

# TRAFFIC STUDY

## Interstate 10 Corridor Project

San Bernardino and Los Angeles Counties

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08-SBD-10 PM 0.0/R37.0

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STATE OF CALIFORNIA  
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<b>TABLE OF CONTENTS</b>	
<b>Table of Contents.....</b>	<b>i</b>
<b>List of Appendices .....</b>	<b>iv</b>
<b>List of Tables .....</b>	<b>v</b>
<b>List of Figures .....</b>	<b>xv</b>
<b>1 INTRODUCTION .....</b>	<b>1-1</b>
1.1 Project Location, Project Purpose and Study Objectives .....	1-1
1.2 Project Study Area.....	1-2
1.3 Analysis Scenarios .....	1-4
1.4 Project Alternatives Description .....	1-4
1.4.1 Alternative 1: No Build .....	1-4
1.4.2 Alternative 2: One High Occupancy Vehicle Lane (HOV) in Each Direction .....	1-6
1.4.3 Alternative 3: Two Express Lanes in Each Direction .....	1-6
1.5 Report Organization .....	1-7
<b>2 FREEWAY COMPONENT .....</b>	<b>2-1</b>
2.1 Freeway Analysis Methodology .....	2-1
2.1.1 Basic Freeway Segment Analysis Methodology.....	2-1
2.1.2 Weaving Analysis Methodology.....	2-6
2.1.3 Ramps and Ramp-Freeway Junction Analysis Methodology .....	2-8
2.2 Freeway Traffic Volumes.....	2-13
2.2.1 Existing (Year 2012) Freeway Traffic Volumes.....	2-13
2.2.2 Future Years Freeway Traffic Volumes .....	2-14
2.3 Existing Conditions (Year 2012) Analysis.....	2-18
2.3.1 Freeway Mainline Analysis and Levels of Service .....	2-18
2.3.2 Ramps and Ramp-Freeway Junction Analysis and Levels of Service .....	2-20
2.3.3 Average Peak Hour Speed, Vehicle Hours of Delay and cost of Delay.....	2-21
2.4 Alternative 1 – No Build Conditions Analysis.....	2-39
2.4.1 Year 2025 Freeway Mainline Analysis and Levels of Service .....	2-40
2.4.2 Year 2025 Ramps and Ramp-Freeway Junction Analysis and Levels of Service .....	2-43
2.4.3 Year 2045 Freeway Mainline Analysis and Levels of Service .....	2-45
2.4.4 Year 2045 Ramps and Ramp-Freeway Junction Analysis and Levels of Service .....	2-46

2.4.5	Average Peak Hour Speed, Vehicle Hours of Delay and Cost of Delay .....	2-47
2.5	Alternative 2 – HOV Conditions Analysis .....	2-79
2.5.1	Year 2025 Freeway Mainline Analysis and Levels of Service .....	2-79
2.5.2	Year 2025 Ramps and Ramp-Freeway Junction Analysis and Levels of Service .....	2-82
2.5.3	Year 2045 Freeway Mainline Analysis and Levels of Service .....	2-84
2.5.4	Year 2045 Ramps and Ramp-Freeway Junction Analysis and Levels of Service .....	2-86
2.5.5	Average Peak Hour Speed, Vehicle Hours of Delay and Cost of Delay .....	2-87
2.6	Alternative 3 – Express Conditions Analysis .....	2-119
2.6.1	Year 2025 General Purpose Lane Segment Analysis and Levels of Service .....	2-120
2.6.2	Year 2025 Ramps and Ramp-Freeway Junction Analysis and Levels of Service .....	2-122
2.6.3	Year 2045 General Purpose Lane Segment Analysis and Levels of Service .....	2-123
2.6.4	Year 2045 Ramps and Ramp-Freeway Junction Analysis and Levels of Service .....	2-124
2.6.5	Express Lane Analysis and Levels of Service .....	2-126
2.6.6	Average Peak Hour Speed, Vehicle Hours of Delay and Cost of Delay .....	2-134
<b>3</b>	<b>ARTERIAL AND INTERCHANGE COMPONENT .....</b>	<b>3-1</b>
3.1	Intersection Analysis Methodology .....	3-8
3.1.1	Intersection Level of Service Analysis Methodology .....	3-9
3.1.2	Queuing at Arterial Roadways and Freeway Off-Ramps Analysis Methodology .....	3-11
3.1.3	Freeway On-Ramp Metering Vehicle Storage Evaluation Analysis Methodology .....	3-12
3.2	Intersection Traffic Volumes .....	3-13
3.2.1	Existing (Year 2012) Intersection Traffic Volumes .....	3-13
3.2.2	Future Years Intersection Traffic Volumes .....	3-13
3.3	Existing (Year 2012) Conditions Analysis .....	3-15
3.3.1	Monte Vista Avenue Interchange Analysis .....	3-15
3.3.2	Mountain Avenue Interchange Analysis .....	3-17
3.3.3	Euclid Avenue Interchange Analysis .....	3-19
3.3.4	Vineyard Avenue Interchange Analysis .....	3-21
3.3.5	Etiwanda Avenue/Commerce Drive Interchange Analysis .....	3-24
3.3.6	Pepper Avenue Interchange Analysis .....	3-26
3.3.7	La Cadena Drive/9 <sup>th</sup> Street Interchange Analysis .....	3-28
3.3.8	Tennessee Street Interchange Analysis .....	3-29

3.3.9	Ford Street Interchange Analysis .....	3-30
3.3.10	Wabash Avenue Interchange Analysis .....	3-33
3.4	Alternative 1: No Build Conditions Analysis.....	3-41
3.4.1	Monte Vista Avenue Interchange Analysis .....	3-42
3.4.2	Mountain Avenue Interchange Analysis .....	3-44
3.4.3	Euclid Avenue Interchange Analysis .....	3-47
3.4.4	Vineyard Avenue Interchange Analysis.....	3-49
3.4.5	Etiwanda Avenue/Commerce Drive Interchange Analysis .....	3-52
3.4.6	Pepper Avenue Interchange Analysis .....	3-55
3.4.7	La Cadena Drive/9 <sup>th</sup> Street Interchange Analysis.....	3-58
3.4.8	Tennessee Street Interchange Analysis .....	3-60
3.4.9	Ford Street Interchange Analysis .....	3-61
3.4.10	Wabash Avenue Interchange Analysis .....	3-64
3.5	Alternative 2: One HOV in Each Direction Conditions Analysis .....	3-79
3.5.1	Monte Vista Avenue Interchange Analysis .....	3-79
3.5.2	Mountain Avenue Interchange Analysis .....	3-81
3.5.3	Euclid Avenue Interchange Analysis .....	3-84
3.5.4	Vineyard Avenue Interchange Analysis.....	3-87
3.5.5	Etiwanda Avenue/Commerce Drive Interchange Analysis .....	3-90
3.5.6	Pepper Avenue Interchange Analysis .....	3-94
3.5.7	La Cadena Drive/9 <sup>th</sup> Street Interchange Analysis.....	3-96
3.5.8	Tennessee Street Interchange Analysis .....	3-98
3.5.9	Ford Street Interchange Analysis .....	3-100
3.5.10	Wabash Avenue Interchange Analysis .....	3-103
3.5.11	Significant Impact Determination and Recommended Improvements .....	3-105
3.6	Alternative 3: Two Express Lanes in Each Direction Conditions Analysis .....	3-121
3.6.1	Monte Vista Avenue Interchange Analysis .....	3-121
3.6.2	Mountain Avenue Interchange Analysis .....	3-124
3.6.3	Euclid Avenue Interchange Analysis .....	3-127
3.6.4	Vineyard Avenue Interchange Analysis.....	3-131
3.6.5	Etiwanda Avenue/Commerce Drive Interchange Analysis .....	3-135
3.6.6	Pepper Avenue Interchange Analysis .....	3-138
3.6.7	La Cadena Drive/9 <sup>th</sup> Street Interchange Analysis.....	3-140
3.6.8	Tennessee Street Interchange Analysis .....	3-142
3.6.9	Ford Street Interchange Analysis .....	3-145
3.6.10	Wabash Avenue Interchange Analysis .....	3-147
3.6.11	Significant Impact Determination and Recommended Improvements .....	3-149
<b>4</b>	<b>ALTERNATIVES COMPARISON .....</b>	<b>4-1</b>
4.1	Comparison of Alternative 2 (HOV) and Alternative 1 (No Build).....	4-1
4.2	Comparison of Alternative 3 (Express) and Alternative 1 (No Build).....	4-4

## LIST OF APPENDICES

(Appendices are provided electronically on a CD inside the back cover of this report.)

