	0.32	0.52	Signalized	
Fern Valley Rd & N/S Phoenix Rd	0.43	0.68	Signalized	
North Phoenix Rd & Home Depot Access	0.23	0.36	Signalized	
South Phoenix Rd & Old Fern Valley Rd	0.14	0.18	SB	

<sup>1</sup>Black-shaded cells indicate that the HDM design v/c ratio of 0.85 has been exceeded and design exceptions will be required.

<sup>2</sup>Shaded cells in this column indicate the HDM design v/c ratio has not been exceeded. No intersection in this table was projected to exceed capacity before 2040.

### Traffic Queues

The limitations of the OR 99 section are clearly evident with the substantial blocking 2030 percentages for the Fern Valley Road and Bolz Lane intersections as shown in Table 13 and the extent of the queues through this area as shown in Figures 14 to 16. The values are very significant in 2010 as well.

In 2030, minor streets such as Cheryl Lane and the Bolz Lane turnaround are blocked over a third of the peak hour. The westbound turn lanes on Fern Valley Road are blocked from a quarter to a third of the peak hour which will limit the ability of Fern Valley Road

to discharge the vehicles onto OR 99 and results in the long westbound queue approaching this intersection.

On Fern Valley Road, the queues in both directions between the southbound ramp terminal and Luman Road extend over halfway between the two in 2010. In 2030, the queue extends almost the whole length which will affect operation of both intersections. With additional growth beyond the current comprehensive plan, these queues are likely to start blocking either intersection which will shorten the life of the interchange and the overall alternative. Within the interchange itself and on the ramps, queues do not pose a problem. The eastbound queue at the North Phoenix Road intersection is long enough that the inside left turn lane is blocked 15% of the peak hour. Also, the northbound left turn lane into the Home Depot is blocked a similar percentage. Appendix I shows the design storage bay lengths used in the Fern Valley Through Alternative.

North of Cheryl Lane, there are significant queues at South Stage Road and on Northridge Terrace because of the relatively high volumes on OR 99. Queuing in the downtown couplet is not an issue.

**Table 14: Year 2010 & 2030 Significant Queue Blocking<sup>1</sup>**

Intersection	Approach	Blocked Turn Bay	Blocked Intersection	Average Percent Time Blocked		
				2010	2030	
OR 99 & South Stage Rd	SB	SBL			10	
	EB	EBL			5	
OR 99 & Fern Valley Rd	SB		Cheryl Ln	25	40	
	WB		Bolz Ln	10	25	
		WBL			35	35
		WBR			10	25
	NB	NBL			5	
EB	EBL		5	10		
OR 99 & Bolz Ln	NB	NBL		15	15	
		NBR		5	25	
Fern Valley Rd & Luman Rd	WB	WBR			10	
	EB	EBL			10	
Fern Valley Rd & North/South Phoenix Rd	WB	WBL			15	
North Phoenix Rd & Home Depot Access	NB	NBL			15	

<sup>1</sup>Significant blocking times are five percent or greater as these levels can have a measurable effect on intersection operation.

## Access Management Standards

The preservation of access/road spacing on a new facility is one of the main ways to maximize mobility, minimize congestion interference between adjacent intersections, and to decrease the crash potential by removing or minimizing conflict points. Many current projects could have been avoided or minimized if the nearest intersection had been originally located a greater distance away from a ramp terminal (such as was addressed in the Unit 1 project). Unfortunately, the ramp terminal spacing decreases between the no-build and the Fern Valley Through alternative. The main reason for this is the DDI concept has very spread out ramp terminals which include the cross-over movements. There is only a little over 500' on the west side and 1100' on the east side between the ramp terminals and the next intersection as shown in Table 14.

**Table 15: Fern Valley Through 2030 Spacing Standards Comparison**

Roadway	Segment	Spacing Standard	2030 Fern Valley Through Alternative <sup>1</sup>
I5	Highland Ave Overcrossing – Fern Valley Rd Overcrossing	3 miles	<b>2.8 miles</b>
	Highland Ave SB On-ramp – Fern Valley Rd SB Off-ramp	1 mile	2.1 miles
	Fern Valley Rd NB On-ramp – Highland Ave NB Off-ramp	1 mile	2.2 miles
	Fern Valley Rd Overcrossing – West Valley View Rd Overcrossing	3 miles	3.2 miles
	Fern Valley Rd SB On-ramp – West Valley View Rd SB Off-ramp	1 mile	2.6 miles
	West Valley View Rd NB On-ramp – Fern Valley Rd NB Off-ramp	1 mile	2.8 miles
Fern Valley Rd	SB ramp terminal – Luman Rd	1320'	<b>510'</b>
	NB ramp terminal – North/South Phoenix Rd	1320'	<b>1125'</b>
OR 99	South Stage Rd - Northridge Terr	500'	<b>2110' ave. street/ 175' ave. access</b>
	Northridge Terr – Rose St	500'	<b>490' ave. street/ 220' ave. access</b>
	Rose St- 6 <sup>th</sup> St (approximate couplet start)	350'	<b>660' ave. street/ 220' ave. access</b>
	6 <sup>th</sup> St – 1 <sup>st</sup> St	320' <sup>2</sup>	<b>320' ave. street/ 140' ave. access</b>

<sup>1</sup>Black-shaded cells mean that the street/access spacing is less than the corresponding standard.

<sup>2</sup>Block spacing in the central core is 320', so the minimum driveway spacing is mid-block or 160'.

Queues from the Luman Road intersection and the southbound ramp terminal (especially the eastbound direction) extend the entire length between them, which will impact operations in this segment. This is because of the 500 foot spacing, as compared to 700 feet in the existing condition. The long queues in this location will have a direct impact on the ability of this alternative to protect the function of the interchange and I5. By 2030, the distance provided between the two intersections is too short.

A potential mitigation for off-ramp queuing would be to install dump loops (detectors) on Fern Valley Road at the OR 99 and Luman Road intersections. When the queues on Fern Valley approach the southbound ramp terminal, the dump loops will cause the signals on Fern Valley to allow the Fern Valley Road traffic to discharge onto OR 99. This “dumping of traffic” would be in excess of the normal signal cycle length and would cause longer queues on OR 99.

There are few changes on OR 99 as roadway spacing stays the same with a few accesses removed in the project section. The Fern Valley Through Alternative is located in the relatively same location as the existing interchange, so the spacing on I5 between the alternative and the interchanges to the north and south do not change significantly.

**Figure 14: Fern Valley Through Alternative 95th Percentile Queues**

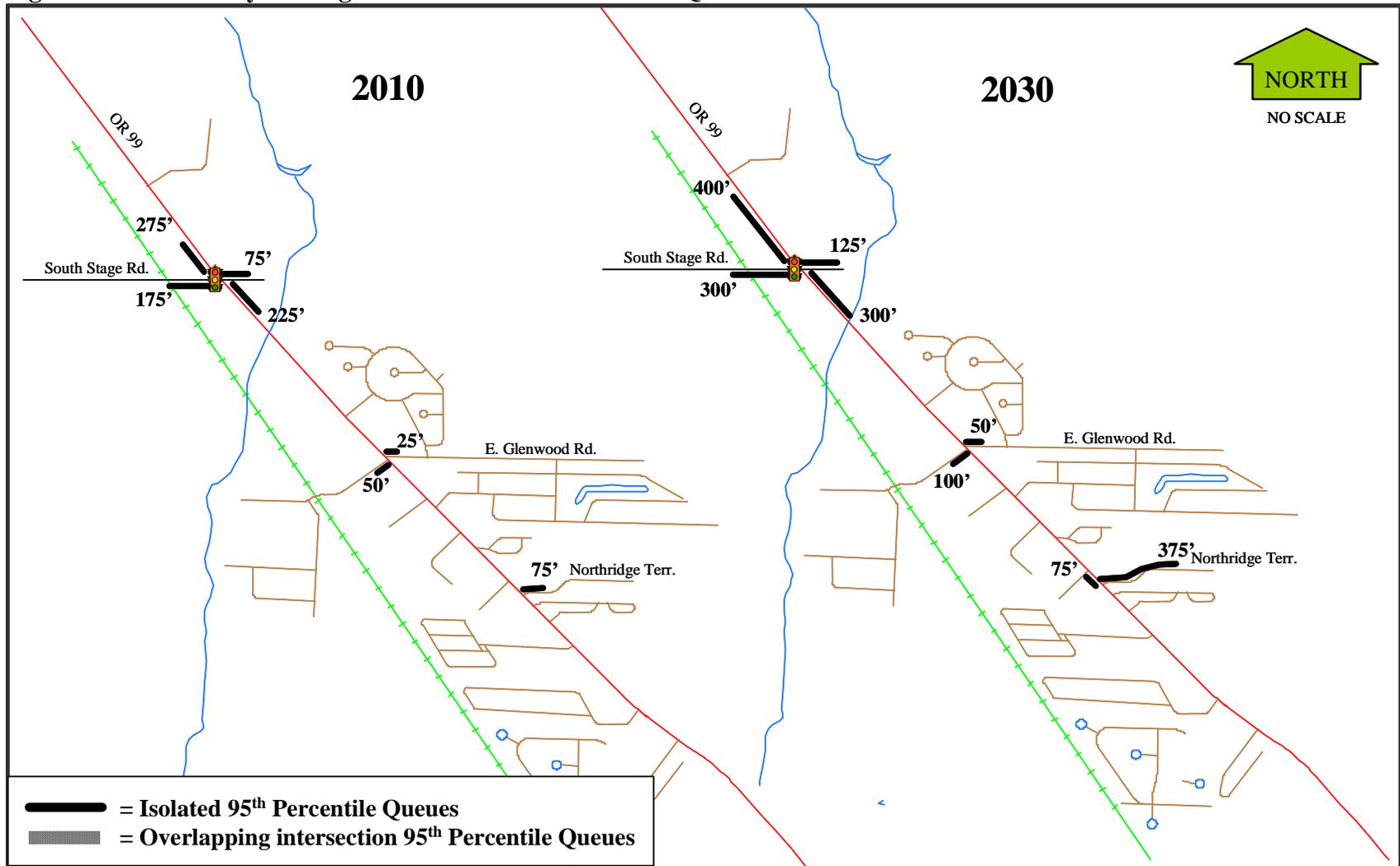


Figure 15: 2010 Fern Valley Through Alternative 95th Percentile Queues

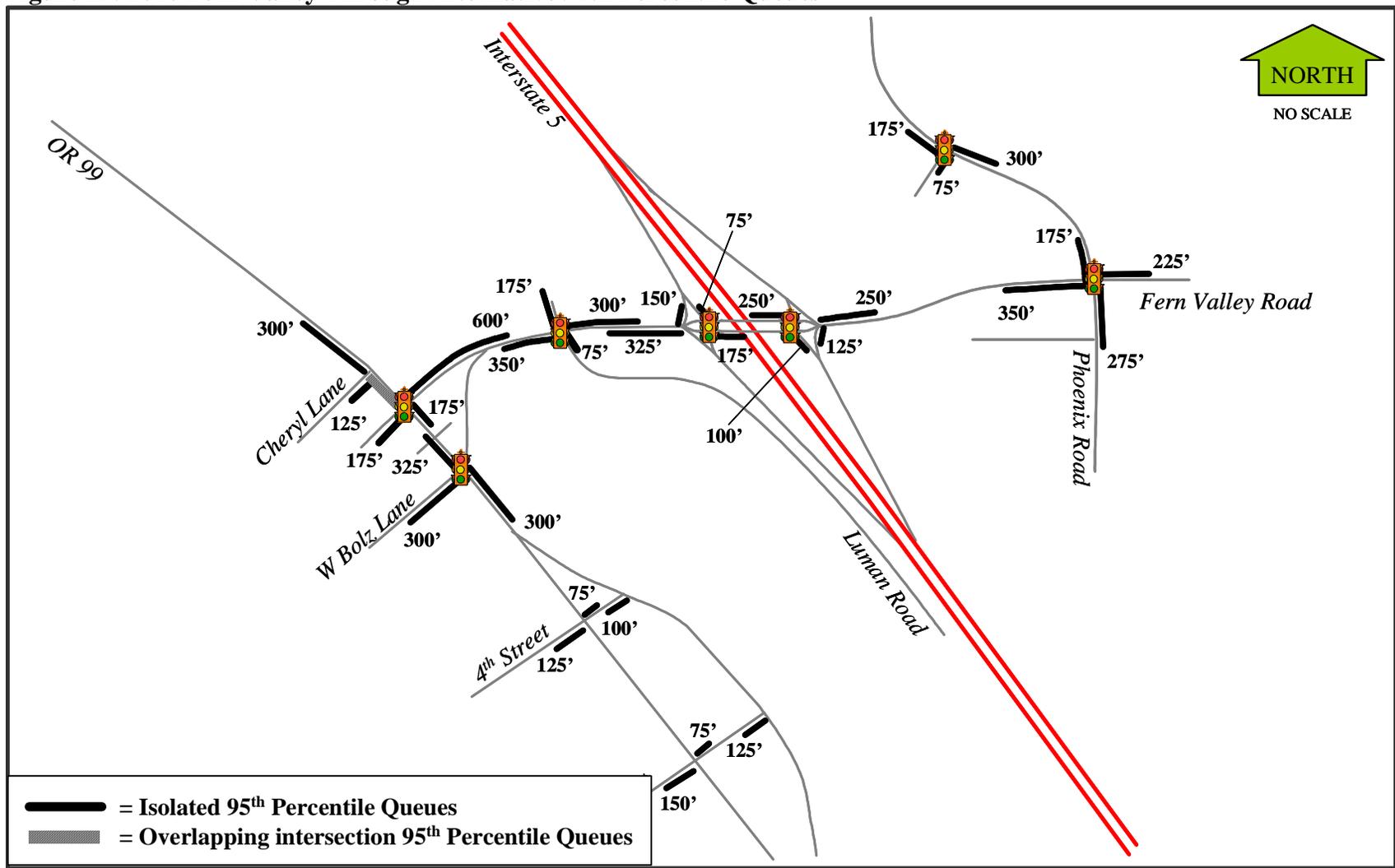
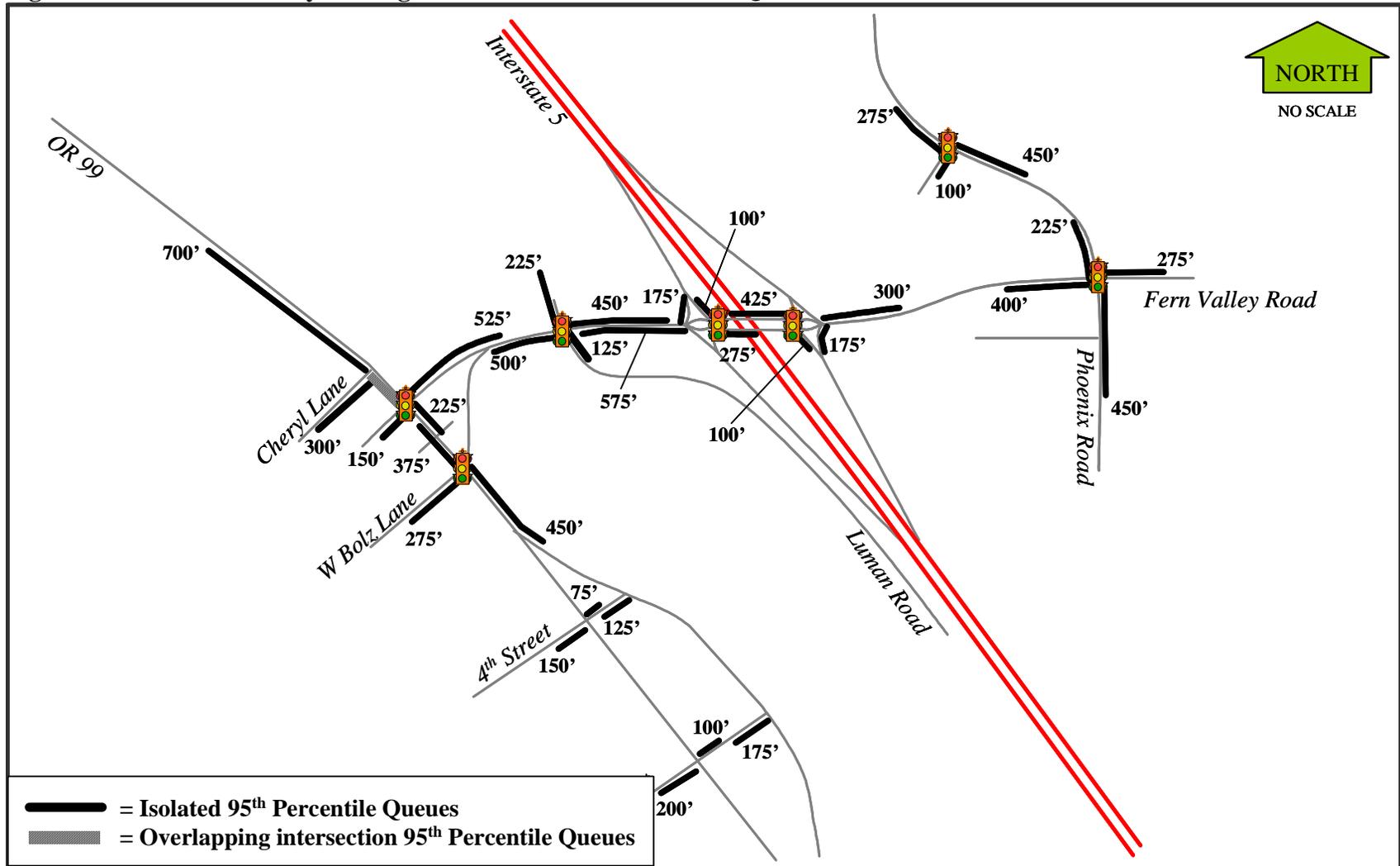


Figure 16: 2030 Fern Valley Through Alternative 95th Percentile Queues



## North Phoenix Through Analysis Results

The South Phoenix Road & Fern Valley Road intersection does not meet PSW's in 2010 or 2030. All of the intersections in the North Phoenix Through Alternative meet the HDM design v/c's in 2010 as shown in Table 15. In 2030, only the OR 99 & Fern Valley Road intersection is slightly over the HDM standard. The OR 99 & Fern Valley intersection is the limiting intersection on the west side. Any additional growth in the study area on west or east sides of I5 above what was assumed in the current comprehensive plan will impact this intersection and cause the life of this alternative to be reduced. Potential mitigation for this additional growth will likely be along the lines of the original higher-impact westside alternatives shown in Appendix G.

**Table 16: Year 2010 & 2030 Intersection v/c ratios<sup>1</sup>**

Intersection	v/c Ratio		Critical Movement	Year Std. Exceeded <sup>2</sup>	Year Capacity Exceeded <sup>2</sup>
	2010	2030			
OR 99 & Cheryl Ln	0.39	0.47	SBT		
OR 99 & Fern Valley Rd	0.67	<b>0.86</b>	Signalized	2028	
OR 99 & Bolz Ln	0.57	0.74	Signalized		
Fern Valley Rd & Bolz Ln	0.40	0.59	NBR		
Fern Valley Rd & Luman Rd	0.43	0.57	Signalized		
Fern Valley Rd & SB Ramp Terminal	0.41	0.62	Signalized		
Fern Valley Rd & NB Ramp Terminal	0.32	0.52	Signalized		
North Phoenix Rd & Home Depot Access	0.40	0.60	Signalized		
South Phoenix Rd & Fern Valley Rd	0.22	0.40	EB		

<sup>1</sup>Black-shaded cells indicate that the HDM design v/c ratio of 0.85 has been exceeded and design exceptions will be required.

<sup>2</sup>Shaded cells in these columns indicate the HDM design v/c ratio and/or capacity is reached beyond 2040.

### **Traffic Queuing**

The limitations of the OR 99 section are clearly evident with the substantial blocking percentages in 2030 for the Fern Valley Road and Bolz Lane intersections as shown in Table 16 and the extent of the queues through this area as shown in Figures 17 to 19. Queues are reasonable in 2010 except for the westbound queue at the OR 99/Fern Valley intersection.

In 2030, minor streets such as Cheryl Lane are blocked over a third of the peak hour. The westbound turn lanes on Fern Valley Road are blocked a little under a third of the peak

hour which will limit the ability of Fern Valley Road to discharge the vehicles onto OR 99 and results in the long westbound queue approaching this intersection. On Fern Valley Road, the queues between the southbound ramp terminal and Luman Road are about halfway between the two in 2010. In 2030, the queue extends three-quarters of the length in 2030. With additional growth beyond the current comprehensive plan, these queues would start blocking either intersection which will shorten the life of the interchange and the overall alternative. Within the interchange itself and on the ramps, queues do not pose a problem. The northbound and southbound left turn lanes into the Home Depot/South Phoenix Road intersection are blocked about 20% of the peak hour. The westbound queue on South Phoenix Road is substantial at 475' but does not cause any operational issues. Appendix I shows the design storage bay lengths used in the North Phoenix Through Alternative.

North of Cheryl Lane, there are significant queues at South Stage Road and on Northridge Terrace because of the relatively high volumes on OR 99. Queuing in the downtown couplet is not an issue.

**Table 17: Year 2010 & 2030 Significant Queue Blocking<sup>1</sup>**

Intersection	Approach	Blocked Turn Bay	Blocked Intersection	Average Percent Time Blocked	
				2010	2030
OR 99 & South Stage Rd	SB	SBL			15
	EB	EBL			5
OR 99 & Fern Valley Rd	SB		Cheryl Ln	30	45
	WB		Bolz Ln	5	15
		WBL			25
	WBR			10	25
	NB	NBL			5
OR 99 & Bolz Ln	EB	EBL		5	10
		NB	NBL	20	20
Fern Valley Rd & Luman Rd	WB	NBR		5	25
		WBL			10
	WBR			10	
North Phoenix Rd & Home Depot Access/South Phoenix Rd	EB	EBL			5
	SB	SBL			20
	NB	NBL			20

<sup>1</sup>Significant blocking times are five percent or greater as these levels can have a measurable effect on intersection operation.

## **Access Management Standards**

As with the Fern Valley Through Alternative, the ramp terminal spacing decreases between the no-build and the North Phoenix Through alternative. The main reason for this is the DDI concept has very spread out ramp terminals which include the cross-over movements. There is only 540' on the west side and 850' on the east side between the ramp terminals and the next intersection. The result of relatively short spacing on the west side (from 700' in the existing conditions) is that the resulting queues from the Luman Road intersection and the southbound ramp terminal extend over three-quarters of the distance between them. The long queues in this location will have a direct impact on the ability of this alternative to protect the function of the interchange and I5. By 2030, the distance provided between the two intersections is too short.

A potential mitigation for off-ramp queuing would be to install dump loops (detectors) on Fern Valley Road at the OR 99 and Luman Road intersections. When the queues on Fern Valley approach the southbound ramp terminal, the dump loops will cause the signals on Fern Valley to allow the Fern Valley Road traffic to discharge onto OR 99. This "dumping of traffic" would be in excess of the normal signal cycle length and would cause longer queues on OR 99.

There are little changes on OR 99 as roadway spacing stays the same with a few accesses removed in the project section. The North Phoenix Through Alternative is located about 300' north of the existing interchange, so the southbound off-ramp and the northbound on-ramp move significantly to the north, shortening the distance slightly to the South Medford Interchange. Spacing between the alternative and the West Valley View Road interchange to the south does not change significantly.

**Table 18: North Phoenix Through 2030 Spacing Standards Comparison**

Roadway	Segment	Spacing Standard	2030 North Phoenix Through Alternative <sup>1</sup>
I5	Highland Ave Overcrossing – Fern Valley Rd Overcrossing	3 miles	<b>2.7 miles</b>
	Highland Ave SB On-ramp – Fern Valley Rd SB Off-ramp	1 mile	2.0 miles
	Fern Valley Rd NB On-ramp – Highland Ave NB Off-ramp	1 mile	2.0 miles
	Fern Valley Rd Overcrossing – West Valley View Rd Overcrossing	3 miles	3.3 miles
	Fern Valley Rd SB On-ramp – West Valley View Rd SB Off-ramp	1 mile	2.6 miles
	West Valley View Rd NB On-ramp – Fern Valley Rd NB Off-ramp	1 mile	2.8 miles
Fern Valley Rd	SB ramp terminal – Luman Rd	1320'	<b>540'</b>
	NB ramp terminal – North/South Phoenix Rd	1320'	<b>850'</b>
OR 99	South Stage Rd - Northridge Terr	500'	<b>2110' ave. street/ 175' ave. access</b>
	Northridge Terr – Rose St	500'	<b>490' ave. street/ 220' ave. access</b>
	Rose St- 6 <sup>th</sup> St (approximate couplet start)	350'	<b>660' ave. street/ 220' ave. access</b>
	6 <sup>th</sup> St – 1 <sup>st</sup> St	320' <sup>2</sup>	<b>320' ave. street/ 140' ave. access</b>

<sup>1</sup>Black-shaded cells mean that the street/access spacing is less than the corresponding standard.

<sup>2</sup>Block spacing in the central core is 320', so the minimum driveway spacing is mid-block or 160'.

**Figure 17: North Phoenix Through Alternative 95th Percentile Queues**

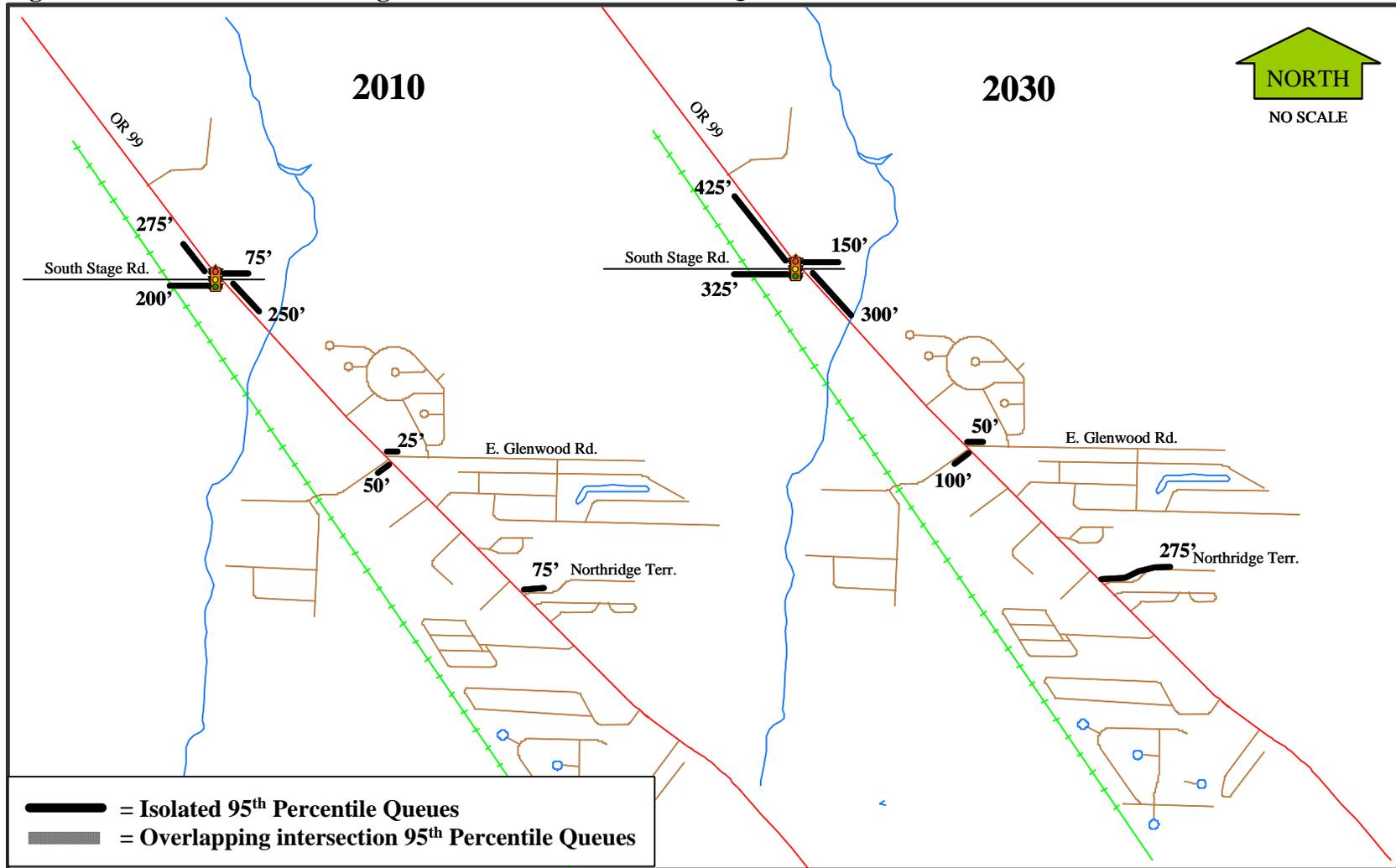


Figure 18: 2010 North Phoenix Through Alternative 95th Percentile Queues

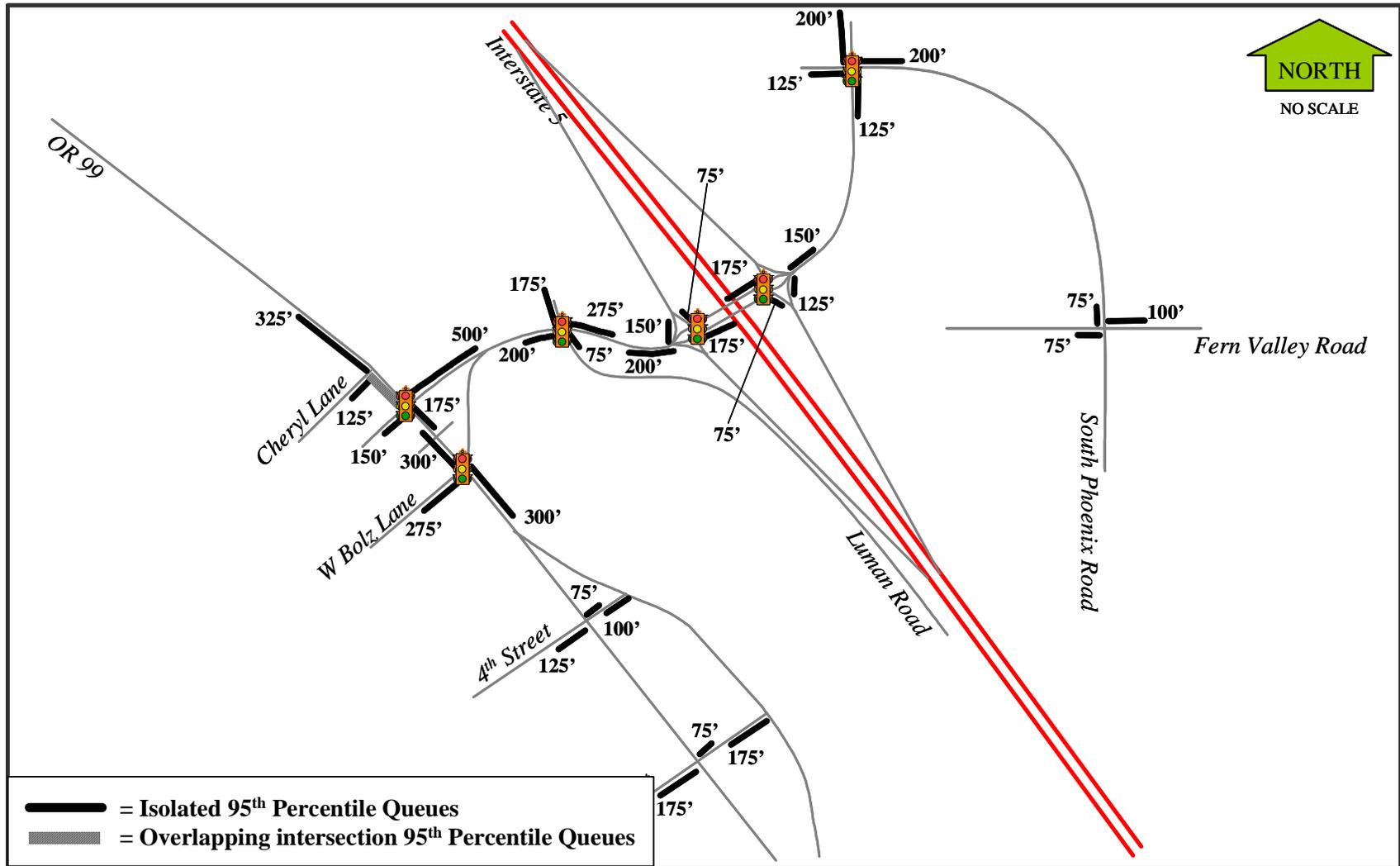
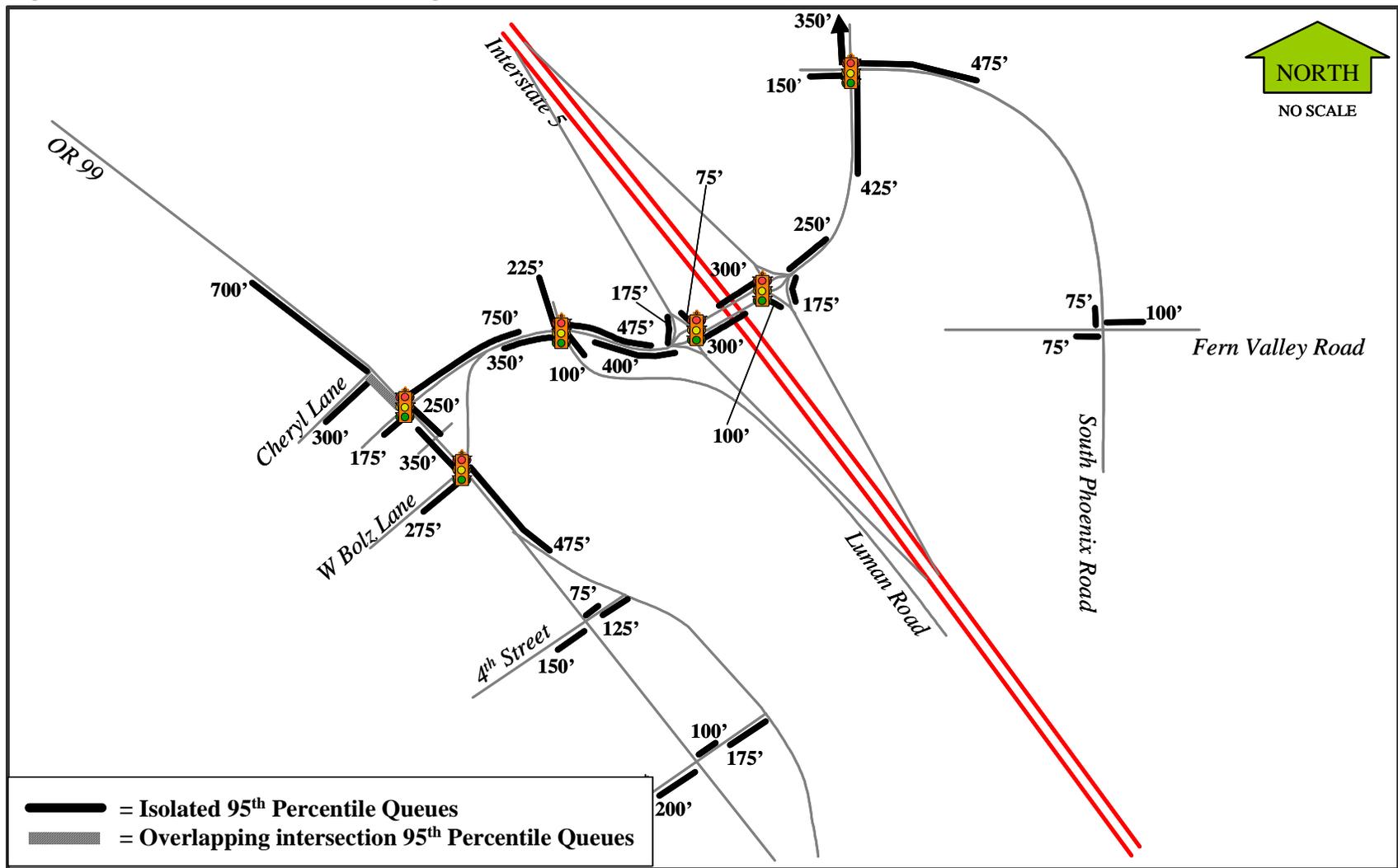


Figure 19: 2030 North Phoenix Through Alternative 95th Percentile Queues



## ALTERNATIVE COMPARISON & SUMMARY

Table 18 shows the summary of the main transportation-based issues between the Fern Valley Through and the North Phoenix Through Alternative. The No-build Alternative is also shown for comparison purposes. This summary is only based on the direct project area of the alternatives meaning that the sections of OR 99 north of Coleman Creek (just north of Cheryl Lane) and south of the northern end of the downtown couplet are excluded. However, they are covered fully in the No-build and the individual alternative analysis sections.

### Capacity & Queuing

Both of the alternatives have common issues at the I5 segment, merge, and diverge sections. By 2030, the I5 mainline north and south of the Fern Valley Interchange, the off-ramp diverges, the southbound on-ramp will all be at or over the HDM design v/c's, but not over capacity. These make up all but one of the HDM v/c deficient sections. Since the I5 mainline is over standard, the connections to it will have higher v/c's. Design exceptions will be required for v/c unless this section I5 is widened to three lanes in each direction. In addition, the volumes for the build alternatives are generally higher than future no-build. Improving the Fern Valley Road corridor causes the volumes on Fern Valley Road to increase significantly as vehicles that were diverting elsewhere return to their desired paths.

The west side and the interchange in both alternatives are the same so generally the v/c's for these points are the same. The OR 99 & Fern Valley Road intersection exceeds the HDM design v/c and will require a design exception. This intersection is the limiting intersection for both alternatives. Any additional growth in the study area beyond what was forecasted or what is in the current comprehensive plan will likely impact this intersection and cause the life of the alternatives to be reduced. The current design represents the most that can be done at this intersection without severely impacting adjacent properties. Addressing additional growth through this intersection will likely require improvements and impacts along the lines of the original higher-impact westside alternatives.

Queues are relatively long in both alternatives extending away from the OR 99 & Fern Valley Road intersection blocking adjacent minor street intersections. This is caused by the through movements blocking adjacent turn lanes and limits the ability of the intersection to discharge vehicles efficiently resulting in long upstream queues. These queues show the limitations of the current design on OR 99 even though it may not be completely evident in the reported v/c ratios. In both alternatives, these blocking queues exist for over a third of the peak hour in 2030. Almost two-thirds of the significant queuing issues exist at the OR 99 & Fern Valley Road or Bolz Lane intersections. The queues from the OR 99 & Fern Valley Road intersection will eventually impact the interchange operation as is currently happening along Fern Valley Road.

**Table 19: Year 2030 Alternative Summary**

Transportation Issue <sup>1</sup>	Alternative		
	No-build	Fern Valley Through	North Phoenix Through
<b>Capacity And Queuing</b>			
Number of intersections and segments not meeting HDM v/c's	5	7	7
Number of intersections and segments exceeding capacity	2	0	0
Flexibility in the design of the west side to accommodate traffic flows higher than forecasted?	No	No	No
Flexibility in the design of the interchange to accommodate traffic flows higher than forecasted?	No	Yes	Yes
Flexibility in the design of the east side to accommodate traffic flows higher than forecasted?	No	Some	Yes
Years of life beyond 2030 for east side <sup>3</sup>	18	13	25
Number of significant queue blockage sites <sup>2</sup>	20	12	13
<b>Spacing</b>			
Number of roadway segments not meeting OHP spacing standards	5	4	4
<b>Sensitivity Analysis</b>			
Years of life beyond 2030 for east side with 20% more traffic <sup>3</sup>	11	10	9-32 <sup>4</sup>
Sensitivity to uneven growth east of North Phoenix Road <sup>5</sup>	High	High	Low
With 20% more traffic, does queuing from the OR 99 & Fern Valley Rd intersection cause "practical" interchange failure? <sup>6</sup>	Yes	Yes	Partial (southbound)
<b>Facility Operations<sup>7</sup></b>			
Relative Total Delay per vehicle	High	Medium	Low
Relative Total Stopped Delay per vehicle	High	Medium	Low
Relative Stops per vehicle	High	High	Low
Relative Travel Time	High	Medium	Low
Relative Average Speed	Low	Medium	Medium

<sup>1</sup>Transportation issues are based on the direct alternative area, so OR 99 north of Coleman Creek and south of northern end of the downtown couplet are excluded.

<sup>2</sup>Significant queuing is five percent or more of the peak hour.

<sup>3</sup>Project lifespan is based on HDM 0.85 v/c ratio for MPO-area local interest roads at the main North/South Phoenix Road intersection in all three alternatives.

<sup>4</sup>Project lifespan is 32 years if an additional left turn lane is added to the westbound approach on South Phoenix Road.

<sup>5</sup>Sensitivity is based on a 40% increase on westbound approach to the North/South Phoenix Road intersection.

<sup>6</sup>Practical failure is defined when queuing from adjacent intersections back into subject intersection preventing traffic flow regardless whether v/c ratio is reported to be under capacity.

<sup>7</sup>Relative operations are based on averaged paths from OR 99 & Cheryl Avenue to either the northeast or southeast interchange quadrants.

A critical queuing area for both alternatives is the section between Luman Road and the southbound ramp terminal. Queues for both alternatives are relatively long and fill most of the distance between the two intersections, more likely with the Fern Valley Through rather than the North Phoenix Through Alternative. The queues are likely to negatively impact both intersections and the overall interchange operation. Dump loops could be installed to help protect the ramp terminal operation.

The North Phoenix Through Alternative has lower v/c's at the North/South Phoenix Road intersection than in its counterpart in the Fern Valley Through Alternative. The major movements are treated as a through movement versus as a turning movement and result in a intersection that will have about 12 more year of life as it is less sensitive to additional volume. Because of the lower sensitivity to future growth, this alternative will accommodate more growth than the Fern Valley Through Alternative, assuming that the west side limitations can be addressed.

The v/c ratios for the North/south Phoenix Road intersection are the same for the two alternatives but that is mainly because the Fern Valley Through Alternative is almost at its maximum configuration with multiple dual turn lanes, while the North Phoenix Through Alternative has just all single lanes. An improvement to the westbound left turn would be to add an additional left turn lane as the volume and queue for this movement is relatively high. Adding a dual left turn lane here would drop the overall intersection v/c to 0.57, significantly lower than the current design. Also, the North Phoenix Through Alternative handles all of the turning movement traffic in a single intersection, while the Fern Valley Through Alternative requires an additional downstream signalized intersection to handle the Home Depot access.

### **Spacing**

The spacing in comparison with the OHP Access Management Standards gets worse in both alternatives. The new South Medford Interchange is built south of the current location and the new Fern Valley Interchange ramps are generally further north, so the interchange-to-interchange crossroad spacing is no longer met. In addition, the interchange cross-road spacing is a little over three miles, there is no room for an additional interchange between the South Medford and Fern Valley interchanges, as has been proposed over the years at South Stage Road.

There are some changes in the ramp-to-ramp spacing, but nothing significant and the standard is still met. The DDI because of its more spread out ramp terminals decreases the spacing on both the east and the west side. While the east side is not too much of a concern, the west side spacing between the southbound ramp terminal and Luman Road is a little over 500' instead of the over 700' today. Combining this with the long queues in this section, the future operation of the interchange is in question. While it may have worked when Unit 1 was built, the location of the Luman Road intersection is too close by or before 2030. Design exceptions and access deviations will be required. On OR 99, the street spacing is remaining the same and most driveways are remaining so little change is expected on the west side.

## **Sensitivity Analysis**

The following sensitivity analysis was done to address concerns about growth beyond that included in the existing comprehensive plan Build 2030 Future Volumes. In order to test the sensitivity of the alternatives, a uniform 20% additional volume increase was added to the entire system. This is an approximation of the growth impacts as actual growth will not occur uniformly.