<u>APPENDIX</u>	<u>DESCRIPTION</u>
A-1	Final Traffic Operations Methodology for I-10 Corridor Project Memorandum and I-10 Traffic Study – HCM 2010 Intersection Methodology Memorandum
A-2	Interstate 10 Existing (2012) Performance Measure System (PeMS) Freeway Speed, Metropolitan Transportation Commission (MTC) Speed Deterioration Curve and I-10 Mainline Speed-Flow Curve
A-3	I-10 Corridor Study – PA/ED HOV and Express Lanes Traffic Volumes Report
B-1	Existing (2012) Freeway Mainline, Weaving and Ramp Junction Level of Service Analysis Worksheets
C-1	Alternative 1 – No Build (Year 2025) Freeway Mainline, Weaving and Ramp Junction Level of Service Analysis Worksheets
C-2	Alternative 1 – No Build (Year 2045) Freeway Mainline, Weaving and Ramp Junction Level of Service Analysis Worksheets
D-1	Alternative 2 – HOV (Year 2025) Freeway Mainline, Weaving and Ramp Junction Level of Service Analysis Worksheets
D-2	Alternative 2 – HOV (Year 2045) Freeway Mainline, Weaving and Ramp Junction Level of Service Analysis Worksheets
E-1	Alternative 3 – Express (Year 2025) Freeway Mainline, Weaving and Ramp Junction Level of Service Analysis Worksheets
E-2	Alternative 3 – Express (Year 2045) Freeway Mainline, Weaving and Ramp Junction Level of Service Analysis Worksheets
F-1	Existing (2012) Intersection Level of Service Analysis Worksheets
G-1	Alternative 1 – No Build (Year 2025) Intersection Level of Service Analysis Worksheets
G-2	Alternative 1 – No Build (Year 2045) Intersection Level of Service Analysis Worksheets
H-1	Alternative 2 – HOV (Year 2025) Intersection Level of Service Analysis Worksheets
H-2	Alternative 2 – HOV (Year 2045) Intersection Level of Service Analysis Worksheets and Ramp Metering Analysis Worksheets
I-1	Alternative 3 – Express (Year 2025) Intersection Level of Service Analysis Worksheets
I-2	Alternative 3 – Express (Year 2045) Intersection Level of Service Analysis Worksheets and Ramp Metering Analysis Worksheets
J	Synchro Files

## **LIST OF TABLES**

<u>TABLE</u>	<u>DESCRIPTION</u>	
2.1.1	Freeway Segment Level of Service based on Density .....	2-3
2.1.2	Freeway Segment Level of Service at FFS = 70 mph based on Volume-to-Capacity (v/c) .....	2-5
2.1.3	Weaving Level of Service .....	2-6
2.1.4	Approximate Capacity of Ramp Roadways .....	2-9
2.1.5	Capacity Values for Merge Areas .....	2-10
2.1.6	Capacity Values for Diverge Areas.....	2-10
2.1.7	Merge and Diverge Level of Service .....	2-11
2.2.1	Existing (Year 2012) Condition I-10 Freeway Mainline Truck Percentages.....	2-14
2.3.1	Existing (Year 2012) Condition I-10 Freeway Mainline Average Daily Traffic (ADT) and Vehicle Miles Travelled (VMT).....	2-18
2.3.2	Existing (Year 2012) Condition I-10 Freeway Mainline Peak Hour Level of Service.....	2-23
2.3.3	Existing (Year 2012) Condition I-10 Ramp Junction Peak Hour Level of Service .....	2-27
2.3.4	Existing (Year 2012) Condition I-10 Freeway Mainline Average Peak Hour Speeds between LA/SB County Line and Ford Street .....	2-21
2.3.5	Existing (Year 2012) Condition I-10 Freeway Mainline Vehicle Hours of Delay and Cost Delay.....	2-22
2.4.1	Alternative 1 Condition I-10 Freeway Mainline Average Daily Traffic (ADT) and Vehicle Miles Travelled (VMT).....	2-40
2.4.2	Alternative 1 (Year 2025) Condition I-10 Freeway Mainline Peak Hour Level of Service .....	2-49
2.4.3	Alternative 1 (Year 2025) Condition I-10 Ramp Junction Peak Hour Level of Service .....	2-53
2.4.4	Alternative 1 (Year 2045) Condition I-10 Freeway Mainline Peak Hour Level of Service .....	2-58
2.4.5	Alternative 1 (Year 2045) Condition I-10 Ramp Junction Peak Hour Level of Service .....	2-62
2.4.6	Alternative 1 Condition I-10 Freeway Mainline Average Peak Hour Speeds between the LA/SB County Line and Ford Street .....	2-47
2.4.7	Alternative 1 Condition I-10 Freeway Mainline Vehicle Hours of Delay and Cost of Delay.....	2-48
2.5.1	Alternative 2 Condition I-10 Freeway Mainline Average Daily Traffic (ADT) and Vehicle Miles Travelled (VMT).....	2-79
2.5.2	Alternative 2 (Year 2025) Condition I-10 Freeway Mainline Peak Hour Level of Service .....	2-89
2.5.3	Alternative 2 (Year 2025) Condition I-10 Ramp Junction Peak Hour Level of Service .....	2-93

2.5.4	Alternative 2 (Year 2045) Condition I-10 Freeway Mainline Peak Hour Level of Service .....	2-98
2.5.5	Alternative 2 (Year 2045) Condition I-10 Ramp Junction Peak Hour Level of Service .....	2-102
2.5.6	Alternative 2 Condition I-10 Freeway Mainline Average Peak Hour Speed between the LA/SB County Line and Ford Street.....	2-88
2.5.7	Alternative 2 Condition I-10 Freeway Mainline Vehicle Hours of Delay and Cost of Delay.....	2-88
2.6.1	Alternative 3 Condition I-10 Freeway Mainline Average Daily Traffic (ADT) and Vehicle Miles Travelled (VMT).....	2-120
2.6.2	Alternative 3 (Year 2025) Condition I-10 Freeway Mainline Peak Hour Level of Service .....	2-135
2.6.3	Alternative 3 (Year 2025) Condition I-10 Ramp Junction Peak Hour Level of Service .....	2-139
2.6.4	Alternative 3 (Year 2045) Condition I-10 Freeway Mainline Peak Hour Level of Service .....	2-144
2.6.5	Alternative 3 (Year 2045) Condition I-10 Ramp Junction Peak Hour Level of Service .....	2-148
2.6.6	Year 2025 Alternative 3 Condition Express Lane Transition Area Peak Hour Level of Service .....	2-153
2.6.7	Year 2025 Alternative 3 Condition Express Lane Segment Peak Hour Level of Service.....	2-154
2.6.8	Year 2025 Alternative 3 Condition Express Lane Intermediate Access Peak Hour Level of Service .....	2-155
2.6.9	Year 2045 Alternative 3 Condition Express Lane Transition Area Peak Hour Level of Service .....	2-156
2.6.10	Year 2045 Alternative 3 Condition Express Lane Segment Peak Hour Level of Service.....	2-157
2.6.11	Year 2045 Alternative 3 Condition Express Lane Intermediate Access Peak Hour Level of Service.....	2-158
2.6.12	Year 2045 Alternative 3 Condition Weave Lane Queuing at Intermediate Access Locations 1 to 9 .....	2-159
2.6.13	Alternative 3 Condition I-10 Freeway Mainline Average Peak Hour Speed between the LA/SB County Line and Ford Street.....	2-134
2.6.14	Alternative 3 Condition I-10 Freeway Mainline Vehicle Hours of Delay and Cost of Delay.....	2-134
3.1.1	Recommendation for a Full Detailed Traffic Operations Analysis .....	3-6
3.1.2	Intersection Level of Service Criteria.....	3-9
3.1.3	Minimum Yellow Change Interval Timing .....	3-10
3.3.1	Monte Vista Avenue Interchange: Existing (2012) Intersection Levels of Service – AM/PM Peak Hours .....	3-15
3.3.2	Monte Vista Avenue Interchange: Existing (2012) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-16
3.3.3	Monte Vista Avenue Interchange: Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-16

3.3.4	Mountain Avenue Interchange: Existing (2012) Intersection Levels of Service – AM/PM Peak Hours .....	3-17
3.3.5	Mountain Avenue Interchange: Existing (2012) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-18
3.3.6	Mountain Avenue Interchange: Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-19
3.3.7	Euclid Avenue Interchange: Existing (2012) Intersection Levels of Service – AM/PM Peak Hours.....	3-20
3.3.8	Euclid Avenue Interchange: Existing (2012) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-20
3.3.9	Euclid Avenue Interchange: Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-21
3.3.10	Vineyard Avenue Interchange: Existing (2012) Intersection Levels of Service – AM/PM Peak Hours .....	3-22
3.3.11	Vineyard Avenue Interchange: Existing (2012) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-22
3.3.12	Vineyard Avenue Interchange: Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-23
3.3.13	Etiwanda Avenue/Commerce Drive Interchange: Existing (2012) Intersection Levels of Service – AM/PM Peak Hours .....	3-24
3.3.14	Etiwanda Avenue/Commerce Drive Interchange: Existing (2012) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-25
3.3.15	Etiwanda Avenue/Commerce Drive Interchange: Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-25
3.3.16	Pepper Avenue Interchange: Existing (2012) Intersection Levels of Service – AM/PM Peak Hours.....	3-26
3.3.17	Pepper Avenue Interchange: Existing (2012) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-27
3.3.18	Pepper Avenue Interchange: Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-27
3.3.19	La Cadena Drive/9 <sup>th</sup> Street Interchange: Existing (2012) Intersection Levels of Service – AM/PM Peak Hours.....	3-28
3.3.20	La Cadena Drive/9 <sup>th</sup> Street Interchange: Existing (2012) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-28
3.3.21	La Cadena Drive/9 <sup>th</sup> Street Interchange: Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-29
3.3.22	Tennessee Street Interchange: Existing (2012) Intersection Levels of Service – AM/PM Peak Hours .....	3-29
3.3.23	Tennessee Street Interchange: Existing (2012) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-30

3.3.24	Tennessee Street Interchange: Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-30
3.3.25	Ford Street Interchange: Existing (2012) Intersection Levels of Service – AM/PM Peak Hours.....	3-31
3.3.26	Ford Street Interchange: Existing (2012) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-32
3.3.27	Ford Street Interchange: Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-32
3.3.28	Wabash Avenue Interchange: Existing (2012) Intersection Levels of Service – AM/PM Peak Hours .....	3-33
3.3.29	Wabash Avenue Interchange: Existing (2012) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-33
3.3.30	Wabash Avenue Interchange: Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-34
3.4.1	Monte Vista Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-42
3.4.2	Monte Vista Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-43
3.4.3	Monte Vista Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-43
3.4.4	Mountain Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-44
3.4.5	Mountain Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-45
3.4.6	Mountain Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-46
3.4.7	Euclid Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-47
3.4.8	Euclid Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-48
3.4.9	Euclid Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-49
3.4.10	Vineyard Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-50
3.4.11	Vineyard Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-51
3.4.12	Vineyard Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-52
3.4.13	Etiwanda Avenue/Commerce Drive Interchange: Alternative 1 – No Build (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-53

3.4.14	Etiwanda Avenue/Commerce Drive Interchange: Alternative 1 – No Build (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-54
3.4.15	Etiwanda Avenue/Commerce Drive Interchange: Alternative 1 – No Build (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-55
3.4.16	Pepper Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-56
3.4.17	Pepper Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-57
3.4.18	Pepper Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-58
3.4.19	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 1 – No Build (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-59
3.4.20	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 1 – No Build (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-59
3.4.21	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 1 – No Build (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-59
3.4.22	Tennessee Street Interchange: Alternative 1 – No Build (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-60
3.4.23	Tennessee Street Interchange: Alternative 1 – No Build (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-60
3.4.24	Tennessee Street Interchange: Alternative 1 – No Build (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-61
3.4.25	Ford Street Interchange: Alternative 1 – No Build (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-62
3.4.26	Ford Street Interchange: Alternative 1 – No Build (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-63
3.4.27	Ford Street Interchange: Alternative 1 – No Build (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-64
3.4.28	Wabash Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-65
3.4.29	Wabash Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-65
3.4.30	Wabash Avenue Interchange: Alternative 1 – No Build (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-65
3.5.1	Monte Vista Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-79
3.5.2	Monte Vista Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-80

3.5.3	Monte Vista Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-81
3.5.4	Mountain Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-81
3.5.5	Mountain Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-83
3.5.6	Mountain Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-84
3.5.7	Euclid Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours.....	3-85
3.5.8	Euclid Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-86
3.5.9	Euclid Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-87
3.5.10	Vineyard Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-87
3.5.11	Vineyard Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-88
3.5.12	Vineyard Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-90
3.5.13	Etiwanda Avenue/Commerce Drive Interchange: Alternative 2 – HOV (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-91
3.5.14	Etiwanda Avenue/Commerce Drive Interchange: Alternative 2 – HOV (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-91
3.5.15	Etiwanda Avenue/Commerce Drive Interchange: Alternative 2 – HOV (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-92
3.5.16	Etiwanda Avenue/Commerce Drive Interchange: Alternative 2 – HOV (Years 2025 and 2045) On-Ramp Meter Queues vs. Storage – AM/PM Peak Hours .....	3-93
3.5.17	Pepper Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-94
3.5.18	Pepper Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-95
3.5.19	Pepper Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-96
3.5.20	Pepper Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) On-Ramp Meter Queues vs. Storage – AM/PM Peak Hours .....	3-96
3.5.21	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-97

3.5.22	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-97
3.5.23	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-98
3.5.24	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) On-Ramp Meter Queues vs. Storage – AM/PM Peak Hours .....	3-98
3.5.25	Tennessee Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-99
3.5.26	Tennessee Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-99
3.5.27	Tennessee Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-100
3.5.28	Tennessee Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) On-Ramp Meter Queues vs. Storage – AM/PM Peak Hours .....	3-100
3.5.29	Ford Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours.....	3-101
3.5.30	Ford Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-102
3.5.31	Ford Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-102
3.5.32	Ford Street Interchange: Alternative 2 – HOV (Years 2025 and 2045) On-Ramp Meter Queues vs. Storage – AM/PM Peak Hours .....	3-103
3.5.33	Wabash Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-104
3.5.34	Wabash Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-104
3.5.35	Wabash Avenue Interchange: Alternative 2 – HOV (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-104
3.5.36	Year 2025 and 2045 Peak Hour Intersection LOS and Significant Impact Determination for Alternative 2 .....	3-107
3.6.1	Monte Vista Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-122
3.6.2	Monte Vista Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-123
3.6.3	Monte Vista Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-124
3.6.4	Monte Vista Avenue Interchange: Alternative 3 – Express (2045) On-Ramp Metering Storage Evaluation.....	3-124
3.6.5	Mountain Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-125

3.6.6	Mountain Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-126
3.6.7	Mountain Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-127
3.6.8	Mountain Avenue Interchange: Alternative 3 – Express (2045) On-Ramp Metering Storage Evaluation.....	3-127
3.6.9	Euclid Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-128
3.6.10	Euclid Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-129
3.6.11	Euclid Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-130
3.6.12	Euclid Avenue Interchange: Alternative 3 – Express (2045) On-Ramp Metering Storage Evaluation.....	3-130
3.6.13	Vineyard Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-131
3.6.14	Vineyard Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-132
3.6.15	Vineyard Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-134
3.6.16	Vineyard Avenue Interchange: Alternative 3 – Express (2045) On-Ramp Metering Storage Evaluation.....	3-134
3.6.17	Etiwanda Avenue/Commerce Drive Interchange: Alternative 3 – Express (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-135
3.6.18	Etiwanda Avenue/Commerce Drive Interchange: Alternative 3 – Express (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-136
3.6.19	Etiwanda Avenue/Commerce Drive Interchange: Alternative 3 – Express (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-137
3.6.20	Etiwanda Avenue/Commerce Drive Interchange: Alternative 3 – Express (2045) On-Ramp Metering Storage Evaluation .....	3-137
3.6.21	Pepper Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-138
3.6.22	Pepper Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-139
3.6.23	Pepper Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-139
3.6.24	Pepper Avenue Interchange: Alternative 3 – Express (2045) On-Ramp Metering Storage Evaluation.....	3-140