### **Both Alternatives**

- OR 99 & Fern Valley Road intersection is at capacity.
- OR 99 & Bolz Lane intersection is slightly over HDM design v/c.
- The interchange is at the HDM design v/c (southbound ramp terminal controls operation).
- Continuous queuing exists on OR 99 from just south of Glenwood Road to south of 4<sup>th</sup> Street.
- I5 Off-ramp queuing is minimal and handled with designed storage bays (no backups on ramps or onto I5).
- A critical queuing area for both alternatives is the Luman Road – southern ramp terminal section of Fern Valley Road as the spacing between these is rather short. The Luman Road intersection is too close to the southern ramp terminal by 2030. The queues are continuous in both directions in this location and contribute to operational problems in the interchange.
- The extensive queuing on Fern Valley Road and on OR 99 directly results from the OR 99 & Fern Valley Road intersection being at capacity as queues radiate in all directions from this point.
- Because of the OR 99 & Fern Valley Road design limitations, a 20% increase of traffic beyond forecasted levels will cause the queues from this intersection to back into the interchange which limits the functionality of the alternatives.

### **Fern Valley Through**

- North/South Phoenix Road intersection has 10 years of life beyond design year.
- Long queues exist (over 500 feet) on the eastbound, westbound, and northbound approaches at the Fern Valley Road & North/South Phoenix Road intersection.
- Queues almost extend whole distance between the northbound ramp terminal and the Fern Valley Road & North/South Phoenix Road intersection.
- The queuing from the OR 99 & Fern Valley Road intersection causes practical intersection failure of intersections to the northbound ramp terminal. Practical failure is defined as traffic backing through a subject intersection from adjacent intersections even if the v/c ratio does not report a problem at the subject intersection. Most v/c ratio computations do not generally take the effect of adjacent intersections fully into account.

The Fern Valley Through Alternative has close to a maximum lane configuration with dual turn lanes for the heavy turning movements at the Fern Valley Road & North/South Phoenix Road intersection. There is very little difference between the no-build and the Fern Valley Through Alternative in the east side lifespan beyond the design year, even though the alternative has more lanes than the no-build. In addition, the sensitivity analysis assumed a relatively low westbound approach volume.

This alternative is very sensitive to uneven growth. An increase of 40% on the westbound Fern Valley Road approach at the Fern Valley Road & North/South Phoenix Road intersection will drop the lifespan beyond 2030 by 30% to seven years. The 40% increase equates out to about 70 vph more than what was forecasted in 2030 or one auto-oriented business (gas-station, bank, or fast-food restaurant). Any commercial development on the east side of North Phoenix Road is likely to be much more intensive than just one business, so the lifespan of this alternative will drop proportionately.

### **North Phoenix Through**

- North/South Phoenix Road intersection has nine years of life beyond the design year, but could have 32 years if westbound left turn lane is changed to a dual left.
- Queuing on OR 99 slightly shorter (a few hundred feet on the north and south ends) than with the Fern Valley Through Alternative.
- Queuing in the eastbound direction on Fern Valley Road is generally free of extensive queues.
- The westbound queues radiating from the OR 99 & Fern Valley Road intersection also extend through the interchange to the North & South Phoenix Road intersection and even extend most of the way down toward the original section of Fern Valley Road. This occurs in part because the distance between the northern ramp terminal and the North & South Phoenix Road intersection is much closer than in the Fern Valley Through alternative.
- The interchange still functions however it is heavily metering traffic in the westbound direction as the westbound queue mostly fills the space between the ramp terminals.

On the North Phoenix Through Alternative, the westbound single left at the N/S Phoenix intersection is overwhelmed with the 20% increase on the side streets. The intersection does handle the larger through movements well. However, if the westbound left is changed to a dual left turn lane, then the intersection will easily handle the additional turning traffic. For comparison purposes, if 40% additional traffic is added to the westbound (South Phoenix Road) approach at the North/South Phoenix Road intersection, which is more than double the approach volume used in the Fern Valley Through Alternative above, the lifespan only drops 6% to 30 years.

## **Facility Operations**

Another way to compare alternatives is to use measures of effectiveness (MOE) from multiple averaged traffic micro-simulation runs. The micro-simulation runs used for this section were the same runs used to create the queuing used in the no-build and alternative analysis sections (this does not include the sensitivity analysis in the previous section) of this report so the results would be consistent. Using MOE's allows comparisons to be made on a system-wide basis. Generally, alternatives with lower delays, lower number of stops, lower travel time and higher average speed are more efficient.

The delay and number of stops MOE's have been reduced down to an individual vehicle basis. The Delay MOE is the total delay for a given vehicle whether stopped or not. The Stopped Delay MOE shows how long a vehicle is delayed at intersections or in slow-moving traffic at less than seven mph. The Stops MOE shows how many times, on the average, a vehicle would stop either at an intersection or slowed down enough in a queue.

Other MOE's include the Travel Time and Average Speed. The Travel Time MOE is accumulated travel time of all vehicles completely or partially traveling this path in the design hour. The Average Speed MOE is the averaged speed of all vehicles completely or partially traveling this path averaged over each segment between intersections.

For this project, the MOE data was filtered so only the direct alternative area was left so effects of the I5 mainline and OR 99 north and south of the project area would not affect the overall results. The MOE data in Table 19 reflects a travel path from the OR 99 & Cheryl Lane intersection traveling east to either the northeast or southeast interchange quadrants.

As would be expected, the No-build Alternative has the highest delays, stops, times, and lower speeds. The Fern Valley Through Alternative has substantially better values than the no-build in most cases except for the number of stops per vehicle. The small difference in the number of stops per vehicle is because the roadway networks between this alternative and no-build are functionally the same.

**Table 20: Year 2030 Simulation Measures of Effectiveness<sup>1</sup>**

<b>Measure</b>	<b>No-build</b>	<b>Fern Valley Through</b>	<b>North Phoenix Through</b>
Delay per vehicle (s)	315	199	138
Stopped Delay per vehicle <sup>2</sup> (s)	265	149	100
Stops per vehicle	5.4	5.0	3.6
Travel Time (hr)	73	60	49
Average Speed (mph)	6	12	13

<sup>1</sup>The MOE's are based on averaged paths from OR 99 & Cheryl Lane to approximately either the northeast or southeast interchange quadrants.

<sup>2</sup>Includes stopped delay at intersections as well as standing and slow-moving (less than 7 mph) queues.

The North Phoenix Through Alternative has about 30% less overall delay, stopped delay, and number of stops per vehicle than with the Fern Valley Through Alternative. Overall travel time is almost 20% less than with the Fern Valley Through Alternative. The average speed is improved over the no-build but is about the same as the Fern Valley Through Alternative. The gains in average speed on the east side is mostly negated by slower speeds on the west side, however the North Phoenix Through Alternative offers almost 50% higher (19 mph versus 13 mph) east side speeds for both interchange quadrants. Access to the northeast quadrant is about 25 % faster and access to the southeast quadrant is about 50% faster even though the roadway distance is longer.

Two-thirds of the roadway networks between the two alternatives are the same, so the only difference is how North Phoenix Road traffic is handled either a through movement or as a turning movement. The choice of handling the North Phoenix Road traffic in a through movement as in the North Phoenix Through Alternative makes Fern Valley Road much more efficient, even with the common west side and interchange sections, as the MOE's are significantly lower.

## **RECOMMENDATION**

The North Phoenix Through Alternative is the recommended build alternative in this report. While the two alternatives have similar overall volume to capacity ratios and west side limitations, the North Phoenix Through Alternative has a much longer lifespan, is less sensitive to future growth beyond what was forecasted, and is more operationally efficient. This alternative will also allow for more future growth than the other build alternative assuming that the west side issues can be mitigated.

However, the final selection of the Preferred Build Alternative will be made by the Project Development Team following release of the Draft Environmental Assessment. The selection will be based on several factors, including: (1) how well the alternative satisfies the Purpose and Need, (2) how well the alternative addresses the community-based Goals and Objectives, (3) adverse impacts of the alternative, and (4) Citizens Advisory Committee and City Council recommendations, as well as public comments and testimony received.

## **APPENDIX A – CRASH HISTORY**

The text below provides a summary of the crash history for both the I5 Fern Valley Interchange and OR 99 from South Stage Road to 1<sup>st</sup> Street. Detailed information on the crash history can be found in Tables A1 to A4.

### **I5 Fern Valley Interchange**

The majority of the crashes are occurring at the ramp terminal intersections. Rear-end collisions are caused by motorists following too close or traveling too fast on the ramps and Fern Valley Road. Limiting or increasing street access spacing, adding turn lanes, or medians might reduce these collisions. Turning movement collisions are being caused by motorists taking improper gaps in the traffic stream, to get onto the ramps. Heavy traffic is limiting available gaps. Changing the signal phasing to allow protected turns or adding turn lanes might help conditions. The crashes on I5 do not follow any particular pattern.

The number of crashes increased over the five year period with a large jump in 2003. This increase may be a result of the installation of the traffic signals at the ramp terminals. This section of I5 is not a SPIS (Safety Priority Index System) site and the crash rate is less than the statewide primary urban freeway rate.

There were 40 crashes in this area between 1999 and 2003.

- No fatal crashes
- 35% injury crashes
- 65% property damage only crashes
- 68% occurred in clear dry daylight conditions
- 65% (26) are on Fern Valley Road and the ramp connections
- 40% (16) are rear-end collisions
- 20% (8) are turn movement related
- 15% (6) are fixed object collisions

### **OR 99 - South Stage Road to 1<sup>st</sup> Street**

The crashes in this section are typical for the existing conditions. The offset driveways and close intersection spacing create numerous conflict points. Long queues cause an increase in rear end collisions.

A large portion of the crashes are either turning movement related or rear end collisions. The turning movement collisions are caused by drivers taking improper gaps in the traffic. Appropriate gaps are limited due to heavy traffic combined with closely spaced streets and access points. Some countermeasures might be to close and/or consolidate driveways and install a raised median from Cheryl Lane to Bolz Lane to prevent left turns. The rear-end collisions are occurring throughout the project area on OR 99 especially near the traffic signals. Lowering the speed limit, making the signal more

visible by removing distractions, and increasing intersection and access point spacing may help minimize these collisions.

There were a total of 12 crashes at South Stage Road. The majority of them were rear-end collisions and turn movement crashes. This was also the case for the seven crashes at Bolz Lane. Cheryl Lane had a total of 17 crashes, most caused by motorists taking improper gaps resulting in turning movement collisions. Fern Valley Road has the largest number of crashes with a total of 25. Most of these were either rear-end or turn movement collisions. The turning movement to/from the Ray's Food Place Driveway is the most problematic. The crashes throughout the couplet area were mainly a result of improper turn movements and the use of improper gaps.

The number of crashes is relatively consistent over the five year period, generally varying between 30 and 35 crashes per year. Table A1 shows a summary of the type and number of crashes on this section of OR 99. Most of the crashes are rear-end or turning which is typical for an urban section with considerable traffic. Table A2 shows the summary of crash severity. The proportion of fatal/injury crashes is slowly increasing over time. This section of OR 99 between the north city limits and Bolz Lane is a SPIS (Safety Priority Index System) site. In addition, the crash rate for this section is more than double the 2003 statewide urban principal arterial rate. All other sections within the project area are below the statewide average.

**Table A1: Types and Number of Crashes on OR 99 from South Stage Road to 1<sup>st</sup> Street**

Crash Type <sup>1</sup>	Year					Total
	1999	2000	2001	2002	2003	
Angle	2	3	4	2	2	<b>13</b>
Rear-end	16	11	9	11	13	<b>60</b>
Sideswipe-overtaking	1	0	1	0	1	<b>3</b>
Turning	14	13	14	12	15	<b>68</b>
Fixed/other object	0	1	1 <sup>2</sup>	1	0	<b>3</b>
Backing	0	0	0	1	0	<b>1</b>
Pedestrians	1		3	3 <sup>3</sup>	2	<b>9</b>
<b>Summary</b>	<b>34</b>	<b>28</b>	<b>32</b>	<b>30</b>	<b>33</b>	<b>157</b>

<sup>1</sup>No reported sideswipe-meeting, parking or miscellaneous crashes in period.

<sup>2</sup>Fatal crash

<sup>3</sup>One of the pedestrian crashes in 2002 was a fatal crash.

**Table A2: Crash Severity Summary**

Crash Severity	Year					Total
	1999	2000	2001	2002	2003	
Fatal	0	0	1	1	0	2
Severe Injury	0	1	0	2	3	6
Moderate Injury	7	5	7	3	5	27
Minor Injury	9	4	9	7	9	39
Property Damage Only	18	17	15	17	16	83
<b>Summary</b>	<b>34</b>	<b>28</b>	<b>32</b>	<b>30</b>	<b>33</b>	<b>157</b>

There were a total of 157 crashes between South Stage Road and 1<sup>st</sup> Street on OR99 between the years 1999-2003

- 2 fatal crashes
- 50% injury crashes
- 53% property damage only crashes
- 55% (86) occurred in clear dry daylight conditions
- 43% (68) are turning movement collisions
- 38% (60) are rear-end collisions

There were a total of nine crashes that involved pedestrians. These crashes were generally the result of people attempting to cross mid-block, especially in the section between South Stage Road and Fern Valley Road. There is no good location between the signals to cross, and because they are more than a mile apart, it is not convenient to walk to the nearest signal. The installation of a signal at Northridge Terrace might provide a good location for pedestrians to cross and might also help lower the number of rear end collisions by decreasing the distance between signals. However, the traffic volume on Northridge terrace is too small to meet preliminary signal warrants.

There were two fatal crashes. One was between the intersections of South Stage Road and Glenwood Road caused by pedestrian attempting to cross OR 99 mid-block. The other was a fixed collision resulting in a fatality at northbound OR 99 and 1<sup>st</sup> Street. The motorist was driving at an unsafe speed and lost control of the vehicle.

**Table A3: Fern Valley I5 Mainline & Interchange Crash Summary**

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
11/01/99	24.00	CLR DRY DUNL	NONC	PDO	Violation of Basic Rule, other improper action
09/27/00	24.00	CLR DRY DAY	SS-O	PDO	Improper lane use, ran into ditch
12/21/00	24.00	FOG DRY DUNL	PED	INJ B	Inattentive driver and a pedestrian in roadway
05/23/02	24.17	CLR DRY DUNL	NONC	INJ B	Driver fell asleep
08/26/03	24.30	CLR DRY DAY	FIX	PDO	Driving too fast, not paying attention; and hit guard rail
04/18/00	24.40	CLDY DRY DAY	FIX	INJ B	Driver physically ill, hit guard rail
01/07/99	24.50	CLDY DRY DAY	REAR	INJ B	Improper lane, failure to yield
05/09/99	24.58	CLR DRY DUNL	FIX	PDO	Driving under the influence, hit sign
07/01/00	25.00	CLR DRY DAY	NONC	INJ A	Driving under the influence
04/12/03	25.00	RAIN WET DAY	SS-O	PDO	Improper lane change
05/21/00	C24.35 Pear Tree	CLR DRY DAY	REAR	INJ B	Following too closely
02/12/02	C24.13 North Phoenix	CLR DRY DAY	ANGL	INJ C	Driving too fast, lost control, hit truck
07/06/99	C24.36 North Phoenix	CLR DRY DAY	TURN	PDO	Improper turn, truck cut corner

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
03/05/03	C24.36 North Phoenix	CLR DRY DAY	FIX	PDO	Driver distracted; ran off road and overturned
07/24/00	C24.34 SB off-ramp	CLR DRY DAY	FIX	PDO	Driving too fast, lost control, ran into ditch
12/08/00	C24.34 SB off-ramp	CLDY DRY DAY	REAR	INJ B	Following too closely
09/25/01	C24.34 SB off-ramp	CLR DRY DAY	REAR	INJ C	Following too closely, hit vehicle waiting to turn left
06/29/02	C24.34 SB off-ramp	CLR DRY DAY	TURN	PDO	Failure to yield while turning left
10/15/02	C24.34 SB off-ramp	CLR DRY DAY	REAR	INJ C	Following too closely
05/28/03	C24.34 SB off-ramp	CLR DRY DAY	TURN	PDO	Disregarded signal; improper turn
06/09/99	C24.85 SB off-ramp	CLR DRY DAY	REAR	PDO	Driving too fast
04/05/01	C24.85 SB off-ramp	CLR DRY DAY	REAR	INJ C	Following too closely
01/17/03	C24.85 SB off-ramp	CLR DRY DAY	REAR	PDO	Following too closely
06/23/00	C24.34 Fern Valley	CLR DRY DAY	FIX	PDO	Too fast, avoiding previous crash, hit guardrail
01/07/00	C24.35 Fern Valley	CLR DRY DUNL	REAR	PDO	Driving too fast
09/25/01	C24.35 Fern Valley	RAIN WET DAY	REAR	PDO	Violation of Basic Rule, Driving too fast
05/18/03	C24.39 Fern Valley	CLR DRY DAY	REAR	PDO	Following too closely

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
08/08/03	C24.40 Fern Valley	CLR DRY DAY	REAR	PDO	Following too closely
05/07/03	C24.45 Fern Valley	CLR DRY DAY	BACK	PDO	Improper backing up
04/26/01	C24.49 Fern Valley	CLR DRY DAY	REAR	INJ A	Driving too fast
05/28/03	C24.26 NB off-ramp	CLR DRY DAY	REAR	PDO	Inadequate brakes
02/04/03	C24.34 NB off-ramp	CLR DRY DLIT	HEAD	INJ B	Wrong way on one way
02/09/00	C24.36 NB off-ramp	CLR DRY DAY	TURN	PDO	Right turn from wrong lane
07/03/02	C24.36 NB off-ramp	CLR DRY DAY	SS-O	PDO	Improper lane, other improper action
07/12/02	C24.36 NB off-ramp	CLR DRY DAY	REAR	INJ B	Other improper action
09/10/03	C24.36 NB off-ramp	CLR DRY DAY	REAR	PDO	Following too closely
01/24/03	C24.47 NB off- ramp	RAIN WET DAY	TURN	INJ B	Failure to yield right-of-way
12/25/03	C24.47 NB off- ramp	RAIN WET DAY	TURN	PDO	Disregarded signal
04/05/01	C24.48 NB on-ramp	CLDY DRY DAY	TURN	PDO	Improper left turn in traffic (improper gap taken)
10/22/03	C24.55 NB off- ramp	CLR DRY DAY	TURN	INJ C	Improper left turn in front of traffic

<sup>1</sup>CLR – Clear; CLDY – Cloudy; DUNL – Dark Unlit; DLIT – Dark-Lit; UNK - Unknown

<sup>2</sup>ANGL – Angle Collision; FIX – Fixed Object Collision; PED – Pedestrian Collision; NONC – Non – Collision; SS-O- Side-swipe Overtaking; REAR – Rear-end Collision; TURN – Turning Collision.

<sup>3</sup>PDO – Property Damage Only; INJ A – Severe Injury; INJ B – Moderate Injury; INJ C- Minor Injury

**Table A4: OR 99 Crash Summary**

Date	Milepoint/ Location	Weather/ Surface/ Light <sup>1</sup>	Type <sup>2</sup>	Severity <sup>3</sup>	Error and/or Cause
02/13/02	9.7	CLR DRY DAY	REAR	PDO	Other improper action
12/12/00	9.77	UNK WET DARK	REAR	INJ C	Other improper action
02/13/02	9.78	CLR DRY DUSK	REAR	PDO	Improper lane change
09/01/99	9.79 S. Stage	CLR DRY DAY	REAR	PDO	Excessive Speed
1/28/00	9.79 S. Stage	CLR UNK DAY	REAR	INJ C	Driver distracted; excessive speed
07/04/00	9.79 S. Stage	CLDY DRY DAY	TURN	PDO	Disregarded signal
10/09/01	9.79 S. Stage	CLR DRY DAY	TURN	PDO	Disregarded signal
11/05/02	9.79 S. Stage	CLR DRY DAY	TURN	INJ C	Improper left turn in traffic
12/06/02	9.79 S. Stage	FOG FRY DLIT	TURN	INJ B	Disregarded signal
05/21/03	9.79 S. Stage	CLR DRY DAY	TURN	INJ C	Disregarded signal
12/30/03	9.79 S. Stage	CLDY DRY DAY	REAR	PDO	Following too closely
11/24/03	9.80	CLDY DRY DAY	REAR	INJ C	Following too closely; excessive speed
10/05/01	9.81	CLR DRY DAY	SS-O	PDO	Improper overtaking

Date	Milepoint/ Location	Weather/ Surface/ Light <sup>1</sup>	Type <sup>2</sup>	Severity <sup>3</sup>	Error and/or Cause
01/16/99	9.85	CLR DRY DAY	REAR	PDO	Following too closely
07/21/00	10.00	CLR DRY DAY	TURN	PDO	Disregarded signal
02/06/02	10.00	CLDY DRY DARK	PED	FAT	Crossing between intersections
02/17/03	10.00	RAIN WET DAY	REAR	INJ B/C	Driver physically ill; rear ended vehicle being towed
06/09/01	10.18	CLD DRY DAY	TURN	INJ C	Failure to yield right-of-way
03/10/99	10.19	CLR DRY DAY	PED	INJ B	Crossing between intersections
03/28/99	10.23 Glenwood	CLR DRY DAY	REAR	INJ C	Following too closely
04/19/01	10.24	CLD WET DAY	REAR	INJ C	Following too closely
04/16/02	10.24	CLD DRY DAY	ANGL	INJ C	Disregarded stop sign
03/05/01	10.30	RAIN WET DAY	REAR	PDO	Other improper driving
01/02/99	10.31	FOG WET DARK	TURN	INJ C	Failure to yield right-of-way; left turn from driveway
12/13/03	10.36	CLDY WET DARK	TURN	PDO	Failure to yield right-of-way
09/28/99	10.42	CLR DRY DAY	TURN	INJ B	Failure to yield right-of-way
2/17/99	10.48	CLR DRY DAY	TURN	INJ C	Failure to yield right-of-way; entering driveway

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
10/11/01	10.48	RAIN WEST DARK	REAR	INJ B	Following too closely; excessive speed
05/15/01	10.50	CLDY DRY DAY	REAR	INJ C	Improper turn entering driveway
09/15/03	10.57	CLR DRY DAY	REAR	INJ C	Improper stop; following too closely
01/27/99	10.58 Northridge	CLR DRY DAY	TURN	PDO	Failure to yield right-of-way
08/23/99	10.58 Northridge	CLR DRY DAY	TURN	INJ C	Failure to yield right-of-way; entering from driveway
10/31/02	10.58 Northridge	CLR DRY DUSK	TURN	INJ A/B	Failure to yield right-of-way
03/10/03	10.58 Northridge	CLR DRY DAY	REAR	PDO	Improper stop; following too closely
07/25/03	10.58 Northridge	CLR DRY DAY	TURN	INJ B	Failure to yield right-of-way; cyclist
10/28/03	10.58 Northridge	CLR DRY DAY	TURN	INJ C	Failure to yield right-of-way
10/23/02	10.63	CLR DRY DAY	REAR	PDO	Following too closely
06/28/01	10.75	CLR DRY DUSK	REAR	INJ C	Following too closely
06/04/99	10.80	CLR DRY DAY	REAR	PDO	Failed to stop; inadequate or no brakes
06/09/03	10.86	CLR DRY DAY	TURN	INJ C	Failure to yield right-of-way
1/11/99	10.87	CLR DRY DARK	TURN	PDO	Excessive speed

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
12/05/99	10.88	CLR DRY DLIT	TURN	PDO	Improper left turn in front of traffic
11/30/03	10.88	CLR DRY DAY	TURN	PDO	Failure to yield right-of-way
12/03/03	10.88	CLDY DRY DLIT	TURN	PDO	Improper turning maneuver; driving on wrong side of road.
12/02/00	10.89	FOG WET DARK	FIX	PDO	Speed too fast for conditions
11/19/01	10.89	RAIN WET DAY	REAR	PDO	Other improper action
09/18/03	10.89	CLR DRY DAY	REAR	INJ C	Following too closely
02/26/02	10.98	CLR DRY DAY	REAR	PDO	Following too closely; excessive speed
06/02/99	11.11 Cheryl	CLR DRY DAY	TURN	PDO	Improper left turn entering driveway
07/19/99	11.11 Cheryl	CLR DRY DAY	REAR	INJ C	Improper stop and following too closely
09/24/99	11.11 Cheryl	CLR DRY DAY	TURN	PDO	Failure to yield right-of-way; exiting left from driveway
02/04/00	11.11 Cheryl	CLDY DRY DAY	TURN	PDO	Improper left turn
05/10/00	11.11 Cheryl	CLR DRY DAY	TURN	PDO	Improper turn from wrong lane
03/15/01	11.11 Cheryl	CLDY DRY DUSK	REAR	INJ C	Following too closely
03/17/01	11.11 Cheryl	RAIN WET DAY	ANGL	INJ C	Failure to yield right-of-way

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
09/14/01	11.11 Cheryl	CLR DRY DAY	ANGL	PDO	Failure to yield right-of-way
10/09/02	11.11 Cheryl	CLR DRY DAY	TURN	INJ A	Obscured vehicle; failure to yield right-of-way
11/04/02	11.11 Cheryl	CLR DRY DLIT	ANGL	PDO	Failure to yield right-of-way
05/14/03	11.11 Cheryl	CLR DRY DAY	TURN	INJ A/B/C	Failure to yield right-of-way; entering highway
11/20/03	11.11 Cheryl	RAIN WET DUSK	TURN	PDO	Failure to yield right-of-way
02/20/02	11.12	CLR DRY DAY	REAR	PDO	Driver distracted; excessive speed
02/07/03	11.12	CLR DRY DAY	TURN	INJ C	Improper left turn from drive way
05/07/03	11.12	CLR DRY DAY	REAR	INJ B/C	Following too close
09/04/03	11.12	CLR DRY DAY	TURN	PDO	Failed to avoid stopped vehicle
11/15/03	11.12	CLR DRY DAY	REAR	INJ C	Following too closely
02/12/99	11.13	CLDY DRY DAY	REAR	INJ C	Following too closely
01/21/00	11.13	RAIN WET DUNL	REAR	PDO	Improper lane; failure to yield right-of-way
02/18/00	11.13	CLR DRY DAY	REAR	PDO	Following too closely
01/31/01	11.13	CLR DRY DAY	REAR	PDO	Other improper action

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
12/09/01	11.13	RAIN WET DAY	REAR	INJ C	Following too closely
09/08/02	11.13	CLR DRY DAY	REAR	PDO	Following too closely
12/04/02	11.13	CLR DRY DAY	TURN	PDO	Failure to yield right-of-way; exiting left from driveway
12/12/02	11.13	CLDY DRY DLIT	REAR	PDO	Distracted driver; other improper action
08/08/03	11.13	CLR DRY DLIT	TURN	PDO	Improper turn from wrong lane; entering driveway
7/31/99	11.14 Fern Valley	CLR DRY DAY	REAR	PDO	Other improper action
01/22/00	11.14 Fern Valley	CLDY DRY DAY	ANGL	PDO	Disregarded signal
02/01/00	11.14 Fern Valley	CLR DRY DAY	REAR	PDO	Other improper action
2/18/00	11.14 Fern Valley	CLR DRY DAY	REAR	PDO	Following too closely
03/10/00	11.14 Fern Valley	CLDY DRY DAY	TURN	INJ B	Left in traffic entering driveway; failure to yield right-of way
05/04/00	11.14 Fern Valley	CLR DRY DAY	TURN	PDO	Right turn from wrong lane; following too closely
01/30/01	11.14 Fern Valley	CLR DRY DAY	TURN	PDO	Left turn in traffic; failure to yield right-of-way
03/06/01	11.14 Fern Valley	CLR DRY DAY	TURN	PDO	Improper left turn in traffic
05/02/01	11.14 Fern Valley	CLR DRY DAY	TURN	PDO	Disregarded signal

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
06/28/01	11.14 Fern Valley	CLR DRY DAY	TURN	PDO	Failure to yield right-of-way
06/30/01	11.14 Fern Valley	CLR DRY DAY	TURN	INJ C	Improper left turn in traffic
11/06/01	11.14 Fern Valley	CLR DRY DAY	TURN	PDO	Disregarded signal
01/16/02	11.14 Fern Valley	CLR DRY DAY	PED	INJ C	Failure to yield right-of-way
01/17/02	11.14 Fern Valley	CLR DRY DLIT	BACK	PDO	Improper backing
02/24/02	11.14 Fern Valley	CLR DRY DLIT	TURN	PDO	Distracted driver; other improper action
02/28/02	11.14 Fern Valley	CLR DRY DLIT	TURN	PDO	Failure to yield right-of-way exiting driveway
06/10/02	11.14 Fern Valley	CLR DRY DAY	TURN	INJ C	Improper left turn in traffic
09/05/02	11.14 Fern Valley	CLR DRY DAY	TURN	INJ C	Improper left turn in traffic
09/27/02	11.14 Fern Valley	CLR DRY DAY	REAR	INJ C	Following too closely
10/08/02	11.14 Fern Valley	CLR DRY DAY	REAR	INJ B	Following too closely
11/17/02	11.14 Fern Valley	CLR DRY DAY	REAR	INJ B	Driving under the influence
12/11/02	11.14 Fern Valley	RAIN WET DLIT	TURN	PDO	Improper left turn in traffic
05/20/03	11.14 Fern Valley	CLR DRY DLIT	REAR	INJ B	Following to closely

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
07/31/99	11.15 Fern Valley	CLR DRY DAY	REAR	PDO	Other improper action
08/25/99	11.15 Fern Valley	CLR DRY DAY	TURN	INJ B	Left turn in traffic entering driveway; failure to yield right-of-way
06/14/00	11.15 Fern Valley	CLR DRY DAY	REAR	INJ C	Other improper action
01/15/02	11.15 Fern Valley	CLR DRY DUSK	REAR	PDO	Other improper action
03/11/02	11.16	RAIN WET DLIT	FIX	PDO	Violation of Basic Rule exiting driveway
10/06/00	11.18	CLR DRY DAY	TURN	PDO	Failure to yield right-of-way; exiting left from driveway
11/14/02	11.18	CLR DRY DAY	PED	INJ C	Pedestrian improperly in roadway
07/15/03	11.21	CLR DRY DAY	REAR	INJ C	Inattention; failed to slow down for stopped vehicle
06/04/99	11.23 Bolz	CLR DRY DAY	TURN	PDO	Failure to yield right-of-way
06/14/00	11.23 Bolz	CLR DRY DAY	TURN	INJ B	Bicycle - Failure to yield right-of-way to vehicle
05/02/01	11.23 Bolz	CLDY DRY DAY	TURN	PDO	Cut corner; improper left turn
09/21/01	11.23 Bolz	CLR DRY DAY	TURN	INJ B	Failure to yield right-of-way to bicycle
03/10/03	11.24 Bolz	CLR DRY DAY	ANGL	PDO	Failure to yield right-of-way
10/14/03	11.28	CLR DRY DAY	REAR	PDO	Following too closely

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
04/13/99	11.30	CLR DRY DAY	REAR	INJ B	Driver distracted by cell phone; other improper action
02/01/00	11.34	CLR DRY DAY	TURN	PDO	Left turn in traffic entering driveway; failure to yield right-of-way
10/20/00	11.36	RAIN WET DAY	REAR	INJ B	Distracted driver; other improper action
6/22/03	11.36	CLR DRY DAY	TURN	PDO	Failure to yield right-of-way
12/10/03	11.36	CLDY WET DLIT	PED	INJ A	Other improper action
11/29/00	11.37	RAIN WET DLIT	REAR	INJ C	Failure to yield right-of-way
4/26/99	11.38	CLR DRY DAY	REAR	INJ C	Other improper action
9/22/99	11.38	CLR DRY DAY	REAR	INJ B	Excessive speed
11/30/99	11.38	CLR DRY DAY	TURN	PDO	Fail to use turn signal
02/28/01	11.38	CLDY DRY DAY	PED	INJ B	Failure to yield right-of-way
04/06/99	11.39	CLR DRY DAY	REAR	PDO	Following too closely
09/21/01	11.23 Bolz	CLR DRY DAY	TURN	INJ B	Failure to yield right-of-way to bicycle
03/10/03	11.24 Bolz	CLR DRY DAY	ANGL	PDO	Failure to yield right-of-way
10/14/03	11.28	CLR DRY DAY	REAR	PDO	Following too closely

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
04/13/99	11.30	CLR DRY DAY	REAR	INJ B	Driver distracted by cell phone; other improper action
02/01/00	11.34	CLR DRY DAY	TURN	PDO	Left turn in traffic entering driveway; failure to yield right-of-way
10/20/00	11.36	RAIN WET DAY	REAR	INJ B	Distracted driver; other improper action
6/22/03	11.36	CLR DRY DAY	TURN	PDO	Failure to yield right-of-way
12/10/03	11.36	CLDY WET DLIT	PED	INJ A	Other improper action
11/29/00	11.37	RAIN WET DLIT	REAR	INJ C	Failure to yield right-of-way
4/26/99	11.38	CLR DRY DAY	REAR	INJ C	Other improper action
9/22/99	11.38	CLR DRY DAY	REAR	INJ B	Excessive speed
11/30/99	11.38	CLR DRY DAY	TURN	PDO	Fail to use turn signal
02/28/01	11.38	CLDY DRY DAY	PED	INJ B	Failure to yield right-of-way
04/06/99	11.39	CLR DRY DAY	REAR	PDO	Following too closely
06/19/99	11.47 4 <sup>th</sup> St SB 99	CLR DRY DAY	ANGL	INJ C	Failure to yield right-of-way
04/26/00	11.47 4 <sup>th</sup> St SB 99	CLR DRY DLIT	TURN	INJ B	Improper turn from wrong lane
07/01/00	11.47 4 <sup>th</sup> St SB 99	CLR DRY DAY	ANGL	INJ A/C	Failed to stop at stop sign

<b>Date</b>	<b>Milepoint/ Location</b>	<b>Weather/ Surface/ Light<sup>1</sup></b>	<b>Type<sup>2</sup></b>	<b>Severity<sup>3</sup></b>	<b>Error and/or Cause</b>
10/23/00	11.47 4 <sup>th</sup> St SB 99	CLR DRY DAY	TURN	PDO	Improper turn in front of oncoming traffic
03/09/01	11.49 4 <sup>th</sup> St SB 99	CLR DRY DAY	ANGL	INJ B	Failure to yield right-of-way
05/31/01	11.49 4 <sup>th</sup> St SB 99	CLR DRY DAY	PED	INJ B	Disregarded flagger; hit worker
11/17/03	11.45 4 <sup>th</sup> St NB 99	CLR DRY DAY	TURN	PDO	Improper turn from wrong lane; entering driveway
06/24/02	11.49 4 <sup>th</sup> St NB 99	CLR DRY DAY	TURN	PDO	Improper turn from wrong lane
01/19/99	11.50 4 <sup>th</sup> St NB 99	CLDY WET DAY	TURN	PDO	Failure to yield right-of-way
09/12/01	11.50 4 <sup>th</sup> St NB 99	CLR DRY DAY	TURN	PDO	Improper turn from wrong lane
09/08/03	11.51	CLR DRY DAY	SS-O	PDO	Improper lane change
02/02/03	11.53	CLR WET UNK	REAR	INJ B	Failed to maintain line; driver distracted
08/19/01	11.65	CLR DRY DAY	TURN	PDO	Improper turn; hit parked vehicle
05/07/99	11.66 1 <sup>st</sup> St SB 99	CLR DRY DAY	SS-O	PDO	Improper lane change
04/18/99	11.67 1 <sup>st</sup> St SB 99	CLDY DRY DAY	ANGL	PDO	Failure to yield right-of-way
06/14/00	11.67 1 <sup>st</sup> St SB 99	CLR DRY DAY	ANGL	PDO	Failure to yield right-of-way
06/13/01	11.67 1 <sup>st</sup> St SB 99	CLR DRY DUSK	TURN	INJ C	Improper turn from wrong lane

Date	Milepoint/ Location	Weather/ Surface/ Light <sup>1</sup>	Type <sup>2</sup>	Severity <sup>3</sup>	Error and/or Cause
11/24/01	11.67 1 <sup>st</sup> St SB 99	RAIN WET DUSK	ANGL	PDO	Improper turn from wrong lane
11/13/02	11.67 1 <sup>st</sup> St SB 99	CLR DRY DAY	TURN	PDO	Improper turn from wrong lane
04/10/01	11.69 1 <sup>st</sup> St NB 99	CLDY DRY DAY	FIX	FAT	Excessive speed for conditions; lost control
09/16/00	11.70 1 <sup>st</sup> St NB 99	CLR DRY DAY	TURN	PDO	Improper turn from wrong lane

<sup>1</sup>CLR – Clear; CLDY – Cloudy; DUNL – Dark Unlit; DLIT – Dark-Lit; UNK - Unknown

<sup>2</sup>ANGL – Angle Collision; BACK – Backing Collision; FIX – Fixed Object Collision; HEAD – Head-on Collision; SS-M- Side-swipe Meeting; REAR – Rear-end Collision; TURN – Turning Collision.

<sup>3</sup>PDO – Property Damage Only; INJ A – Severe Injury; INJ B – Moderate Injury; INJ C- Minor Injury

## **APPENDIX B – TRAFFIC DEVELOPMENT**

## **Traffic Counts**

The 2004 30<sup>th</sup> Highest Hour Volumes used in this analysis were developed mainly using 14-hour manual counts. A number of peak hour counts were obtained throughout the project for refining specific locations. Table B1 shows the location and date of the counts.

**Table B1: Count Locations**

<b>Location</b>	<b>Duration</b>	<b>Date</b>
OR 99 & South Stage Rd	14-hour	06/05/04
OR 99 & East Glenwood Dr	14-hour	10/22/04
OR 99 & Northridge Terrace	14-hour	10/22/04
OR 99 & Cheryl Ln	14-hour	03/05/04
OR 99 & Ray's Food Place/ Fern Valley Rd	14-hour	03/29/04
OR 99 & Bolz Rd	14-hour	03/19/04
OR 99 Driveway Counts – Coleman Creek to Bolz Ln	1-hour	09/07/05
OR 99 SB & 4 <sup>th</sup> St	14-hour	10/15/04
OR 99 SB & 1 <sup>st</sup> St	14-hour	10/08/04
OR 99 NB & 4 <sup>th</sup> St	14-hour	10/15/04
OR 99 NB & 1 <sup>st</sup> St	14-hour	10/08/04
Fern Valley Rd Driveway Counts – OR 99 to Bear Creek	1-hour	09/07/05
Fern Valley Rd & East Bolz Ln	14-hour	03/19/04
Fern Valley Rd & Luman Rd	14-hour	03/03/04
Fern Valley Rd & I5 SB Ramp Terminal	14-hour	03/24/04
Fern Valley Rd & I5 NB Ramp Terminal	14-hour	03/12/04
Fern Valley Rd & Petro Driveways (3)	14-hour	03/12/04
Fern Valley Rd & North/South Phoenix Rd	14-hour	06/18/03
Fern Valley Rd & Breckinridge St	1-hour	04/18/07
Cheryl Ln Driveway Counts – OR 99 to Rays's Food Place	1-hour	09/07/05
East Bolz Ln Driveway Counts – OR 99 to Fern Valley Rd	1-hour	09/07/05
I5 NB & SB, south of Fern Valley Road	14-hour	10/01/04

## **30<sup>th</sup> Highest Hour Traffic Development**

The peak hour for the study area was found to be 4:00 to 5:00 pm. The 30<sup>th</sup> Highest Hour Volume occurs in the month of July. The counts were seasonally adjusted to 30<sup>th</sup> Highest Hour Volumes using two local Automatic Traffic Recorders (ATR). The Talent ATR, #15-014, was used for counts on OR 99, Fern Valley Road, N. Phoenix/S. Phoenix Road,

and the Fern Valley Interchange on-ramps. The Medford Viaduct ATR, #15-019, was used to adjust the counts at the Fern Valley off-ramps and for Interstate 5.

A growth factor was developed for the Fern Valley Road and N. Phoenix/S. Phoenix Road count. This factor was developed using the future historical volumes based on the Transportation Volume Tables (TVT) to adjust the 2003 volumes to 2004. The adjusted volumes were then balanced between the intersections.

### **Future Traffic Development**

The updated RVCOG (Rogue Valley Council of Governments) model was used for the model applications for the Fern Valley Interchange Phase 2 project. Travel demand models are a combination of mathematical equations and relationships using locally-provided existing housing and employment information to project future traffic conditions. These future traffic conditions are placed on a network which is similar to the actual roadway network.

Figure B1 shows the assumed comprehensive plan designations for Phoenix that are incorporated into the RVCOG model. Figures B2 and B3 show the population and employment percent change from 2005 to 2030 by transportation analysis zone (TAZ) which covers the analysis range in this report. The large changes in population for the SE Plan in Medford and surrounding the Fern valley Interchange especially in the northeast quadrant can be clearly seen. There are large employment changes in the lands between Phoenix and Medford, in the SE Plan area, and around the Fern Valley Interchange, again most concentrated in the northeast quadrant. Overall, most of the growth in population and employment will be in the interchange area instead of in the city core because the city core area is mostly developed.

The results using the updated RVCOG model should be consistent to the now-current RVMPO (Rogue Valley Metropolitan Planning Organization) model. The transportation analysis zone (TAZ) structure is virtually the same in the project area for both models and the base and future household and employment data intended for the RVMPO model has been integrated into the RVCOG model.

It should be noted that there will be no true “base” scenario for this project. The actual official base year of the RVCOG model is 1995 which does not have any updated information. The baseline scenarios that will be used are 2005 for the existing conditions and 2010 which matches the project build year (open to traffic). The 2005 and 2010 scenarios are treated as other future scenarios relative to the RVCOG model. The 2005 and 2010 scenarios were used to calculate the 2010 build year volumes. All model comparisons used 2010 and 2030 for the build and future years. All model scenarios used a PM Peak Hour (4-5 PM) assignment. Model modifications were limited to links and centroid connectors.

This model application effort used a variant based on the RTP (Regional Transportation Plan) Tier 1 project list. The “Tier 1” designation means that these model application volumes included all the city, county and state projects (outside of the Fern Valley Interchange) that can be funded within the next 20 years in and around Central Point, Medford and Phoenix. These projects are assumed to occur regardless of what happens at the Fern Valley Road interchange. Projects relating to improvements on the Fern Valley Road corridor were removed before model modifications began. Two (2) projects in the RTP list were removed from the 2010 and 2030 Tier 1 scenarios:

- I-5, Fern Valley Interchange, Unit 2
- Fern Valley Road, Bear Creek Bridge

The Fern Valley Interchange improvements in Tier 1 are simply additional lane capacity (4-lanes) from OR 99 to North Phoenix Road on Fern Valley Road and additional lane capacity (4-lanes) on North Phoenix Road. The capacities were reduced to reflect the current 2-lane conditions. The existing signals at the ramp terminals were kept with the existing 30 and 45 mph speeds on Fern Valley Road and North Phoenix Road, respectively. The existing centroid connectors for the NW and SW interchange quadrants remained at the same location on Fern Valley Road (approximately at the Luman Road intersection). The centroid connector serving the NE quadrant was moved to load on North Phoenix Road to simulate future development accesses.

The 2030 Tier 1 volumes assume substantial future development in the northeast quadrant of the Fern Valley Road interchange. Additionally, volumes can easily fluctuate 10% over a given week, so any comparison analysis used a 10% threshold for determining if a change makes a difference (i.e. significant). It should be noted that not every detail is large enough for a model to see relative differences between (e.g., signals, residential street alignments, or whether an interchange ramp is straight or a loop).

In order to create the 2030 design hour volumes, the RVCOG 2030 future year were post-processed using the NCHRP (National Cooperative Highway Research Council) Report 255. Model base and future year volumes are compared to develop a relative difference between scenarios. This relative difference was applied to the existing 2004 30th highest hour volumes to arrive at the 2030 design hour volumes used in the analysis. The actual model volumes cannot be directly used because the model is just mathematical relationships and needs to be tied to actual traffic volumes. The following example illustrates why models are used to report the relative change rather than absolute actual volumes.