3.6.25	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 3 – Express (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-141
3.6.26	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 3 – Express (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-141
3.6.27	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 3 – Express (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-142
3.6.28	La Cadena Drive/9 <sup>th</sup> Street Interchange: Alternative 3 – Express (2045) On-Ramp Metering Storage Evaluation.....	3-142
3.6.29	Tennessee Street Interchange: Alternative 3 – Express (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-143
3.6.30	Tennessee Street Interchange: Alternative 3 – Express (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-144
3.6.31	Tennessee Street Interchange: Alternative 3 – Express (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-144
3.6.32	Tennessee Street Interchange: Alternative 3 – Express (2045) On-Ramp Metering Storage Evaluation.....	3-144
3.6.33	Ford Street Interchange: Alternative 3 – Express (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours.....	3-145
3.6.34	Ford Street Interchange: Alternative 3 – Express (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-146
3.6.35	Ford Street Interchange: Alternative 3 – Express (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-146
3.6.36	Ford Street Interchange: Alternative 3 – Express (2045) On-Ramp Metering Storage Evaluation.....	3-147
3.6.37	Wabash Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Intersection Levels of Service – AM/PM Peak Hours .....	3-147
3.6.38	Wabash Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Arterial Intersection Approaches Queues vs. Storage – AM/PM Peak Hours.....	3-148
3.6.39	Wabash Avenue Interchange: Alternative 3 – Express (Years 2025 and 2045) Off-Ramp Intersection Approaches Queues vs. Storage – AM/PM Peak Hours .....	3-148
3.6.40	Year 2025 and 2045 Peak Hour Intersection LOS and Significant Impact Determination for Alternative 2.....	3-149
4.1.1	I-10 Freeway Mainline Year 2045 Average Daily Vehicle Miles Travelled (VMT) for Alternative 2 (HOV) and Alternative 1 (No Build) .....	4-1
4.1.2	I-10 Freeway Mainline Year 2045 Peak Hour Traffic Volumes for Alternative 2 (HOV) and Alternative 1 (No Build) .....	4-2
4.1.3	I-10 Freeway Mainline Year 2045 Peak Hour Demand Volume-to-Capacity (d/c) Ratio and Level of Service (LOS) for Alternative 2 (HOV) and Alternative 1 (No Build) .....	4-3
4.2.1	I-10 Freeway Mainline Year 2045 Average Daily Vehicle Miles Travelled (VMT) for Alternative 3 (Express) and Alternative 1 (No Build).....	4-5

4.2.2	I-10 Freeway Mainline Year 2045 Peak Hour Traffic Volumes for Alternative 3 (Express) and Alternative 1 (No Build) .....	4-5
4.2.3	I-10 Freeway Mainline Year 2045 Peak Hour Demand Volume-to-Capacity (d/c) Ratio and Level of Service (LOS) for Alternative 3 (Express) and Alternative 1 (No Build).....	4-6

## LIST OF FIGURES

<u>FIGURE</u>	<u>DESCRIPTION</u>	
1.1.1	Location of Proposed Project .....	1-1
1.2.1	Project Study Area.....	1-9
1.4.1	Alternatives 1, 2, and 3 Typical Half Sections.....	1-11
1.4.2	Express Lane Access Locations .....	1-15
2.3.1	Existing (Year 2012) Conditions Freeway Traffic Volumes and Lane Configuration .....	2-33
2.4.1	Alternative 1 - No Build (Year 2025) Conditions Freeway Traffic Volumes and Lane Configuration.....	2-67
2.4.2	Alternative 1 - No Build (Year 2045) Conditions Freeway Traffic Volumes and Lane Configuration.....	2-73
2.5.1	Alternative 2 - HOV (Year 2025) Conditions Freeway Traffic Volumes and Lane Configuration.....	2-107
2.5.2	Alternative 2 - HOV (Year 2045) Conditions Freeway Traffic Volumes and Lane Configuration.....	2-113
2.6.1	Alternative 3 - Express (Year 2025) Conditions Freeway Traffic Volumes and Lane Configuration.....	2-161
2.6.2	Alternative 3 - Express (Year 2045) Conditions Freeway Traffic Volumes and Lane Configuration.....	2-167
2.6.3	Alternative 3 Express Lane Access Locations and Lane Configurations .....	2-173
3.3.1	Existing (Year 2012) Conditions Intersection Traffic Volumes .....	3-35
3.3.2	Existing (Year 2012) Conditions Intersection Traffic Control and Lane Configuration.....	3-38
3.4.1	Alternative 1 - No Build (Year 2025) Conditions Intersection Traffic Volumes .....	3-67
3.4.2	Alternative 1 – No Build (Year 2025) Conditions Intersection Traffic Control and Lane Configuration.....	3-70
3.4.3	Alternative 1 - No Build (Year 2045) Conditions Intersection Traffic Volumes .....	3-73
3.4.4	Alternative 1 – No Build (Year 2045) Conditions Intersection Traffic Control and Lane Configuration.....	3-76
3.5.1	Alternative 2 - HOV (Year 2025) Conditions Intersection Traffic Volumes .....	3-109
3.5.2	Alternative 2 – HOV (Year 2025) Conditions Intersection Traffic Control and Lane Configuration.....	3-112
3.5.3	Alternative 2 - HOV (Year 2045) Conditions Intersection Traffic Volumes .....	3-115
3.5.4	Alternative 2 – HOV (Year 2045) Conditions Intersection Traffic Control and Lane Configuration.....	3-118
3.6.1	Alternative 3 - Express (Year 2025) Conditions Intersection Traffic Volumes .....	3-151
3.6.2	Alternative 3 – Express (Year 2025) Conditions Intersection Traffic Control and Lane Configuration.....	3-154
3.6.3	Alternative 3 - Express (Year 2045) Conditions Intersection Traffic Volumes .....	3-157
3.6.4	Alternative 3 – Express (Year 2045) Conditions Intersection Traffic Control and Lane Configuration.....	3-160

4.1.1	I-10 Freeway Mainline Year 2045 Alternative 1 (No Build) and Alternative 2 (HOV) Average Speed Data (mph) for a Full Length Corridor Trip .....	4-4
4.2.1	I-10 Freeway Mainline Year 2045 Alternative 1 (No Build) and Alternative 3 (Express) Average Speed Data (mph) for a Full Length Corridor Trip .....	4-7

# 1 INTRODUCTION

## 1.1 Project Location, Project Purpose and Study Objectives

The California Department of Transportation (Caltrans), in cooperation with the San Bernardino Associated Governments (SANBAG), proposes to add freeway lanes through all or a portion of the 33-mile stretch of Interstate 10 (I-10) from the Los Angeles/San Bernardino (LA/SB) County Line to Ford Street in San Bernardino County. The project limits including transition areas extend from approximately 0.4 miles west of White Avenue in the City of Pomona at Post Mile (PM) 44.9 to Live Oak Canyon Road in the City of Yucaipa at PM 37.0. The project is currently expected to be open to traffic in year 2025 with a design year of 2045. The project location is illustrated in [Figure 1.1.1](#).



Figure 1.1.1 Location of Proposed Project

The purpose of the proposed I-10 Corridor Project is to improve traffic operations on the I-10 freeway in San Bernardino County in order to reduce congestion, increase throughput and enhance trip reliability for the planning design year of 2045.

The objectives of the project are to:

- Reduce volume-to-capacity (v/c) ratios along the corridor;
- Improve travel times within the corridor;
- Provide a facility that is compatible with transit and other modal options;
- Provide consistency with the SCAG Regional Transportation Plan;
- Provide a cost effective project solution; and

- Minimize environmental impacts and right of way acquisition.

The I-10 corridor within the project limits is currently experiencing congestion and traffic delays during the peak hours due to demand exceeding capacity, resulting from local, regional, and interregional traffic demand. In addition, forecasted local and regional traffic demand is expected to increase, resulting in the need to improve the I-10 corridor.

Deficiencies of I-10 within the project limits are summarized below:

- Substantial portions of the I-10 mainline general purpose (GP) lanes peak-period traffic demand currently exceeds capacity;
- Nearly all of the I-10 mainline GP lanes are projected to exceed capacity in the future years; and
- The I-10 existing mainline High Occupancy Vehicle (HOV) lanes operation is degraded during the peak periods.

The purpose of this report is to present the analysis of the traffic operations for existing (2012) conditions as well as future conditions both with and without the construction of various design alternatives within the project area. This report documents an evaluation of the Level of Service (LOS) and other performance measures for the various freeway segments, ramp junctions, and ramp/arterial street intersections, as required.

## 1.2 Project Study Area

This study provides traffic operation analysis of the I-10 mainline, including analysis of freeway merge and diverge areas associated with interchange ramps. [Figure 1.2.1](#) illustrates the study area for the Traffic Study. As shown in the figure, the project study area covers a distance of approximately 40 miles along I-10 from White Avenue to Yucaipa Boulevard. The Traffic Study does not include analysis of areas near the project limits that do not include permanent physical improvements, such as the area between Yucaipa Boulevard and Live Oak Canyon Road where only temporary signing and striping for stage construction would occur. It should be noted that full- and multi-page figures and tables are generally located at the end of the section in which their reference appears, with tables presented before figures. Smaller figures and tables are embedded in the text. This approach limits the number of pages to be turned and amount of searching for the next page of text when reading the report.

The study also provides traffic operations analysis for the arterial component of some interchanges along the corridor including analysis of freeway ramps at their intersections with arterials, and other arterial intersections that are in the immediate vicinity and have a direct bearing on freeway interchange traffic operations. There are 33 local interchanges within the limits of the I-10 Corridor Project. However, the project does not require local interchange improvements to meet the project purpose and need and, therefore, does not include traffic operations analysis for all interchanges.

Due to potential project related traffic impacts at arterial intersections, a preliminary analysis of all interchanges was performed to identify interchanges for which full detailed traffic operations analysis is needed. Alternative 3 is used for this preliminary analysis because Alternative 3 adds the most freeway capacity among the build alternatives and has the most extensive project limits. In comparison to Alternative 1 (No Build), Alternative 3 represents the “worst case” in determining the potential of the

build alternatives for significant impacts to the interchanges in the corridor. The preliminary analysis consisted of the three steps described below.

**Step 1**

In Step 1, an interchange is identified for full detailed traffic operations analysis if Alternative 3 includes construction affecting an arterial at the interchange in any of the following ways:

- Replacement of an arterial overcrossing or undercrossing;
- Relocation of a ramp/arterial intersection; or
- Widening of an arterial at an interchange.

If Alternative 3 widens ramps at the arterial terminus but does not affect arterial legs of the arterial/ramp intersection, the interchange is not identified for full detailed traffic operations analysis under Step 1. Additional ramp lanes would tend to improve operations; by themselves, they do not represent potential for a significant traffic impact.

If an interchange includes construction that would require a Modified Access Report (MAR), then the MAR requirement for analysis of adjacent interchanges applies. Step 1 identifies interchanges that are adjacent to interchanges requiring a MAR for full detailed traffic operations analysis to meet the MAR requirement.

**Step 2**

In Step 2, an interchange is excluded from full detailed traffic operations analysis if the interchange:

- (1) Does not currently exist and is expected to be designed assuming that proposed I-10 improvements are implemented
- (2) Is scheduled in the RTP for improvements to be designed prior to opening of I-10 improvements and assuming that proposed I-10 improvements are implemented; or
- (3) Was recently reconstructed and designed assuming I-10 HOV improvements.

**Step 3**

In Step 3, interchanges are identified for full detailed traffic operations analysis based on the interchange having an:

- (1) Intersection with more than 50 additional peak hour vehicles (Alternative 3 compared to No Build); and
- (2) Intersection with a peak hour volume increase factor of 0.08 (8%) or more (Alternative 3 compared to No Build).

Based on the three steps above, the following 10 interchanges are included in this report with full detailed traffic operations analysis:

- Monte Vista Avenue Interchange
- Mountain Avenue Interchange
- Euclid Avenue Interchange
- Vineyard Avenue Interchange
- Etiwanda Avenue Interchange

- Pepper Avenue Interchange
- La Cadena Drive/9<sup>th</sup> Street Interchange
- Tennessee Street Interchange
- Ford Street Interchange
- Wabash Avenue Interchange

A more detailed description of the determination of which interchanges require or do not require full detailed traffic operations analysis can be found in **Section 3.0** of this report.

### 1.3 Analysis Scenario

This traffic study evaluates the existing and future traffic flow conditions within the project study area including, at a minimum, demand, capacity and LOS for the mainline freeway segments, the ramps and ramp-freeway junctions, weaving areas, ramp/arterial street intersections, and arterial/arterial street intersections affecting interchange operations. The analyses were conducted for the following scenarios:

- Existing Traffic Conditions – Year 2012
- Opening Year 2025 Alternative 1 – No Build
- Design Year 2045 Alternative 1 – No Build
- Opening Year 2025 Alternative 2 – HOV Lanes
- Design Year 2045 Alternative 2 – HOV Lanes
- Opening Year 2025 Alternative 3 – Express Lanes
- Design Year 2045 Alternative 3 – Express Lanes

### 1.4 Project Alternatives Description

The I-10 Corridor Project considers one “no build” and two “build” alternatives. The “no build” alternative is Alternative 1. The two “build” alternatives are Alternatives 2 and 3. Alternative 1 would maintain the existing configuration of the I-10 corridor with no additional mainline lanes. Alternatives 2 and 3 include construction of additional lane(s) in each direction of I-10 and auxiliary lanes, and improvement of freeway ramps.

#### 1.4.1 Alternative 1: No Build

Alternative 1 (No Build) would maintain the existing lane configuration of I-10 within the project limits with no additional mainline lanes or associated improvements to be provided. The I-10 corridor would not be widened from the LA/SB County line to Ford Street nor would interchange improvements included as part of Alternatives 2 and 3 be constructed. However, other interchange and arterial improvement projects along the I-10 corridor planned by SANBAG, Caltrans and local agencies that are under construction or included in the Final 2012 Regional Transportation Plan (RTP) are assumed to be constructed.

The freeway mainline typical half sections for Alternative 1 are illustrated in **Figure 1.4.1**. As shown in the figure, the freeway mainline for Alternative 1 consists of 1 HOV lane and 4 GP lanes in each direction with auxiliary lanes on some segments between the LA/SB County line and Haven Avenue interchange. Between the Haven Avenue and California Street interchanges, the freeway mainline consists of 4 GP

lanes in each direction with auxiliary lanes on some segments. For the freeway mainline between the California Street and Ford Street interchanges, the freeway mainline consists of 4 GP lanes in each direction with auxiliary lanes on some segments.

The traffic operations analysis for Alternative 1 assumes all RTP and municipal planned projects. The list below identifies improvements at locations discussed and analyzed in this report. While all RTP and municipal and planned improvements are assumed in Alternative 1, not all are discussed in this report.

- I-10/Grove Avenue/4<sup>th</sup> Street Interchange Project
- I-10/Cherry Avenue Interchange Project
- I-10/Beech Avenue Interchange Project
- I-10/Citrus Avenue Interchange Project
- I-10/Alder Avenue Interchange Project
- I-10/Cedar Avenue Interchange Project
- I-10/Pepper Avenue Bridge Replacement Project
- I-10/Tippecanoe Avenue Interchange Project
- I-10/Ford Street Interchange Project
- I-10/Wabash Avenue Interchange Project
- I-10 Eastbound Lane Shift from California Street to SR-210
- I-10 Auxiliary Lane Project from Etiwanda Avenue to Riverside Avenue
- I-10 HOV Lane Project from Riverside County Line to Ford Street
- Mountain Avenue Widening Project
- Grove Avenue Widening Project
- Vineyard Avenue Widening Project (4<sup>th</sup> Street to I-10)
- Etiwanda Avenue Widening Project
- Widen Pepper Avenue from Slover to Valley from 2 to 4 Lanes
- La Cadena Drive/9<sup>th</sup> Street Eastbound Ramp Entrance Widening Project
- Ford Street Widening Project (5<sup>th</sup> Avenue to I-10)
- Ford Street Signalization Improvement Project
- Wabash Avenue Widening Project (5<sup>th</sup> Avenue to I-10)

Detailed discussion of the improvements for each project is included in **Section 2.4** for the freeway improvements and **Section 3.4** for the arterial improvements. Since traffic operations analysis is not conducted for all the interchanges within the limits of the I-10 Corridor Project, there are additional improvement projects in the Final 2012 RTP or in municipal plans that are not listed above. For example, the I-10/Mt. Vernon Avenue interchange improvement project and the California Street widening project are listed in the Final 2012 RTP and are within the limits of the I-10 Corridor Project. However, the I-10/Mt. Vernon Avenue and California Street interchanges are not included in this report based on the preliminary analysis performed to identify interchanges for which full detailed traffic operations analysis is needed, as noted above. Therefore, the interchange and widening projects at the I-10/Mt. Vernon Avenue and California Street interchanges are not listed above.