Example:

Northbound Fern Valley Interchange off-ramp: model volume in 2005: 353 vehicles per hour (vph)

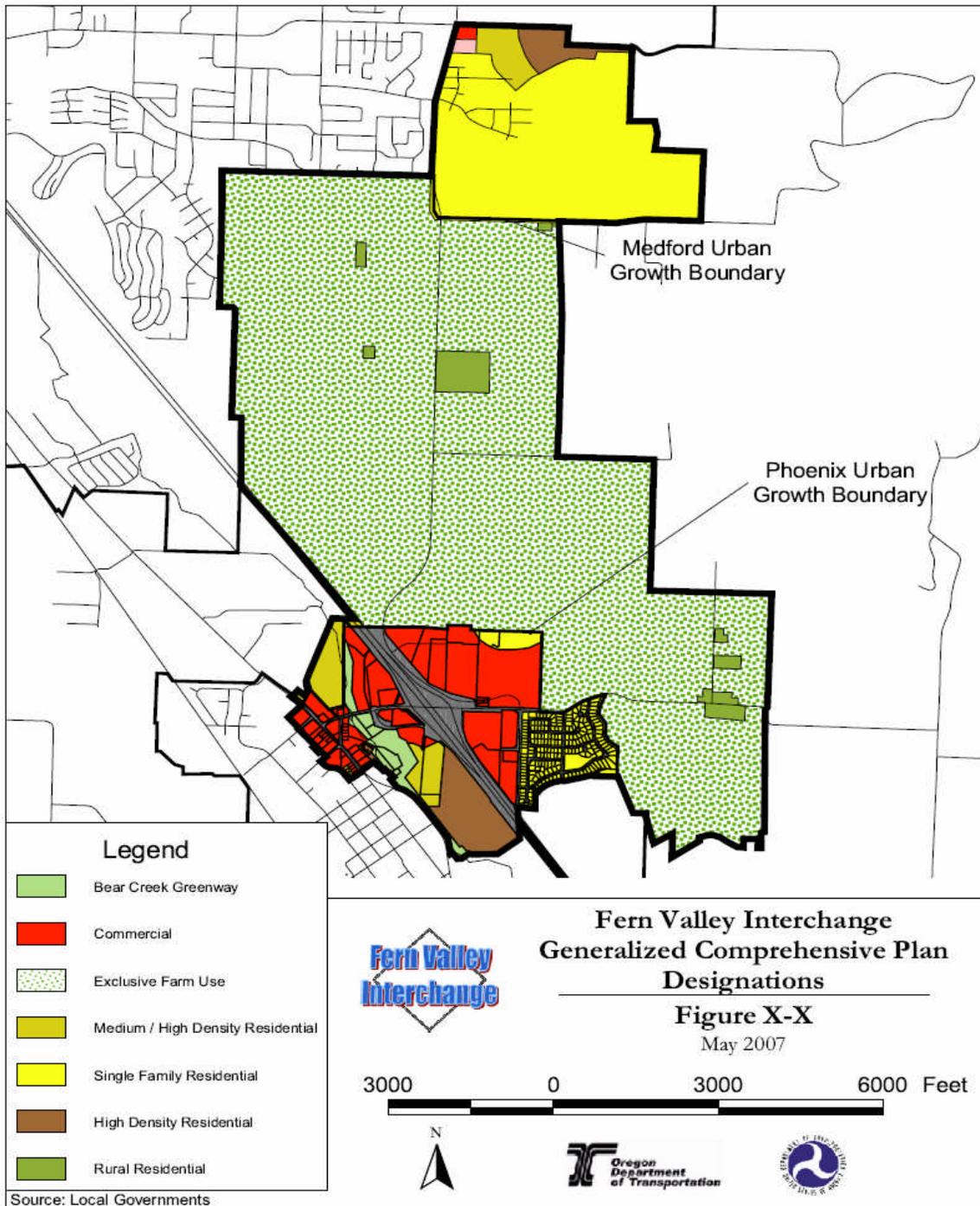
Northbound Fern Valley Interchange off-ramp: model volume in 2030: 716 vph

The relative change in model volumes on the northbound off-ramp between 2005 and 2030 =  $716 / 353 = 2.03$  (103% increase). The actual 2005 volume on the northbound off ramp is 479 vph. The actual 2030 volume on the northbound off-ramp would be  $479 \times 2.03 = 972$  vph.

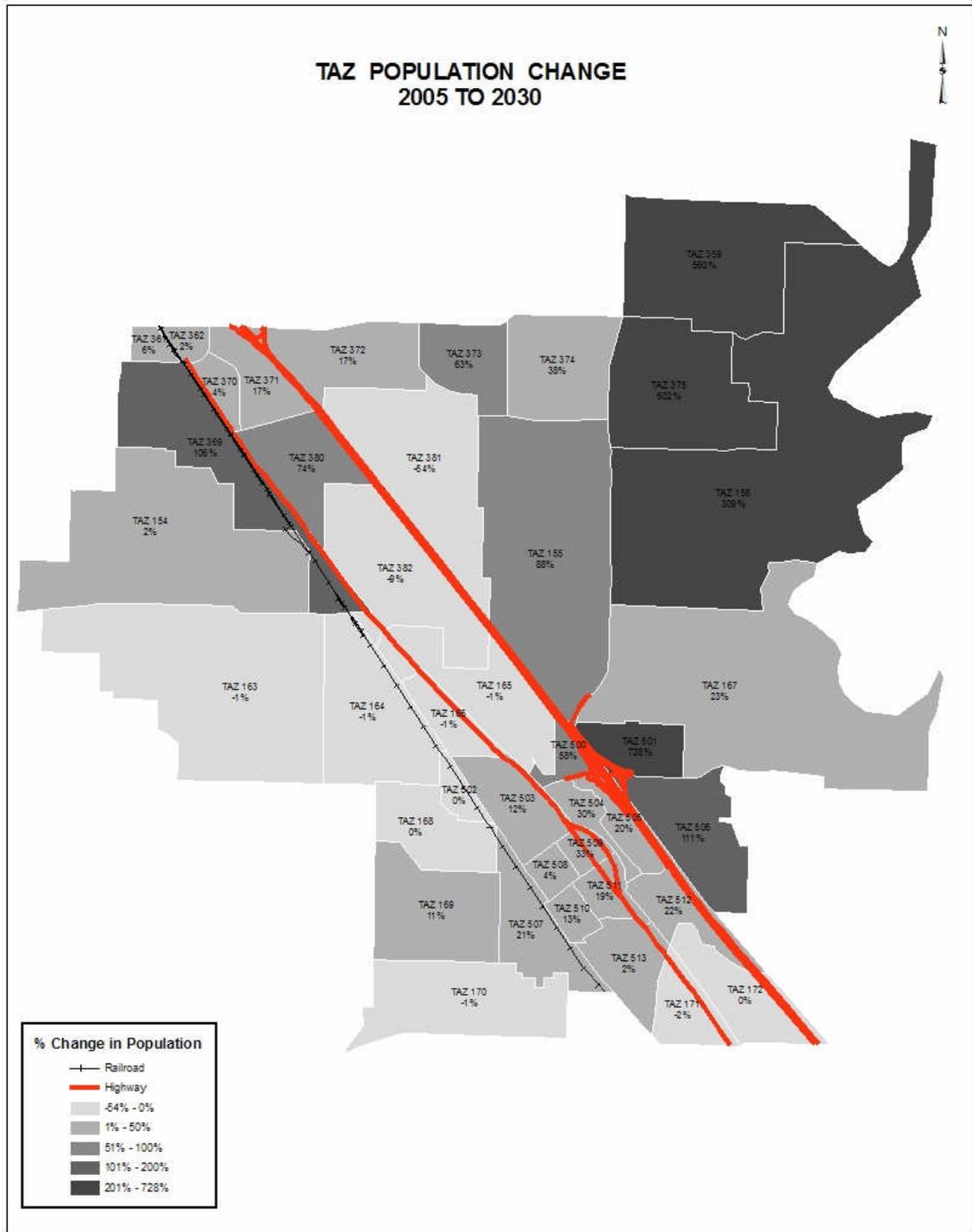
The example shows that the actual model volumes have lesser value; however the important part is the 103% increase over the next 25 years. These types of relative comparisons were used throughout the model-based analysis in this project.

In order to use the 2030 no-build future volumes for the 2030 build analysis, the difference in link volumes between the two scenarios should not be significant (less than 10% difference). The alternative screening analysis using the RVCOG model, summarized in Appendix D, found that improving the Fern Valley Road corridor to four lanes (similar to Tier 1-level improvements) caused the volumes on Fern Valley Road to increase 27%. This increase was relatively consistent across all alternatives tested. There is a large amount of traffic in the future that is diverting to other routes that upon an improvement to Fern Valley Road will return. Model runs with the widened corridor were used to develop the 2030 build future volumes.

**Figure B1: Fern Valley Interchange Generalized Comprehensive Plan Designations**



**Figure B2: TAZ Population Percent Change 2005-2030**



**Figure B3: TAZ Employment Percent Change 2005-2030**



## **APPENDIX C – YEAR 2004 EXISTING VOLUMES**

Figure C1: Year 2004 Existing 30<sup>th</sup> Highest Hour Volumes

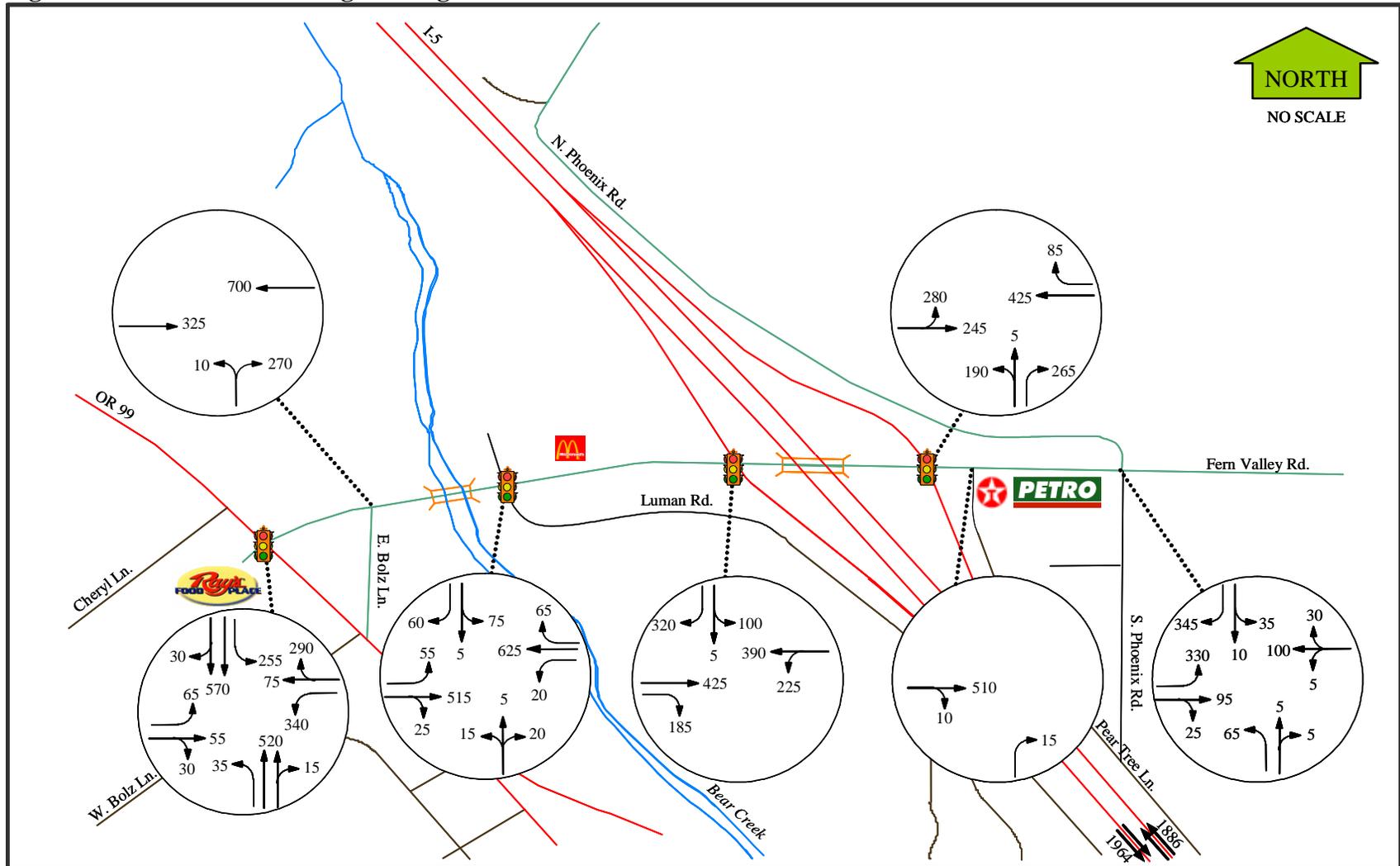


Figure C2: Year 2004 Existing 30<sup>th</sup> Highest Hour Volumes

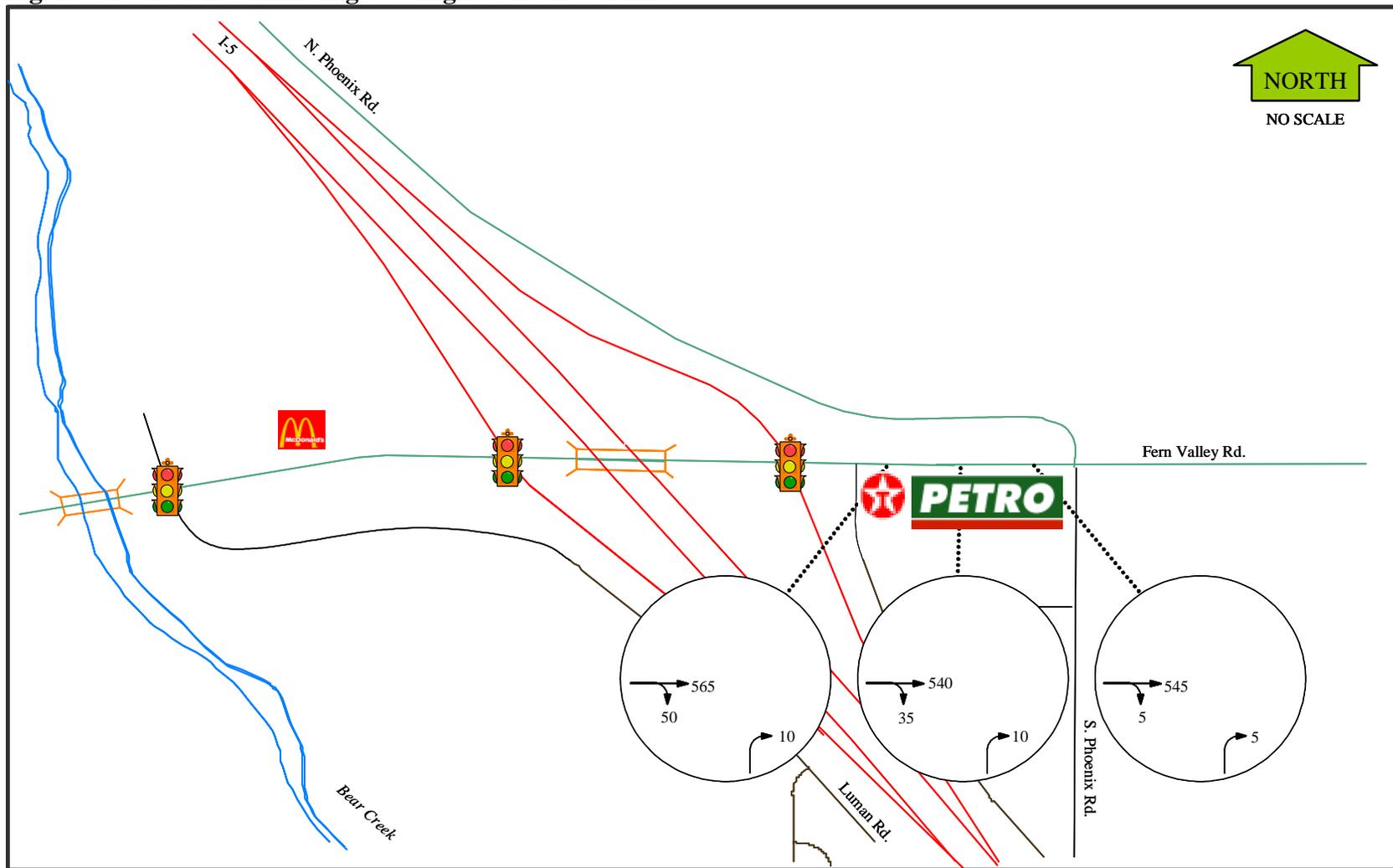
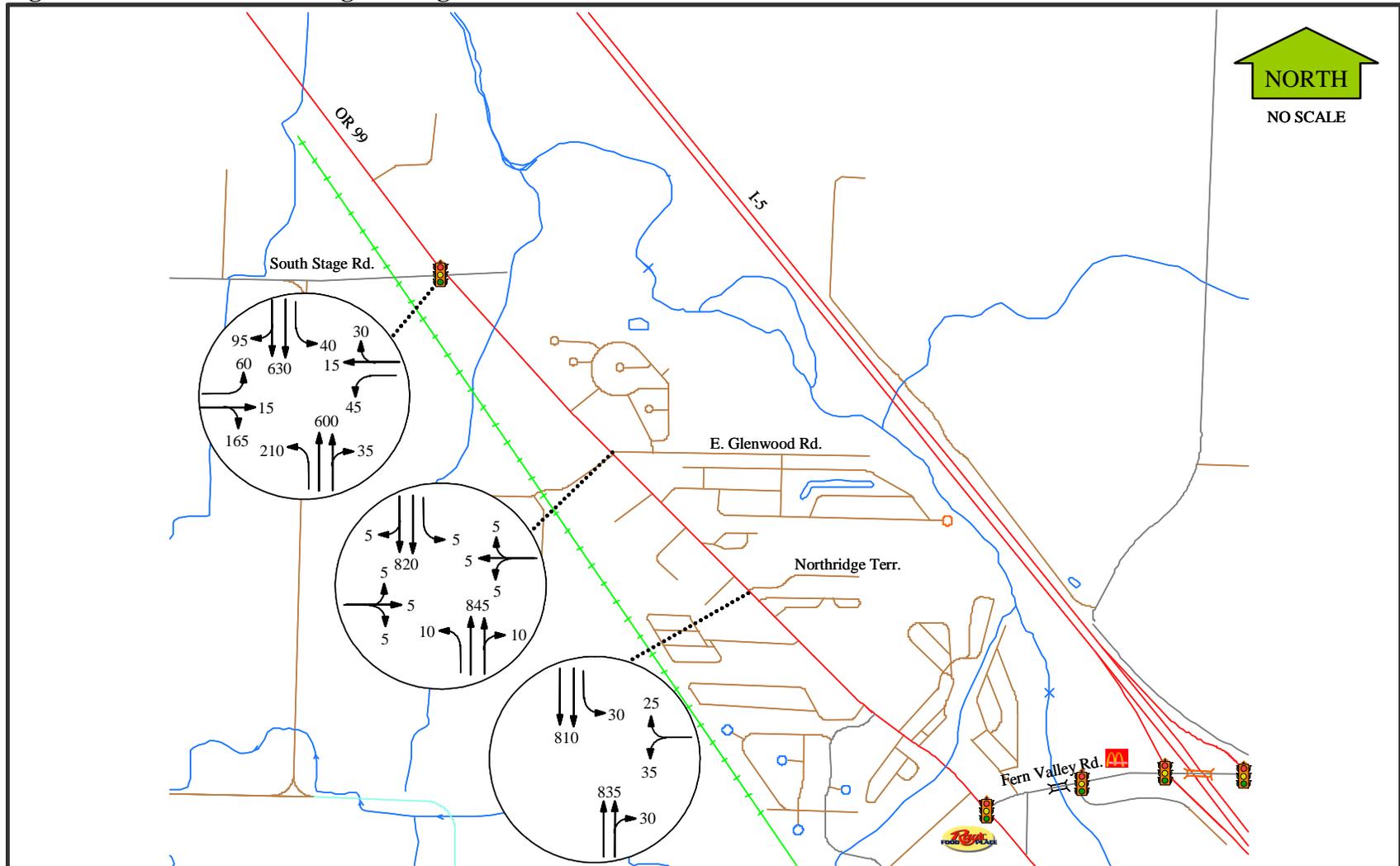
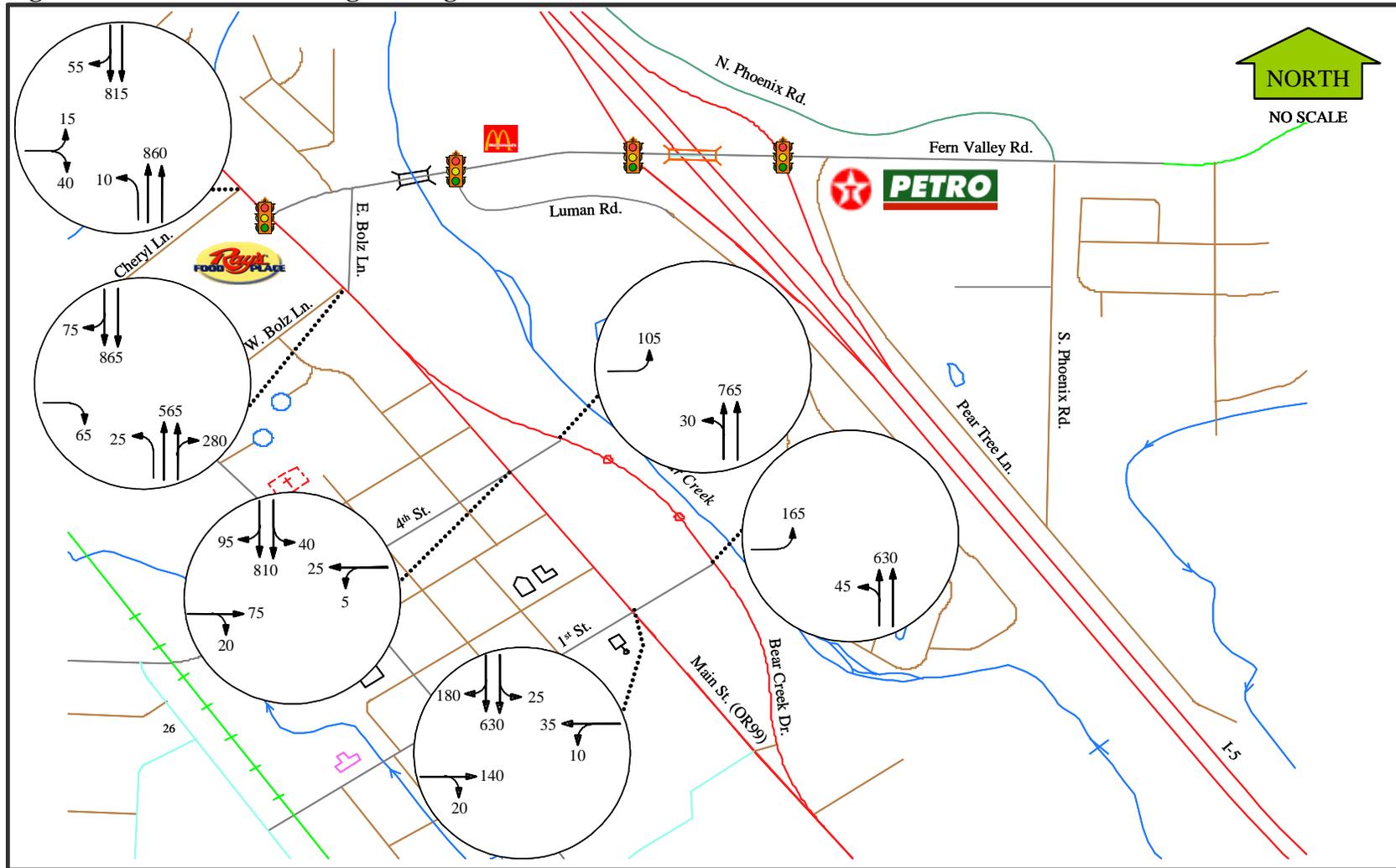


Figure C3: Year 2004 Existing 30<sup>th</sup> Highest Hour Volumes

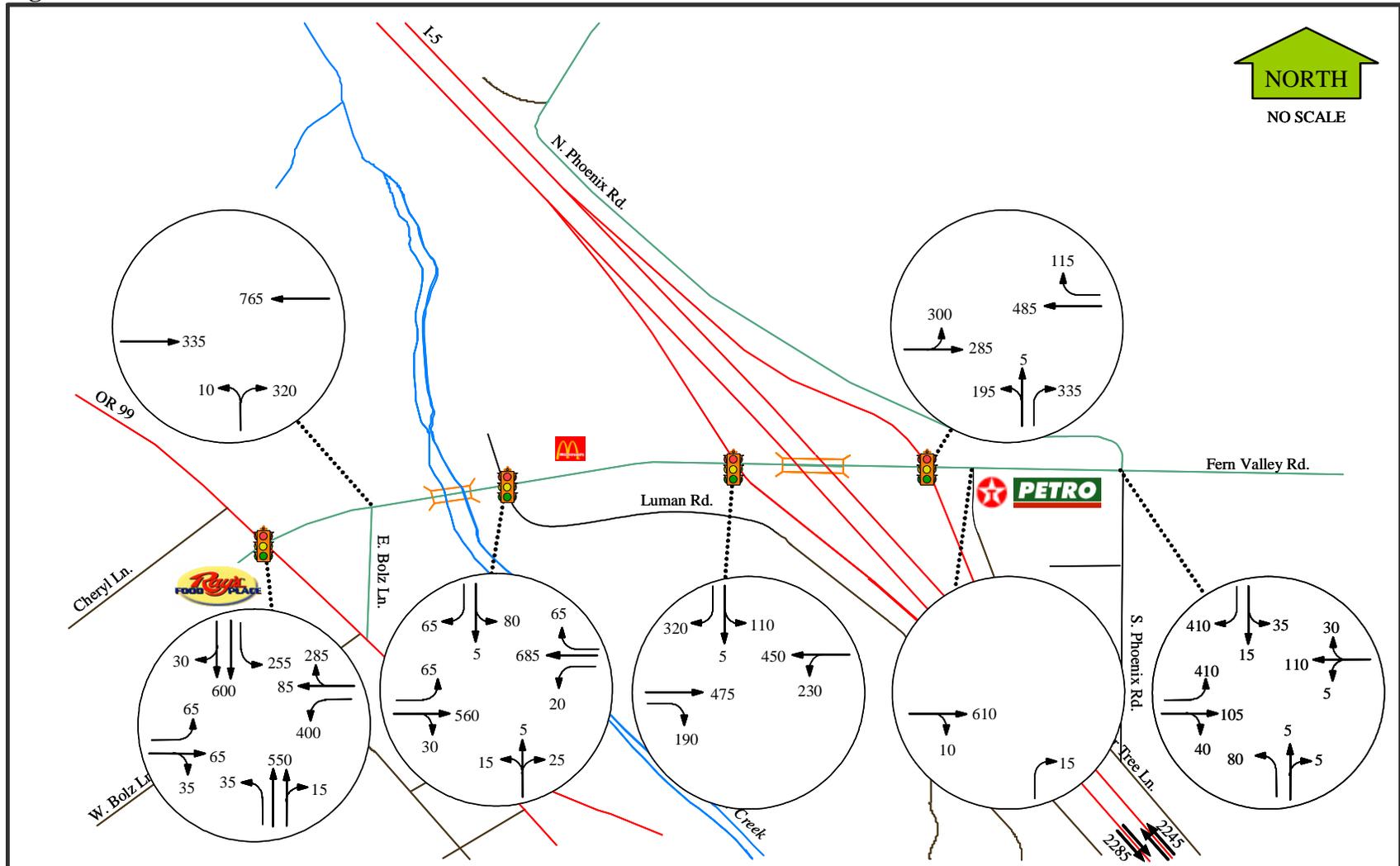


**Figure C4: Year 2004 Existing 30<sup>th</sup> Highest Hour Volumes**

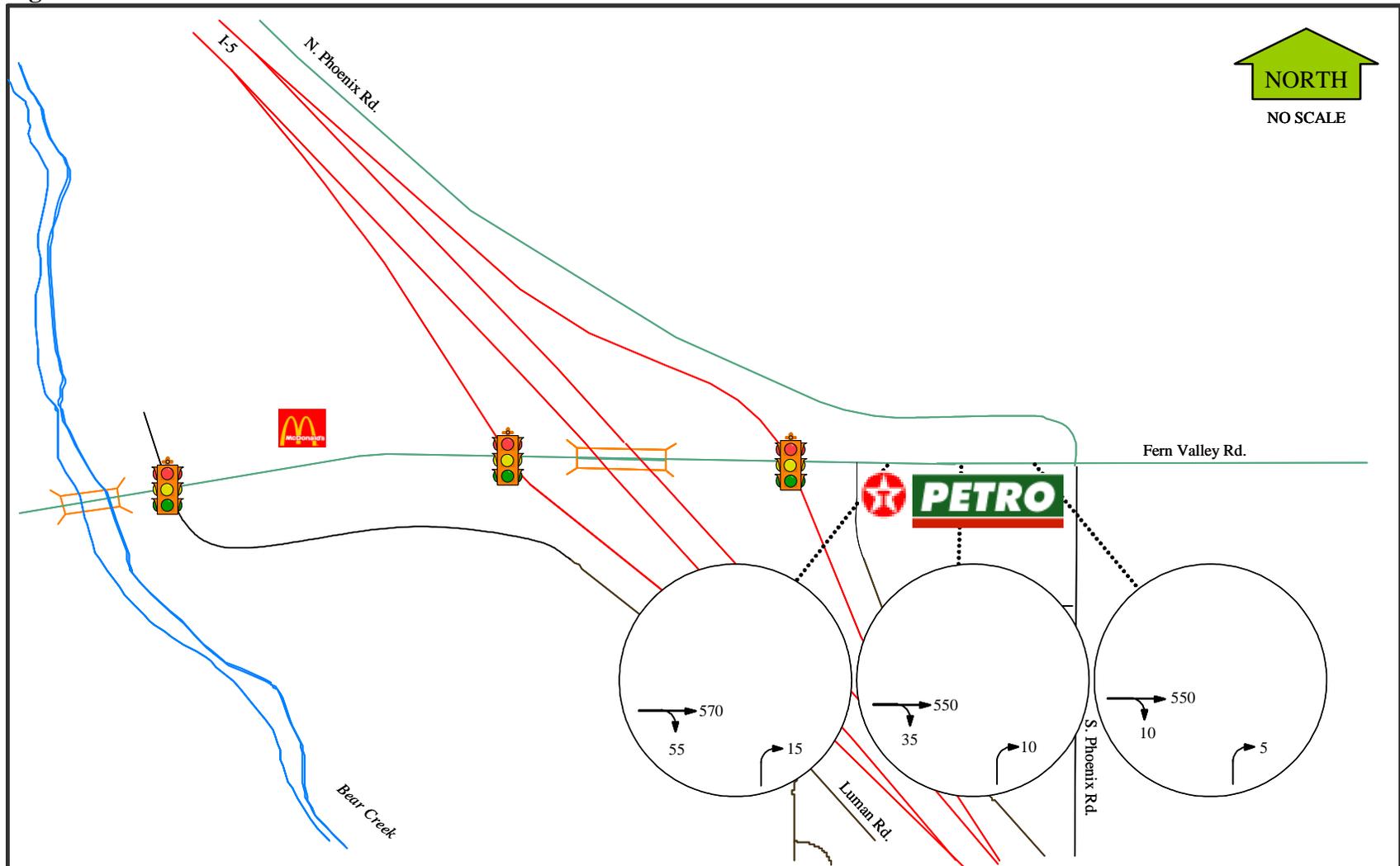


## **APPENDIX D – YEAR 2010 NO-BUILD VOLUMES**

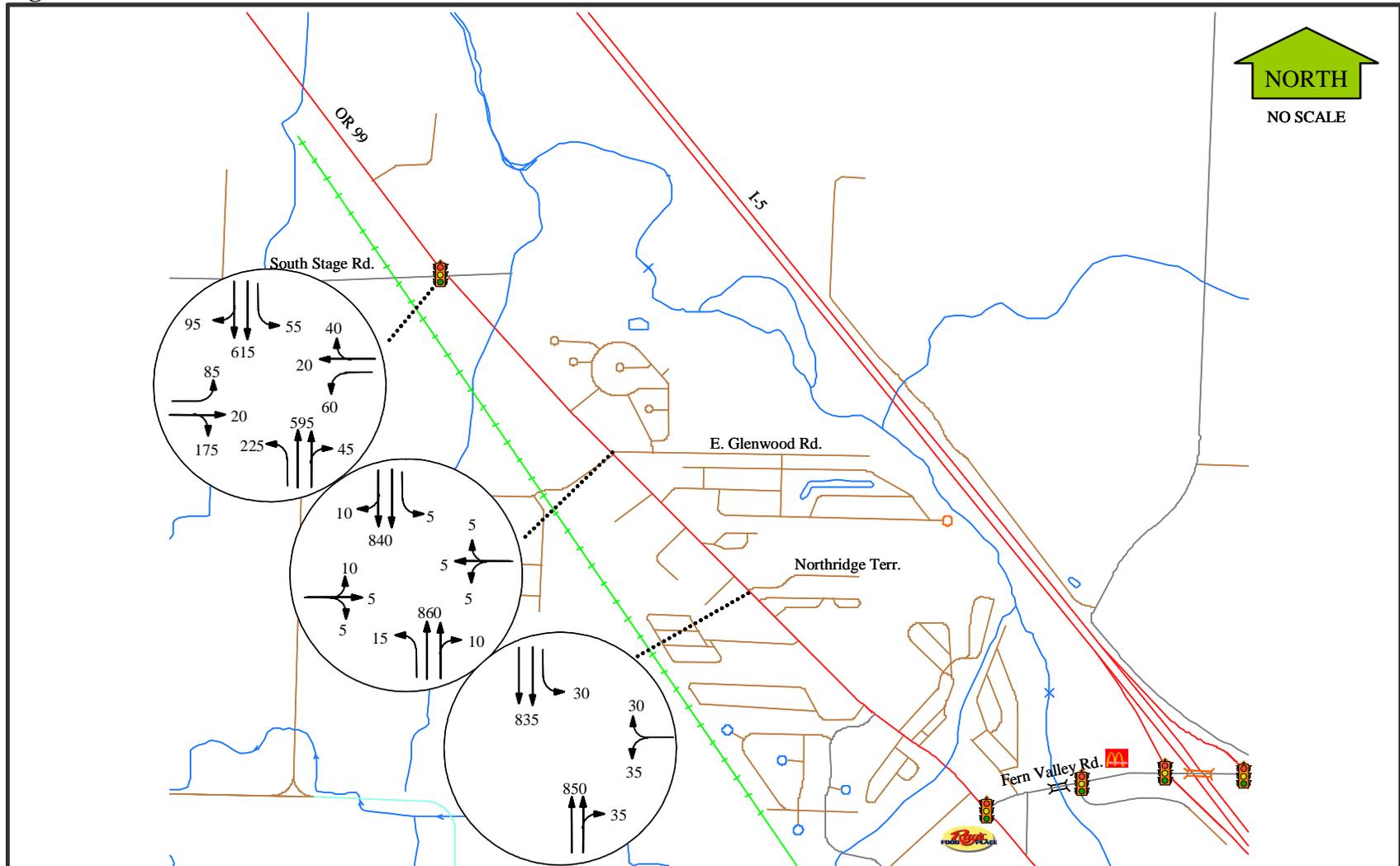
**Figure D1: Year 2010 No-Build Volumes**



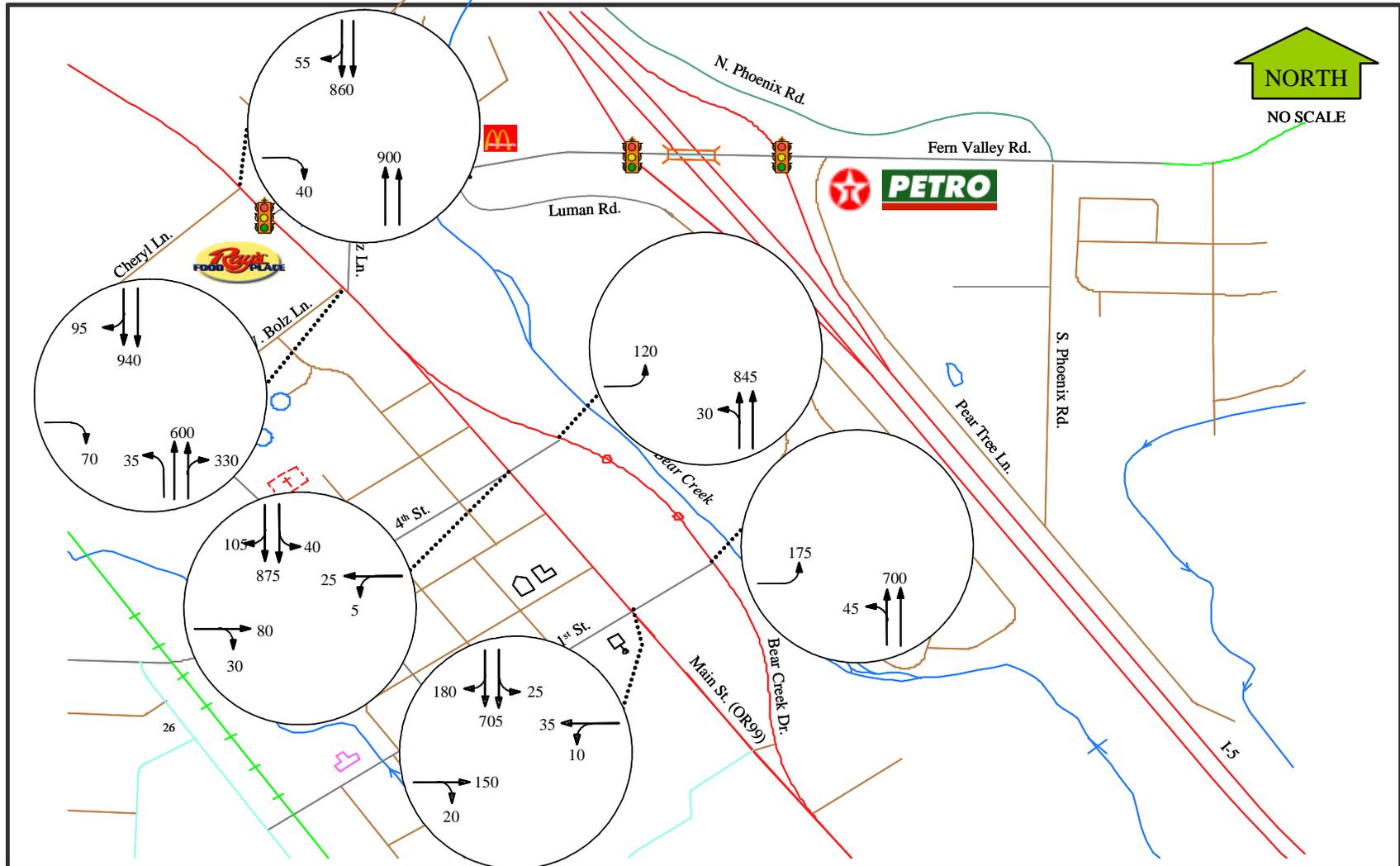
**Figure D2: Year 2010 No-Build Volumes**



**Figure D3: Year 2010 No-Build Volumes**

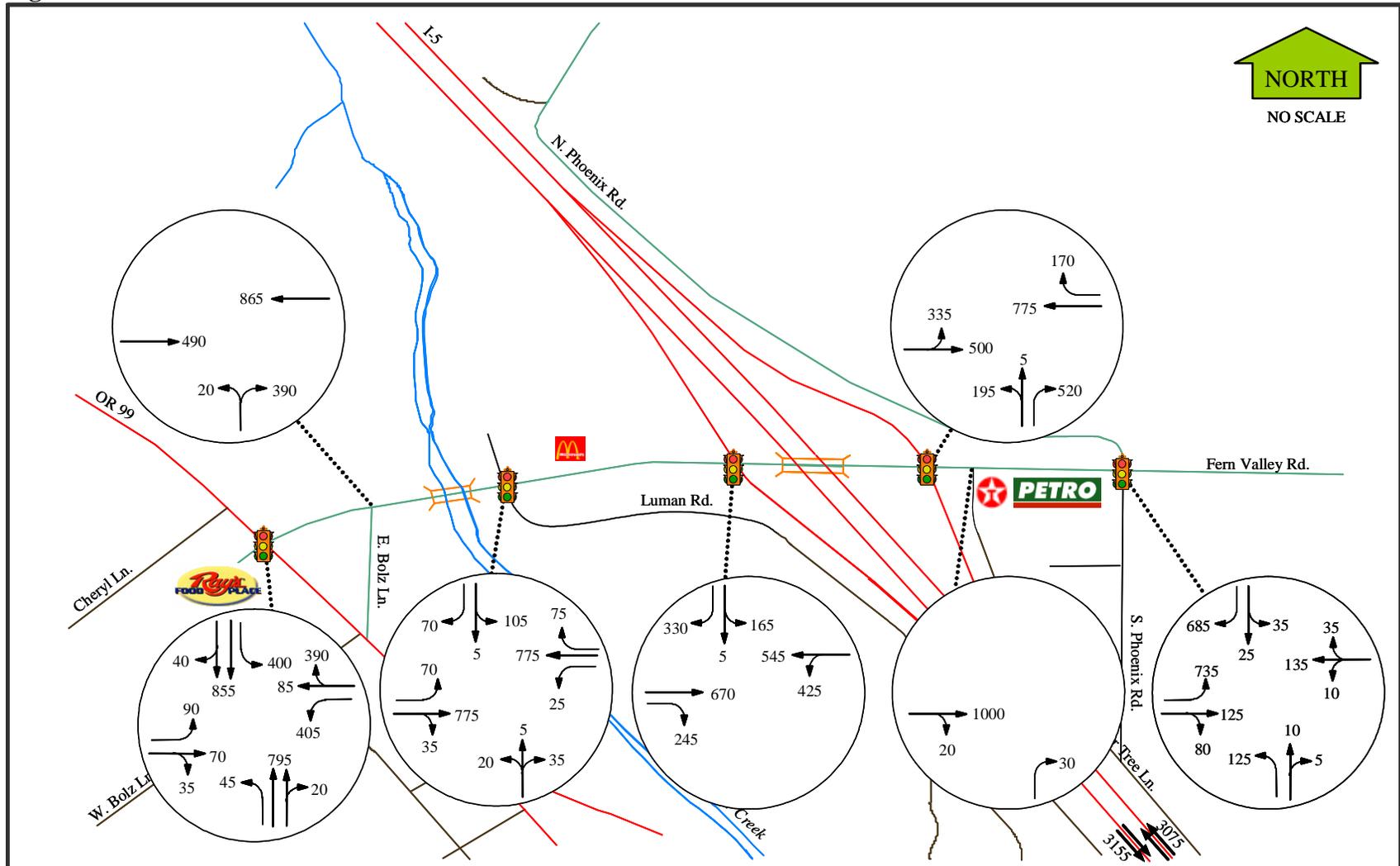


**Figure D4: Year 2010 No-Build Volumes**

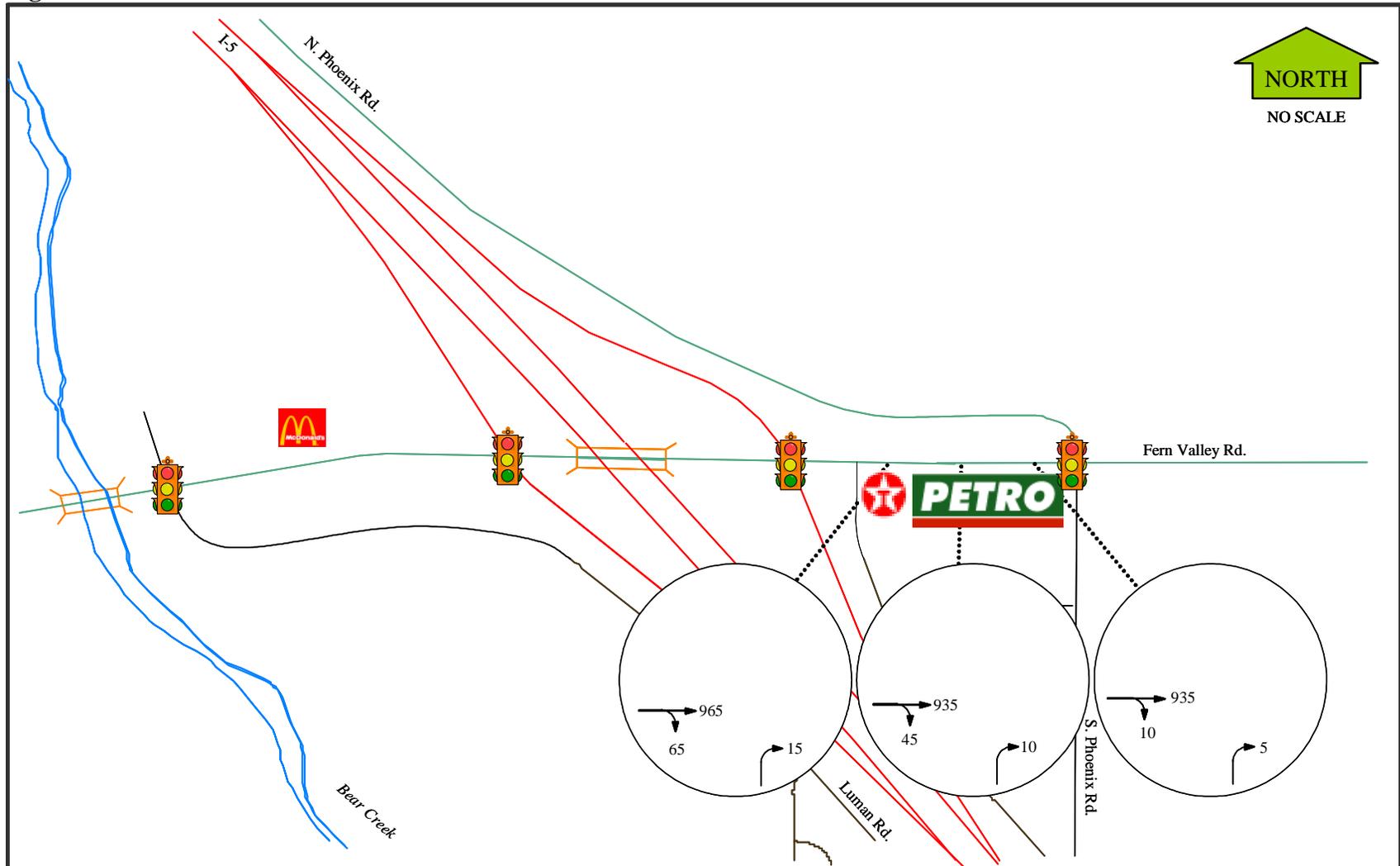


## **APPENDIX E – YEAR 2030 NO-BUILD VOLUMES**

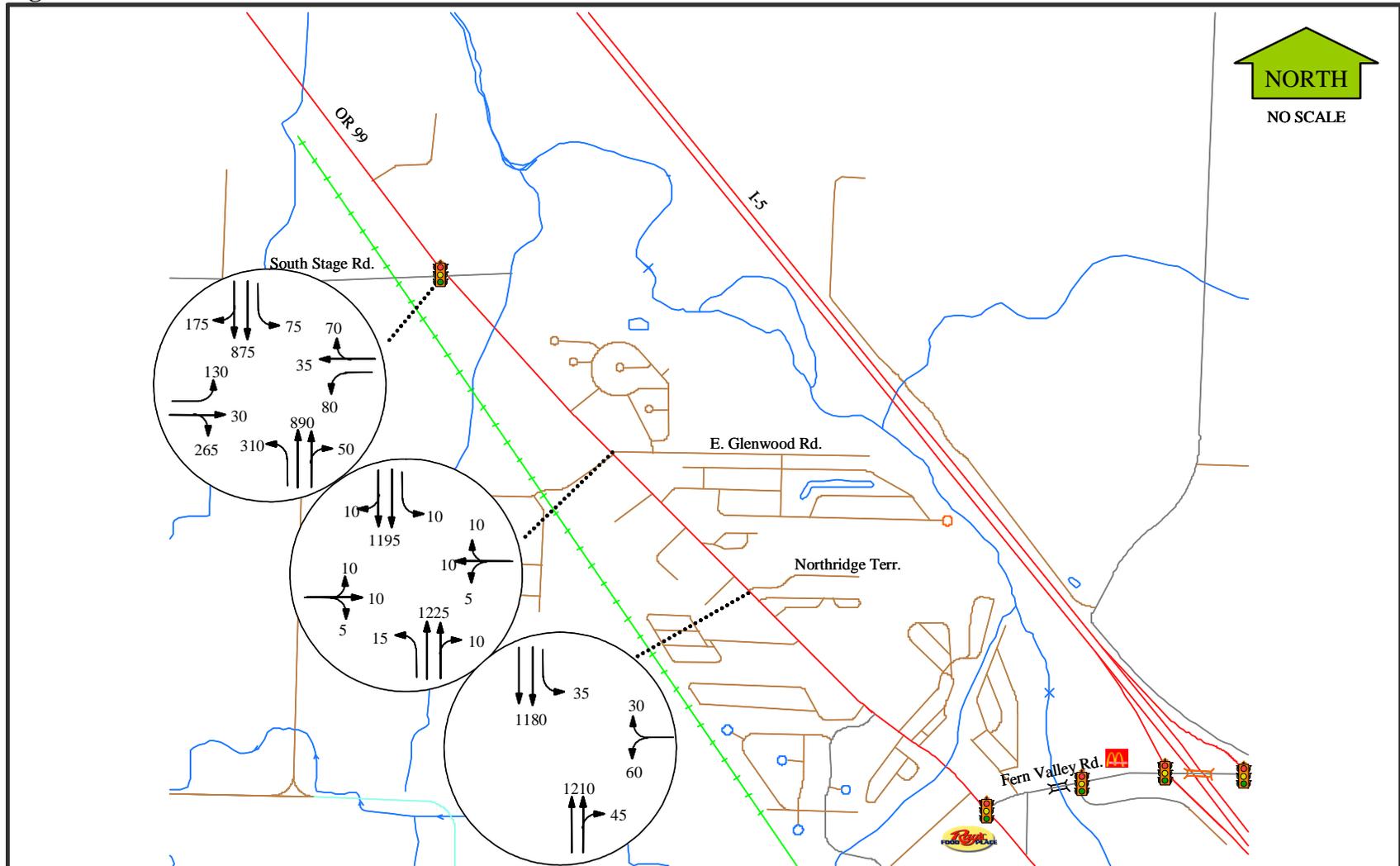
**Figure E1: Year 2030 No-Build Volumes**