The list above includes the Beech Avenue and Alder Avenue interchange improvement projects. Although neither of these interchanges was identified in the preliminary analysis performed to identify interchanges for which full detailed traffic operations analysis is needed, these interchanges are included in the list above because they provide new access to the freeway mainline and those access points require analysis.

### **1.4.2 Alternative 2: One High Occupancy Vehicle Lane (HOV) in Each Direction**

Alternative 2 (One HOV Lane in Each Direction) would extend the existing HOV lane in each direction of I-10 from the current HOV terminus near Haven Avenue in the City of Ontario to Ford Street in the City of Redlands, a distance of approximately 25 miles. Alternative 2 would provide continuous access between the HOV and GP lanes. The freeway mainline typical half sections for Alternative 2 are illustrated in [Figure 1.4.1](#).

In addition to the extension of the current HOV lane, Alternative 2 would provide the following improvements:

- Construct westbound auxiliary lane between Rancho Avenue and La Cadena Drive
- Modify one-lane off-ramps to two-lane off-ramp at Waterman Avenue/Carnegie Drive westbound off-ramp
- Improvements at the Tennessee Street Interchange

Detailed intersection improvements for the Tennessee Street interchange are included in [Section 3.5](#). Alternative 2 assumes the completion of improvements along the project corridor included in Alternative 1 (No Build).

### **1.4.3 Alternative 3: Two Express Lanes in Each Direction**

Alternative 3 (Two Express Lanes in Each Direction) would provide two Express Lanes in each direction of I-10 from the LA/SB County Line to California Street (near SR-210) in the City of Redlands and one Express Lane in each direction from California Street to Ford Street in the City of Redlands, a total of 33 miles. The Express Lanes would be priced manage lanes in which vehicles not meeting the minimum occupancy requirement would pay a toll. Toll policy, including toll rates and which vehicles would use the lanes free and which pay a toll, have not been finally determined. Forecasts used in this report assume tolling of single occupant passenger vehicles only. West of Haven Avenue, a single new lane would be constructed and combined with the existing HOV lane to provide two Express Lanes in each direction; east of Haven Avenue all Express Lanes would be constructed by the project. The freeway mainline typical half sections for Alternative 3 are illustrated in [Figure 1.4.1](#).

Transition areas would be provided where the Express Lanes begin and end. Transition areas near the beginning of the Express Lanes would allow for traffic in HOV and GP lanes to change lanes to access the GP and Express Lanes within the project limits of Alternative 3. Transition areas at the end of the Express Lanes would allow traffic in the Express and GP lanes to change lanes to access the GP and HOV lanes downstream of the end of the Express Facility. Transition areas may add new lanes and/or redesignate lanes from Express to HOV or GP.

Express Lanes would begin and end near the LA/SB County line and in the vicinity of the Ford Street interchange. Two transition areas (one in each direction) would be required for each location, for a total of 4 transition areas.

In addition to the beginning and end near the LA/SB County line and Ford Street, access to and from the Express Lanes would be provided in each direction at the following 10 locations:

1. Mountain Avenue interchange area
2. Between the Euclid Avenue and Grove Avenue interchanges
3. Haven Avenue interchange area
4. Between the Etiwanda Avenue and Cherry Avenue interchanges
5. Citrus Avenue interchange area
6. Cedar Avenue interchange area
7. Pepper Avenue interchange area
8. Tippecanoe Avenue interchange area
9. California Street interchange area
10. Orange Avenue/6<sup>th</sup> Street interchange area

**Figure 1.4.2** illustrates the proposed access points to the Express Lane.

In addition to the Express Lanes, Alternative 3 would provide the following improvements:

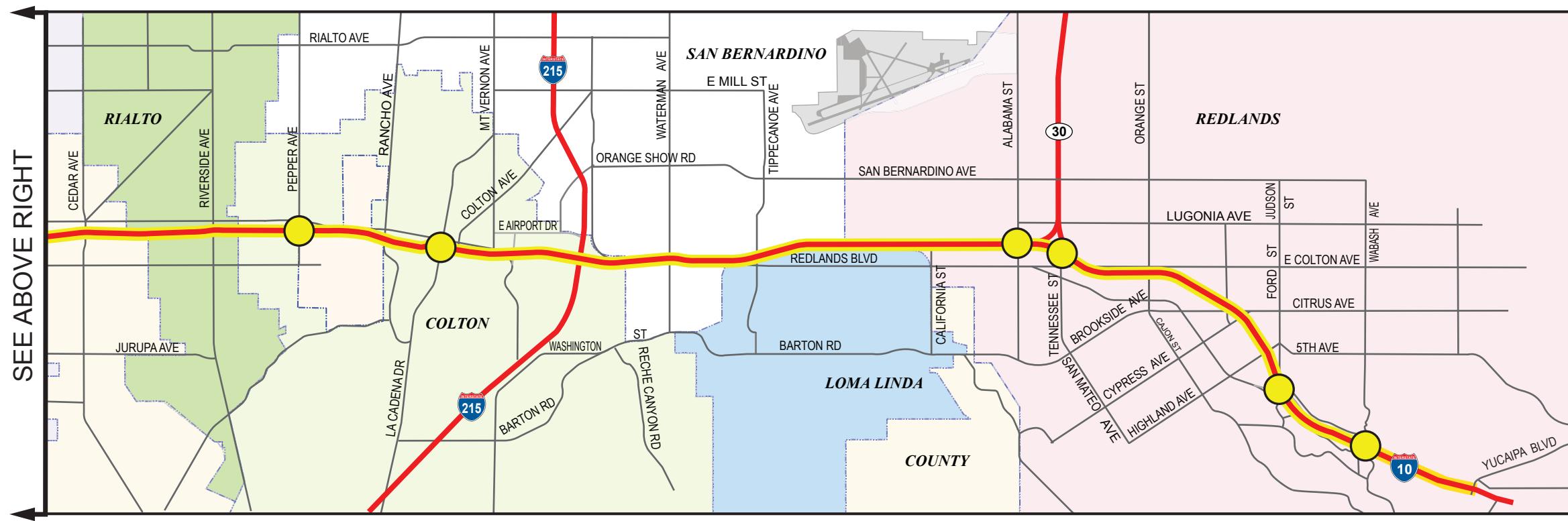
- Construct eastbound auxiliary lane between Mountain Avenue and Euclid Avenue
- Construct westbound auxiliary lane between Rancho Avenue and La Cadena Drive
- Extend westbound auxiliary lane between Pepper Avenue and Riverside Avenue
- Modify one-lane off-ramps to two-lane off-ramps at the following locations:
  - Monte Vista Avenue Westbound Off-Ramp
  - Mountain Avenue Westbound Off-Ramp
  - Euclid Avenue Eastbound Off-Ramp
  - Holt Boulevard Westbound Off-Ramp
  - Waterman Avenue/Carnegie Drive Westbound Off-Ramp
- Improvements at the Monte Vista Avenue Interchange
- Improvements at the Euclid Avenue Interchange
- Improvements at the Vineyard Avenue Interchange
- Improvements at the La Cadena Drive/9<sup>th</sup> Street Interchange
- Improvements at the Tennessee Street Interchange

Detailed descriptions of the improvements for the interchanges listed above are included in **Section 3.6**. Alternative 3 assumes the completion of improvements along the project corridor included in Alternative 1 (No Build).

## 1.5 Report Organization

A description of the methodologies utilized to determine freeway and arterial traffic volumes for existing (2012) conditions, Opening Year (2025) conditions and Design Year (Year 2045) conditions are included in **Sections 2.2 and 3.2** of this report. A detailed description of the analysis methodology and analysis results for the freeway component for all alternatives and analysis scenarios is included in **Section 2** of this report. Similarly, the analysis methodology and the analysis results relative to operations of interchanges, including ramp terminals at arterials, on-ramp metering, and arterial intersections are included in **Section 3** of this report.