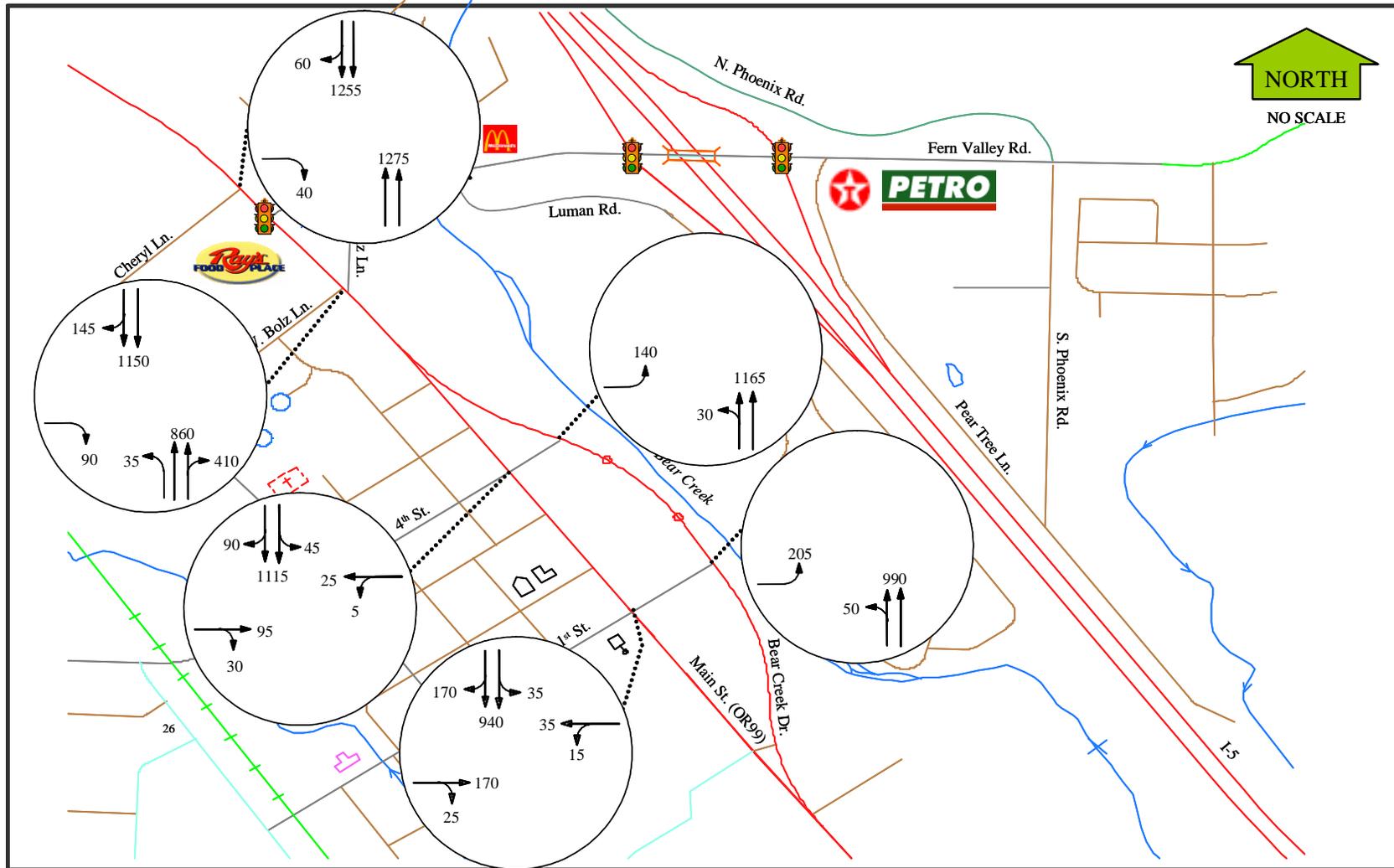
**Figure E2: Year 2030 No-Build Volumes**



**Figure E3: Year 2030 No-Build Volumes**



**Figure E4: Year 2030 No-Build Volumes**



## **APPENDIX F – ALTERNATIVE SCREENING**

This is a summary of the results from the first level of analysis of the off-system connections (options) and the interchange alternatives for the Fern Valley Interchange Phase 2 project originally shown in Technical Memorandum #1A in May 2005. This first level of analysis is intended to determine the impact of major elements of a potential alternative (e.g., how would an interchange at Old South Stage Road affect the existing Fern Valley Road corridor).

## **Option Results**

All of the options were evaluated under at least two scenarios. These two scenarios assumed that 1) no improvements occurred at the Fern Valley Road interchange and 2) a baseline improvement of widening Fern Valley Road to four lanes with a diamond-style interchange occurred. Additionally, the City of Phoenix asked ODOT to re-evaluate Option 16 which is the Fern Valley Road connection to 4<sup>th</sup> Street. This option was originally dropped earlier in the process. Table F1 shows the summary of the issues for each option and the resulting recommendation. Individual findings for each option follow.

### **Option 4 – Fern Valley Connection to Bolz Lane**

The west end of Fern Valley Road would be moved south to connect with Bolz Lane. The diagonal East Bolz Lane would be removed. Connecting Fern Valley Road to OR 99 at Bolz Lane allows easier access to Fern Valley Road from neighborhoods surrounding Bolz Lane. There are current turn restrictions at the OR 99/Bolz Lane intersection which result in limited direct access to Fern Valley Road. This option is compatible with all interchange forms. This option is recommended to be kept for further analysis.

There were no significant volume changes throughout the project area. This option is recommended to be kept mainly because the results between Options 4, 5 and the existing configuration do not significantly differ. Further analysis will be necessary to compare Option 4 from the existing and Cheryl Avenue (Option 5) connections.

### **Option 5 – Fern Valley Connection to Cheryl Avenue**

The west end of Fern Valley Road would be moved north to connect with Cheryl Avenue. The diagonal East Bolz Lane connection would be removed. The connection to Cheryl Avenue would provide easier access to OR 99 and Fern Valley Road from neighborhoods surrounding Cheryl Avenue. This option is compatible with all interchange forms. This option is recommended to be kept for further analysis.

There were no significant volume changes on Fern Valley Road. There were some localized significant reductions on the I-5 northbound on-ramp, Bolz Lane, and 4<sup>th</sup> Street, however, these areas are not enough to cause a significant difference over Option 4 ( Fern Valley Connection to Bolz Lane). This option is recommended to be kept mainly because the results between Options 4, 5 and the existing configuration do not

significantly differ. Further analysis will be necessary to compare Option 5 from the existing and Bolz Lane (Option 4) connections.

**Table F1: Option Recommendations**

Option	Issues	Recommendation
Option 4 – Fern Valley Connection to Bolz Ln	No significant reduction in volume on Fern Valley Rd. Not significantly different from existing Fern Valley Rd. Encourages use of I-5 rather than OR 99 for local trips.	Keep
Option 5 – Fern Valley Connection to Cheryl Ln	No significant reduction in volume on Fern Valley Rd. Not significantly different from existing Fern Valley Rd. Encourages use of OR 99 rather than I-5 for local trips.	Keep
Option 6 – Old South Stage Rd Overcrossing to North Phoenix Rd	Potential reduction of 10 – 15% on Fern Valley Rd with or without improvements at the Fern Valley Interchange assuming a 45 mph speed on Old South Stage Rd.	Keep
Option 8 – 1 <sup>st</sup> St Extension to Bear Lake Estates	No significant reductions on Fern Valley Rd.	Drop
Option 15 – Northridge Terr Overcrossing	Not speed sensitive because of proximity to Fern Valley Rd. Potential reduction in volume of 15-20% on Fern Valley Rd with or without improvements.	Keep
Option 16 – Fern Valley Connection to 4 <sup>th</sup> Street	<p>Best performing west-end connection as it has potential reductions of 15% on Fern Valley Rd and 10 – 30% on OR 99.</p> <p>A significant amount of traffic no longer has to use OR 99 to access the center of Phoenix as the 4<sup>th</sup> Street connects directly to downtown. Significant volume changes on local streets: Bolz Ln and Rose St drop up to two-thirds, while 1<sup>st</sup> and 4<sup>th</sup> St increase two to four times or more.</p> <p>Not compatible with a diamond-style interchange because of too-sharp curves required.</p>	Keep

### **Option 6 – Old South Stage Road Overcrossing to North Phoenix Road**

Old South Stage Road would be extended east from OR 99 crossing over I-5 to connect with North Phoenix Road. The effectiveness of the Old South Stage option relative to Fern Valley Road interchange drops as the South Medford/North Phoenix area urbanizes or as improvements are made to the Fern Valley Road corridor. This option is compatible with all interchange forms. This option is recommended to be kept for further analysis.

Option 6 was originally analyzed assuming 45 and 55 mph speeds. The 45 mph speed is consistent to current speeds on Old South Stage Road and OR 99, so the 45 mph speed is the more likely future speed assuming more urbanization will occur in the area. The slower 45 mph speed will control the results.

With or without baseline improvements on Fern Valley Road, Option 6 would likely reduce traffic on Fern Valley Road by 10 -15% if the Old South Stage Road connection is at 45 mph.

### **Option 8 – First Street Extension to Bear Lake Estates**

First Street would be extended east across Bear Creek to provide a new outlet for local Bear Lake Estates traffic to use instead of relying on Fern Valley Road. Option 8 was evaluated with and without the existing connection to Luman Road. This option is compatible with all interchange forms. Option 8 does not provide any significant volume reductions on Fern Valley Road and is recommended to be dropped from further consideration as a standalone option.

The smaller volume on Option 8 does not cause any significant reduction in traffic on Fern Valley Road with or without any improvements on Fern Valley Road. Option 8 was looked at with and without the existing Luman Road connection, but there were no significant changes to Fern Valley Road volumes. There are some significant volume changes, but only to the local downtown area from where the connection would be located. Option 8 is not needed as a standalone connection. It is only needed if roadway access to Fern Valley Road from the southwest interchange quadrant is not possible.

### **Option 15 – Northridge Terrace Overcrossing**

The Northridge Terrace Overcrossing (Option 15) would be a new east-west roadway connection using Northridge Terrace (or close to it) from OR 99 extending east to North Phoenix Road. This option is compatible with all interchange forms. Option 15 is not speed sensitive, so it reduces volumes on Fern Valley Road significantly in all scenarios and is recommended to be kept for further consideration.

The Northridge Terrace Overcrossing was originally evaluated with varying roadway speeds from 25 to 35 mph. The proximity of this connection to Fern Valley Road caused this connection not to be speed sensitive. The 25 mph speed was used in the revised

analysis to be conservative. There was a resulting 15 – 20 % volume reduction on Fern Valley Road either with or without Fern Valley Road improvements.

### **Option 16 – Fern Valley Connection to 4<sup>th</sup> Street**

The west end of Fern Valley Road would be moved south to connect with 4<sup>th</sup> Street. The diagonal East Bolz Lane connection would be removed. The connection to 4<sup>th</sup> Street would allow a direct connection to the center of Phoenix without traffic having to use OR 99. This option provides easier access to central Phoenix. However, Option 16 is not geometrically compatible with a diamond-style interchange on the existing Fern Valley Road alignment because the curves required are too sharp. Option 16 is recommended to be kept for further analysis.

Option 16 provides at least a 15% volume reduction on Fern Valley Road and 10 to 30% reduction on OR 99. Significant reductions also occur for local streets like Bolz lane or Rose Street which drop up to two-thirds of their volume. First and Fourth Streets also incur significant increases of 200% or more. This option is by far the best of the “west end” connections and is recommended to be kept for further analysis.

### **Interchange Alternative Results**

All of the interchange alternatives were evaluated on a volume, capacity, and travel time basis. The volume evaluation would indicate how much extra traffic is “attracted” to the new interchange when compared to the baseline level of improvements. The baseline level of improvements is a diamond interchange in the existing interchange location with Fern Valley Road and the southern portion of North Phoenix Road widened to four lanes (a.k.a. Baseline Diamond).

The current interchange is at capacity today and will be over capacity in the future. In the future, traffic will divert to other roadways to avoid the congestion at the Fern Valley Road interchange. If Fern Valley Road were widened, this would allow more traffic to use it than if no improvements were done. For example, about 27% more traffic will use a widened Fern Valley Road in 2030 than if no improvement were done at all. This volume evaluation would indicate if a particular alternative attracts more or less traffic than the baseline interchange alternative. However, there were no significant volume differences between all of the interchange alternatives so this evaluation is not included in Table F2 or the interchange discussions.

The capacity evaluation would indicate if certain roadway segments would be likely over capacity and if certain interchange alternatives had less capacity available than the baseline interchange alternative. The travel time evaluation would indicate the overall network efficiency of a particular alternative. The travel times were based from downtown Phoenix going through the interchange to various points north, south and east.

The alternatives were compared on a relative basis for each of the two evaluations (capacity and travel time) with the baseline level of interchange improvements. Table F2 shows the evaluated interchange alternatives and the issues surrounding each recommendation. Individual findings follow for each alternative.

### Baseline Diamond

The Baseline Diamond interchange assumes that the existing Fern Valley Road diamond interchange is rebuilt and widened to a four or five lane cross-section. The southern portion of North Phoenix Road is also assumed to be widened. The Baseline Diamond interchange alternative is recommended to be kept for now.

This alternative was used as the comparison for other alternatives; however, it does not have a consistent comparison of its own. It can only be compared to the existing interchange, but to make this an “apples-to-apples” comparison, all of the alternatives would also need to be compared to the existing conditions. All of the results would have the improvements from the existing two-lane to the four-lane Fern Valley Road within them. It is best if initial analysis only compares one variable, for example, such as speed (25 mph vs. 35 mph) rather than trying to figure out the overlapping effects of multiple variables.

**Table F2: Interchange Alternative Results**

Alternative	Issues	Recommendation
Baseline Diamond	No consistent comparisons available.	Keep for now
Partial Cloverleaf	Over capacity segments on: <ul style="list-style-type: none"> <li>• OR 99 from realigned North Phoenix Road connection and existing Fern Valley Road</li> <li>• North Phoenix Road from Fern Valley Road to I-5</li> </ul> Travel times significantly less than the Baseline Diamond alternative because of direct Fern Valley to North Phoenix Road connection.	Drop
CAC Lowry SPUI	One of the two top-performing SPUI-based alternatives.  Results are generally no different from the Baseline Diamond alternative.	Keep
CAC Lewin SPUI	One of the two top-performing SPUI-based alternatives.  Results are generally no different from the Baseline Diamond alternative.	Keep

Alternative	Issues	Recommendation
CAC Table 1 SPUI	<p>Significantly better travel times on the east of I-5 because of the direct through move for Fern Valley and North Phoenix Road traffic.</p> <p>Significantly higher v/c on North Phoenix Road however problems are unlikely.</p>	Keep
CAC Table 3 SPUI	Poorest and significantly worse travel times of all SPUI-based alternatives. Left turn from Fern Valley Road onto North Phoenix is deciding factor.	Drop
PDT Alt 1 SPUI	Poor travel time when compared to other SPUI-based alternatives. Left turn from Fern Valley Road onto North Phoenix is deciding factor.	Drop
South Stage Diamond	<p>18% of traffic using interchange is diverting from the South Medford Interchange area.</p> <p>Over capacity segments on:</p> <ul style="list-style-type: none"> <li>• Old South Stage Road between OR 99 and I-5</li> <li>• North Phoenix Road north of South Stage Road connection.</li> </ul> <p>OR 99 between South Stage Road and Fern Valley Road is approaching capacity.</p> <p>Alternative requires six east-west lanes to handle traffic flow while other alternatives can handle the flow in four lanes.</p> <p>Alternative has significantly worse volume-to-capacity ratios than the Baseline Diamond alternative.</p> <p>Alternative has the worse travel times of all the alternatives because of the long distance required to access I-5 northbound.</p>	Drop

## **Partial Cloverleaf**

The Partial Cloverleaf alternative would realign North Phoenix Road to interchange with I-5 and connect directly to OR 99. Loop on-ramps would be added in the northwest and southeast interchange quadrants. Fern Valley Road would remain as an east-west overcrossing only for local access. The Partial Cloverleaf alternative is recommended to be dropped from further consideration.

- The Partial Cloverleaf alternative has a segment of OR 99 between where the realigned North Phoenix Road would connect and the existing Fern Valley Road that is over capacity. These two major connections are only a block or two apart and more through lanes would be needed than the current four. Intersection capacities are lower than segment capacities, so the actual extent of the problem is much larger than shown. This section would be very problematic to get to work without the intersections interfering with each other. In addition, the section of North Phoenix Road from Fern Valley Road to I-5 is also over capacity, so it is recommended that this alternative be dropped.
- The Partial Cloverleaf alternative is the only alternative to have travel times significantly lower than the Baseline Diamond alternative. This is mainly because of the direct through Fern Valley Road - North Phoenix Road connection.

## **CAC Lowry SPUI**

The CAC Lowry SPUI (single point urban interchange) alternative keeps the alignment of Fern Valley and North Phoenix Roads east of I-5 generally the same as the existing conditions. The Fern Valley to North Phoenix Road movement remains a left turn. The interchange is relocated slightly to the south of the existing interchange location. The CAC Lowry SPUI is recommended to be kept for further consideration.

- The CAC Lowry SPUI alternative does not have any segments over capacity or significantly worse v/c ratios than the Baseline Diamond alternative.
- The CAC Lowry SPUI alternative does not have any significantly less travel times than the Baseline Diamond alternative. Travel times did decrease but are less than the 10% threshold. The CAC Lowry SPUI alternative is one of the two top-performing SPUI forms for travel times.
- Even though the Fern Valley to North Phoenix Road movement remains a left turn, the difference in travel times through this intersection is still significant over the Baseline Diamond alternative.

## **CAC Lewin SPUI**

The CAC Lewin SPUI alternative keeps the alignment of Fern Valley west of I-5 generally the same as the existing conditions. The interchange is relocated slightly to the north of the existing interchange location. Traffic heading north on North Phoenix Road would turn right off of Fern Valley Road and loop underneath Fern Valley Road. The CAC Lewin SPUI is recommended to be kept for further consideration.

- The CAC Lewin SPUI alternative does not have any segments over capacity or significantly worse v/c ratios than the Baseline Diamond alternative.
- The CAC Lewin SPUI alternative does not have any significantly less travel times than the Baseline Diamond alternative. Travel times did decrease but are lower than the 10% threshold. The CAC Lewin SPUI is one of the two top-performing SPUI forms for travel times.
- The right turn for the Fern Valley to North Phoenix Road movements has a significantly smaller travel time through this intersection compared with the Baseline Diamond alternative.

## **CAC Table 1 SPUI**

The CAC Table 1 SPUI alternative would realign the Fern Valley Road to North Phoenix Road movement to a through movement. The interchange is relocated slightly to the north of the existing interchange location. A local access road would be provided (an extension of South Phoenix Road) for local traffic to access the eastern half of Fern Valley Road. The CAC Table 1 SPUI alternative is recommended to be kept for further consideration.

- The CAC Table 1 SPUI alternative does not have any segments over capacity, but does have the North Phoenix Road v/c significantly higher than the Baseline Diamond alternative. However, this v/c is significantly less than capacity, so problems are unlikely.
- The CAC Table 1 SPUI alternative does not have any significantly less travel times than the Baseline Diamond alternative. However, when looking at the eastside connection of Fern Valley and North Phoenix Road, this alternative has one of the best travel times. This efficiency comes from the direct through Fern Valley Road - North Phoenix Road connection.

## **CAC Table 3 SPUI**

The CAC Table 3 SPUI alternative keeps the alignment of Fern Valley west of I-5 generally the same as the existing conditions. The interchange is relocated slightly to the north of the existing interchange location. The Fern Valley to North Phoenix Road

movement remains a left turn. The CAC Table 3 SPUI alternative is recommended to be dropped because there are better SPUI-based alternatives available.

- The CAC Table 3 SPUI alternative does not have any segments over capacity or significantly worse v/c ratios than the Baseline Diamond alternative.
- The CAC Table 3 SPUI alternative was found to have the poorest travel times of all the SPUI-based alternatives. The times are high because of the longer time and distance required to make the left turn movement from Fern Valley to North Phoenix Road.

### **PDT Alt 1 SPUI**

The PDT Alt 1 SPUI alternative keeps the alignment of Fern Valley west of I-5 generally the same as the existing conditions. The interchange is relocated slightly to the north of the existing interchange location. The Fern Valley to North Phoenix Road movement remains a left turn. The PDT Alt 1 SPUI alternative is recommended to be dropped because there are better SPUI-based alternatives available.

- The PDT Alt 1 SPUI alternative does not have any segments over capacity or significantly worse v/c ratios than the Baseline Diamond alternative.
- The PDT Alt 1 SPUI alternative has poor travel times when compared to other SPUI configurations. These times were slightly under the 10% significant threshold. The deciding factor is the longer time and distance required to make the left turn movement from Fern Valley to North Phoenix Road.

### **South Stage Diamond**

The South Stage Diamond alternative would extend Old South Stage Road east from OR 99 to North Phoenix Road and build a diamond-style interchange with I-5. The ramps at Fern Valley Road would be removed, but the Fern Valley Road overcrossing would remain to serve local traffic. The South Stage Diamond alternative is recommended to be dropped from further consideration.

- The South Stage Diamond alternative has an over-capacity section between OR 99 and I-5 on Old South Stage Road. North Phoenix Road north of connection to South Stage Road is over capacity and OR 99 is also near capacity. The majority of traffic using the interchange uses it to access OR 99 or I-5 rather than North Phoenix Road.
- All of the traffic from Phoenix that wants to use northbound I-5 must divert to Old South Stage Road. Diverting traffic from the south Medford area (about 18% of the total Old South Stage Road volume) also uses this section of Old South Stage Road to access I-5. Having two lanes on Old South Stage Road and two on Fern Valley Road are not enough. Old South Stage Road would need to be four

lanes in the OR 99 to I-5 section for a total of six east-west lanes. There are six other alternatives that can handle the east-west flow in four lanes, so there are better alternatives available and this alternative is recommended to be dropped.

- The South Stage Diamond alternative also has segments that are significantly worse when compared with the Baseline Diamond Alternative. These include segments outside of the over-capacity segment.
- The South Stage Diamond alternative had poor travel times because of the long travel time required to access I-5 northbound from Phoenix.

### **South Stage Road Scenarios – July 2006**

In 2006, there were continuing discussions surrounding the potential impact of South Stage Road improvements on the project. Technical Memorandum #3 in July 2006 was written to respond to those concerns. This memorandum discusses the results from the screening analysis of the South Stage Interchange as it relates to the Fern Valley Interchange (FVI) Phase 2 project.

### **Scenario Descriptions**

In addition to the South Stage Interchange + Fern Valley Interchange scenario, three others from the May 19<sup>th</sup>, 2005 Technical Memorandum #1A along with their results were compared. A short description of the each scenario:

- Baseline Diamond - The baseline level of improvements is a diamond interchange in the existing interchange location with Fern Valley Road and the southern portion of North Phoenix Road widened to four lanes.
- South Stage Diamond - The South Stage Diamond scenario would extend South Stage Road east from OR 99 to North Phoenix Road and build a diamond-style interchange with I-5. The ramps at Fern Valley Road would be removed, but the Fern Valley Road overcrossing would remain to serve local traffic.
- South Stage Overcrossing - South Stage Road would be extended east from OR 99 crossing over I-5 to connect with North Phoenix Road.
- South Stage Interchange + Fern Valley Interchange – This scenario is similar to the South Stage Diamond, but the Fern Valley Interchange would remain using the Baseline Diamond level of improvements.

## Scenario Results

### Volume Test

The volume evaluation indicates how much new traffic is “attracted” into the study area from the surrounding area when compared to the Baseline Diamond scenario level of improvements. The volume evaluation looked at the east-west routes of Fern Valley Road and South Stage Road between OR 99 and I5 and the north-south routes of OR 99, I5 and North Phoenix Road north of Fern Valley Road. There were no significant changes in north-south volumes in any of the scenarios. Table F3 shows the relative east-west volume change between each of the scenarios compared to the Baseline Diamond scenario.

**Table F3: East-West Volume Comparison**

Scenario	Percent Difference from Baseline Diamond Scenario
Baseline Diamond	0
South Stage Diamond	2
South Stage Overcrossing	9
South Stage Intch. + Fern Valley Intch.	13

Only the South Stage Interchange + Fern Valley Interchange (SSI+FVI) scenario has east-west volumes significantly different from the Baseline Diamond scenario. The SSI+FVI scenario only drops Fern Valley Road volumes by 10% overall through the interchange. Only about 20% of the volume using the South Stage Interchange is diverting from the Fern Valley Interchange. The rest (80%) is coming from the southern part of Medford. Local Phoenix users are still using the Fern Valley Interchange. Northern Phoenix/ Jackson County users along OR 99 are more likely to use the South Stage Interchange.

Primary use of the South Stage Interchange is facilitating the OR 99 – I-5 movement as little volume travels between I-5 and North Phoenix Road. With the future land uses assumed in the current Phoenix/Medford/Jackson County comprehensive plans, there is no significant benefit for the east side of the Fern Valley Interchange.

The 10% diversion for the SSI+FVI scenario is in contrast to the South Stage Overcrossing which was showing a potential 10-15% diversion from Fern Valley Road in Technical Memorandum #1A. When actual post-processed design hour volumes were developed, and v/c ratios calculated, created the overall diversion from Fern Valley Road was not significant (less than 10% change). Therefore, under the SSI+FVI scenario, the actual v/c impact will be less than the South Stage Overcrossing and will also not be significant.

The analysis also showed an increase of volumes on I-5. This is local traffic that is finding it faster to use I-5 rather than the local street network. This is important because

the Federal Highway Administration requires, through the interchange modification request process, that a new interchange benefits the interstate (no adverse impact). Adding more volume to the interstate, especially what is generally local traffic, is not a benefit and therefore, the SSI+FVI scenario is unlikely to pass this test.

In addition, because the SSI+FVI scenario has volumes significantly different from the Baseline Diamond scenario, new volumes will need to be created if more detailed analysis was desired. All of the other interchange alternatives (i.e. Table 1 SPUI) use the Baseline Diamond scenario volumes as a base, but using the Baseline Diamond scenario for the SSI+FVI will result in volumes that are too low.

### Capacity Test

The capacity test indicates if certain roadway segments would be likely over capacity. Like the South Stage Diamond scenario, the SSI+FVI scenario also showed the section of South Stage Road between OR 99 and I-5 to be over capacity. This indicates a need for four lanes in this section and likely on the entire extension to North Phoenix Road.

### Travel Time Test

The travel time test indicates the overall network efficiency of a particular scenario. The travel times were based from downtown Phoenix going through the Fern Valley Interchange to various points north, south and east. Table F4 shows the relative differences in the travel times for the scenarios.

**Table F4: Travel Time Comparison**

Scenario	Percent Difference from Baseline Diamond Scenario
Baseline Diamond	0
South Stage Diamond	28
South Stage Overcrossing	-3
South Stage Intch. + Fern Valley Intch.	-5

The only scenario to have a significant difference in the travel time is the South Stage Diamond because there are not any ramps at Fern Valley Road and all traffic wishing to access I-5 must go north to South Stage or south to Talent. The SSI+FVI scenario has the lowest travel times but is not significant when compared to the Baseline Diamond or the South Stage Overcrossing.

### **Conclusions**

The National Environmental Policy Act (NEPA) requires that only future land uses in current comprehensive plans are considered for a project. With the current comprehensive plans, the South Stage Interchange does not have a significant benefit to the Fern Valley Interchange project, and therefore will not meet the purpose and need as

part of the FVI project. Additionally, under current comprehensive plans, the South Stage Interchange benefits the south Medford area (including the South Medford Interchange) rather than the Phoenix area.

The South Stage interchange also increases local traffic volumes on I-5. This will likely have adverse impacts to I-5 operations and is unlikely to meet the FHWA benefit test for new interchanges.

## **APPENDIX G – ALTERNATIVES CONSIDERED BUT DISMISSED**

## **Dismissed May 2004 to October 2005**

The following alternatives and options were dismissed between May 2004 and October 2005. At that point two alternatives remained, Lowry SPUI and Table 1 SPUI.

### **Alternatives**

#### **PDT Alternative #1 – SPUI with original Fern Valley Road Alignment**

This alternative included a SPUI located on the original interchange alignment. Due to design constraints – SPUI's cannot be built on a severely skewed alignment – this alternative was dropped. The alternative was not advanced by the CAC; the PDT dismissed it in May of 2004.

#### **PDT Alternative #1 – SPUI with Fern Valley Through**

This alternative is similar to the previous one, but it would have shifted the interchange north of the existing alignment and corrected the skew of the current interchange. Reasons for dropping this alternative included: poor travel times in comparison to other SPUI alternatives; traffic flow issues at North Phoenix Road; and connection and spacing issues for OR 99. This alternative was not advanced by the CAC; the PDT dismissed it in April of 2005.

#### **PDT Alternative #1A – SPUI with North Phoenix Through**

PDT Alternative #1A was found to be very similar to the CAC Table 1 SPUI with North Phoenix through Alternative. The PDT decided to combine it with CAC Table 1 SPUI in April of 2005.

#### **PDT Alternative #2 – Split Diamond with original Fern Valley Road Alignment**

This alternative would have constructed a split diamond interchange along the existing Fern Valley Road alignment. The north portion would have remained on Fern Valley Road and the south portion would have been located south of Bear Lake Estates. It was dropped since it would impact both the Bear Creek Greenway and Blue Heron Park. It also created three additional crossings over Bear Creek. This alternative was not advanced by the CAC; the PDT dismissed it in September of 2004.

#### **PDT Alternative #3 – Diamond perpendicular to Fern Valley Alignment**

PDT Alternative #3 would have constructed a diamond interchange north of the existing interchange. The skew would have been corrected in relation to Interstate 5. Due to major right of way impacts, access issues, 2 additional structures over Bear Creek, and

the potential need for a goal exception, this alternative was dropped. This alternative was not advanced by the CAC; the PDT dismissed it in April of 2005.

#### PDT Alternative #3A – Diamond with North Phoenix Through

Similar to PDT Alternative #3, but would have created a connection to the east on the North Phoenix Road through alignment. It was dropped due to major right-of-way impacts, limits access, and additional crossings over Bear Creek. This alternative was not advanced by the CAC; the PDT dismissed it in April of 2005.

#### PDT Alternative #7 – Diamond South Stage Road Alignment

This alternative would have constructed a diamond interchange at South Stage Road, and removed the existing interchange at Fern Valley Road. It was dropped since it would be located too close to the South Medford Interchange, isolation of existing businesses on Fern Valley Road, significant impacts to the Bear Creek Greenway, goal exception likely required, and poor overall performance. This alternative was not advanced by the CAC; the PDT dismissed it in September of 2004.

#### PDT Alternative #11 – Diamond Southern Bear Creek Estates alignment

This alternative would have constructed a diamond interchange south of Bear Lake Estates and corrected the skew of the interchange relative to Interstate 5. It was dropped due to the fact that it would isolate businesses, have major impacts to Bear Lake Estates, Blue Heron Park, and Bear Creek Greenway, and a goal exception would likely be required. Also, federal interchange policy does not allow direct connection to local streets, so this alternative would require upgrading the functional classification of local streets. This alternative was not advanced by the CAC; the PDT dismissed it in May of 2004.

#### PDT Alternative #13 & 22 – Diamond Bolz Lane to North Phoenix Road alignment

PDT Alternatives #13 and 22 would have constructed a diamond interchange north of the existing interchange, and corrected the existing skew in relation to Interstate 5. Existing Fern Valley Road would have crossed under the new northbound off and southbound on ramps. There may have been fatal flaws with this alternative due to the steep ramps necessary. The interchange would have been double decker height in order to cross Fern Valley Road. There would have been major impacts to existing and proposed development. This alternative was not advanced by the CAC; the PDT dismissed it in September of 2004.

#### PDT Alternative #14 – Diamond Cheryl Lane to North Phoenix Road alignment

For this alternative the interchange would have been very similar in location and configuration to PDT Alternative #13 and 22, but the OR 99 connection would have been at Cheryl Lane. This alternative was dropped due to right-of way impacts, impacts to Bear Creek, low capacity, and major impact to existing and planned development. This alternative was not advanced by the CAC; the PDT dismissed it in April of 2005.

#### PDT Alternative #18 – Diamond Siphon to Frontage Road alignment

This alternative is the same as PDT Alternative #11, except of the additional local road connection that would have been added south of the Phoenix Hills neighborhood connection to South Phoenix Road. The reasons for dropping this alternative included: fatal flaw due to below standard interchange spacing; isolation of existing businesses, need to reclassify roads; impacts to a number of residential neighborhoods; and substantial cost. This alternative was not advanced by the CAC; the PDT dismissed it in September of 2004.

#### PDT Alternative #19– Diamond – Original Fern Valley Alignment

This alternative is similar to the north portion of the split diamond that was described in PDT Alternative #2. This alternative was dropped because it would not handle as much traffic as other alternatives and does not perform as well. The CAC and PDT agreed to drop this alternative. It was dismissed October 2005.

#### PDT Alternative #20 – Diamond w/SE Loop original Fern Valley Road alignment, North Phoenix Through east

Alternative #20 would have involved constructing a diamond interchange at the existing interchange location and included an additional northbound loop on-ramp in the southeast quadrant. This alternative was dropped based on reasons including: no direct access from northwest to southwest quadrants; major impacts to existing businesses, future development, and neighborhoods; and staging issues. This alternative was not advanced by the CAC; the PDT dismissed it in April of 2005.

#### PDT Alternative #21 – Partial Cloverleaf Loop original Fern Valley Road alignment, North Phoenix Through east

This alternative is similar to PDT alternative #20 except on the Westside where the alternative would have included an additional loop ramp in the northwest quadrant. This alternative was dropped based on similar reasons to those listed for alternative #20, plus major additional right-of-way and access impacts to existing businesses. This alternative was not advanced by the CAC; the PDT dismissed it in April of 2005.

### PDT Alternative #23 – Diamond 5<sup>th</sup> Street to North Phoenix alignment

This alternative would have constructed a diamond interchange north of the existing interchange as well as corrected the skew in relation to Interstate 5. The OR 99 connection would have been made at 5<sup>th</sup> Street. Reasons for dismissing this alternative are the same as those for Alternatives #13 and 22, except there are additional impacts associated with the OR 99 connection. There is also more impact to the Bear Creek Greenway. This alternative was not advanced by the CAC; the PDT dismissed it in July of 2004.

### PDT Alternative #24 – Diamond 4<sup>th</sup> Street to North Phoenix alignment

Alternative #24 is the same as #23 except the connection to OR 99 would have been made at 4<sup>th</sup> Street rather than 5<sup>th</sup> Street. The reasons for dropping it are the essentially the same as those for #23. This alternative was not advanced by the CAC; the PDT dismissed this alternative in July of 2004.

### PDT Alternative #25 – Diamond Glenwood Road

This alternative included constructing a diamond interchange at Glenwood Road. It would have left Fern Valley Road as and Interstate 5 overcrossing only. Reasons for dropping this alternative include: fatal flaw due to substandard interchange spacing; isolation of existing businesses; major impacts to adjacent residential areas and Bear Creek; and potential for needing a goal exception. This alternative was not advanced by the CAC; the PDT dismissed this alternative in September of 2004.

### CAC Table 2 – Partial Cloverleaf North of Fern Valley Interchange, North Phoenix Through

This is very similar to PDT Alternative #13 and 22 except it would have constructed a partial cloverleaf interchange with loop ramps in the northwest and southeast quadrants. This alternative was dropped based on: the substantial right-of-way impacts; the major impacts to existing business, residential areas, Bear Creek Greenway, and future developable lands; the additional costs for the overpass; and the major economic impacts to the city. This alternative was not advanced by the CAC; the PDT dismissed this alternative in April of 2005.

### CAC 2 – Partial Cloverleaf original Fern Valley Alignment

This alternative is the same as PDT Alternative #21, and the reasons for not advancing are the same. This alternative was not advanced by the CAC; the PDT dismissed it in April of 2005.

### CAC Lewin – SPUI North of FVI, underpass for N. Phoenix and Fern Valley Roads

This alternative would have constructed a SPUI about 250 feet south of the existing interchange and corrected the skew of the interchange in relation to I-5. Reasons for not forwarding this alternative included: access issues; difficulty with truck turn moves; additional cost for undercrossing; and it did not perform well in analysis. The CAC recommended this alternative be dropped. The PDT dismissed in October 2005.

### CAC 3 – SPUI Fern Valley Through

CAC Table 3 included constructing an interchange and west connection to OR 99 in the same location and configuration as CAC Table 2 (Lewin) Alternative, but Fern Valley as the through movement. Reasons for dropping this alternative included: large intersection at entrance to residential neighborhood (Breckinridge); construction issues; potential need for goal exception; impacts to residential neighborhoods; and impact to developable lands. This alternative was not advanced by the CAC; the PDT dismissed it in April of 2005.

### CAC Table 3 – SPUI south of Fern Valley Interchange alignment

This alternative later became the Lowry SPUI alternative. See the Lowry SPUI alternative for more information.

### CAC 4 – Interchange at South Bear Lake Estates, South Stage Road and Fern Valley Road

This alternative would retain the existing Fern Valley Road Interchange, and add diamond interchanges at South Stage Road and just south of Bear Lake Estates. Reasons for dropping this alternative included: interchange spacing too close; grade issues at south interchange; impact to Bear Creek Greenway and Blue Heron Park; and extensive cost. This alternative was dropped by the PDT on September 2004, and upon agreement with CAC was officially dropped in April 2005.

### CAC Table 4 – South Interchange with Connection to 4<sup>th</sup> Street

This alternative would have constructed a diamond interchange about 400 feet south of the existing interchange and corrected the skew of the interchange in relation to I-5. Reasons for not advancing this alternative included: out of direction across to the northwest and southwest quadrants; impacts to commercial properties; and additional Bear Creek Crossing. The CAC and PDT agreed to drop this alternative. It was dismissed in July 2005.

## **Options**

### Fern Valley connection to Cheryl Lane

The Fern Valley connection to Cheryl Lane would have had Fern Valley Road connecting to Cheryl Lane as opposed to Rays Access. The reason to drop this option was that there were too many impacts. This option was dropped as an option by both the CAC and PDT in July 2005.

### Old South Stage Overcrossing to North Phoenix

This option would have extended Old South Stage Road east for OR 99 crossing over I-5 to connect with N. Phoenix Road. Reasons for dropping this alternative included: the fact that the effectiveness drops as the area urbanizes and speeds slow down or as improvements are made to the Fern Valley Road corridor; and the option would only draw traffic from Fern Valley Road if speeds were higher. The CAC and PDT agreed to drop this alternative. It was dismissed in April 2005.

### 1<sup>st</sup> Street Extension to Bear Lake Estates

This option would have connected Bear Lake Estates to the OR 99 couplet at 1<sup>st</sup> Street. It would provide a new outlet for local Bear Lake Estates traffic. Reasons for dropping this option included: impacts to Bear Lake Estates traffic circulation; potential impacts to some mobile homes; and an additional crossing over the Bear Creek Greenway. The PDT and CAC agreed not to further this option. It was dismissed in July 2005.

### South Bear Lake Estates Overcrossing to Breckinridge

This option would have constructed an overcrossing south of Bear Lake Estates, and connected with OR 99 at the south end of the couplet. Reasons for dismissing this option included major impacts to the Breckinridge neighborhood, Blue Heron Park, and the Bear Creek Greenway. The CAC and PDT agreed to drop this option. It was dismissed in May 2004.

### Northridge Terrace Overcrossing

This option would have constructed a new east-west roadway to connect OR 99 to N. Phoenix Road. Reasons for not advancing this option included no significant improvement to Fern Valley Road and impacts to homes. The CAC and PDT agreed to drop this alternative. It was dismissed in July of 2005.

### Fern Valley Connection to 4<sup>th</sup> Street

This option would have connected to OR 99 across Luman Road, along north and western edge of pond, with a connection at north end of couplet at 4<sup>th</sup> Street. Reasons for dropping this option included: poor traffic operations; excessive queuing; and increased cross section. The CAC and PDT agreed to drop this alternative. It was dismissed in July of 2005.

### Fern Valley Connection to 5<sup>th</sup> Street

This option would have connected to OR 99 across Luman Road, along north and western edge of pond, with a connection at north end of couplet at 5<sup>th</sup> Street. Reasons for dropping this option included: poor traffic operations; excessive queuing; and increased cross section. The CAC and PDT agreed to drop this alternative. It was dismissed in July of 2005.

## **Dismissed October 2006**

As more alternatives were added, the CAC and PDT began looking at alternatives on a section basis. The project area was divided into westside, eastside options, and interchange options. The PDT and CAC voted in October 2006 to consolidate the westside options to: PBA West, Original Table 1 West; the eastside options to PBA East, Lowry/TPAU East and North Phoenix Through; and the interchange options to Diamond 6-Lane with SE Loop and SPUI North.

## **Westside Options**

### TPAU West

This alternative created a mini-couplet on Fern Valley Road with westbound traffic on the original Fern Valley Road alignment and eastbound traffic on a new alignment starting from the OR 99/Bolz Lane (Figure G1). The eastbound alignment had a less-sharp angle with OR 99 than was with the forwarded PBA West alternative. This alternative was dropped because of greater displacements on the west side of Bear Creek and because two Bear Creek crossings would be required. The alternative was dropped by the PDT and CAC in October 2006.

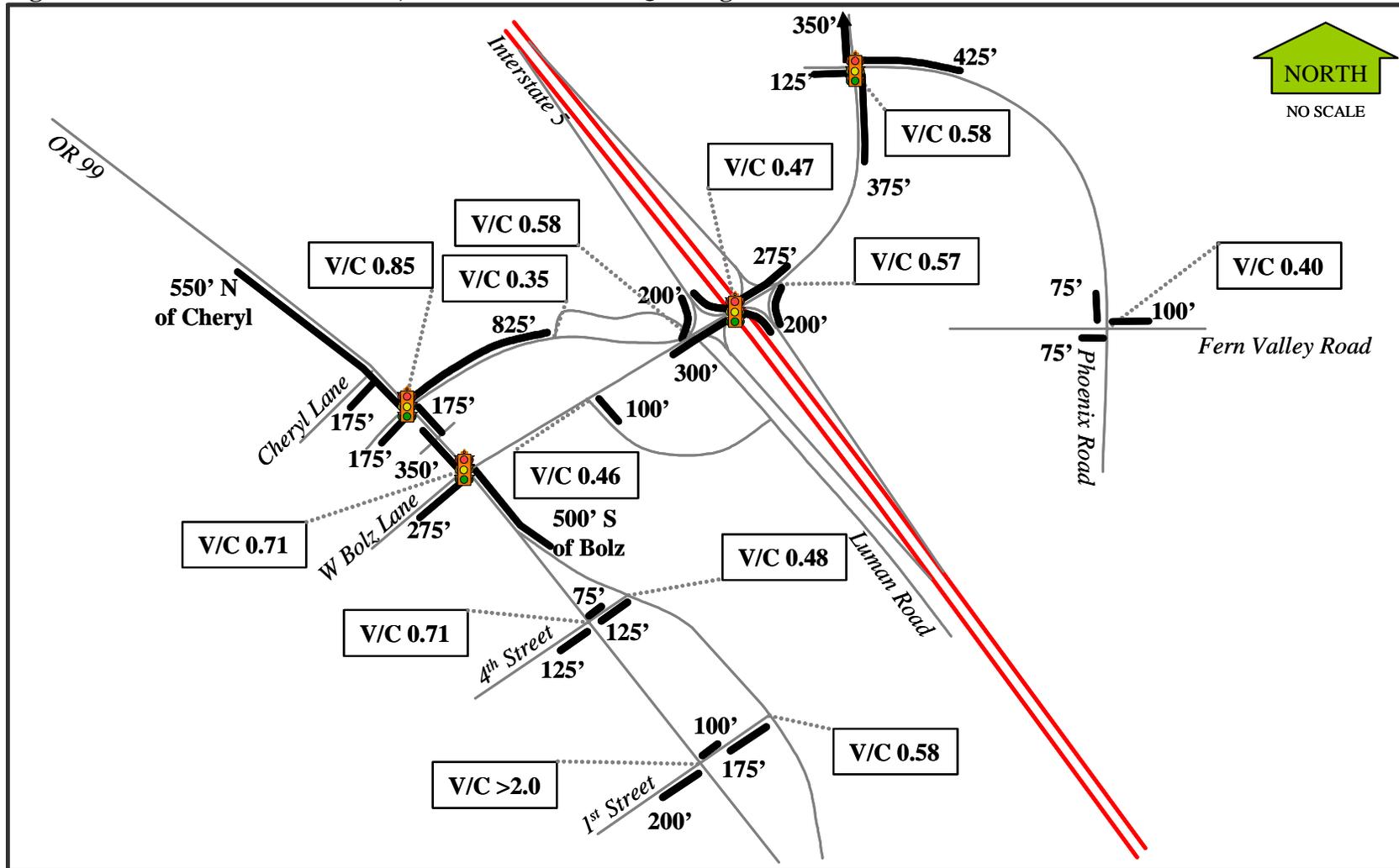
### TPAU West with Luman Undercrossing

This alternative is the same as the TPAU West except that the Fern Valley Road intersection is replaced by an undercrossing with jug-handle type connections. The PDT and CAC dropped this alternative as it still had two Bear Creek crossings and the overall layout would be confusing and non-standard for the driver. The alternative was dropped by the PDT and CAC in October 2006.

### Eastbound-Westbound Couplet

This alternative is another variant on the above alternative except that it had only one right-in-right-out jug-handle type connection and had longer out-of direction travel. The PDT and CAC dropped this alternative as it had two Bear Creek crossings, an overall confusing layout, out-of-of direction travel, and indirect parcel access. The alternative was dropped by the PDT and CAC in October 2006.

Figure G1: Table 1 SPUI w/TPAU; 2030 V/C Ratios & Queuing



## Interchange Options

### 6-Lane Diamond

Both the original PBA and TPAU (Figures G2 and G3) diamond alternatives originally had back-to-back dual left turn lanes plus four travel lanes on the I-5 overpass structure to accommodate the future traffic volumes. In June of 2006, the Roadway Section commented that even though these alternatives had enough room to store left-turning vehicles, there was not enough physical room to allow for vehicles to decelerate into the turn bays—i.e., not enough room to develop taper sections for the dual turn lanes.

To keep the I-5 structure width at six lanes total, the left-turn lanes were changed to single side-by-side left-turn lanes that go almost the whole length between the ramp terminal intersections—this would provide more queuing length. The following summarizes discussions regarding this configuration:

1. A 6-lane diamond is likely affordable within the budget available.
2. Design volume-to-capacity (v/c) ratio standards would not be met because of using single left-turn lanes.
3. The single left-turn lanes cannot handle all of the left-turning vehicles.
4. The ramp terminal intersections would have to be moved at least 300 feet further apart to accommodate the left-turn vehicle demand in a single lane.
5. This design is inflexible, and cannot support new growth beyond what was forecasted in the local comprehensive plan.
  - a. A 6-lane diamond is projected to last only 10 years. However, because Phoenix's comprehensive plan can only accommodate about 10 more years of growth (according to the City) and because this interchange would not be open before 2010, there would be about 15 years of growth that this interchange could not accommodate. (Under NEPA, traffic analysis focuses on 20-year future projections.)
  - b. It is highly likely that a 6-lane diamond configuration will not even last 10 years judging from the fast growth occurring in the area.

Another six-lane variant would be to keep the dual back-to-back turn lanes, but shorten them to fit the room available as a 1<sup>st</sup> phase (Figures G4 and G5). The following summarizes discussions regarding this configuration:

1. The shortened turn lanes would not be able to handle the full demand so; the design v/c standards would be effectively not met once the left turn queues started backing into the adjacent ramp terminal intersection.
2. Because of queuing concerns, the turn lanes are projected to function for less than 10 years before the through lanes start being blocked.
3. This design is inflexible to new growth beyond what was forecasted. If growth comes faster than predicted, the back-to-back turn lanes may spill back into the through lanes or into the ramp terminal intersections sooner than predicted.

Figure G2: PBA Diamond 6-lane w/loop; 2030 V/C Ratios and Queuing

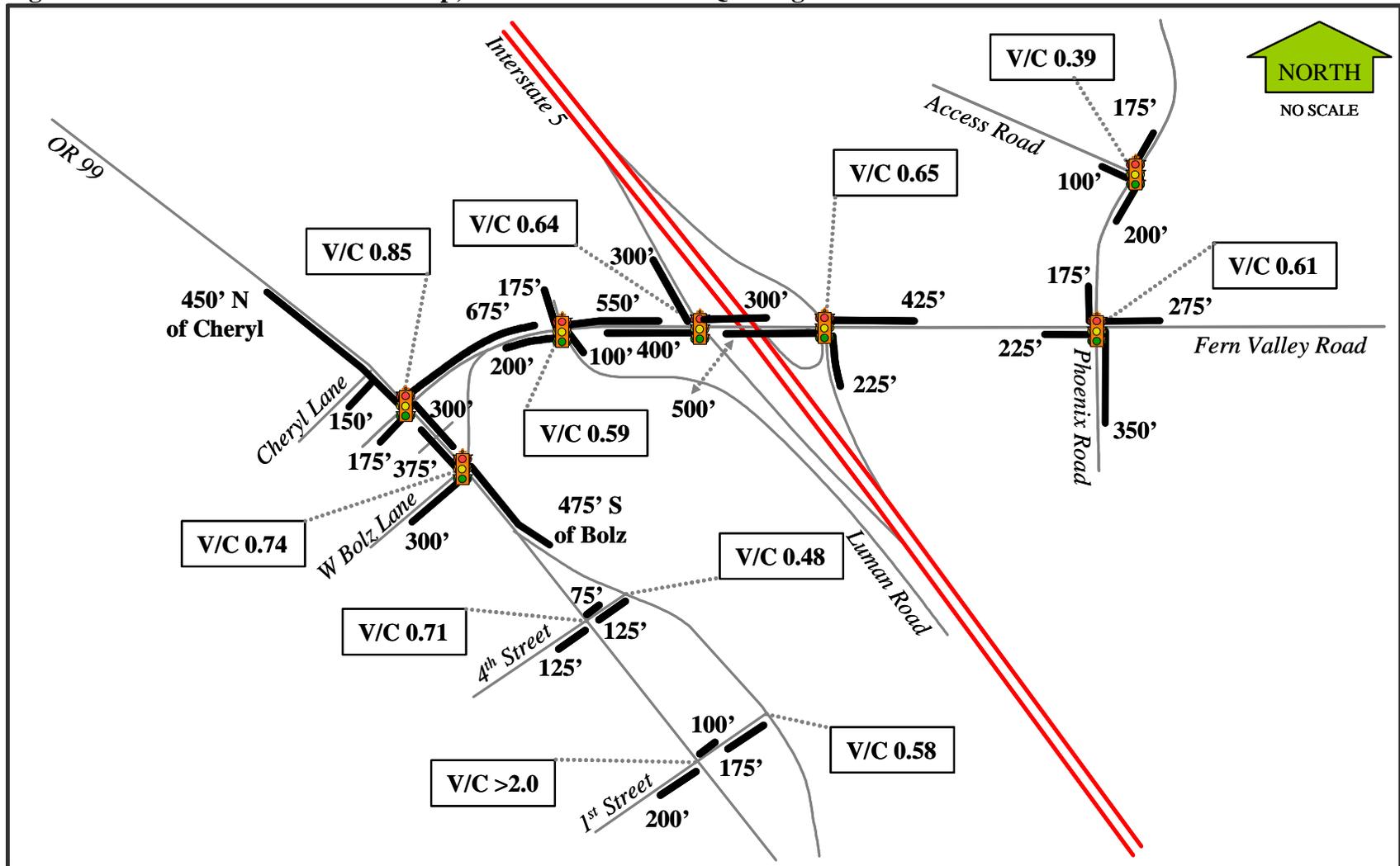


Figure G3: TPAU Diamond 6-lane w/loop; 2030 V/C Ratios and Queuing

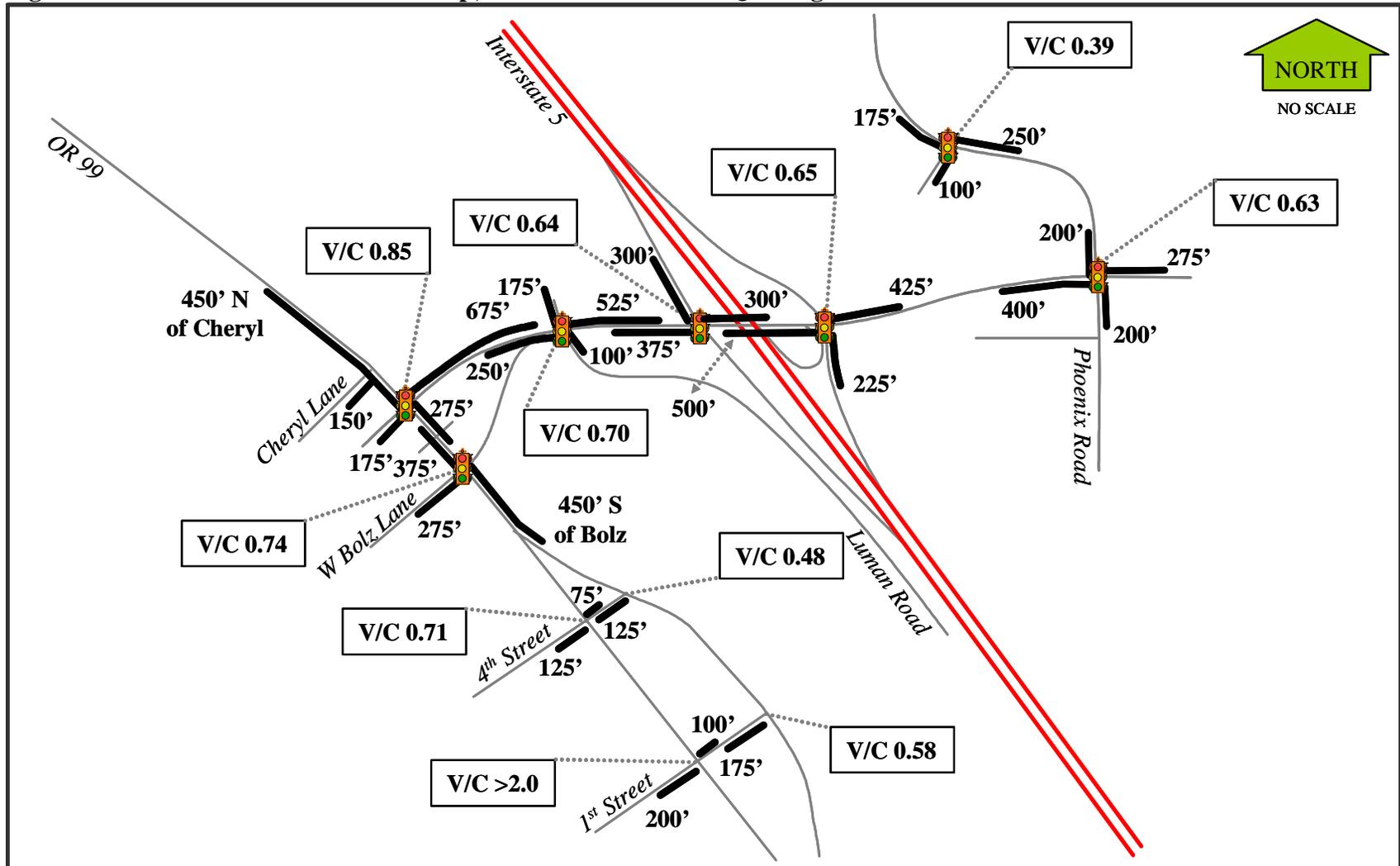


Figure G4: PBA Diamond Back-to-back Turn Bays; 2010 V/C Ratios and Queuing

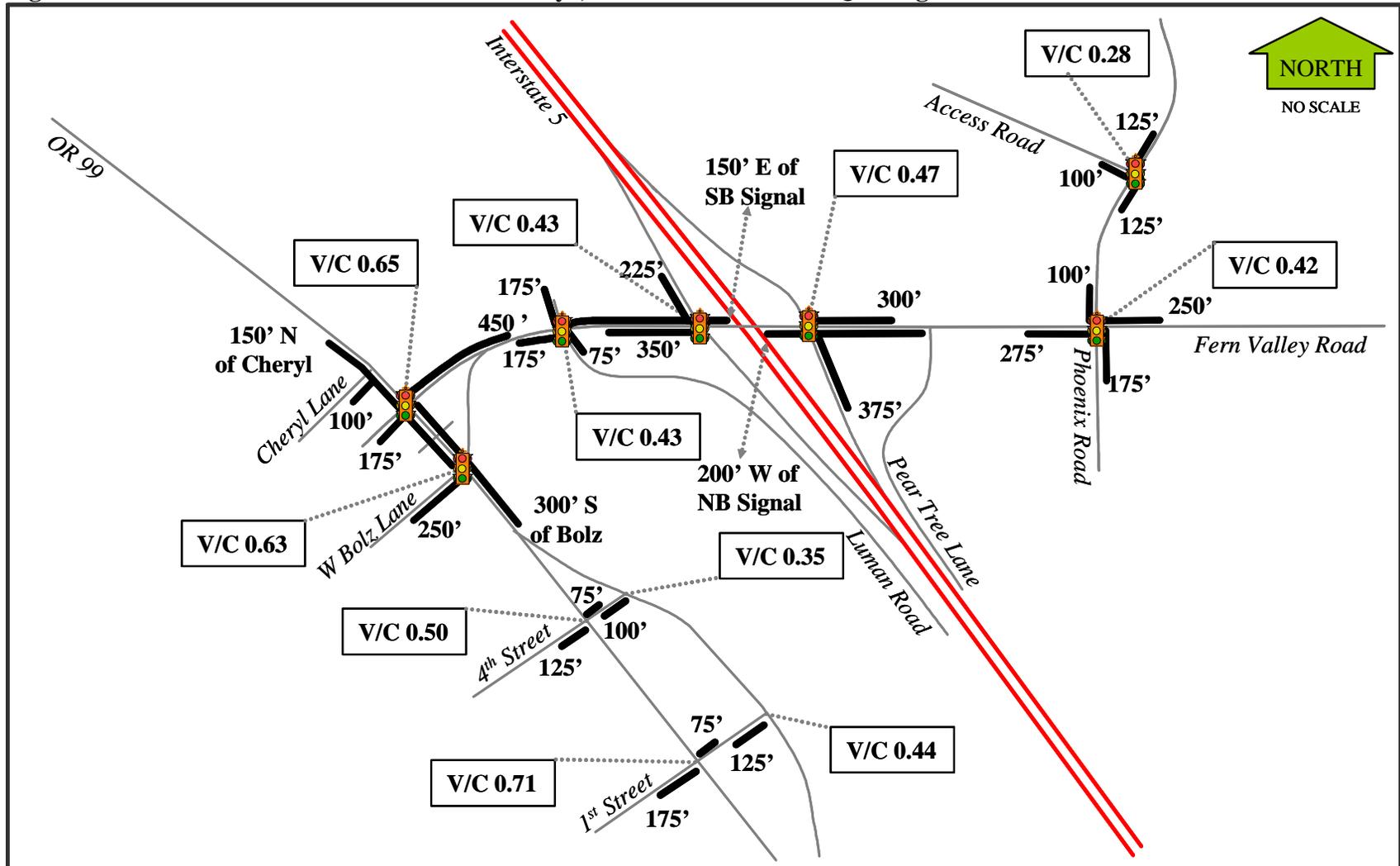
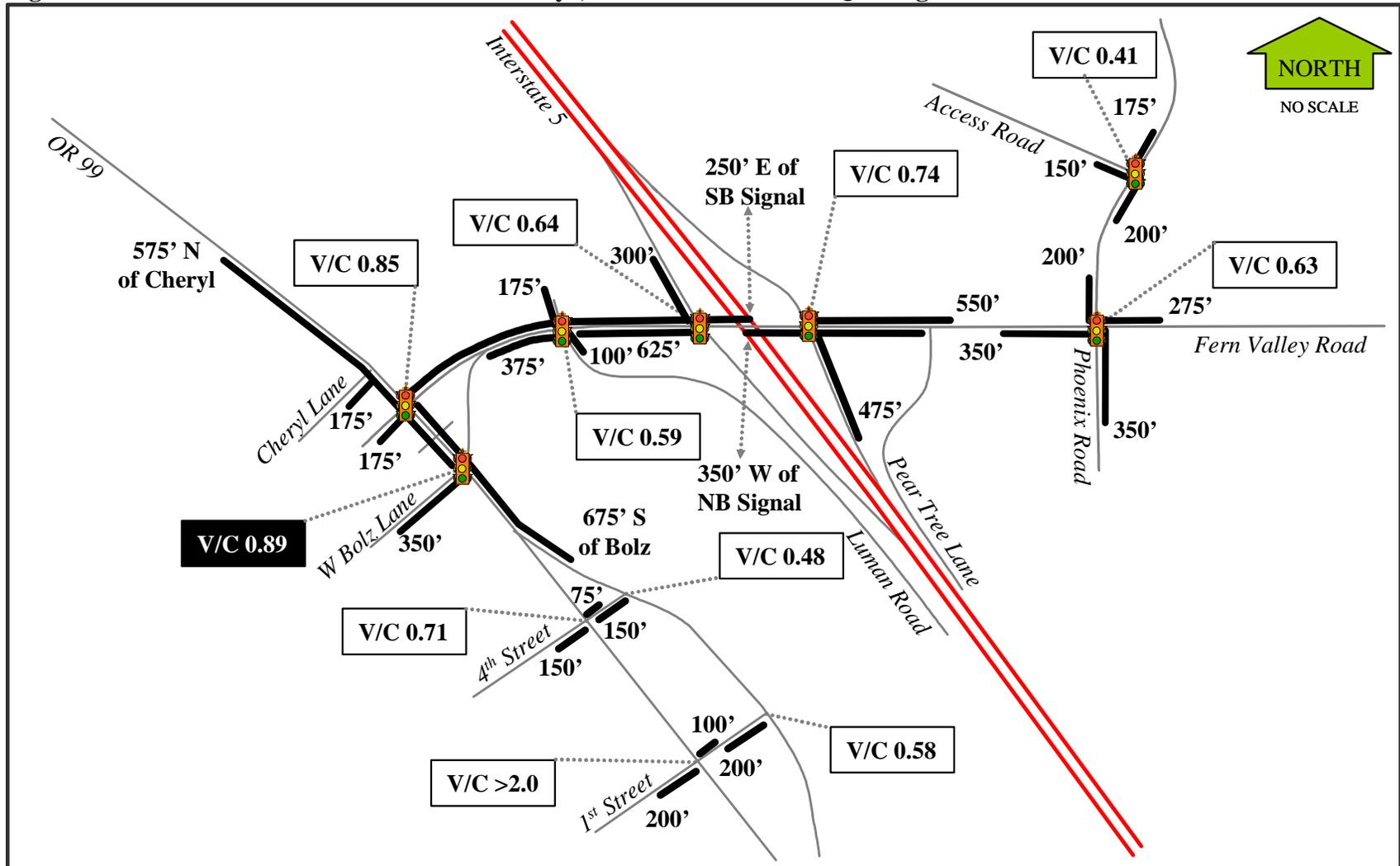


Figure G5: PBA Diamond Back-to-back Turn Bays; 2030 V/C Ratios and Queuing



Also, a true “tight diamond” alternative where the ramp terminals are pushed as close as possible together, which would theoretically allow for improved operation, was briefly looked at. Unfortunately, the terminals could not be brought close enough together because of the skew to I-5 and the traffic signal timing could not be adjusted in such a manner to allow for proper operation, so this idea was dropped. Tight diamonds are best used for highly urban, congested, right-of-way restricted areas where no other options exist which fit the context of the interchange area.

By July of 2007, it was determined that all of the six-lane diamond interchange variants above would not work for the project area. To keep the project alternative process moving forward, the 8-Lane Diamond and the 6-Lane Diamond with SE Loop were created and the original diamond concepts were dropped by ODOT.

### 8-Lane Diamond

To allow for a solution that lasts through the 20-year horizon, the overpass structure was expanded to 8 lanes to accommodate side-by-side left-turn lanes that go the entire length between ramp terminal intersections (Figures G6 and G7). The following summarizes discussions regarding this configuration:

- An 8-lane diamond may approach the cost of a SPUI.
- Traffic operations would be poorer than a SPUI; however 20-year design v/c standards would still be met.
  - The single intersection configuration of a SPUI is more efficient than a pair of wider standard intersections.
  - The SPUI handles the same traffic in a 6-lane cross-section versus 8 lanes in this configuration.
- Extra width would be required east and west of the interchange to allow room to develop from two to four lanes in each direction; this would have greater right of way impacts.
- An 8-lane diamond could be phased, but lacks flexibility to accommodate accelerated or unanticipated growth. Also, there is a large amount of throwaway (previous construction work that is totally replaced versus incorporating into another phase) on the structure and on the approaches to the structure.
- The total size of the structure and other improvements would likely be out of context (scale) for the area.

This alternative was dropped by the CAC and PDT in October 2006 citing overall size, too much out of scale for the area, and too much wasted space.

Figure G6: PBA Diamond 8-lane; 2010 V/C Ratios and Queuing

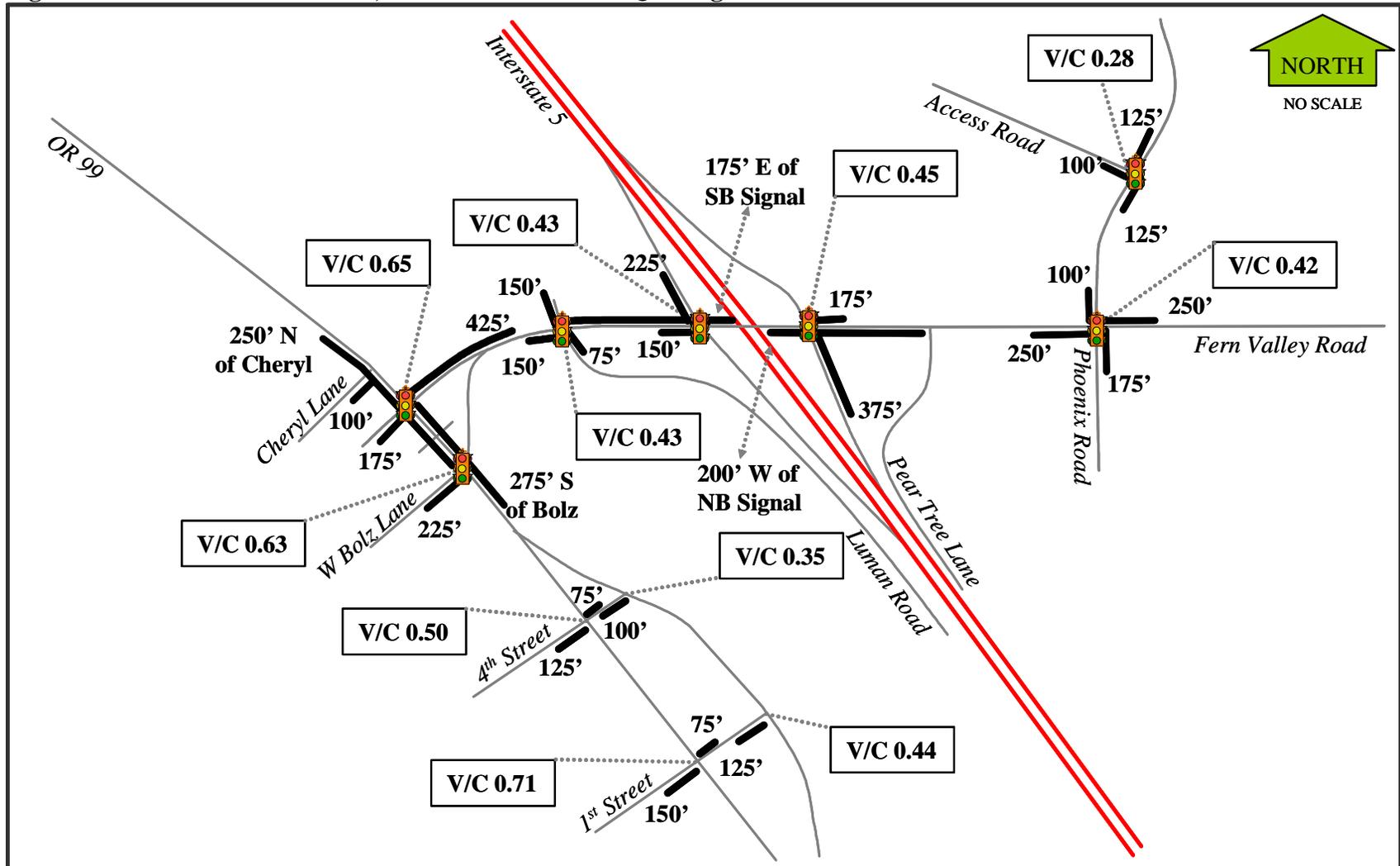
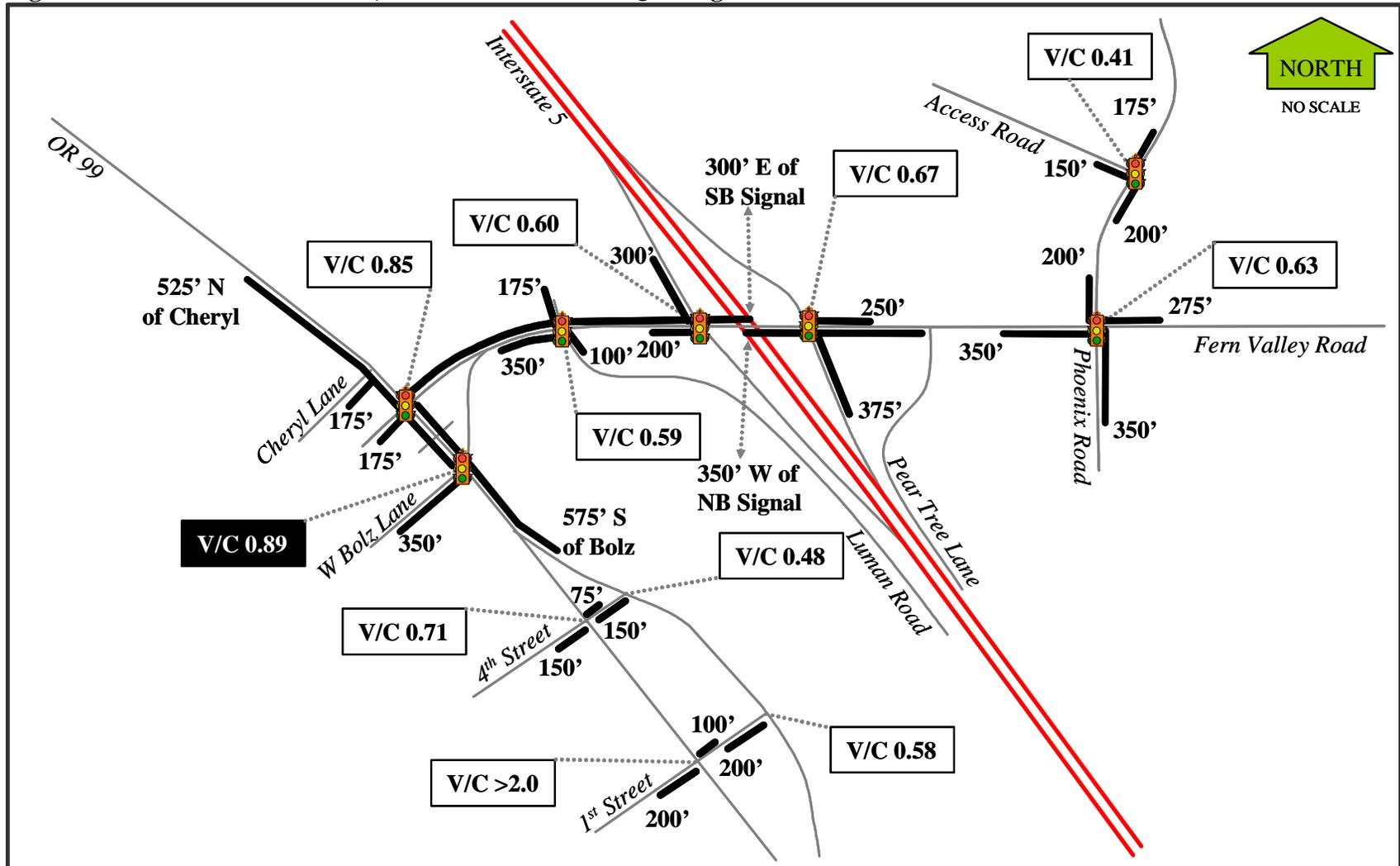


Figure G7: PBA Diamond 8-lane; 2030 V/C Ratios and Queuing



### SPUI South (Lowry SPUI)

This single point urban interchange (SPUI) was located south of the existing Fern Valley Road. This was part of the original Lowry SPUI alternative (Figure G8). This option was dropped by the CAC and PDT in October 2006 because of the superior SPUI North option, greater environmental impacts, and incompatibilities with the surrounding west and eastside options.

### **Dismissed November 2006 – February 2007**

In February 2007, the PDT and CAC voted to consolidate the remaining option combinations down to the ones chosen to be forwarded into the EA. Both alternatives kept the PBA West and CDI options but differed on the eastside option. The eastside option was either the TPAU East (Fern Valley Through) or the North Phoenix Through.

### **Westside Options**

#### Original Table 1 West

This alternative had direct connection between OR 99 at Bolz Lane and I-5 to the south of the existing Fern Valley Road to accommodate intersection spacing standards (Figure G9). The Luman Road signal was eliminated and replaced with a set of right-in-right-out jug handle connections with an underpass to facilitate local access to adjacent housing and the Stores at Exit 24. The original Fern Valley Road alignment was disconnected from OR 99 but remained between the East Bolz Lane and Luman Road intersections for local access. In late 2006 this alternative was modified to conform to the rest of the alternatives by eliminating the jug handle connections and adding the Luman Road signalized intersection back in. At this point, the alternative was renamed Bolz Thru West and the original Table 1 West concept was dropped by ODOT.

#### Bolz Thru West

This alternative was created when the original Table 1 West alternative was modified with the Luman signalized intersection (Figure G10). In addition, the old connection to Fern Valley Road was left in and signalized. There was in option to either keep this signal at the current location at Ray's Food Place or move it a bit north to Cheryl Avenue to increase the signal spacing. The alternative and both options were dropped in February 2007 by the PDT and CAC citing overall community impacts (displacements, ROW, two Bear Creek crossings, etc)

Figure G8: Lowry SPUI w/TPAU west side; 2030 V/C Ratios and Queuing

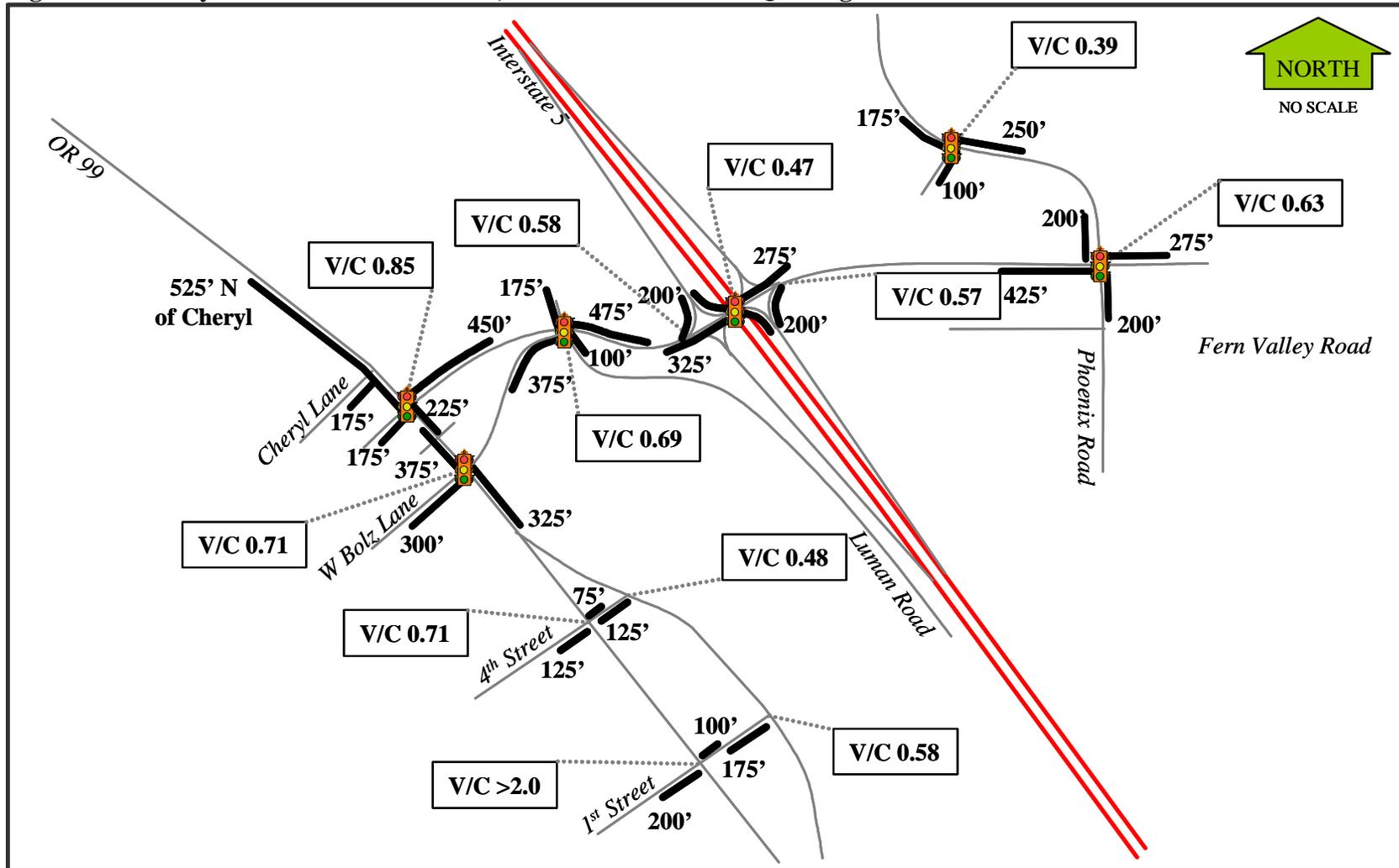
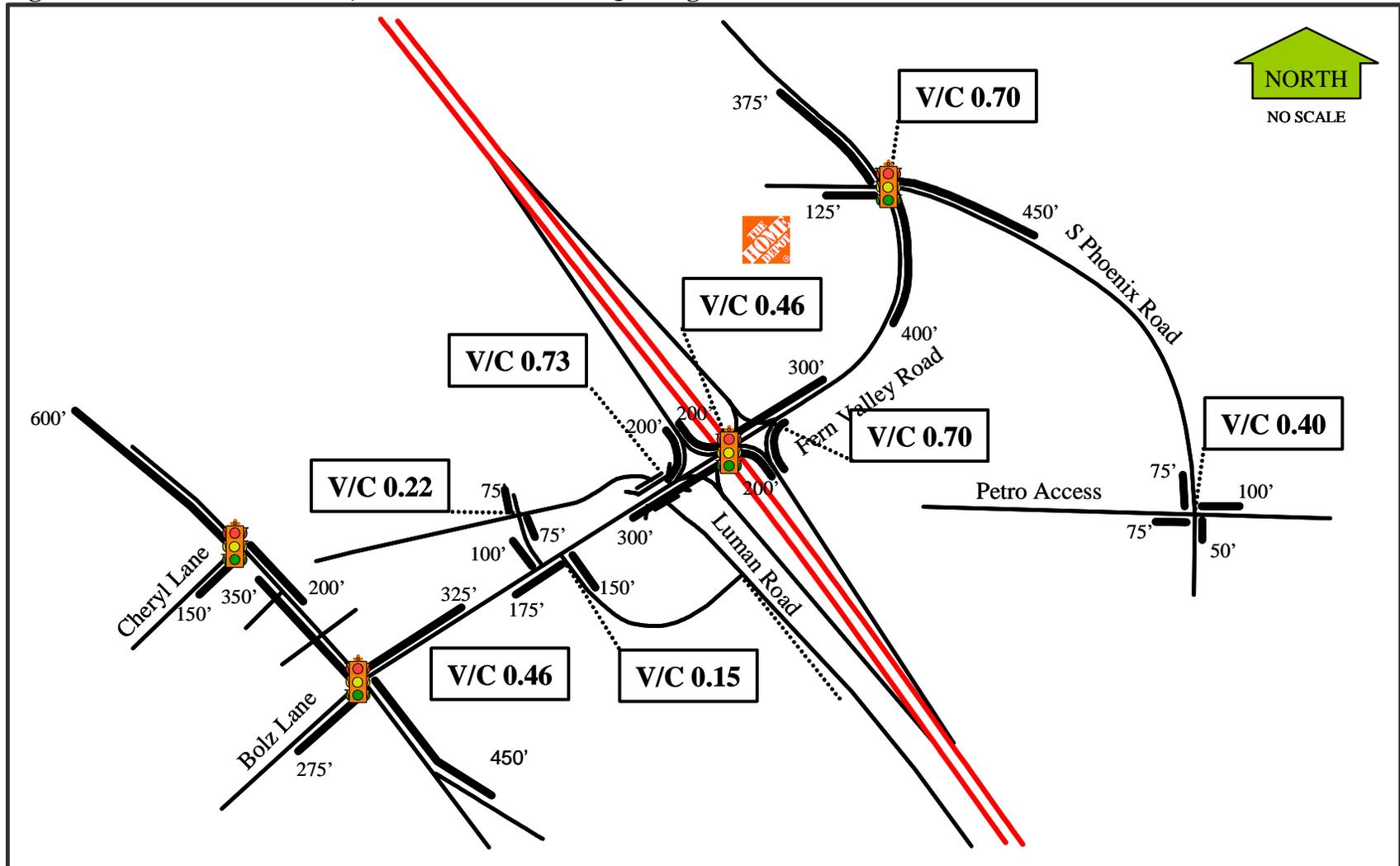


Figure G9: CAC Table 1 SPUI; 2030 V/C Ratios and Queuing





## **Interchange Options**

### 6-Lane Diamond with SE Loop

This alternative was one of the two proposed in mid-2006 as the solution to the left-turn lane issue on the overpass structure (Figures G11 and G12). The loop would eliminate the left on to I-5 at the northbound ramp terminal. This would also allow for a dual left-turn lane for the southbound terminal. The following summarizes discussions regarding this configuration:

- The addition of the loop ramp allows the northbound ramp terminal to meet 20-yr design v/c standards.
- The addition of the dual left-turn lanes for the southbound terminal accommodates the left-turn demand and meets the 20-year design v/c standards.
- The loop ramp allows for the flexibility of future growth for the diamond-style interchange and can also be phased in at a later date as long as the northbound ramp terminal is in the proper location.
- Future growth that is beyond the consideration of this project can be accommodated (but not as much as a SPUI will allow).
- To accommodate the ramp in the SE quadrant, the gas station and the Pear Tree Lane connection will need to be removed. The Pear Tree Lane connection has a low volume, so cars using this will have to use South Phoenix Road or Furry Lane to access the Petro site.