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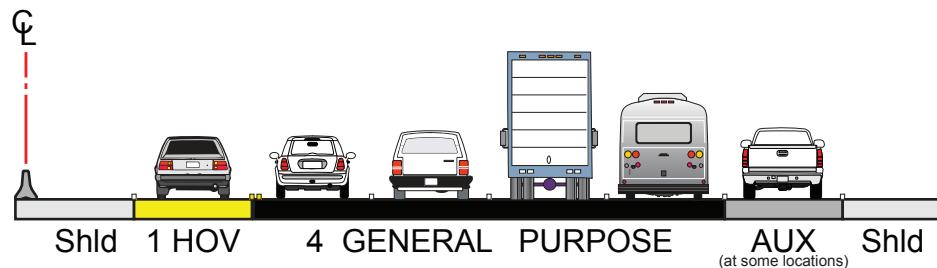
- LEGEND**
- Study Area Limits** (Yellow line)
  - Study Interchanges** (Yellow circle)

**FIGURE 1.2.1**  
I-10 Corridor Study PA/ED  
Project Study Area

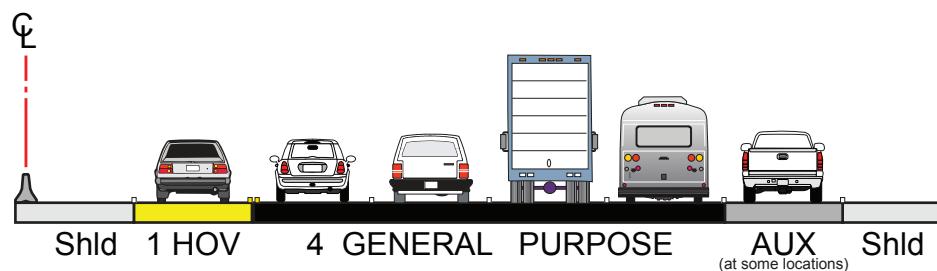
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# Los Angeles / San Bernardino County Line to Haven Avenue

## Freeway Mainline Typical Half Sections

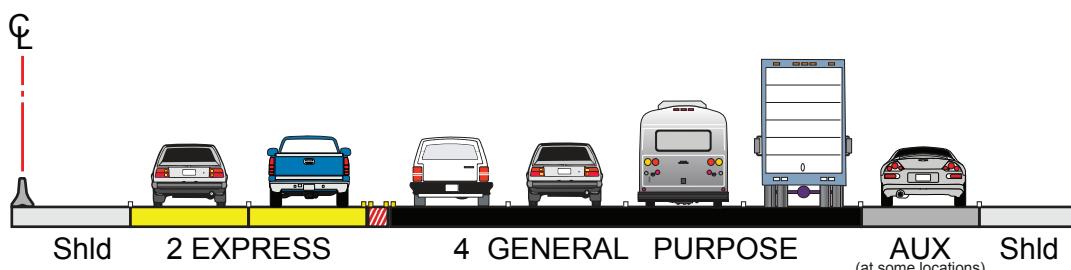


**ALTERNATIVE 1**  
NO BUILD



**ALTERNATIVE 2**  
HOV LANE

Western project limit of  
Alternative 2 is Haven Avenue

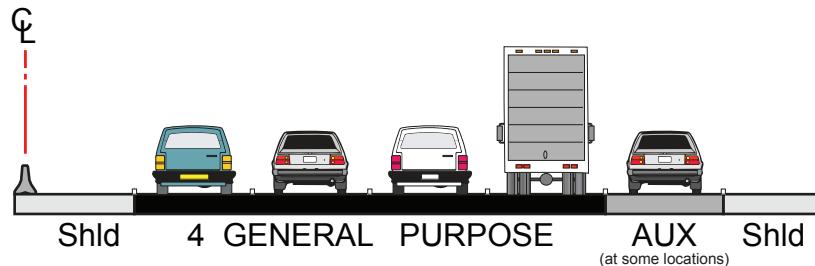


**ALTERNATIVE 3**  
EXPRESS LANES

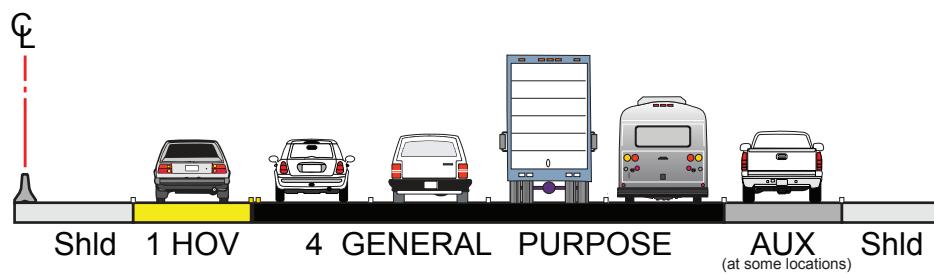
**FIGURE 1.4.1**  
I-10 Corridor Study PA/ED  
Alternatives 1, 2 and 3  
Freeway Mainline Typical Half Sections

# Haven Avenue to California Street

Freeway Mainline Typical Half Sections

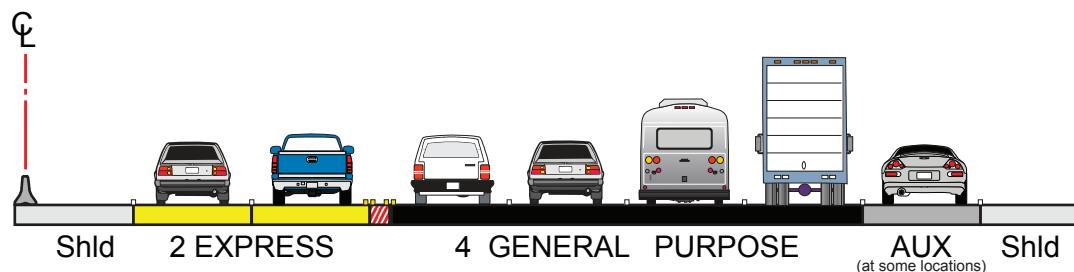


**ALTERNATIVE 1**  
NO BUILD



**ALTERNATIVE 2**  
HOV LANE

Western project limit of  
Alternative 2 is Haven Avenue

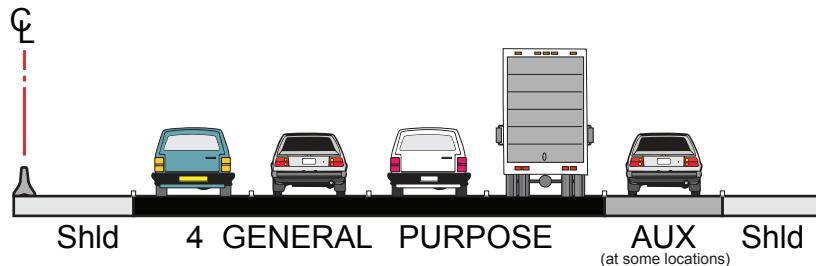


**ALTERNATIVE 3**  
EXPRESS LANES

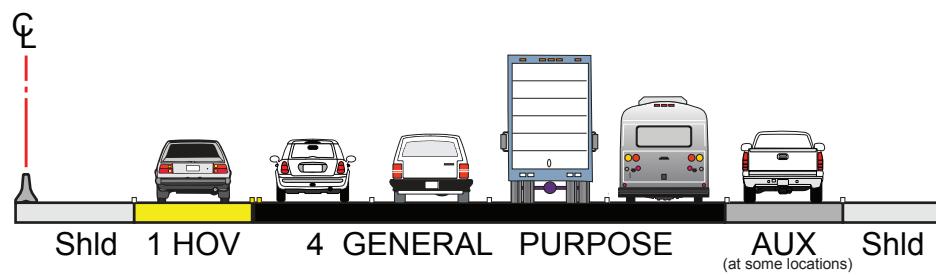
**FIGURE 1.4.1**  
I-10 Corridor Study PA/ED  
Alternatives 1, 2 and 3  
Freeway Mainline Typical Half Sections