This alternative was dropped by the PDT in February 2006 because the new alternative, the Crossing Diamond Interchange (CDI, or commonly known as a Diverging Diamond Interchange or DDI), was superior in all respects to ROW, cost, number of lanes on the structure, design life expectancy, traffic, etc.

### SPUI North

This SPUI alternative was located to the north of the existing Fern Valley Road. This alternative was dropped by the CAC and PDT in February 2007 because the CDI option could have the same traffic capacity but have fewer lanes than the SPUI.

## **Eastside Option**

### PBA East

The PBA East option kept the current Fern Valley alignment along the Petro truck stop with widening to four lanes and additional turn lanes for truck movements into the truck stop. In January 2007, the new CDI option was married up to all of the remaining east and Westside options. It was found that the PBA East option would not operate well with a CDI because of the close distance between the northbound ramp terminal and the truck stop fueling bay driveway, so the option was dropped by the PDT.

Figure G11: PBA Diamond – 6 lane w/ SE loop; 2010 V/C Ratios and Queuing

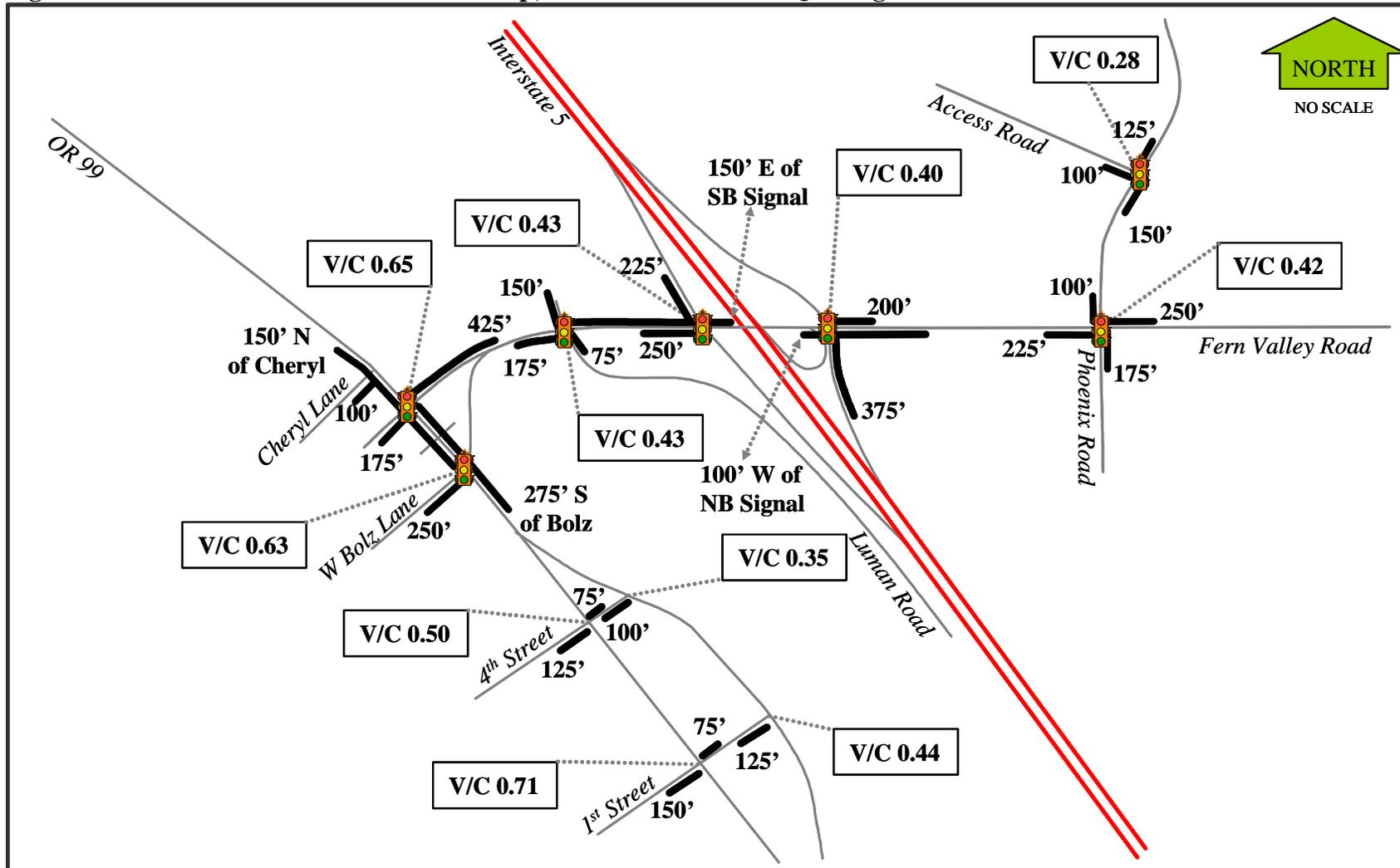
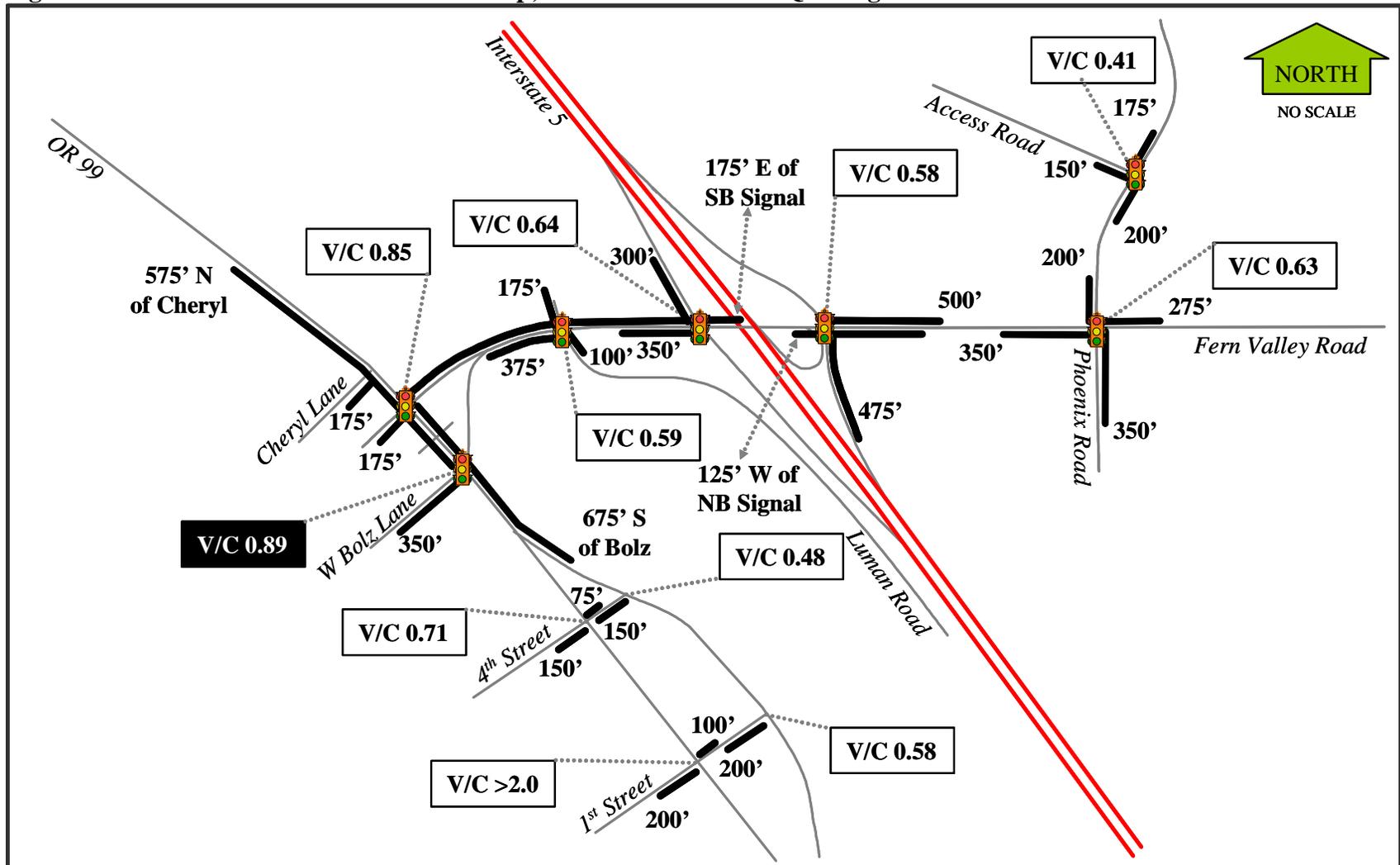
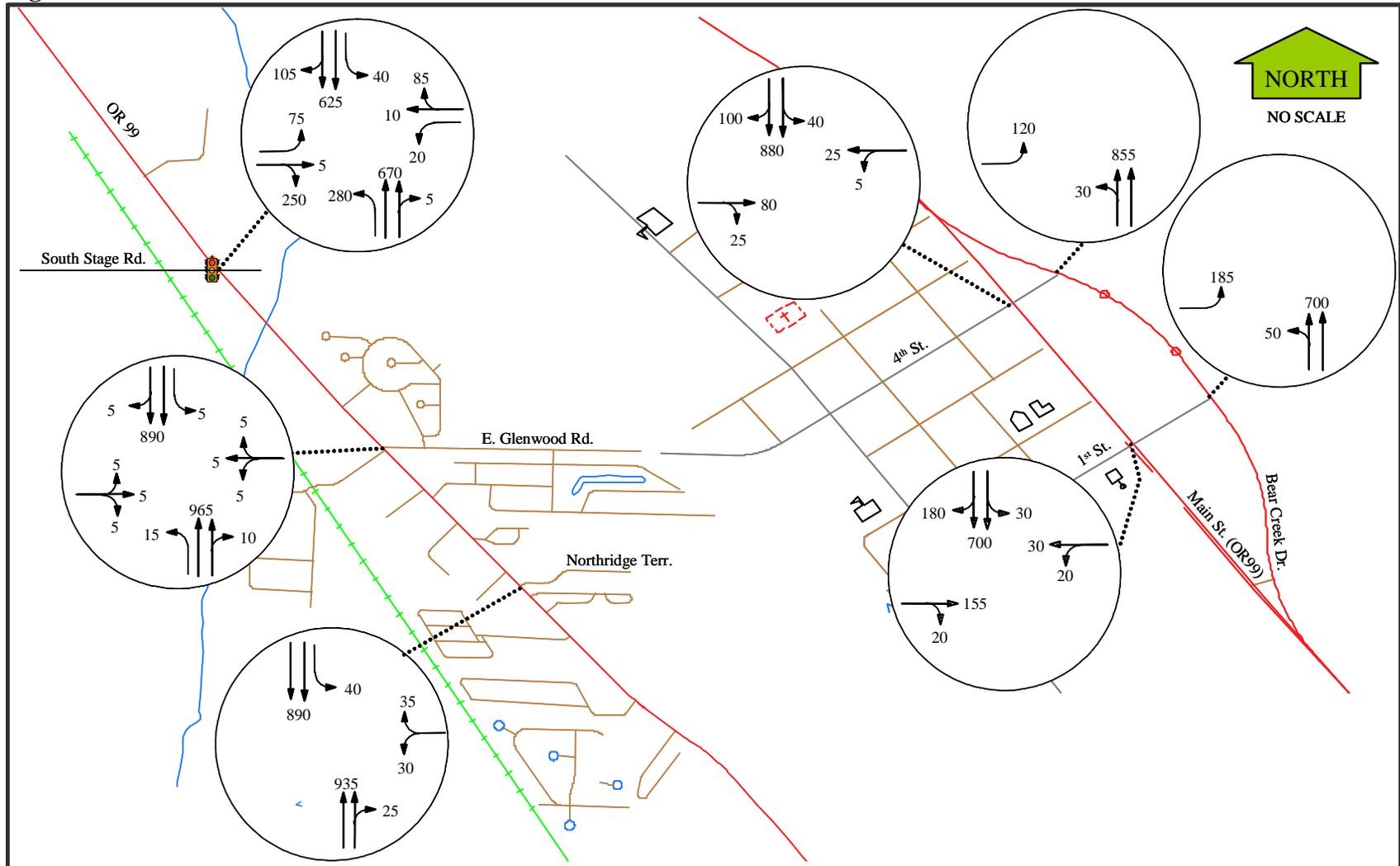


Figure G12: PBA Diamond – 6 lane w/ SE loop; 2030 V/C Ratios and Queuing

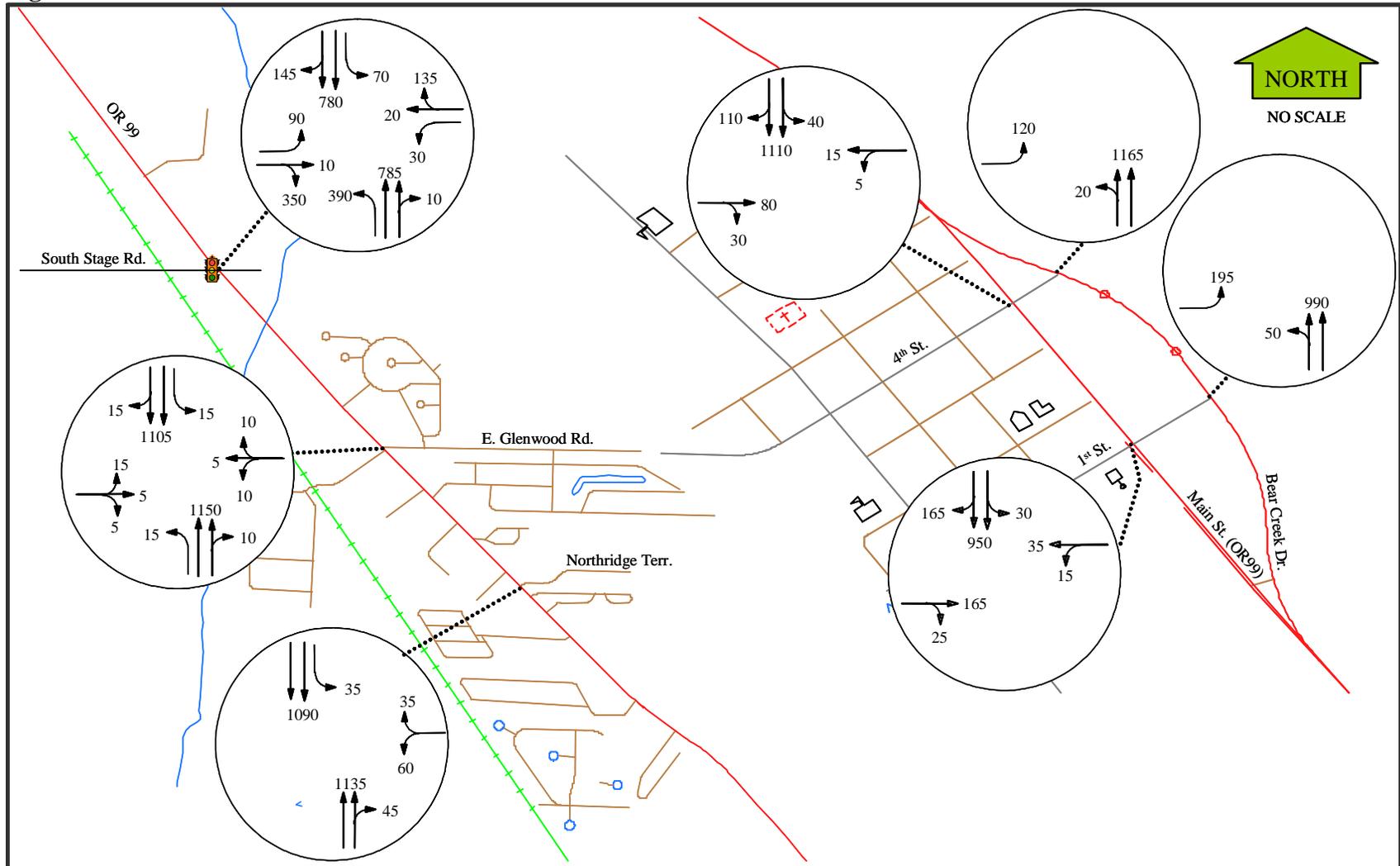


**APPENDIX H – YEAR 2010 & 2030 ALTERNATIVE  
DESIGN HOUR VOLUMES**

**Figure H1: Year 2010 – Common Year 2010 Build Alternative Volumes**

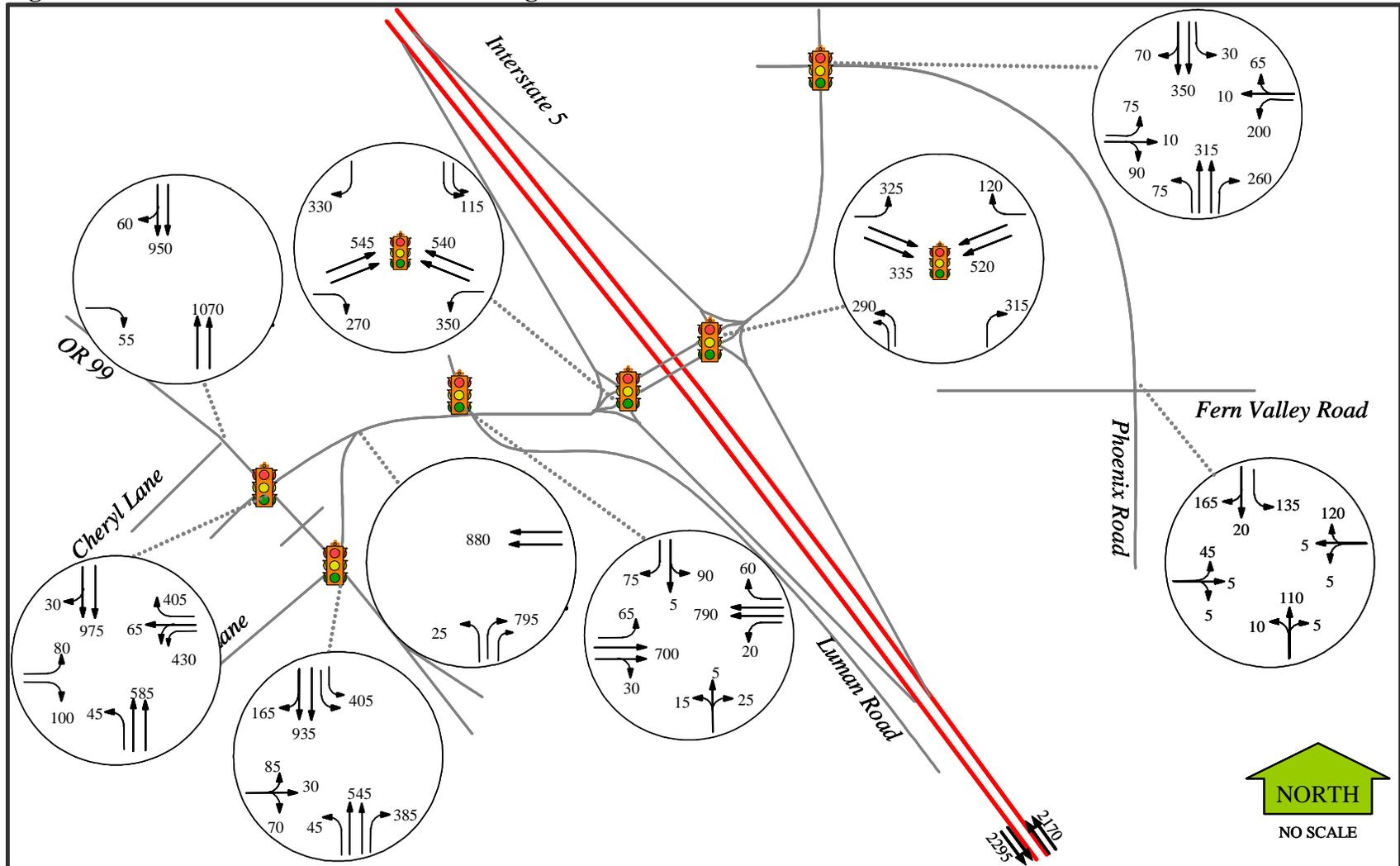


**Figure H2: Year 2030 – Common Year 2030 Build Alternative Volumes**

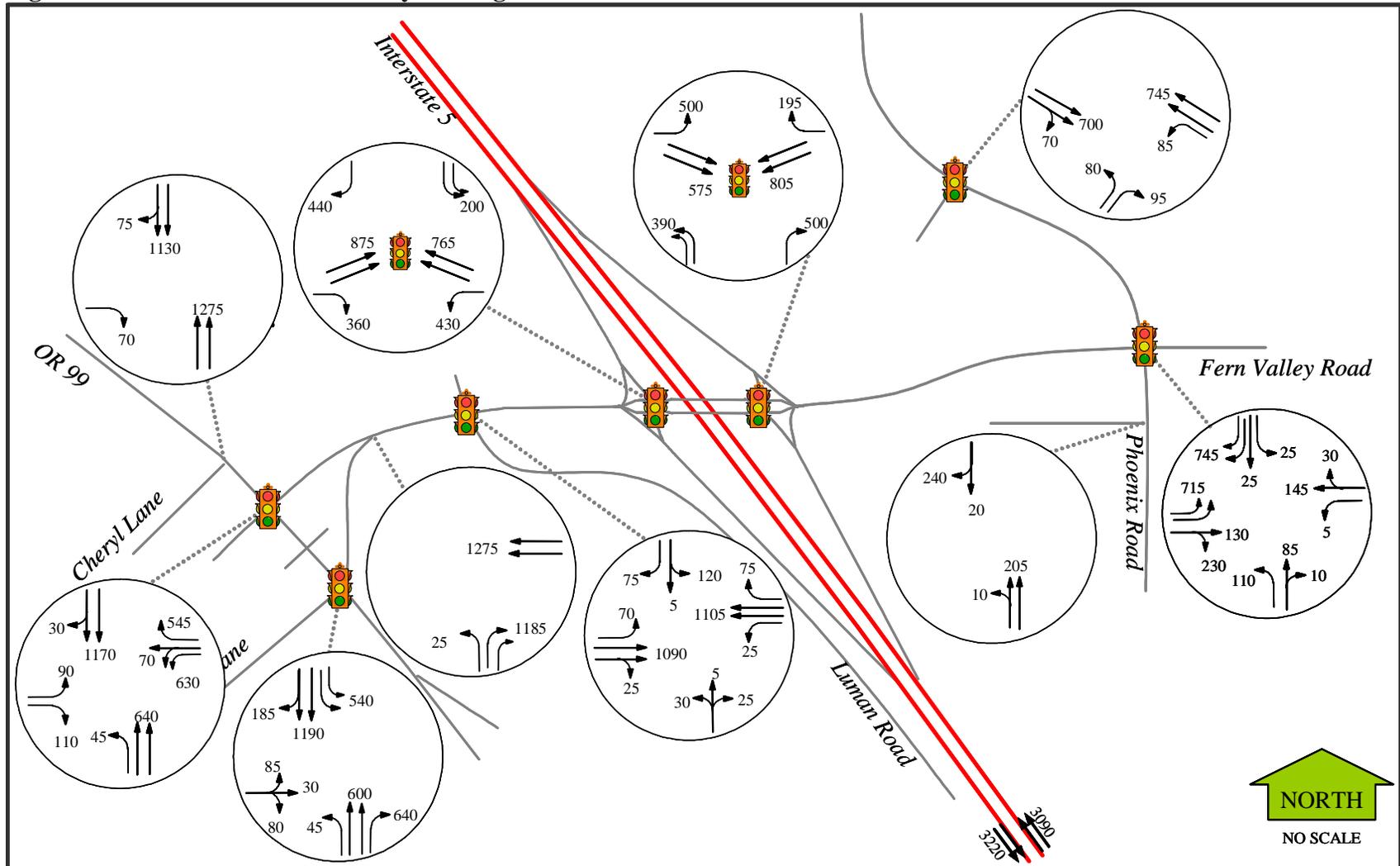




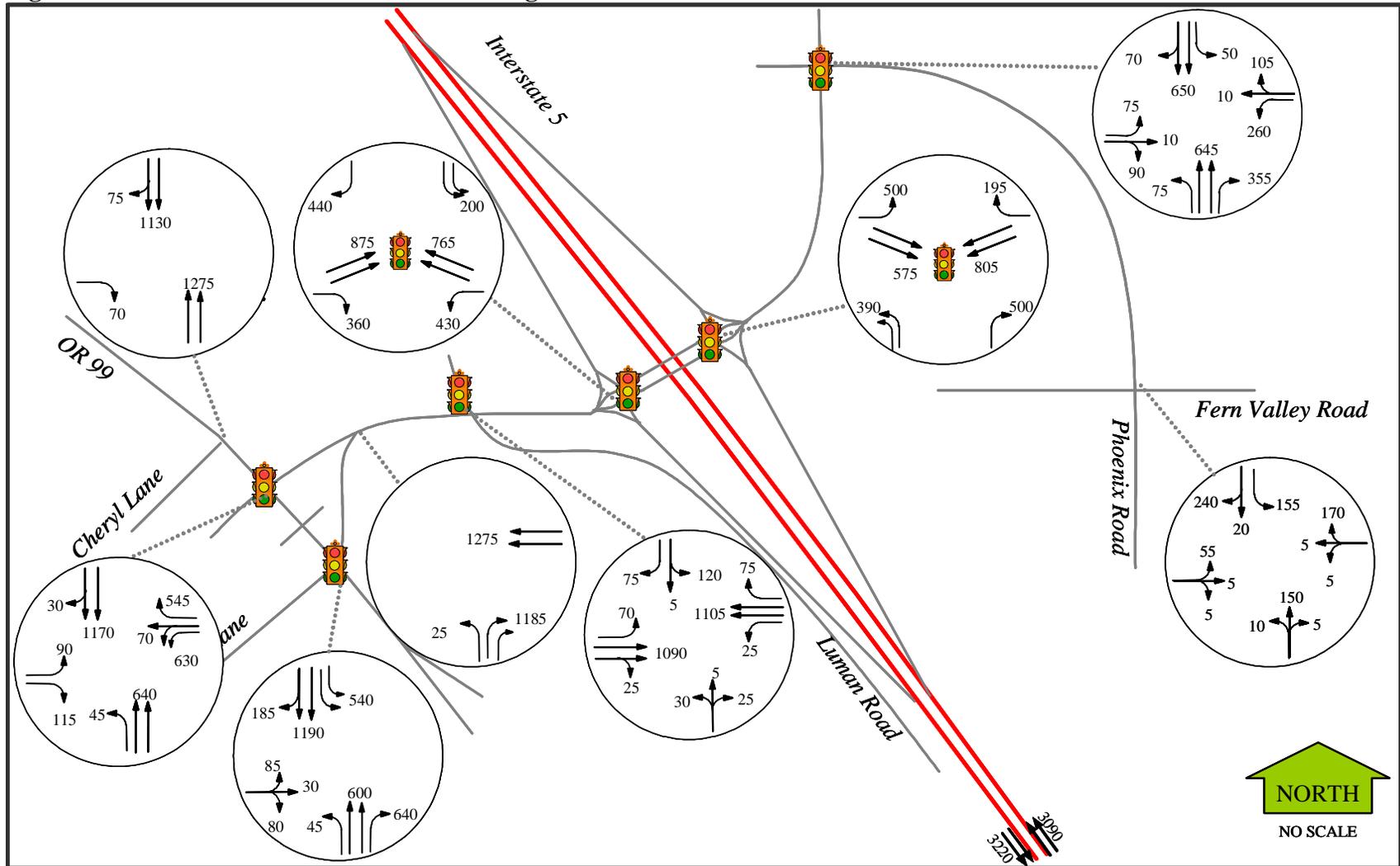
**Figure H4: Year 2010 – North Phoenix Through Alternative**



**Figure H5: Year 2030 – Fern Valley Through Alternative**



**Figure H6: Year 2030 – North Phoenix Through Alternative**



## **APPENDIX I – BUILD ALTERNATIVE DESIGN STORAGE LENGTHS**

**Table I1: Build Alternative Design Storage Bays Lengths**

<b>Alternative</b>	<b>Intersection</b>	<b>Approach</b>	<b>Turn Bay</b>	<b>Length<sup>1</sup> (feet)</b>
Both	OR 99 & Fern Valley Rd	WB	R	100
		NB	L	100
		EB	R	100
	OR 99 & Bolz Ln	SB	Dual L	275
		NB	L	100
			R	100
	Fern Valley Rd & Luman Rd	WB	L	150
			R	200
EB		L	200	
Fern Valley Through	Fern Valley Rd & North/South Phoenix Rd	SB	L	100
			Dual R	300
		WB	L	150
			EB	Dual L
	North Phoenix Rd & Home Depot Access	NB	L	150
		WB	L	150
North Phoenix Through	North Phoenix Rd & Home Depot Access/South Phoenix Rd	SB	L	100
		WB	L	425
		NB	L	150
			R	200
		EB	L	125
	South Phoenix Rd & Old Fern Valley Rd	SB	L	100

<sup>1</sup>Storage bay length does not include taper length, so the actual full turn lane will be longer than shown.

## **APPENDIX J – ANALYSIS METHODOLOGIES**

## **Analysis Methodologies**

The v/c ratios and intersection queuing for signalized intersections were analyzed using Synchro and SimTraffic, which are intended to be used as companion models. The signalized intersection v/c ratio is a quantitative measure of the ratio between the existing for projected volumes to the ideal capacity of the roadway at a given location. The OHP lists v/c mobility standards based on highway classification and surrounding land use.

Synchro is a software package for intersection capacity analysis, modeling actuated signals and optimizing traffic signal timings. Synchro determines v/c ratios and delays at a macro level, while SimTraffic determines problems that may not be realized with a macro-level model. Synchro represents traffic in terms of aggregate measures for each intersection movement. Measures of effectiveness like delay and queue length are determined with equations. These models do not account for “bottleneck” situations where upstream traffic deficiencies reduce the amount of traffic reaching downstream intersections. This situation would have Synchro showing more delay than SimTraffic because of the reduced volumes arriving at the intersection.

SimTraffic is traffic simulation and animation software that models the behavior of vehicles. Turn moves use gap acceptance methodology. SimTraffic provides average speeds for the link conditions and maximum queue length over the designated time period. SimTraffic also includes vehicle and driver performance characteristics developed by Federal Highway Administration for use in traffic modeling. SimTraffic is a microscopic simulation model that has the capability to simulate a variety of traffic controls, including a network with traffic signals operation on different cycle lengths or operation under fully actuated conditions. Most other traffic analysis software packages do not allow for a direct evaluation of these types of traffic conditions.

All v/c ratios with obtained from Highway Capacity Software (HCS2000) or the Highway Capacity Manual (HCM2000) methods. Two-way and T-intersection stops were analyzed using HCM2000 methodology.

All queues shown are the 95<sup>th</sup> percentile queue. The 95<sup>th</sup> percentile queue represents the length that covers 95% of all queues that exist for a particular movement. The remaining 5% generally occurs with volumes that exceed the 30<sup>th</sup> highest hour. The 95<sup>th</sup> percentile queue is also used as the design standard in determining the length of turn storage bays.

## **Preliminary ADT Traffic Signal Warrants**

Of the eight traffic signal warrants in the Manual on Uniform Traffic Control Devices (MUTCD), page 4C-1, only Warrant 1 (Case A or Case B) can be used to project a future need for a traffic signal, according to Oregon Administrative Rule 734-020-0460. Case A (minimum vehicular volume) is mainly for high volumes on the minor street. Case B (interruption of Continuous Volume) deals with high volumes on the major street and the

potential delays and safety hazards with minor street traffic crossing or turning onto the major street.

When evaluating Preliminary ADT (Average Daily Traffic) Traffic Signal Warrants for unsignalized intersections, both the size of the community and the speeds are considered. Intersections have the 85<sup>th</sup> percentile speed in excess of 40 MPH on the major street (the roadway not being stopped) or are located in an isolated community with a population less than 10,000 are evaluated with 70 percent of the standard warrants. If the 85<sup>th</sup> percentile speed is less than 40 miles per hour and the population are greater than 10,000, full standard warrants are used for evaluation. Depending on the location's speed, 70 percent warrants may have been used.

Meeting Preliminary ADT Traffic Signal Warrants does not guarantee that a signal will be installed. Before any signals are considered for installation on the state highway system, ODOT Region Traffic staff need to perform a "field warrant" analysis and submit a recommendation to the ODOT Traffic Engineering and Operation Section. Even if the MUTCD signal warrants are met, the State Traffic Engineer must approve the signals before they may be installed.

## **APPENDIX K – NO-BUILD AIR/NOISE TRAFFIC DATA**

**Table K1: Year 2004 No-build Air Quality Traffic Data for Top 3 Intersections**

Item	OR 99 & Fern Valley Rd	Fern Valley Rd & SB Ramp Terminal	Fern Valley Rd & NB Ramp Terminal
Signal Type	Actuated - Uncoordinated	Actuated - Coordinated	Actuated - Coordinated
LOS	C	C	E
v/c	0.77	0.76	0.96
Total Cycle Length (s)	115	100	100
Total Red Cycle Length	0	1	3
Clearance Lost Time (s)	16	12	12
Saturation Flow (pcphpl)	1800	1800	1800
Arrival Type SB Approach	3	6	
Arrival Type WB Approach	6	4	3
Arrival Type NB Approach	4		3
Arrival Type EB Approach	4	6	5

**Table K2: Year 2010 No-build Air Quality Traffic Data for Top 3 Intersections**

Item	OR 99 & Fern Valley Rd	Fern Valley Rd & SB Ramp Terminal	Fern Valley Rd & NB Ramp Terminal
Signal Type	Actuated - Coordinated	Actuated - Coordinated	Actuated - Coordinated
LOS	D	D	E
v/c	0.79	1.03	1.00
Total Cycle Length (s)	120	120	120
Total Red Cycle Length	0	3	3
Clearance Lost Time (s)	16	12	12
Saturation Flow (pcphpl)	1800	1800	1800
Arrival Type SB Approach	2	4	
Arrival Type WB Approach	6	3	3
Arrival Type NB Approach	3		3
Arrival Type EB Approach	6	6	3

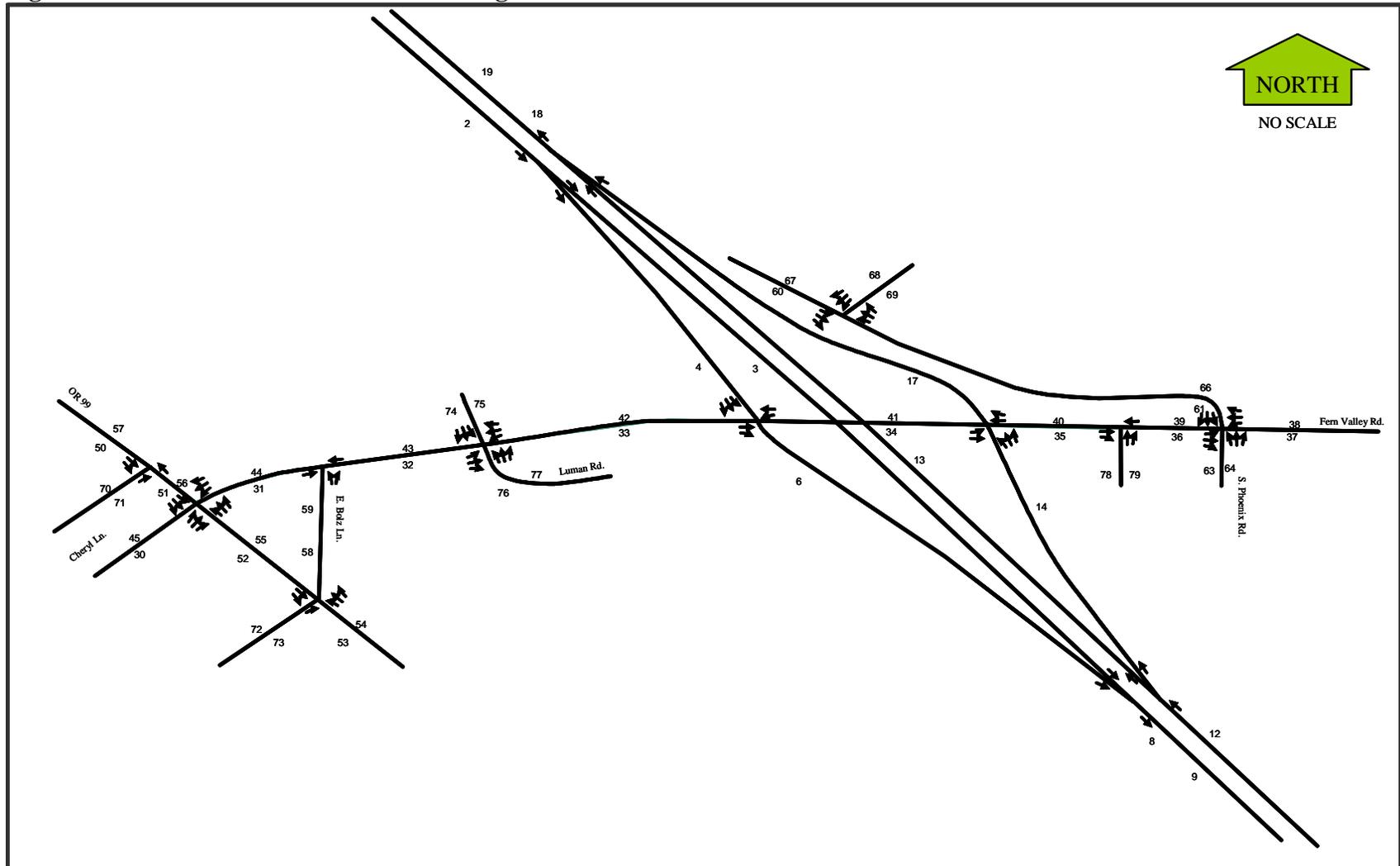
**Table K3: Year 2020 No-build Air Quality Traffic Data for Top 3 Intersections**

Item	OR 99 & Fern Valley Rd	Fern Valley Rd & SB Ramp Terminal	Fern Valley Rd & NB Ramp Terminal
Signal Type	Actuated - Coordinated	Actuated - Coordinated	Actuated - Coordinated
LOS	D	F	F
v/c	0.87	1.13	1.17
Total Cycle Length (s)	120	120	120
Total Red Cycle Length	0	3	3
Clearance Lost Time (s)	16	12	12
Saturation Flow (pcphpl)	1800	1800	1800
Arrival Type SB Approach	2	4	
Arrival Type WB Approach	6	2	3
Arrival Type NB Approach	3		3
Arrival Type EB Approach	6	6	2

**Table K4: Year 2030 No-build Air Quality Traffic Data for Top 3 Intersections**

Item	OR 99 & Fern Valley Rd	Fern Valley Rd & SB Ramp Terminal	Fern Valley Rd & NB Ramp Terminal
Signal Type	Actuated - Coordinated	Actuated - Coordinated	Actuated - Coordinated
LOS	E	E	F
v/c	1.08	1.48	1.66
Total Cycle Length (s)	120	120	120
Total Red Cycle Length	0	3	3
Clearance Lost Time (s)	16	12	12
Saturation Flow (pcphpl)	1800	1800	1800
Arrival Type SB Approach	2	3	
Arrival Type WB Approach	6	1	3
Arrival Type NB Approach	3		3
Arrival Type EB Approach	6	4	1

Figure K1: No-build Noise Traffic Link Diagram



**Table K5: No-build Noise Traffic Data**

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
LOCATION: Phoenix  
ALTERNATIVE: No-Build

PAGE: 1  
PRINTING DATE: Jun 19, 2007  
UNIT: English

SECT	DIST YEAR	AVERAGE DAY		PEAK HOUR		AVERAGE HOUR		PEAK TRUCK HOUR		SP				
		VOL	TRKS	VOL	TRKS	VOL	TRKS	VOL	TRKS					
I-5 SB-North of SB Off-Ramp	002 0.25 2004	19900	2089	1980	1804	89	107	65	65	1770	1552	94	124	65
	002 0.25 2010	23300	2446	2300	2095	81	124	65	65	2060	1807	109	144	65
	002 0.25 2020	26700	2803	2640	2405	92	143	65	65	2370	2078	126	166	65
I-5 SB-Between Ramps	002 0.25 2030	30100	3160	3180	2897	111	172	63	65	2850	2499	151	200	65
	003 0.53 2004	16300	1907	1550	1400	59	91	65	65	1490	1298	83	109	65
	003 0.53 2010	19600	2293	1860	1679	71	110	65	65	1790	1559	100	131	65
I-5 SB-Off Ramp	003 0.53 2020	22900	2668	2170	1960	82	128	65	65	2090	1820	117	153	65
	003 0.53 2030	25900	3030	2480	2240	94	146	65	65	2390	2082	134	174	65
	004 0.16 2004	3600	216	420	396	10	14	45	45	270	246	10	14	45
I-5 SB-On Ramp	004 0.16 2010	3700	222	440	414	11	15	45	45	290	264	11	15	45
	004 0.16 2020	3900	234	460	434	11	15	45	45	300	273	11	16	45
	004 0.16 2030	4200	252	500	471	12	17	45	45	330	301	12	17	45
I-5 SB-South of SB On	007 0.26 2004	4800	336	420	392	7	21	65	65	310	281	8	21	65
	007 0.26 2010	5000	350	420	392	7	21	65	65	310	281	8	21	65
	007 0.26 2020	6400	448	550	514	9	27	65	65	400	362	10	28	65
I-5 SB-South of SB Off	007 0.26 2030	8000	560	680	635	12	33	65	65	500	452	13	35	65
	008 0.20 2004	21100	2258	1960	1764	73	123	65	65	1790	1563	98	129	65
	008 0.20 2010	24600	2632	2280	2052	84	144	65	65	2080	1816	114	150	65
I-5 SB-South of SB On	008 0.20 2020	29200	3124	2720	2448	101	171	65	65	2490	2174	137	179	65
	008 0.20 2030	33900	3627	3160	2844	117	199	63	65	2890	2523	159	208	65
	009 0.25 2004	21100	2258	1960	1764	73	123	65	65	1790	1565	98	127	65
I-5 NB-South of NB Off Rair	009 0.25 2010	24600	2632	2280	2052	84	144	65	65	2080	1818	114	148	65
	009 0.25 2020	29200	3124	2720	2448	101	171	65	65	2490	2176	137	177	65
	009 0.25 2030	33900	3627	3160	2844	117	199	63	65	2890	2526	159	205	65
I-5 NB-South of NB Off Rair	012 0.25 2004	20300	2355	1880	1694	68	118	65	65	1880	1637	98	145	65
	012 0.25 2010	24100	2796	2240	2018	81	141	65	65	2240	1952	116	172	65

ANALYST: Christina Thompson  
CHECKED BY: [Signature]  
FILE: FM\_EIS.MDB

SP = SPEED OF VEHICLE  
AUTO = AUTOMOBILE VOLUME  
HTR = HEAVY TRUCK VOLUME

SECT = SECTION NUMBER  
VOL = TOTAL VOLUME  
MTR = MEDIUM TRUCK VOLUME

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Phoenix  
 ALTERNATIVE: No-Build

PAGE: 2  
 PRINTING DATE: Jun 19, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY		PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR			SP		
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012	0.25	2030	33100	3840	3080	2775	111	194	64	0	0	3080	2683	160	237	64
I-5 NB-Between Ramps			15300	2035	1420	1246	60	114	65	0	0	1420	1211	84	125	65
013	0.48	2004	18300	2434	1710	1501	72	137	65	0	0	1710	1459	101	150	65
013	0.48	2010	21800	2889	2040	1791	86	163	65	0	0	2040	1740	120	180	65
013	0.48	2020	25300	3365	2360	2072	99	189	65	0	0	2360	2013	139	208	65
I-5 NB-NB Off Ramp			5000	330	460	434	9	17	45	0	0	400	372	10	18	45
014	0.18	2004	5800	383	540	509	11	20	45	0	0	470	436	12	22	45
014	0.18	2010	6800	449	620	565	12	23	45	0	0	540	501	14	25	45
014	0.18	2020	7800	515	720	679	14	27	45	0	0	630	585	16	29	45
I-5 NB-NB On Ramp			4300	318	370	350	8	12	45	0	0	320	290	11	19	45
017	0.21	2004	4900	363	420	397	9	14	45	0	0	370	335	13	22	45
017	0.21	2010	5400	400	460	435	10	15	45	0	0	400	362	14	24	45
017	0.21	2030	6000	444	510	482	11	17	45	0	0	450	408	15	27	45
I-5 NB-North of NB On			19600	2352	1800	1606	68	126	65	0	0	1780	1536	98	146	65
018	0.20	2004	23200	2784	2120	1891	81	148	65	0	0	2090	1804	115	171	65
018	0.20	2010	27200	3264	2500	2230	95	175	65	0	0	2470	2131	136	203	65
018	0.20	2030	31300	3756	2860	2551	109	200	65	0	0	2830	2442	156	232	65
I-5 NB-North of NB On			19600	2352	1800	1606	68	126	65	0	0	1780	1536	98	146	65
019	0.25	2004	23200	2784	2120	1891	81	148	65	0	0	2090	1804	115	171	65
019	0.25	2020	27200	3264	2500	2230	95	175	65	0	0	2470	2131	136	203	65
019	0.25	2030	31300	3756	2860	2551	109	200	65	0	0	2830	2442	156	232	65
Rays Exit			1700	29	150	150	0	0	20	0	0	120	118	1	1	20
030	0.25	2004	1900	32	160	160	0	0	20	0	0	130	128	1	1	20
030	0.25	2010	2000	34	160	160	0	0	16	0	0	150	148	1	1	20
030	0.25	2030	2200	37	200	200	0	0	13	0	0	160	158	1	1	19

ANALYST: Christina Thompson  
 CHECKED BY: [Signature]  
 FILE: FV\_EIS.MOB

SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME  
 SECTION NUMBER  
 VOL = TOTAL VOLUME  
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**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Phoenix  
 ALTERNATIVE: No-Build

PAGE: 3  
 PRINTING DATE: Jun 19, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY		PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR								
			VOL	TRKS	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP		
031	0.08	2004	4400	172	30	320	312	7	1	30	0	0	0	280	266	9	5	30	
031	0.08	2010	4600	179	30	340	332	7	1	30	0	0	0	300	285	10	5	30	
031	0.08	2020	5600	218	30	420	410	9	1	30	0	0	0	370	351	12	7	30	
031	0.08	2030	6500	253	30	480	468	11	1	30	0	0	0	420	399	13	8	30	
Fern Valley Rd EB-E Boiz 1																			
032	0.12	2004	7900	324	30	600	585	12	3	30	0	0	0	550	521	20	9	30	
032	0.12	2010	8700	357	30	660	644	13	3	30	0	0	0	610	578	22	10	30	
032	0.12	2020	10300	422	30	770	751	15	4	29	0	0	0	710	673	26	11	30	
032	0.12	2030	11700	480	30	880	858	18	4	26	0	0	0	810	768	29	13	30	
Fern Valley Rd EB- Luman																			
033	0.13	2004	7600	220	30	610	594	13	3	30	0	0	0	560	533	20	7	30	
033	0.13	2010	8300	241	30	660	643	14	3	30	0	0	0	610	582	21	7	30	
033	0.13	2020	9900	287	30	790	769	17	4	28	0	0	0	730	695	26	9	30	
033	0.13	2030	11500	334	30	920	896	19	5	10	0	0	0	850	810	30	10	13	
Fern Valley Rd EB- SB Rai																			
034	0.13	2004	6100	268	30	520	499	8	13	30	0	0	0	400	369	16	15	30	
034	0.13	2010	6800	299	30	580	556	9	15	30	0	0	0	450	415	18	17	30	
034	0.13	2020	8400	370	30	710	681	11	18	30	0	0	0	550	508	22	20	30	
034	0.13	2030	9800	431	30	840	806	13	21	20	0	0	0	650	600	26	24	30	
Fern Valley Rd EB- NB Rai																			
035	0.12	2004	6400	448	30	510	475	13	22	30	0	0	0	490	446	16	28	30	
035	0.12	2010	7800	546	30	620	577	16	27	30	0	0	0	600	546	20	34	30	
035	0.12	2020	10400	728	30	820	764	21	35	23	0	0	0	790	719	26	45	25	
035	0.12	2030	12800	896	30	1020	950	26	44	10	0	0	0	980	892	32	56	11	
Fern Valley Rd EB- Access																			
036	0.12	2004	5600	207	30	450	437	12	1	30	0	0	0	430	415	9	6	30	
036	0.12	2010	6900	255	30	560	544	15	1	30	0	0	0	540	521	11	8	30	
036	0.12	2020	9500	351	30	750	728	20	2	26	0	0	0	720	694	15	11	28	
036	0.12	2030	11800	437	30	940	913	25	2	16	0	0	0	900	868	19	13	18	
Fern Valley Rd EB- East of																			
037	0.25	2004	1800	49	30	140	137	3	0	30	0	0	0	130	127	3	0	30	
037	0.25	2010	1900	51	30	140	137	3	0	30	0	0	0	130	127	3	0	30	
037	0.25	2020	2100	57	30	160	156	4	0	30	0	0	0	150	146	4	0	30	

ABBREVIATION SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME

ANALYST: Christina Torres  
 CHECKED BY: *[Signature]*  
 FILE: FVI\_EIS.MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Phoenix  
 ALTERNATIVE: No-Build

PAGE: 4  
 PRINTING DATE: Jun 19, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY		PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR								
			VOL	TRKS	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP		
037	0.25	2030	2200	59	30	160	156	4	0	30	0	0	0	150	146	4	0	30	
Fern Valley Rd WB- East o																			
038	0.25	2004	1800	52	30	140	139	1	0	30	0	0	0	140	136	4	0	30	
038	0.25	2010	1900	55	30	140	139	1	0	30	0	0	0	140	136	4	0	30	
038	0.25	2020	2200	64	30	160	159	1	0	30	0	0	0	160	155	5	0	30	
038	0.25	2030	2400	70	30	180	179	1	0	30	0	0	0	180	175	5	0	30	
Fern Valley Rd WB- N Pho																			
039	0.12	2004	6600	614	30	510	470	14	26	30	0	0	0	490	434	20	36	30	
039	0.12	2010	7800	725	30	600	553	16	31	30	0	0	0	570	505	23	42	30	
039	0.12	2020	10000	930	30	780	719	21	40	24	0	0	0	740	656	30	54	28	
039	0.12	2030	12200	1135	30	940	867	25	48	16	0	0	0	900	797	37	66	18	
Fern Valley Rd WB- Access																			
040	0.12	2004	700	53	30	510	470	14	26	30	0	0	0	490	434	20	36	30	
040	0.12	2010	7800	583	30	600	553	16	31	30	0	0	0	570	505	23	42	30	
040	0.12	2020	10000	760	30	780	719	21	40	25	0	0	0	740	655	30	55	28	
040	0.12	2030	12200	927	30	940	867	25	48	14	0	0	0	900	796	37	67	16	
Fern Valley Rd WB- NB Ra																			
041	0.13	2004	700	36	30	620	590	8	22	30	0	0	0	520	477	20	23	30	
041	0.13	2010	7700	393	30	680	647	9	24	30	0	0	0	570	522	22	26	30	
041	0.13	2020	9400	479	30	820	779	11	30	26	0	0	0	680	622	27	31	30	
041	0.13	2030	11000	561	30	970	922	13	35	12	0	0	0	810	742	32	36	22	
Fern Valley Rd WB- SB Ra																			
042	0.13	2004	7300	212	30	710	688	16	6	30	0	0	0	640	605	25	10	30	
042	0.13	2010	7900	229	30	770	746	18	6	27	0	0	0	700	662	27	11	30	
042	0.13	2020	8400	244	30	820	794	19	7	26	0	0	0	740	699	29	12	30	
042	0.13	2030	8900	258	30	860	853	20	7	10	0	0	0	800	756	31	13	16	
Fern Valley Rd WB- Lumbar																			
043	0.12	2004	8200	312	30	700	677	20	3	30	0	0	0	630	595	28	7	30	
043	0.12	2010	9000	342	30	760	735	22	3	26	0	0	0	690	652	30	8	30	
043	0.12	2020	9600	365	30	820	793	24	3	26	0	0	0	740	699	33	8	30	
043	0.12	2030	10300	391	30	860	832	25	3	27	0	0	0	780	737	34	9	30	
Fern Valley Rd WB-E Boltz																			

ABBREVIATION SECT = SECTION NUMBER  
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 MTR = MEDIUM TRUCK VOLUME  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME

ANALYST: *Christina F...*  
 CHECKED BY: *...*  
 FILE: FVI\_EIS.MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Phoenix  
 ALTERNATIVE: No-Build

PAGE: 5  
 PRINTING DATE: Jun 19, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY		PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR							
			VOL	TRKS	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	
044	0.08	2004	8300	315	30	700	677	20	3	21	0	0	0	650	615	28	7	25
044	0.08	2010	9100	346	30	770	745	22	3	16	0	0	0	710	671	31	8	21
044	0.08	2020	9700	369	30	820	794	23	3	10	0	0	0	760	719	33	8	14
044	0.08	2030	10400	395	30	880	851	25	4	10	0	0	0	810	766	35	9	10
Rays Entrance																		
045	0.25	2004	1200	42	20	140	140	0	0	20	0	0	0	110	110	0	0	20
045	0.25	2010	1300	46	20	150	150	0	0	20	0	0	0	120	120	0	0	20
045	0.25	2020	1400	49	20	160	160	0	0	20	0	0	0	130	130	0	0	20
045	0.25	2030	1400	49	20	170	170	0	0	20	0	0	0	130	130	0	0	20
OR 99 SB-North of Cheryl I																		
050	0.25	2004	10400	260	30	870	853	15	2	30	0	0	0	860	835	19	6	30
050	0.25	2010	10900	273	30	920	902	16	2	29	0	0	0	910	884	20	6	30
050	0.25	2020	13400	335	30	1120	1099	19	2	24	0	0	0	1110	1078	24	8	24
050	0.25	2030	15800	395	30	1320	1295	22	3	17	0	0	0	1310	1272	29	9	17
OR 99 SB-Cheryl Ln to Fer																		
051	0.04	2004	10300	319	30	860	842	16	2	30	0	0	0	860	833	21	6	30
051	0.04	2010	10700	332	30	880	861	17	2	30	0	0	0	880	853	21	6	30
051	0.04	2020	13200	409	30	1100	1077	21	2	25	0	0	0	1100	1066	26	8	25
051	0.04	2030	15600	484	30	1300	1272	25	3	17	0	0	0	1300	1260	31	9	17
OR 99 SB-Fern Valley Rd I																		
052	0.10	2004	10800	389	30	940	915	24	1	26	0	0	0	920	885	29	6	27
052	0.10	2010	11900	428	30	1040	1012	27	1	21	0	0	0	1020	981	32	7	22
052	0.10	2020	13400	482	30	1160	1129	30	1	15	0	0	0	1130	1087	35	8	16
052	0.10	2030	15000	540	30	1300	1265	34	1	10	0	0	0	1270	1222	39	9	10
OR 99 SB-South of W Boz																		
053	0.25	2004	11000	429	30	930	904	25	1	30	0	0	0	930	896	29	5	30
053	0.25	2010	11900	464	30	1010	982	27	1	30	0	0	0	1010	974	31	5	30
053	0.25	2020	13300	519	30	1120	1089	30	1	30	0	0	0	1120	1079	35	6	30
053	0.25	2030	14700	573	30	1240	1206	33	1	29	0	0	0	1240	1196	38	6	29
OR 99 NB-South of W Boz																		
054	0.25	2004	11000	440	30	870	848	18	4	29	0	0	0	870	829	32	9	29
054	0.25	2010	12100	484	30	960	935	20	5	25	0	0	0	960	914	36	10	25
054	0.25	2020	14400	576	30	1140	1110	24	6	16	0	0	0	1140	1087	42	11	16

ABBREVIATION SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME

ANALYST: Christina Felton Thomas  
 CHECKED BY: *[Signature]*  
 FILE: FVI\_EIS MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Phoenix  
 ALTERNATIVE: No-Build

PAGE: 6  
 PRINTING DATE: Jun 19, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY		PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR								
			VOL	TRKS	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP		
054	0.25	2030	16400	656	30	1300	1266	27	7	10	0	0	0	1300	1239	48	13	10	
OR 99 NB-W Bolz Ln to Fe																			
055	0.10	2004	7000	231	30	570	555	13	2	30	0	0	0	570	544	20	6	30	
055	0.10	2010	7400	244	30	600	584	14	2	30	0	0	0	600	572	21	7	30	
055	0.10	2020	9000	297	30	730	710	17	3	30	0	0	0	730	696	26	8	30	
055	0.10	2030	10600	350	30	860	837	20	3	30	0	0	0	860	821	30	9	30	
OR 99 NB-Fern Valley Rd 1																			
056	0.04	2004	10900	305	30	880	857	18	5	30	0	0	0	880	842	33	5	30	
056	0.04	2010	11300	316	30	900	876	19	5	30	0	0	0	900	862	33	5	30	
056	0.04	2020	13500	378	30	1090	1060	23	7	25	0	0	0	1090	1043	40	7	25	
056	0.04	2030	15900	445	30	1280	1245	27	8	18	0	0	0	1280	1225	47	8	18	
OR 99 NB - North of Chery																			
057	0.25	2004	10900	283	30	880	857	18	5	30	0	0	0	880	842	33	5	30	
057	0.25	2010	11300	294	30	900	876	19	5	30	0	0	0	900	862	33	5	30	
057	0.25	2020	13500	351	30	1090	1060	23	7	30	0	0	0	1090	1043	40	7	30	
057	0.25	2030	15900	413	30	1280	1245	27	8	27	0	0	0	1280	1225	47	8	27	
E Bolz Ln																			
058	0.10	2004	3600	173	30	280	273	5	2	30	0	0	0	270	254	12	4	30	
058	0.10	2010	4200	202	30	330	322	6	2	30	0	0	0	320	301	14	5	30	
058	0.10	2020	4800	230	30	370	360	7	3	28	0	0	0	360	339	16	5	29	
058	0.10	2030	5300	254	30	410	400	7	3	23	0	0	0	400	376	18	6	24	
E Bolz Ln																			
059	0.10	2004	3600	173	30	280	273	5	2	30	0	0	0	270	254	12	4	30	
059	0.10	2010	4200	202	30	330	322	6	2	30	0	0	0	320	301	14	5	30	
059	0.10	2020	4800	230	30	370	360	7	3	28	0	0	0	360	339	16	5	29	
059	0.10	2030	5300	254	30	410	400	7	3	23	0	0	0	400	376	18	6	24	
N Phoenix Rd SB-North of																			
060	0.25	2004	4600	156	30	390	379	7	4	30	0	0	0	360	348	7	5	30	
060	0.25	2010	5300	180	30	430	417	8	5	30	0	0	0	390	377	8	5	30	
060	0.25	2020	6900	235	30	580	563	11	6	30	0	0	0	530	512	11	7	30	
060	0.25	2030	8700	296	30	720	698	14	8	30	0	0	0	660	638	13	9	30	
N Phoenix Rd SB-Home Dr																			

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 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME

ANALYST: Chris M. [Signature]  
 CHECKED BY: [Signature]  
 FILE: FV1\_EIS.MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Phoenix  
 ALTERNATIVE: No-Build

PAGE: 7  
 PRINTING DATE: Jun 19, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR						
			VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP
061	0.28	2004	4700	160	30	390	377	9	4	30	0	0	30	360	344	12	4	30
061	0.28	2010	5500	167	30	460	444	11	5	30	0	0	30	420	401	14	5	30
061	0.28	2020	7300	248	30	600	580	14	6	30	0	0	30	550	525	19	6	30
061	0.28	2030	9100	309	30	740	716	17	7	30	0	0	30	680	650	23	7	30
N Phoenix Rd SB-South of																		
063	0.25	2004	500	58	25	40	39	1	0	25	0	0	25	30	27	3	0	25
063	0.25	2010	700	81	25	60	58	2	0	25	0	0	25	40	36	4	0	25
063	0.25	2020	1300	151	25	100	97	3	0	25	0	0	25	70	63	7	0	25
063	0.25	2030	1600	186	25	140	136	4	0	25	0	0	25	100	90	10	0	25
N Phoenix Rd NB-South of																		
064	0.25	2004	1300	689	25	80	50	4	26	25	0	0	25	80	34	11	35	25
064	0.25	2010	1600	848	25	90	56	5	29	25	0	0	25	90	38	12	40	25
064	0.25	2020	2000	1060	25	120	76	6	38	19	0	0	25	120	51	16	53	19
064	0.25	2030	2100	1113	25	120	76	6	38	19	0	0	25	120	51	16	53	19
N Phoenix Rd NB-Fern Val																		
066	0.28	2004	4500	149	30	360	349	8	3	30	0	0	30	350	334	9	7	30
066	0.28	2010	5500	182	30	440	426	10	4	30	0	0	30	430	410	11	9	30
066	0.28	2020	7600	251	30	620	601	14	5	30	0	0	30	600	573	15	12	30
066	0.28	2030	9500	314	30	780	757	17	6	30	0	0	30	760	728	19	15	30
N Phoenix Rd NB-North of																		
067	0.25	2004	4500	149	30	360	352	6	2	30	0	0	30	350	336	6	8	30
067	0.25	2010	5500	182	30	440	429	8	3	30	0	0	30	430	413	8	9	30
067	0.25	2020	7300	241	30	600	585	11	4	30	0	0	30	580	557	10	13	30
067	0.25	2030	9200	304	30	770	751	14	5	30	0	0	30	750	721	13	16	30
Home Depot Exit																		
068	0.25	2004	0	0	20	0	0	0	0	20	0	0	20	0	0	0	0	20
068	0.25	2010	2500	57	20	180	176	4	0	20	0	0	20	180	176	4	0	20
068	0.25	2020	2500	57	20	180	176	4	0	20	0	0	20	180	176	4	0	20
068	0.25	2030	2500	57	20	180	176	4	0	20	0	0	20	180	176	4	0	20
Home Depot Entrance																		
069	0.25	2004	0	0	20	0	0	0	0	20	0	0	20	0	0	0	0	20
069	0.25	2010	2400	46	20	160	157	3	0	20	0	0	20	160	157	3	0	20
069	0.25	2020	2400	46	20	160	157	3	0	20	0	0	20	160	157	3	0	20

ANALYST: Christopher Thomas  
 CHECKED BY: *[Signature]*  
 FILE: FV\_EIS.MDB

SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME

SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
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**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Phoenix  
 ALTERNATIVE: No-Build

PAGE: 8  
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SECT	DIST	YEAR	AVERAGE DAY		PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR						
			VOL	TRKS	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP
069	0.25	2030	2400	46	20	160	157	3	0	20	160	157	3	0	20		
Cheryl Ln WB																	
070	0.25	2004	800	19	25	60	60	0	0	25	60	60	0	0	25		
070	0.25	2010	800	19	25	60	60	0	0	25	60	60	0	0	25		
070	0.25	2020	800	18	25	60	60	0	0	25	60	60	0	0	25		
070	0.25	2030	800	19	25	60	60	0	0	25	60	60	0	0	25		
Cheryl Ln EB																	
071	0.25	2004	600	19	25	40	39	1	0	25	40	39	1	0	25		
071	0.25	2010	600	19	25	40	39	1	0	25	40	39	1	0	25		
071	0.25	2020	600	19	25	40	39	1	0	25	40	39	1	0	25		
071	0.25	2030	600	19	25	40	39	1	0	25	40	39	1	0	25		
W Boiz Ln WB																	
072	0.25	2004	1000	17	25	100	100	0	0	25	100	100	0	0	25		
072	0.25	2010	1300	22	25	130	130	0	0	25	130	130	0	0	25		
072	0.25	2020	1600	27	25	160	160	0	0	25	160	160	0	0	25		
072	0.25	2030	1800	31	25	180	180	0	0	25	180	180	0	0	25		
W Boiz Ln EB																	
073	0.25	2004	800	7	25	60	59	1	0	25	60	59	1	0	25		
073	0.25	2010	800	7	25	70	69	1	0	25	70	69	1	0	25		
073	0.25	2020	1000	9	25	80	79	1	0	25	80	79	1	0	25		
073	0.25	2030	1000	9	25	90	89	1	0	25	90	89	1	0	25		
Luman Rd SB-N of Fern Vt																	
074	0.25	2004	2200	68	25	140	136	4	0	25	140	136	4	0	25		
074	0.25	2010	2400	74	25	150	146	4	0	25	150	146	4	0	25		
074	0.25	2020	2600	81	25	160	156	4	0	23	160	155	5	0	23		
074	0.25	2030	2800	87	25	180	175	5	0	19	180	175	5	0	19		
Luman Rd NB-N of Fern Vt																	
075	0.25	2004	2100	71	25	120	116	3	1	25	120	115	4	1	25		
075	0.25	2010	2200	75	25	140	136	3	1	25	140	135	4	1	25		
075	0.25	2020	2400	82	25	140	136	3	1	25	140	135	4	1	25		
075	0.25	2030	2500	85	25	150	145	4	1	25	150	144	5	1	25		
Luman Rd SB-S of Fern Vt																	

ANALYST: Christopher Thomas  
 CHECKED BY: [Signature]  
 FILE: FVLEIS.MDB

SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME

SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Phoenix  
 ALTERNATIVE: No-Build

PAGE: 9  
 PRINTING DATE: Jun 19, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR						
			VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	VOL	AUTO	MTR	HTR	SP			
076	0.25	2004	500	21	25	50	47	1	2	25	0	0	25	50	44	2	4	25
076	0.25	2010	600	26	25	60	57	1	2	25	0	0	25	60	53	2	5	25
076	0.25	2020	600	26	25	60	57	1	2	25	0	0	25	60	53	2	5	25
076	0.25	2030	600	26	25	60	57	1	2	25	0	0	25	60	53	2	5	25
Luman Rd NB-S of Fern Vt			1000	30	25	40	35	5	0	25	0	0	25	40	35	5	0	25
077	0.25	2004	1200	36	25	40	35	5	0	25	0	0	25	40	35	5	0	25
077	0.25	2010	1400	42	25	60	52	8	0	19	0	0	25	60	52	8	0	19
077	0.25	2020	1500	45	25	60	52	8	0	19	0	0	25	60	52	8	0	19
Truck Stop Access SB			1700	476	20	90	64	7	19	20	0	0	20	90	56	11	23	20
078	0.25	2004	1900	532	20	120	85	10	25	20	0	0	20	120	75	14	31	20
078	0.25	2010	2100	588	20	140	100	11	29	20	0	0	20	140	87	17	36	20
078	0.25	2020	2400	672	20	160	113	13	34	20	0	0	20	160	99	19	42	20
Truck Stop Access NB			900	207	20	40	35	5	0	20	0	0	20	40	35	5	0	20
079	0.25	2004	1000	230	20	40	35	5	0	20	0	0	20	40	35	5	0	20
079	0.25	2010	1200	276	20	60	52	8	0	20	0	0	20	60	52	8	0	20
079	0.25	2020	1400	322	20	60	52	8	0	20	0	0	20	60	52	8	0	20

ABBREVIATION SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUM  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME

ANALYST: Christina T. Thomas  
 CHECKED BY: [Signature]  
 FILE: FV\_EIS.MCB

## **APPENDIX L – BUILD AIR/NOISE TRAFFIC DATA**

**Table L1: 2010 Fern Valley Through Air Quality Traffic Data**

<b>Item</b>	<b>OR 99 &amp; Fern Valley Rd</b>	<b>OR 99 &amp; Bolz Ln</b>	<b>Fern Valley Rd &amp; North/South Phoenix Rd</b>
Signal Type	Actuated - Coordinated	Actuated - Coordinated	Actuated - Coordinated
LOS	C	C	C
v/c	0.68	0.57	0.43
Total Cycle Length (s)	120	120	120
Total Red Cycle Length	0	1	1
Clearance Lost Time (s)	12	12	12
Saturation Flow (pcphpl)	1800	1800	1800
Arrival Type SB Approach	5	3	6
Arrival Type WB Approach	5		6
Arrival Type NB Approach	5	5	6
Arrival Type EB Approach	6	6	6

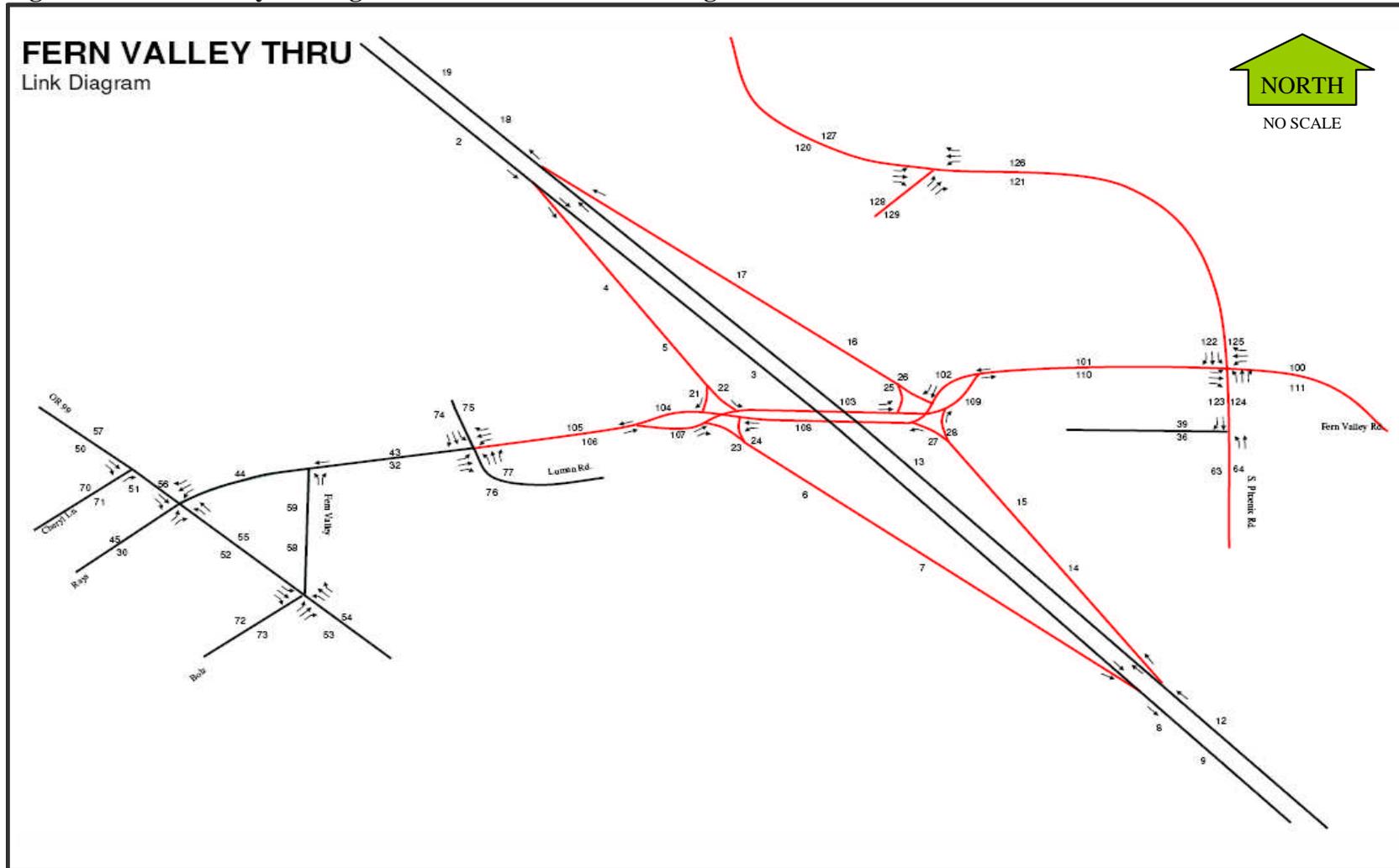
**Table L2: 2020 Fern Valley Through Air Quality Traffic Data**

<b>Item</b>	<b>OR 99 &amp; Fern Valley Rd</b>	<b>OR 99 &amp; Bolz Ln</b>	<b>Fern Valley Rd &amp; North/South Phoenix Rd</b>
Signal Type	Actuated - Coordinated	Actuated - Coordinated	Actuated - Coordinated
LOS	C	C	D
v/c	0.76	0.63	0.56
Total Cycle Length (s)	120	120	120
Total Red Cycle Length	0	3	3
Clearance Lost Time (s)	16	12	12
Saturation Flow (pcphpl)	1800	1800	1800
Arrival Type SB Approach	6	3	6
Arrival Type WB Approach	5		6
Arrival Type NB Approach	5	6	6
Arrival Type EB Approach	6	6	6

**Table L3: 2030 Fern Valley Through Air Quality Traffic Data**

<b>Item</b>	<b>OR 99 &amp; Fern Valley Rd</b>	<b>OR 99 &amp; Bolz Ln</b>	<b>Fern Valley Rd &amp; North/South Phoenix Rd</b>
Signal Type	Actuated - Coordinated	Actuated - Coordinated	Actuated - Coordinated
LOS	C	C	D
v/c	0.86	0.74	0.68
Total Cycle Length (s)	120	120	120
Total Red Cycle Length	0	3	3
Clearance Lost Time (s)	16	12	12
Saturation Flow (pcphpl)	1800	1800	1800
Arrival Type SB Approach	6	3	6
Arrival Type WB Approach	5		6
Arrival Type NB Approach	6	5	6
Arrival Type EB Approach	6	6	6

**Figure L1: Fern Valley Through Noise Traffic Data Link Diagram**



**Table L4: Fern Valley Through Noise Traffic Data**

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
LOCATION: Region 3  
ALTERNATIVE: Build - Fern Valley Through

PAGE: 1  
PRINTING DATE: Aug 14, 2007  
UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR							
			VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	VOL	AUTO	MTR	HTR	SP				
15 SB N of SB Off	0.25	2010	22200	2442	65	2200	1996	81	123	65	0	0	0	65	1970	1716	110	144	65
		2020	26700	2937	65	2640	2304	98	148	65	0	0	0	65	2370	2064	133	173	65
		2030	31000	3410	65	3070	2784	114	172	64	0	0	0	65	2750	2395	154	201	65
15 SB N Btwn Ramps	0.53	2010	18500	2294	65	1760	1579	70	111	65	0	0	0	65	1680	1450	101	129	65
		2020	22100	2740	65	2100	1884	84	132	65	0	0	0	65	2010	1734	121	155	65
		2030	25600	3174	65	2430	2180	97	153	65	0	0	0	65	2320	2002	139	179	65
15 SB Off ramp	0.20	2010	3800	228	45	440	414	11	15	45	0	0	0	45	230	264	11	15	45
		2020	4600	276	45	540	509	13	18	45	0	0	0	45	350	318	13	19	45
		2030	5400	324	45	640	604	15	21	45	0	0	0	45	420	382	16	22	45
15 SB On ramp	0.10	2010	6300	353	45	540	511	10	19	45	0	0	0	45	400	365	14	21	45
		2020	7700	431	45	660	624	13	23	45	0	0	0	45	490	447	17	26	45
		2030	9200	515	45	790	747	15	28	45	0	0	0	45	580	529	20	31	45
15 SB On ramp	0.10	2010	6300	353	45	540	511	10	19	45	0	0	0	45	400	365	14	21	45
		2020	7700	431	45	660	624	13	23	45	0	0	0	45	490	447	17	26	45
		2030	9200	515	45	790	747	15	28	45	0	0	0	45	580	529	20	31	45
15 SB S of SB On	0.20	2010	28700	2640	65	2300	2090	81	129	65	0	0	0	65	2080	1816	114	150	65
		2020	34500	3174	65	2760	2508	97	155	65	0	0	0	65	2500	2182	138	180	65
		2030	40200	3698	65	3220	2927	113	180	63	0	0	0	65	2910	2540	160	210	65
15 SB S of SB On	0.25	2010	28700	2640	65	2300	2090	81	129	65	0	0	0	65	2080	1816	114	150	65
		2020	34500	3174	65	2760	2508	97	155	65	0	0	0	65	2500	2182	138	180	65
		2030	40200	3698	65	3220	2927	113	180	63	0	0	0	65	2910	2540	160	210	65
15 NB S of NB Off	0.25	2010	23300	2796	65	2170	1935	85	150	65	0	0	0	65	2080	1793	114	173	65
		2020	28300	3396	65	2630	2346	103	181	65	0	0	0	65	2520	2172	139	209	65
		2030	33200	3984	65	3090	2756	121	213	64	0	0	0	65	2960	2551	163	246	65

ABBREVIATION SECT = SECTION NUMBER  
VOL = TOTAL VOLUME  
MTR = MEDIUM TRUCK VOLUME  
SP = SPEED OF VEHICLE  
AUTO = AUTOMOBILE VOLUME  
HTR = HEAVY TRUCK VOLUME

ANALYST: *Thammy*  
CHECKED BY: *[Signature]*  
FILE: FV\_E\_1.MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Region 3  
 ALTERNATIVE: Build - Fern Valley Through

PAGE: 2  
 PRINTING DATE: Aug 14, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR							
			VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	
I5 NB Btwn Ramps	013	0.48	2010	16800	2436	65	1560	1355	72	133	65	0	0	65	1560	1311	101	148	65
		0.20	2020	20200	2929	65	1880	1634	86	160	65	0	0	65	1880	1579	122	179	65
		0.48	2030	23700	3436	65	2200	1912	101	187	65	0	0	65	2200	1848	143	209	65
I5 NB Off Ramp	014	0.20	2010	6600	383	45	600	571	12	17	45	0	0	45	520	484	12	24	45
		0.20	2020	8200	476	45	750	714	15	21	45	0	0	45	650	605	15	30	45
		0.20	2030	9700	563	45	890	847	18	25	45	0	0	45	770	717	18	35	45
I5 NB On Ramp	016	0.10	2010	5200	364	45	440	415	10	15	45	0	0	45	380	345	13	22	45
		0.10	2020	6700	469	45	580	548	13	19	45	0	0	45	510	463	17	30	45
		0.10	2030	8100	567	45	700	662	15	23	45	0	0	45	610	554	21	35	45
I5 NB On Ramp	017	0.16	2010	5200	364	45	440	415	10	15	45	0	0	45	380	345	13	22	45
		0.16	2020	6700	469	45	580	548	13	19	45	0	0	45	510	463	17	30	45
		0.16	2030	8100	567	45	700	662	15	23	45	0	0	45	610	554	21	35	45
I5 NB N of NB On	018	0.20	2010	21800	2790	65	2010	1781	80	149	65	0	0	65	1940	1653	114	173	65
		0.20	2020	26700	3418	65	2460	2180	98	182	65	0	0	65	2370	2019	140	211	65
		0.20	2030	31400	4019	65	2900	2569	116	215	65	0	0	65	2800	2386	165	249	65
I5 NB N of NB On	019	0.25	2010	21800	2790	65	2010	1781	80	149	65	0	0	65	1940	1653	114	173	65
		0.25	2020	26700	3418	65	2460	2180	98	182	65	0	0	65	2370	2019	140	211	65
		0.25	2030	31400	4019	65	2900	2569	116	215	65	0	0	65	2800	2386	165	249	65
I5 SB off ramp (Right onto)	021	0.05	2010	2800	59	30	330	318	8	4	30	0	0	30	220	213	3	4	30
		0.05	2020	3300	69	30	380	366	9	5	30	0	0	30	250	242	4	4	30
		0.05	2030	3700	78	30	440	424	11	5	30	0	0	30	290	281	4	5	30
I5 SB off ramp (Left onto F)	022	0.05	2010	1000	188	30	120	106	3	11	30	0	0	30	80	61	8	11	30
		0.05	2020	1400	235	30	160	141	4	15	30	0	0	30	100	76	10	14	30
		0.05	2030	1700	286	30	200	177	5	18	30	0	0	30	130	99	13	18	30

ABBREVIATION: SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME  
 ANALYST: Thanh Nguyen  
 CHECKED BY: [Signature]  
 FILE: FV\_B\_1.MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Region 3  
 ALTERNATIVE: Build - Fern Valley Through

PAGE: 3  
 PRINTING DATE: Aug 14, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR						
			VOL	TRKS	SP	VOL	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	
I5 SB on ramp (Right from																		
023	0.07	2010	3100	118	30	270	265	5	0	30	0	0	0	200	192	7	1	30
023	0.07	2020	3700	141	30	320	315	5	0	30	0	0	0	240	231	8	1	30
023	0.07	2030	4200	160	30	360	354	6	0	30	0	0	0	260	250	9	1	30
I5 SB on ramp (Left from F																		
024	0.05	2010	3100	232	30	270	246	5	19	30	0	0	0	200	173	7	20	30
024	0.05	2020	4100	307	30	350	319	6	25	30	0	0	0	260	225	9	26	30
024	0.05	2030	5000	375	30	430	393	7	30	30	0	0	0	320	277	11	32	30
I5 NB on ramp (Left from F																		
025	0.05	2010	3800	99	30	320	313	3	4	30	0	0	0	280	264	10	6	30
025	0.05	2020	4800	125	30	420	411	4	5	30	0	0	0	370	349	13	8	30
025	0.05	2030	5800	151	30	500	490	4	6	30	0	0	0	440	416	15	9	30
I5 NB on ramp (Right from																		
026	0.06	2010	1400	265	30	120	102	7	11	30	0	0	0	100	81	3	16	30
026	0.06	2020	1900	359	30	160	136	9	15	30	0	0	0	140	113	5	22	30
026	0.06	2030	2300	435	30	200	170	12	18	30	0	0	0	170	137	6	27	30
I5 NB off ramp (Left onto F																		
027	0.05	2010	3200	186	30	290	283	6	1	30	0	0	0	260	253	6	1	30
027	0.05	2020	3700	215	30	340	332	7	1	30	0	0	0	300	292	7	1	30
027	0.05	2030	4200	244	30	390	381	8	1	30	0	0	0	350	341	8	1	30
I5 NB off ramp (Right onto																		
028	0.06	2010	3400	197	30	320	298	6	16	30	0	0	0	260	231	6	23	30
028	0.06	2020	4500	261	30	410	381	8	21	30	0	0	0	330	293	8	29	30
028	0.06	2030	5400	313	30	500	465	10	25	30	0	0	0	410	365	9	36	30
Rays Exit																		
030	0.25	2010	2000	32	20	180	180	0	0	20	0	0	0	150	148	1	1	20
030	0.25	2020	2100	34	20	180	180	0	0	20	0	0	0	150	148	1	1	20
030	0.25	2030	2300	37	20	200	200	0	0	20	0	0	0	160	158	1	1	20
Fern Valley Rd EB-E BoizLn																		
032	0.12	2010	10600	360	30	800	783	13	4	30	0	0	0	760	727	23	10	30
032	0.12	2020	13200	449	30	990	969	16	5	30	0	0	0	940	900	28	12	30
032	0.12	2030	15800	537	30	1180	1155	19	6	30	0	0	0	1120	1071	34	15	30

ABBREVIATION: SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME

ANALYST: *Thammy*  
 CHECKED BY: *Thammy*  
 FILE: FV\_B\_1.MDOB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Region 3  
 ALTERNATIVE: Build - Fern Valley Through

PAGE: 4  
 PRINTING DATE: Aug 14, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK-HOUR						
			VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP
Shared Access EB			0	0	20	0	0	0	0	0	20	0	0	0	0	0	0	20
036	0.25	2010	0	0	20	0	0	0	0	0	20	0	0	0	0	0	0	20
036	0.25	2020	0	0	20	0	0	0	0	0	20	0	0	0	0	0	0	20
036	0.25	2030	0	0	20	0	0	0	0	0	20	0	0	0	0	0	0	20
Shared Access WB			3600	533	20	190	155	10	0	0	20	0	0	0	180	135	14	31
039	0.25	2010	4200	622	20	220	179	12	0	0	20	0	0	0	210	158	16	36
039	0.25	2020	4700	696	20	250	204	13	0	0	20	0	0	0	240	180	19	41
039	0.25	2030	10400	343	30	880	855	22	0	0	30	0	0	0	790	752	30	8
Fern Valley Rd WB-E Boiz			12400	409	30	1060	1030	27	3	28	0	0	0	0	950	904	36	10
043	0.12	2010	15000	495	30	1280	1244	32	4	22	0	0	0	0	1150	1094	44	12
043	0.12	2030	10600	360	30	900	875	22	3	30	0	0	0	830	791	31	8	
Fern Valley WB-OR99 To E			12700	432	30	1080	1051	26	3	28	0	0	0	1000	953	37	10	
044	0.08	2010	15300	520	30	1300	1265	31	4	21	0	0	0	1200	1144	44	12	
044	0.08	2030	1200	46	20	140	140	0	0	20	0	0	0	110	110	0	0	
Rays Entrance			1200	46	20	140	140	0	0	20	0	0	0	110	110	0	0	
045	0.25	2010	1200	46	20	140	140	0	0	20	0	0	0	110	110	0	0	
045	0.25	2020	1200	46	20	140	140	0	0	20	0	0	0	110	110	0	0	
045	0.25	2030	1200	46	20	140	140	0	0	20	0	0	0	110	110	0	0	
OR99 SB-North of Cheryl L			12000	276	30	1010	992	16	2	30	0	0	0	1000	974	20	6	
050	0.25	2010	13100	301	30	1100	1080	18	2	30	0	0	0	1090	1061	22	7	
050	0.25	2020	14300	329	30	1200	1179	19	2	30	0	0	0	1190	1159	24	7	
050	0.25	2030	12100	327	30	1000	981	17	2	30	0	0	0	1000	973	21	6	
OR99 SB Cheryl Ln To Fer			13100	354	30	1090	1069	19	2	30	0	0	0	1090	1060	23	7	
051	0.04	2010	14500	391	30	1200	1178	20	2	30	0	0	0	1200	1168	25	7	
051	0.04	2020	17000	595	30	1480	1443	34	3	30	0	0	0	1440	1386	42	12	
051	0.04	2030	19400	679	30	1690	1648	39	3	30	0	0	0	1650	1589	48	13	
OR99 SB Cheryl Ln To W I			22000	770	30	1910	1862	44	4	30	0	0	0	1860	1791	54	15	
052	0.10	2010																
052	0.10	2020																
052	0.10	2030																

ABBREVIATION: SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME  
 ANALYST: Thanh Nguyen  
 CHECKED BY: *[Signature]*  
 FILE: FV\_B\_1.MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Region 3  
 ALTERNATIVE: Build - Fern Valley Through

PAGE: 5  
 PRINTING DATE: Aug 14, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY		PEAK HOUR		AVERAGE HOUR		PEAK TRUCK HOUR		SP			
			VOL	TRKS	VOL	HTR	VOL	TRKS	VOL	MTR		HTR		
OR99 SB-S of W Bolz Ln	0.25	2010	12900	464	30	972	27	1	30	1000	964	31	5	30
		2020	14300	515	30	1089	30	1	30	1120	1079	35	6	30
		2030	16300	587	30	1235	34	1	28	1270	1225	39	6	28
OR99 NB-S of W Bolz Ln	0.25	2010	12300	480	30	955	20	5	30	980	937	33	10	30
		2020	14200	554	30	1092	22	6	30	1120	1071	38	11	30
		2030	16300	636	30	1248	26	6	30	1280	1223	44	13	30
OR99 NB-Fern Valley Rd to	0.10	2010	7800	250	30	614	14	2	30	630	602	21	7	30
		2020	8100	259	30	643	15	2	30	660	631	22	7	30
		2030	8500	272	30	662	16	2	30	680	651	22	7	30
OR99 NB-Cheryl Ln to Fern	0.04	2010	13400	322	30	1046	19	5	30	1070	1027	33	10	30
		2020	14700	353	30	1153	21	6	30	1180	1132	37	11	30
		2030	15900	382	30	1251	23	6	30	1280	1228	40	12	30
OR99 NB-North of Cheryl L	0.25	2010	13400	295	30	1046	19	5	30	1070	1027	33	10	30
		2020	14700	323	30	1153	21	6	30	1180	1132	37	11	30
		2030	15900	350	30	1251	23	6	30	1280	1228	40	12	30
E Bolz Ln	0.10	2010	10500	388	30	803	13	4	30	820	766	24	10	30
		2020	13000	481	30	999	16	5	30	1020	957	30	13	30
		2030	15500	573	30	1185	19	6	30	1210	1139	36	15	30
E Bolz Ln	0.10	2010	10500	388	30	803	13	4	30	820	766	24	10	30
		2020	13000	481	30	999	16	5	30	1020	957	30	13	30
		2030	15500	573	30	1185	19	6	30	1210	1139	36	15	30
S Phoenix Rd SB-S of Fern	0.25	2010	200	81	25	18	2	0	25	20	9	1	0	25
		2020	200	81	25	18	2	0	25	20	9	1	0	25
		2030	200	81	25	18	2	0	25	20	9	1	0	25

ANALYST: Thanh Nguyen  
 CHECKED BY: *[Signature]*  
 FILE: FV\_B\_1.MDB

SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME

SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Region 3  
 ALTERNATIVE: Build - Fern Valley Through

PAGE: 6  
 PRINTING DATE: Aug 14, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR				
			VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR
S Phoenix Rd NB-S of Fern	064	0.25	2010	2600	736	25	180	141	10	29	25	180	118	19	43	25
		0.25	2020	2900	821	25	200	157	11	32	25	200	131	21	48	25
		0.25	2030	3100	877	25	220	173	12	35	25	220	144	23	53	25
Cheryl Ln WB	070	0.25	2010	800	19	25	60	60	0	0	25	60	60	0	0	25
		0.25	2020	900	22	25	70	70	0	0	25	70	70	0	0	25
		0.25	2030	1000	24	25	80	80	0	0	25	80	80	0	0	25
Cheryl Ln EB	071	0.25	2010	800	19	25	60	59	1	0	25	60	49	1	0	25
		0.25	2020	900	22	25	60	59	1	0	25	60	49	1	0	25
		0.25	2030	1000	24	25	70	69	1	0	25	60	59	1	0	25
W Boiz Ln WB	072	0.25	2010	2100	31	25	210	210	0	0	25	180	159	0	1	25
		0.25	2020	2200	33	25	220	220	0	0	25	170	169	0	1	25
		0.25	2030	2300	34	25	230	230	0	0	25	180	179	0	1	25
W Boiz Ln EB	073	0.25	2010	2300	9	25	180	179	1	0	25	180	179	1	0	25
		0.25	2020	2300	9	25	190	189	1	0	25	190	189	1	0	25
		0.25	2030	2400	10	25	200	199	1	0	25	200	199	1	0	25
Luman SB-N of Fern Valley	074	0.25	2010	2700	76	25	170	166	4	0	25	150	146	4	0	25
		0.25	2020	2900	81	25	180	176	4	0	25	160	155	5	0	25
		0.25	2030	3100	87	25	200	195	5	0	25	180	175	5	0	25
Luman NB-N of Fern Valley	075	0.25	2010	2200	77	25	130	126	3	1	25	130	125	4	1	25
		0.25	2020	2200	77	25	140	136	3	1	25	140	135	4	1	25
		0.25	2030	2500	88	25	150	145	4	1	25	150	144	5	1	25
Luman SB-S of Fern Valley	076	0.25	2010	800	26	25	60	57	1	2	25	60	53	2	5	25
		0.25	2020	500	21	23	50	47	1	2	25	50	44	2	4	25
		0.25	2030	600	26	25	60	57	1	2	25	60	53	2	5	25

ABBREVIATION SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME  
 ANALYST: Thanh Nguyen  
 CHECKED BY: *[Signature]*  
 FILE: FV\_B\_1.MBB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Region 3  
 ALTERNATIVE: Build - Fern Valley Through

PAGE: 7  
 PRINTING DATE: Aug 14, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY		PEAK HOUR		AVERAGE HOUR		PEAK TRUCK HOUR							
			VOL	TRKS	VOL	MTR	HTR	SP	VOL	TRKS	VOL	AUTO	MTR	HTR	SP	
Luman NB-S of Fern Valley	077	0.25	2010	1300	39	25	40	35	5	0	25	40	35	5	0	25
	077	0.25	2020	1400	42	25	60	52	8	0	25	60	52	8	0	25
	077	0.25	2030	1500	45	25	60	52	8	0	25	60	52	8	0	25
Fern Valley WB-E of N Phk	100	0.25	2010	1900	55	30	140	139	1	0	30	140	136	4	0	30
	100	0.25	2020	2200	64	30	160	159	1	0	30	160	155	5	0	30
	100	0.25	2030	2400	70	30	180	179	1	0	30	180	175	5	0	30
Fern Valley WB Btwn Phoe	101	0.15	2010	8300	481	30	640	593	16	31	30	610	540	28	42	30
	101	0.15	2020	10700	621	30	820	760	21	39	30	780	690	36	54	30
	101	0.15	2030	13000	754	30	1000	927	25	48	30	950	840	44	66	30
Fern Valley WB-into Divert	102	0.06	2010	8300	481	30	640	593	16	31	30	610	540	28	42	30
	102	0.06	2020	10700	621	30	820	760	21	39	30	780	690	36	54	30
	102	0.06	2030	13000	754	30	1000	927	25	48	30	950	840	44	66	30
Fern Valley EB - Diverge S	103	0.19	2010	7700	293	30	660	632	13	15	30	640	599	24	17	30
	103	0.19	2020	10100	384	30	870	833	17	20	30	840	785	32	23	30
	103	0.19	2030	12500	475	30	1080	1033	22	25	20	1050	982	40	28	22
Fern Valley WB - Leaving L	104	0.06	2010	9000	225	30	870	846	18	6	30	790	752	27	11	30
	104	0.06	2020	10700	268	30	1040	1011	22	7	30	940	895	32	13	30
	104	0.06	2030	12400	310	30	1200	1167	25	8	30	1090	1038	37	15	30
Fern Valley WB Btwn Luma	105	0.05	2010	9000	225	30	870	846	18	6	30	790	752	27	11	30
	105	0.05	2020	10700	268	30	1040	1011	22	7	30	940	895	32	13	30
	105	0.05	2030	12400	310	30	1200	1167	25	8	30	1090	1038	37	15	30
Fern Valley EB Btwn Luma	106	0.05	2010	10200	245	30	820	801	15	4	30	760	730	23	7	30
	106	0.05	2020	12800	307	30	1020	987	18	5	30	940	904	28	8	30
	106	0.05	2030	15400	370	30	1240	1212	22	6	26	1150	1106	34	10	29

ABBREVIATION: SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME

ANALYST: Thanh Nguyen  
 CHECKED BY: *John S. Kelly*  
 FILE: FV\_B\_1.MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
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PROJECT: Fern Valley Interchange  
 LOCATION: Region 3  
 ALTERNATIVE: Build - Fern Valley Through

PAGE: 8  
 PRINTING DATE: Aug 14, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR						
			VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP
Fern Valley EB-Into Diverg																		
107	0.06	2010	10200	245	30	820	801	15	4	30	0	0	0	760	730	23	7	30
107	0.06	2020	12800	307	30	1020	997	18	5	30	0	0	0	950	913	28	9	30
107	0.06	2030	15400	370	30	1240	1212	22	6	26	0	0	0	1150	1106	34	10	29
Fern Valley WB - Diverge S																		
108	0.19	2010	9200	405	30	810	774	15	21	30	0	0	0	770	712	31	27	30
108	0.19	2020	11400	502	30	1000	955	19	26	30	0	0	0	950	879	38	33	30
108	0.19	2030	13600	598	30	1200	1146	23	31	21	0	0	0	1140	1054	46	40	23
Fern Valley EB - Leaving D																		
109	0.06	2010	8100	397	30	650	607	16	27	30	0	0	0	620	566	20	34	30
109	0.06	2020	10800	529	30	860	802	22	36	30	0	0	0	820	749	26	45	30
109	0.06	2030	13400	657	30	1080	1008	27	45	30	0	0	0	1030	940	33	57	30
Fern Valley EB Bwm Phoen																		
110	0.15	2010	8100	397	30	650	607	16	27	30	0	0	0	620	566	20	34	30
110	0.15	2020	10800	529	30	860	802	22	36	30	0	0	0	830	757	27	46	30
110	0.15	2030	13400	657	30	1080	1008	27	45	30	0	0	0	1040	949	34	57	30
Fern Valley EB - E of N Ph																		
111	0.25	2010	1800	49	30	140	137	3	0	30	0	0	0	130	127	3	0	30
111	0.25	2020	2000	54	30	150	147	3	0	30	0	0	0	140	137	3	0	30
111	0.25	2030	2200	59	30	160	156	4	0	30	0	0	0	150	146	4	0	30
N Phoenix SB-N of Home f																		
120	0.25	2010	5300	180	30	450	437	8	5	30	0	0	0	420	407	8	5	30
120	0.25	2020	7200	245	30	610	592	11	7	30	0	0	0	570	552	11	7	30
120	0.25	2030	9100	309	30	770	748	14	8	30	0	0	0	720	697	14	9	30
N Phoenix SB-S of Home F																		
121	0.26	2010	5700	194	30	480	464	11	5	30	0	0	0	440	421	14	5	30
121	0.26	2020	7700	262	30	640	619	15	6	30	0	0	0	560	565	19	6	30
121	0.26	2030	9600	326	30	800	774	18	8	30	0	0	0	730	699	23	8	30
N Phoenix SB-0.25 miles N																		
122	0.26	2010	5700	194	30	480	464	11	5	30	0	0	0	440	421	14	5	30
122	0.26	2020	7700	262	30	640	619	15	6	30	0	0	0	590	565	19	6	30
122	0.26	2030	9600	326	30	800	774	18	8	30	0	0	0	730	699	23	8	30

ABBREVIATION: SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME  
 ANALYST: Thank Nguyen  
 CHECKED BY: *[Signature]*  
 FILE: FV\_B\_1.MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
LOCATION: Region 3  
ALTERNATIVE: Build - Fern Valley Through

PAGE: 9  
PRINTING DATE: Aug 14, 2007  
UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR						
			VOL	TRKS	SP	VOL	AUTO	MTR	HTR	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	
S Phoenix SB-BW of Fern V																		
123	0.05	2010	2500	400	30	200	163	12	25	30	0	0	0	180	134	15	31	30
123	0.05	2020	2800	464	30	240	196	14	30	30	0	0	0	210	156	18	36	30
123	0.05	2030	3200	512	30	260	212	16	32	30	0	0	0	230	170	20	40	30
S Phoenix NB-BW of Fern V																		
124	0.05	2010	2100	500	30	170	131	10	29	30	0	0	0	170	108	19	43	30
124	0.05	2020	2400	571	30	190	147	11	32	30	0	0	0	190	121	21	48	30
124	0.05	2030	2600	619	30	200	154	12	34	30	0	0	0	200	127	22	51	30
N Phoenix NB-S of Home L																		
125	0.25	2010	5700	188	30	460	446	10	4	30	0	0	0	450	430	11	9	30
125	0.25	2020	8000	264	30	640	621	14	5	30	0	0	0	620	592	16	12	30
125	0.25	2030	10200	337	30	830	805	18	7	30	0	0	0	810	774	20	16	30
N Phoenix NB-S of Home L																		
126	0.25	2010	5700	188	30	460	446	10	4	30	0	0	0	450	430	11	9	30
126	0.25	2020	8000	264	30	640	621	14	5	30	0	0	0	620	592	16	12	30
126	0.25	2030	10200	337	30	830	805	18	7	30	0	0	0	810	774	20	16	30
N Phoenix NB-N of Home L																		
127	0.25	2010	5600	185	30	460	449	8	3	30	0	0	0	450	435	6	9	30
127	0.25	2020	7900	261	30	640	624	12	4	30	0	0	0	620	600	8	12	30
127	0.25	2030	10200	337	30	820	800	15	5	30	0	0	0	800	774	10	16	30
Home Depot Entrance																		
128	0.25	2010	2400	46	20	160	157	3	0	20	0	0	0	160	157	3	0	20
128	0.25	2020	2400	46	20	160	157	3	0	20	0	0	0	160	157	3	0	20
128	0.25	2030	2400	46	20	160	157	3	0	20	0	0	0	160	157	3	0	20
Home Depot Exit																		
129	0.25	2010	2500	57	20	180	176	4	0	20	0	0	0	180	176	4	0	20
129	0.25	2020	2500	57	20	180	176	4	0	20	0	0	0	180	176	4	0	20
129	0.25	2030	2500	57	20	180	176	4	0	20	0	0	0	180	176	4	0	20

ABBREVIATION SECT = SECTION NUMBER  
VOL = TOTAL VOLUME  
MTR = MEDIUM TRUCK VOLUME  
SP = SPEED OF VEHICLE  
AUTO = AUTOMOBILE VOLUME  
HTR = HEAVY TRUCK VOLUME  
ANALYST: Thant Nuy  
CHECKED BY: [Signature]  
FILE: FV\_B\_1.MDB

**Table L5: 2010 North Phoenix Through Air Quality Traffic Data**

<b>Item</b>	<b>OR 99 &amp; Fern Valley Rd</b>	<b>OR 99 &amp; Bolz Ln</b>	<b>North Phoenix Rd &amp; Home Depot Access/South Phoenix Rd</b>
Signal Type	Actuated - Coordinated	Actuated - Coordinated	Actuated - Coordinated
LOS	C	C	B
v/c	0.68	0.57	0.40
Total Cycle Length (s)	120	120	120
Total Red Cycle Length	0	1	1
Clearance Lost Time (s)	12	12	12
Saturation Flow (pcphpl)	1800	1800	1800
Arrival Type SB Approach	5	3	5
Arrival Type WB Approach	6		6
Arrival Type NB Approach	5	5	5
Arrival Type EB Approach	6	6	6

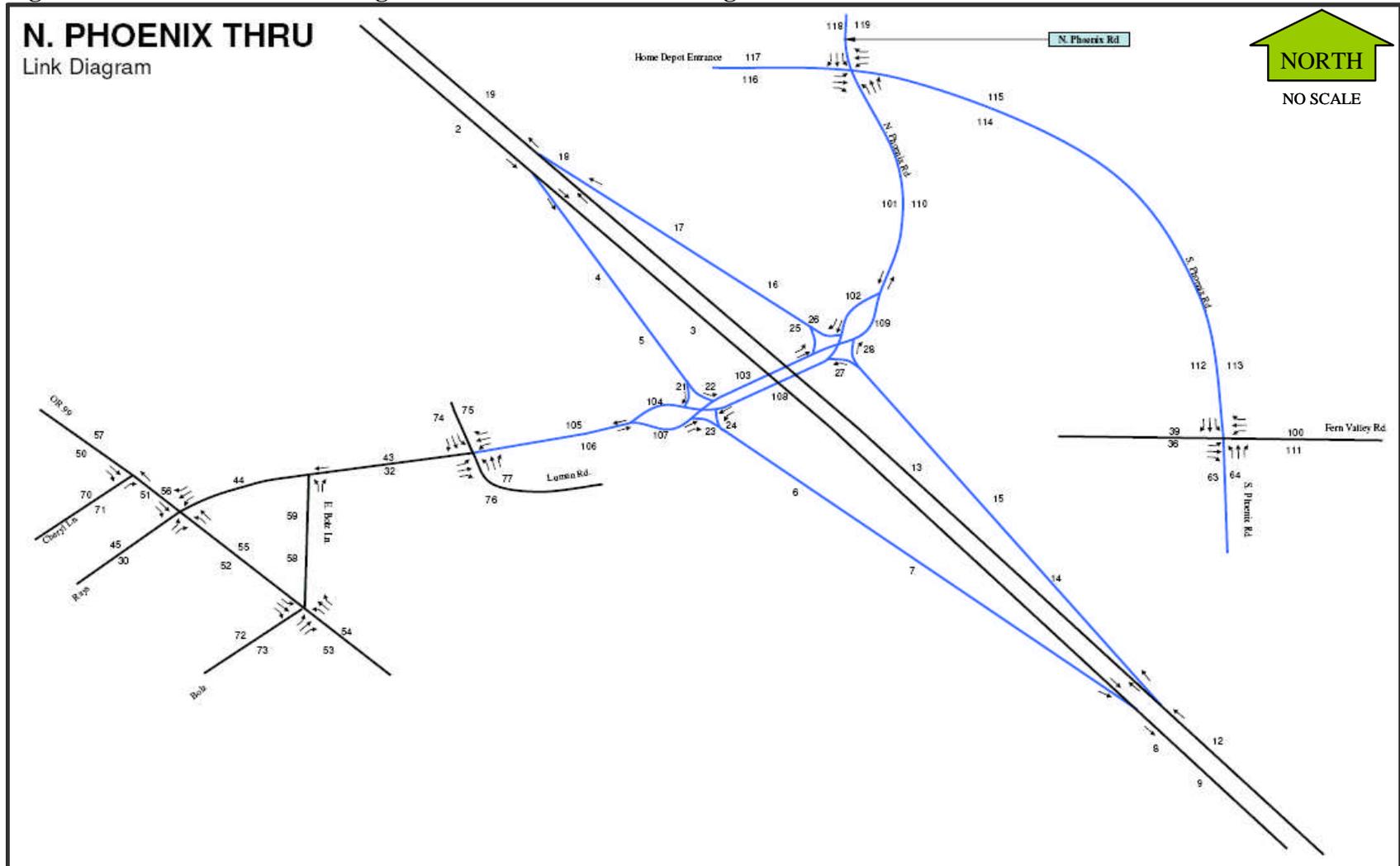
**Table L6: 2020 North Phoenix Through Air Quality Traffic Data**

<b>Item</b>	<b>OR 99 &amp; Fern Valley Rd</b>	<b>OR 99 &amp; Bolz Ln</b>	<b>North Phoenix Rd &amp; Home Depot Access/South Phoenix Rd</b>
Signal Type	Actuated - Coordinated	Actuated - Coordinated	Actuated - Coordinated
LOS	C	C	C
v/c	0.76	0.63	0.49
Total Cycle Length (s)	120	120	120
Total Red Cycle Length	0	3	3
Clearance Lost Time (s)	16	12	12
Saturation Flow (pcphpl)	1800	1800	1800
Arrival Type SB Approach	6	3	5
Arrival Type WB Approach	5		6
Arrival Type NB Approach	5	6	5
Arrival Type EB Approach	6	6	6

**Table L7: 2030 North Phoenix Through Air Quality Traffic Data**

<b>Item</b>	<b>OR 99 &amp; Fern Valley Rd</b>	<b>OR 99 &amp; Bolz Ln</b>	<b>North Phoenix Rd &amp; Home Depot Access/South Phoenix Rd</b>
Signal Type	Actuated - Coordinated	Actuated - Coordinated	Actuated - Coordinated
LOS	C	C	C
v/c	0.86	0.74	0.60
Total Cycle Length (s)	120	120	120
Total Red Cycle Length	0	3	3
Clearance Lost Time (s)	16	12	12
Saturation Flow (pcphpl)	1800	1800	1800
Arrival Type SB Approach	6	3	5
Arrival Type WB Approach	5		6
Arrival Type NB Approach	5	5	5
Arrival Type EB Approach	6	6	6

Figure L2: North Phoenix Through Noise Traffic Data Link Diagram



**Table L8: North Phoenix Through Noise Traffic Data**

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
LOCATION: Region 3  
ALTERNATIVE: Build - Phoenix Through

PAGE: 1  
PRINTING DATE: Aug 16, 2007  
UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR						
			VOL	TRKS	SP	VOL	AUTO	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	
15 SB N of SB Off	002	0.25	22200	2442	65	2200	1996	81	123	65	0	0	65	1970	1716	110	144	65
		2010	26700	2937	65	2640	2394	98	148	65	0	0	65	2370	2064	133	173	65
		2030	31000	3410	65	3070	2784	114	172	64	0	0	65	2750	2395	154	201	65
15 SB N Btwn Ramps	003	0.53	18500	2294	65	1760	1579	70	111	65	0	0	65	1680	1450	101	129	65
		2010	22100	2740	65	2100	1884	84	132	65	0	0	65	2010	1734	121	155	65
		2030	25600	3174	65	2430	2180	97	153	65	0	0	65	2320	2002	139	179	65
15 SB Off ramp	004	0.20	3800	228	45	440	414	11	15	45	0	0	45	290	264	11	15	45
		2010	4600	276	45	540	509	13	18	45	0	0	45	350	318	13	19	45
		2030	5400	324	45	640	604	15	21	45	0	0	45	420	382	16	22	45
15 SB On ramp	006	0.09	6300	353	45	540	511	10	19	45	0	0	45	400	365	14	21	45
		2010	7700	431	45	660	624	13	23	45	0	0	45	490	447	17	26	45
		2030	9200	515	45	790	747	15	28	45	0	0	45	580	529	20	31	45
15 SB On ramp	007	0.18	6300	353	45	540	511	10	19	45	0	0	45	400	365	14	21	45
		2010	7700	431	45	660	624	13	23	45	0	0	45	490	447	17	26	45
		2030	9200	515	45	790	747	15	28	45	0	0	45	580	529	20	31	45
15 SB S of SB On	008	0.20	28700	2640	65	2300	2090	81	129	65	0	0	65	2080	1816	114	150	65
		2010	34500	3174	65	2760	2508	97	155	65	0	0	65	2500	2182	138	180	65
		2030	40200	3698	65	3220	2927	113	180	63	0	0	65	2910	2540	160	210	65
15 SB S of SB On	009	0.25	28700	2640	65	2300	2090	81	129	65	0	0	65	2080	1816	114	150	65
		2010	34500	3174	65	2760	2508	97	155	65	0	0	65	2500	2182	138	180	65
		2030	40200	3698	65	3220	2927	113	180	63	0	0	65	2910	2540	160	210	65
15 NB S of NB Off	012	0.25	23300	2796	65	2170	1935	85	150	65	0	0	65	2080	1793	114	173	65
		2010	28300	3396	65	2630	2346	103	181	65	0	0	65	2520	2172	139	209	65
		2030	33200	3984	65	3090	2756	121	213	64	0	0	65	2960	2551	163	246	65

ABBREVIATION: SECT = SECTION NUMBER  
VOL = TOTAL VOLUME  
MTR = MEDIUM TRUCK VOLUME  
SP = SPEED OF VEHICLE  
AUTO = AUTOMOBILE VOLUME  
HTR = HEAVY TRUCK VOLUME  
ANALYST: Thariff Nanyias  
CHECKED BY: [Signature]  
FILE: FV\_B\_2.MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Region 3  
 ALTERNATIVE: Build - Phoenix Through

PAGE: 2  
 PRINTING DATE: Aug 16, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK-HOUR						
			VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP
I5 NB Bypass Ramps	0.13	2010	16800	2436	65	1560	1355	72	133	65	0	0	65	1560	1311	101	148	65
		2020	20200	2929	65	1880	1634	86	160	65	0	0	65	1880	1579	122	179	65
		2030	23700	3436	65	2200	1912	101	187	65	0	0	65	2200	1848	143	209	65
I5 NB Off Ramp	0.14	2010	6600	383	45	600	571	12	17	45	0	0	45	520	484	12	24	45
		2020	8200	476	45	750	714	15	21	45	0	0	45	650	605	15	30	45
		2030	9700	563	45	890	847	18	25	45	0	0	45	770	717	18	35	45
I5 NB On Ramp	0.16	2010	5200	364	45	440	415	10	15	45	0	0	45	380	345	13	22	45
		2020	6700	469	45	580	548	13	19	45	0	0	45	510	463	17	30	45
		2030	8100	567	45	700	662	15	23	45	0	0	45	610	554	21	35	45
I5 NB On Ramp	0.17	2010	5200	364	45	440	415	10	15	45	0	0	45	380	345	13	22	45
		2020	6700	469	45	580	548	13	19	45	0	0	45	510	463	17	30	45
		2030	8100	567	45	700	662	15	23	45	0	0	45	610	554	21	35	45
I5 NB N of NB On	0.18	2010	21800	2790	65	2010	1781	80	149	65	0	0	65	1940	1653	114	173	65
		2020	26700	3418	65	2460	2180	98	182	65	0	0	65	2370	2019	140	211	65
		2030	31400	4019	65	2900	2569	116	215	65	0	0	65	2800	2386	165	249	65
I5 NB N of NB On	0.19	2010	21800	2790	65	2010	1781	80	149	65	0	0	65	1940	1653	114	173	65
		2020	26700	3418	65	2460	2180	98	182	65	0	0	65	2370	2019	140	211	65
		2030	31400	4019	65	2900	2569	116	215	65	0	0	65	2800	2386	165	249	65
I5 SB off ramp (Right onto)	0.21	2010	2800	59	30	330	318	8	4	30	0	0	30	220	213	3	4	30
		2020	3300	69	30	380	366	9	5	30	0	0	30	250	242	4	4	30
		2030	3700	78	30	440	424	11	5	30	0	0	30	290	281	4	5	30
I5 SB off ramp (Left onto F)	0.22	2010	1000	168	30	120	105	3	11	30	0	0	30	80	61	8	11	30
		2020	1400	235	30	160	141	4	15	30	0	0	30	100	76	10	14	30
		2030	1700	286	30	200	177	5	18	30	0	0	30	130	99	13	18	30

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**TRANSPORTATION PLANNING ANALYSIS UNIT  
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PROJECT: Fern Valley Interchange  
LOCATION: Region 3  
ALTERNATIVE: Build - Phoenix Through

PAGE: 3  
PRINTING DATE: Aug 16, 2007  
UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR					
			VOL	TRKS	SP	VOL	AUTO	HTR	SP	VOL	TRKS	SP	VOL	AUTO	HTR	SP	
I5 SB on ramp (Right from 023)	0.07	2010	3100	118	30	270	265	5	0	30	0	0	200	192	7	1	30
			3700	141	30	320	315	5	0	30	0	0	240	231	8	1	30
			4200	160	30	360	354	6	0	30	0	0	260	250	9	1	30
I5 SB on ramp (Left from F 024)	0.05	2010	3100	232	30	270	246	5	19	30	0	0	200	173	7	20	30
			4100	307	30	350	319	6	25	30	0	0	260	225	9	26	30
			5000	375	30	430	393	7	30	30	0	0	320	277	11	32	30
I5 NB on ramp (Left from F 025)	0.05	2010	3800	99	30	320	313	3	4	30	0	0	280	264	10	6	30
			4800	125	30	420	411	4	5	30	0	0	370	349	13	8	30
			5800	151	30	500	480	4	6	30	0	0	440	416	15	9	30
I5 NB on ramp (Right from 026)	0.06	2010	1400	265	30	120	102	7	11	30	0	0	100	81	3	16	30
			1900	359	30	160	136	9	15	30	0	0	140	113	5	22	30
			2300	435	30	200	170	12	18	30	0	0	170	137	6	27	30
I5 NB off ramp (Left onto F 027)	0.05	2010	3200	186	30	290	283	6	1	30	0	0	260	253	6	1	30
			3700	215	30	340	332	7	1	30	0	0	300	292	7	1	30
			4200	244	30	390	381	8	1	30	0	0	350	341	8	1	30
I5 NB off ramp (Right onto 028)	0.06	2010	3400	197	30	320	298	6	16	30	0	0	260	231	6	23	30
			4500	261	30	410	381	8	21	30	0	0	330	293	8	29	30
			5400	313	30	500	465	10	25	30	0	0	410	365	9	36	30
Rays Exit 030	0.25	2010	2000	32	20	180	180	0	0	20	0	0	150	148	1	1	20
			2100	34	20	180	180	0	0	20	0	0	150	148	1	1	20
			2300	37	20	200	200	0	0	20	0	0	160	158	1	1	20
FernValleyRd EB-E BoizLn 032	0.12	2010	10600	360	30	800	783	13	4	30	0	0	760	727	23	10	30
			13200	449	30	990	969	16	5	30	0	0	940	900	28	12	30
			15800	537	30	1180	1155	19	6	30	0	0	1120	1071	34	15	30

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PAGE: 4  
 PRINTING DATE: Aug 16, 2007  
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SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK-HOUR							
			VOL	TRKS	SP	VOL	AUTO	HTR	SP	VOL	TRKS	SP	VOL	AUTO	HTR	SP			
Shared Access EB																			
036	0.25	2010	1200	216	20	60	46	5	9	20	0	0	0	20	60	55	5	0	20
036	0.25	2020	1400	252	20	60	46	5	9	20	0	0	0	20	60	55	5	0	20
036	0.25	2030	1500	270	20	60	46	5	9	20	0	0	0	20	60	55	5	0	20
Shared Access WB																			
039	0.25	2010	3400	513	20	180	150	6	24	20	0	0	0	20	170	119	20	31	20
039	0.25	2020	4000	604	20	210	175	7	28	20	0	0	0	20	200	140	24	36	20
039	0.25	2030	4800	725	20	260	216	9	35	20	0	0	0	20	250	176	29	45	20
Fern Valley Rd WB-E Boltz																			
043	0.12	2010	10400	343	30	880	855	22	3	30	0	0	0	30	790	752	30	8	30
043	0.12	2020	12400	409	30	1060	1030	27	3	28	0	0	0	30	950	904	36	10	30
043	0.12	2030	15000	495	30	1280	1244	32	4	22	0	0	0	30	1150	1094	44	12	27
Fern Valley WB-OR99 To E																			
044	0.08	2010	10600	360	30	900	875	22	3	30	0	0	0	30	830	791	31	8	30
044	0.08	2020	12700	432	30	1080	1051	26	3	28	0	0	0	30	1000	953	37	10	30
044	0.08	2030	15300	520	30	1300	1265	31	4	21	0	0	0	30	1200	1144	44	12	25
Rays Entrance																			
045	0.25	2010	1200	46	20	140	140	0	0	20	0	0	0	20	110	110	0	0	20
045	0.25	2020	1200	46	20	140	140	0	0	20	0	0	0	20	110	110	0	0	20
045	0.25	2030	1200	46	20	140	140	0	0	20	0	0	0	20	110	110	0	0	20
OR99 SB-North of Cheryl L																			
050	0.25	2010	12000	276	30	1010	992	16	2	30	0	0	0	30	1000	974	20	6	30
050	0.25	2020	13100	301	30	1100	1080	18	2	30	0	0	0	30	1090	1061	22	7	30
050	0.25	2030	14300	329	30	1200	1179	19	2	30	0	0	0	30	1190	1159	24	7	30
OR99 SB Cheryl Ln To Fer																			
051	0.04	2010	12100	327	30	1000	981	17	2	30	0	0	0	30	1000	973	21	6	30
051	0.04	2020	13100	354	30	1090	1069	19	2	30	0	0	0	30	1090	1060	23	7	30
051	0.04	2030	14500	391	30	1200	1178	20	2	30	0	0	0	30	1200	1168	25	7	30
OR99 SB Cheryl Ln To W I																			
052	0.10	2010	17000	595	30	1480	1443	34	3	30	0	0	0	30	1440	1386	42	12	30
052	0.10	2020	19400	679	30	1690	1648	39	3	30	0	0	0	30	1650	1589	48	13	30
052	0.10	2030	22000	770	30	1910	1862	44	4	30	0	0	0	30	1860	1791	54	15	30

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PAGE: 5  
PRINTING DATE: Aug 16, 2007  
UNIT: English

SECT	DIST	YEAR	AVERAGE DAY		PEAK HOUR		AVERAGE HOUR		PEAK TRUCK HOUR		SP			
			VOL	TRKS	VOL	HTR	VOL	TRKS	VOL	MTR		HTR		
OR99 SB-S of W Bolz Ln	053	2010	12900	464	1000	972	27	1	30	1000	964	31	5	30
		2020	14300	515	1120	1089	30	1	30	1120	1079	35	6	30
		2030	16300	587	1270	1235	34	1	28	1270	1225	39	6	28
OR99 NB-S of W Bolz Ln	054	2010	12300	480	980	955	20	5	30	980	937	33	10	30
		2020	14200	554	1120	1092	22	6	30	1120	1071	38	11	30
		2030	16300	636	1280	1248	26	6	30	1280	1223	44	13	30
OR99 NB-Fern Valley Rd to	055	2010	7800	250	630	614	14	2	30	630	602	21	7	30
		2020	8100	259	660	643	15	2	30	660	631	22	7	30
		2030	8500	272	680	662	16	2	30	680	651	22	7	30
OR99 NB-Cheryl Ln to Fern	056	2010	13400	322	1070	1046	19	5	30	1070	1027	33	10	30
		2020	14700	353	1180	1153	21	6	30	1180	1132	37	11	30
		2030	15900	382	1280	1251	23	6	30	1280	1228	40	12	30
OR99 NB-North of Cheryl Ln	057	2010	13400	295	1070	1046	19	5	30	1070	1027	33	10	30
		2020	14700	323	1180	1153	21	6	30	1180	1132	37	11	30
		2030	15900	350	1280	1251	23	6	30	1280	1228	40	12	30
E Bolz Ln	058	2010	10500	388	820	803	13	4	30	800	766	24	10	30
		2020	13000	481	1020	999	16	5	30	1000	957	30	13	30
		2030	15500	573	1210	1185	19	6	30	1190	1139	36	15	30
E Bolz Ln	059	2010	10500	388	820	803	13	4	30	800	766	24	10	30
		2020	13000	481	1020	999	16	5	30	1000	957	30	13	30
		2030	15500	573	1210	1185	19	6	30	1190	1139	36	15	30
S Phoenix Rd SB-S of Fern	063	2010	400	152	30	27	3	0	25	10	9	1	0	25
		2020	400	152	30	27	3	0	25	10	9	1	0	25
		2030	400	152	30	27	3	0	25	10	9	1	0	25

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PAGE: 6  
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 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY		PEAK HOUR		AVERAGE HOUR		PEAK TRUCK HOUR		SP					
			VOL	TRKS	VOL	MTR	HTR	SP	VOL	TRKS		VOL	AUTO	MTR	HTR	SP
S Phoenix Rd NB-S of Fern	064	0.25	2010	1800	520	120	98	5	17	25	25	120	57	20	43	25
		0.25	2020	2100	607	140	114	6	20	25	25	140	67	23	50	25
		0.25	2030	2400	694	160	131	6	23	25	25	160	76	27	57	25
Cheryl Ln WB	070	0.25	2010	800	19	60	60	0	0	25	25	60	60	0	0	25
		0.25	2020	900	22	70	70	0	0	25	25	70	70	0	0	25
		0.25	2030	1000	24	80	80	0	0	25	25	80	80	0	0	25
Cheryl Ln EB	071	0.25	2010	800	19	60	59	1	0	25	25	50	49	1	0	25
		0.25	2020	900	22	60	59	1	0	25	25	50	49	1	0	25
		0.25	2030	1000	24	70	69	1	0	25	25	60	59	1	0	25
W Boiz Ln WB	072	0.25	2010	2100	31	210	210	0	0	25	25	160	159	0	1	25
		0.25	2020	2200	33	220	220	0	0	25	25	170	169	0	1	25
		0.25	2030	2300	34	230	230	0	0	25	25	180	179	0	1	25
W Boiz Ln EB	073	0.25	2010	2300	9	180	179	1	0	25	25	180	179	1	0	25
		0.25	2020	2300	9	190	189	1	0	25	25	190	189	1	0	25
		0.25	2030	2400	10	200	199	1	0	25	25	200	199	1	0	25
Luman SB-N of Fern Valley	074	0.25	2010	2700	76	170	166	4	0	25	25	150	146	4	0	25
		0.25	2020	2900	81	180	176	4	0	25	25	160	155	5	0	25
		0.25	2030	3100	87	200	195	5	0	25	25	180	175	5	0	25
Luman NB-N of Fern Valley	075	0.25	2010	2200	77	130	126	3	1	25	25	130	125	4	1	25
		0.25	2020	2200	77	140	136	3	1	25	25	140	135	4	1	25
		0.25	2030	2500	88	150	145	4	1	25	25	150	144	5	1	25
Luman SB-S of Fern Valley	076	0.25	2010	600	26	60	57	1	2	25	25	60	53	2	5	25
		0.25	2020	500	21	50	47	1	2	25	25	50	44	2	4	25
		0.25	2030	600	26	60	57	1	2	25	25	60	53	2	5	25

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PAGE: 7  
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			VOL	TRKS	SP	VOL	AUTO	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP			
Lumain NB-S of Fern Valley																				
077	0.25	2010	1300	39	25	40	35	5	0	25	0	0	0	0	25	40	35	5	0	25
077	0.25	2020	1400	42	25	60	52	8	0	25	0	0	0	0	25	60	52	8	0	25
077	0.25	2030	1500	45	25	60	52	8	0	25	0	0	0	0	25	60	52	8	0	25
Fern Valley WB-E of N Phc																				
100	0.25	2010	1700	56	30	130	129	1	0	30	0	0	0	0	30	130	126	4	0	30
100	0.25	2020	2100	69	30	160	159	1	0	30	0	0	0	0	30	160	155	5	0	30
100	0.25	2030	2400	79	30	180	179	1	0	30	0	0	0	0	30	180	175	5	0	30
Fern Valley WB Btwn Phoe																				
101	0.09	2010	8300	481	30	640	593	16	31	30	0	0	0	0	30	610	540	28	42	30
101	0.09	2020	10700	621	30	820	780	21	39	30	0	0	0	0	30	780	690	36	54	30
101	0.09	2030	13000	754	30	1000	927	25	48	30	0	0	0	0	30	950	840	44	66	30
Fern Valley WB-Into Diverc																				
102	0.07	2010	8300	481	30	640	593	16	31	30	0	0	0	0	30	610	540	28	42	30
102	0.07	2020	10700	621	30	820	780	21	39	30	0	0	0	0	30	780	690	36	54	30
102	0.07	2030	13000	754	30	1000	927	25	48	30	0	0	0	0	30	950	840	44	66	30
Fern Valley EB - Diverge S																				
103	0.15	2010	7700	293	30	660	632	13	15	30	0	0	0	0	30	640	599	24	17	30
103	0.15	2020	10100	384	30	870	833	17	20	30	0	0	0	0	30	840	785	32	23	30
103	0.15	2030	12500	475	30	1080	1033	22	25	20	0	0	0	0	30	1050	982	40	28	22
Fern Valley WB - Leaving L																				
104	0.06	2010	9000	225	30	870	846	18	6	30	0	0	0	0	30	790	752	27	11	30
104	0.06	2020	10700	268	30	1040	1011	22	7	30	0	0	0	0	30	940	895	32	13	30
104	0.06	2030	12400	310	30	1200	1167	25	8	30	0	0	0	0	30	1090	1038	37	15	30
Fern Valley WB Btwn Lumr																				
105	0.06	2010	9000	225	30	870	846	18	6	30	0	0	0	0	30	790	752	27	11	30
105	0.06	2020	10700	268	30	1040	1011	22	7	30	0	0	0	0	30	940	895	32	13	30
105	0.06	2030	12400	310	30	1200	1167	25	8	30	0	0	0	0	30	1090	1038	37	15	30
Fern Valley EB Btwn Lumr																				
106	0.06	2010	10200	245	30	820	801	15	4	30	0	0	0	0	30	760	730	23	7	30
106	0.06	2020	12800	307	30	1020	997	18	5	30	0	0	0	0	30	940	904	28	8	30
106	0.06	2030	15400	370	30	1240	1212	22	6	26	0	0	0	0	30	1150	1106	34	10	29

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			VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP
Fern Valley EB-Into Diverge																		
107	0.06	2010	10200	245	30	820	801	15	4	30	0	0	30	760	730	23	7	30
107	0.06	2020	12800	307	30	1020	997	18	5	30	0	0	30	950	913	28	9	30
107	0.06	2030	15400	370	30	1240	1212	22	6	26	0	0	30	1150	1106	34	10	29
Fern Valley WB - Diverge S																		
108	0.17	2010	9200	405	30	810	774	15	21	30	0	0	30	770	712	31	27	30
108	0.17	2020	11400	502	30	1000	955	19	26	30	0	0	30	950	879	38	33	30
108	0.17	2030	13600	598	30	1200	1146	23	31	21	0	0	30	1140	1054	46	40	23
Fern Valley EB - Leaving D																		
109	0.08	2010	8100	397	30	650	607	16	27	30	0	0	30	620	566	20	34	30
109	0.08	2020	10800	529	30	860	802	22	36	30	0	0	30	820	749	26	45	30
109	0.08	2030	13400	657	30	1080	1008	27	45	30	0	0	30	1030	940	33	57	30
Fern Valley EB Btwn Phoe																		
110	0.09	2010	8100	397	30	650	607	16	27	30	0	0	30	620	566	20	34	30
110	0.09	2020	10800	529	30	860	802	22	36	30	0	0	30	830	757	27	46	30
110	0.09	2030	13400	657	30	1080	1008	27	45	30	0	0	30	1040	949	34	57	30
Fern Valley EB - E of N Ph																		
111	0.25	2010	1900	49	30	140	137	3	0	30	0	0	30	130	127	3	0	30
111	0.25	2020	2100	55	30	160	157	3	0	30	0	0	30	140	137	3	0	30
111	0.25	2030	2200	57	30	160	157	3	0	30	0	0	30	140	137	3	0	30
S Phoenix SB-0.25 mile N																		
112	0.25	2010	3900	636	30	320	284	12	24	30	0	0	30	270	215	24	31	30
112	0.25	2020	4300	701	30	360	319	14	27	30	0	0	30	310	246	28	36	30
112	0.25	2030	5000	815	30	420	373	16	31	30	0	0	30	360	287	32	41	30
S Phoenix NB-0.25 mile N																		
113	0.25	2010	3400	711	30	280	242	11	27	30	0	0	30	280	208	29	43	30
113	0.25	2020	4000	836	30	320	276	13	31	30	0	0	30	320	238	33	49	30
113	0.25	2030	4600	961	30	360	329	15	36	30	0	0	30	380	281	40	59	30
S Phoenix SB-E of Home C																		
114	0.25	2010	3900	636	30	320	284	12	24	30	0	0	30	270	215	24	31	30
114	0.25	2020	4300	701	30	360	319	14	27	30	0	0	30	310	246	28	36	30
114	0.25	2030	5000	815	30	420	373	16	31	30	0	0	30	360	287	32	41	30

ABBREVIATION SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUME  
 SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
 HTR = HEAVY TRUCK VOLUME  
 ANALYST: Thanh Nguyen  
 CHECKED BY: [Signature]  
 FILE: FV\_B\_2.MDB

**TRANSPORTATION PLANNING ANALYSIS UNIT  
EIS TRAFFIC DATA**

PROJECT: Fern Valley Interchange  
 LOCATION: Region 3  
 ALTERNATIVE: Build - Phoenix Through

PAGE: 9  
 PRINTING DATE: Aug 16, 2007  
 UNIT: English

SECT	DIST	YEAR	AVERAGE DAY			PEAK HOUR			AVERAGE HOUR			PEAK TRUCK HOUR						
			VOL	TRKS	SP	VOL	AUTO	HTR	SP	VOL	TRKS	SP	VOL	AUTO	MTR	HTR	SP	
S Phoenix NB-E of Home I	115	0.25	3400	711	30	280	242	11	27	30	0	0	0	280	208	29	43	30
	115	0.25	4000	836	30	320	276	13	31	30	0	0	0	320	238	33	49	30
	115	0.25	4600	961	30	380	329	15	36	30	0	0	0	380	281	40	59	30
Home Depot Exit	116	0.25	2500	57	20	180	176	4	0	20	0	0	0	180	176	4	0	20
	116	0.25	2500	57	20	180	176	4	0	20	0	0	0	180	176	4	0	20
	116	0.25	2500	57	20	180	176	4	0	20	0	0	0	180	176	4	0	20
Home Depot Entrance	117	0.25	2400	46	20	160	157	3	0	20	0	0	0	160	157	3	0	20
	117	0.25	2400	46	20	160	157	3	0	20	0	0	0	160	157	3	0	20
	117	0.25	2400	46	20	160	157	3	0	20	0	0	0	160	157	3	0	20
N Phoenix SB-N of Home f	118	0.25	5300	180	30	450	437	8	5	30	0	0	0	420	407	8	5	30
	118	0.25	7200	245	30	610	582	11	7	30	0	0	0	570	552	11	7	30
	118	0.25	9100	309	30	770	748	14	8	30	0	0	0	720	697	14	9	30
N Phoenix NB-N of Home l	119	0.25	5600	179	30	460	449	8	3	30	0	0	0	450	435	6	9	30
	119	0.25	7900	253	30	640	624	12	4	30	0	0	0	620	600	8	12	30
	119	0.25	10200	326	30	820	800	15	5	30	0	0	0	800	774	10	16	30

ABBREVIATION SECT = SECTION NUMBER  
 VOL = TOTAL VOLUME  
 MTR = MEDIUM TRUCK VOLUA

SP = SPEED OF VEHICLE  
 AUTO = AUTOMOBILE VOLUME  
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ANALYST: Thanh Nguyen  
 CHECKED BY: [Signature]  
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