# California Street to Ford Street

Freeway Mainline Typical Half Sections

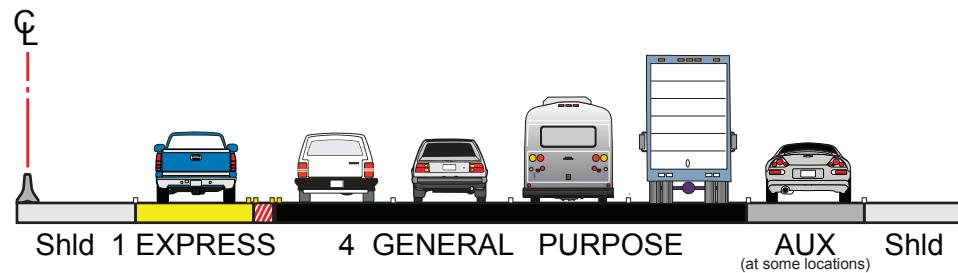


**ALTERNATIVE 1**  
NO BUILD



**ALTERNATIVE 2**  
HOV LANE

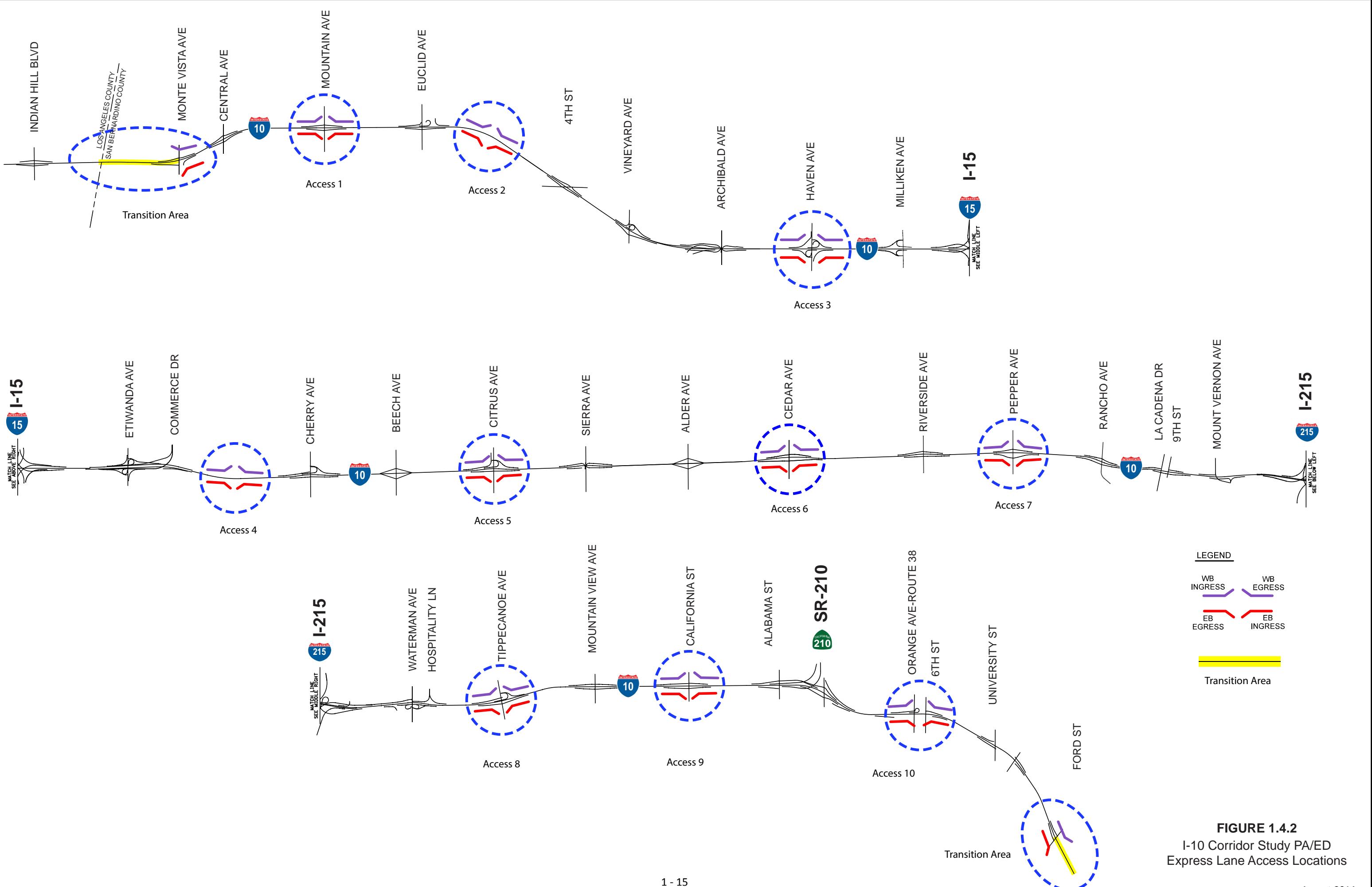
Western project limit of  
Alternative 2 is Haven Avenue



**ALTERNATIVE 3**  
EXPRESS LANES

**FIGURE 1.4.1**  
I-10 Corridor Study PA/ED  
Alternatives 1, 2 and 3  
Freeway Mainline Typical Half Sections

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## **FIGURE 1.4.2**

### I-10 Corridor Study PA/ED press Lane Access Locations

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## 2 FREEWAY COMPONENT

This section of the report discusses the freeway analysis methodology, identifies how traffic volumes were determined for the various scenarios, and evaluates aspects of I-10 operations including freeway mainline traffic operations, ramp traffic operations, and ramp-freeway junction operations for existing (2012) conditions, Opening Year (2025) conditions and Design Year (2045) conditions. Alternative 1 (No Build), Alternative 2 (HOV) and Alternative 3 (Express) are evaluated for both Opening Year (2025) and Design Year (2045) traffic conditions. The analysis of freeway traffic operations includes all mainline segments and ramp junctions along the I-10 corridor from White Avenue to Wabash Avenue.

The analysis of freeway traffic operations is based on the methodologies described in the Highway Capacity Manual (HCM) 2000. The methodologies from the most recent version, HCM 2010, are not used due to unreliable results discovered through conducting intersection analysis. Detailed discussion of the problems that were discovered is discussed in [Section 3.0](#) of this report. For consistency, the freeway traffic operations are based on the methodologies described in the HCM 2000. Use of the HCM 2000 procedures is included in the *I-10 Traffic Study – HCM 2010 Intersection Methodology Memorandum* approved by Caltrans on March 2013. The traffic operations methodology memo and approval email are included in [Appendix A-1](#).

### 2.1 Freeway Analysis Methodology

This section identifies the methodologies used for freeway mainline analysis, weaving analysis and ramp junction analysis. The mainline freeway segments between interchanges were analyzed using either the basic freeway segment or weaving analysis, as appropriate. Generally, freeway mainline segments within the interchanges were not analyzed, since these are within the influence areas of the ramp junctions. As noted below in [Section 2.1.3](#) under the heading “Special Ramp Conditions”, mainline segments within interchanges are analyzed only when single-lane off-ramps are accompanied by a lane drop and the segment upstream of the lane drop is not a weaving section or when single-lane on-ramps are accompanied by a lane add and the segment of the lane add is not a weaving section.

This section is based on the *Final Traffic Operations Methodology for I-10 Corridor Project Memorandum* dated May 2013. The traffic operations methodology memorandum is included in [Appendix A-1](#).

#### 2.1.1 Basic Freeway Segment Mainline Analysis Methodology

A basic freeway segment can be characterized by various performance measures, including level of service (LOS), density in terms of passenger cars per mile per lane, average speed, and volume-to-capacity (v/c) or demand volume-to-capacity (d/c) ratio. Each of these measures is an indication of how well traffic flow is being accommodated by the freeway.

The freeway mainline analysis is based on the Highway Capacity Manual (HCM) 2000 Basic Freeway Segment analysis method. The freeway mainline analysis is performed using the Highway Capacity Software (HCS) 2000 computer program. The results provide density which is passenger cars/mile/lane (pc/mi/ln) and a LOS for the freeway segments. Each freeway mainline segment evaluation is based upon directional traffic volumes during both the AM and PM peak hours.

The performance measures of the I-10 corridor are calculated based on roadway characteristics, such as the existing or proposed geometric conditions of the freeway, including the number and width of lanes, right shoulder lateral clearance, interchange spacing, and lane configurations. Key analysis variables and their metrics are defined by the HCM; values and assumptions for each of those variables are as follows:

- Existing and Future Peak Hour Factor (PHF): Based on the San Bernardino County Congestion Management Program (CMP), the PHF for uncongested conditions is 0.95 and for congested conditions is 0.98. Congested conditions are assumed when the volume-to-capacity ratio (v/c) is in excess of 0.90.
- Mainline Truck Percent (%): The I-10 corridor is divided into 4 segments for the consideration of truck activity, each of which has a common truck percentage assumption:
  - West of LA/SB County Line
  - LA/SB County Line to Interstate 15
  - Interstate 15 to Interstate 215
  - Interstate 215 to Wabash Avenue

For existing truck percentages, manual traffic counts were performed along key segments of the I-10 corridor and future truck percentages are calculated using the model as presented in the *I-10 Corridor Study – PA/ED HOV and Express Lanes Traffic Volumes Report* (Traffic Volumes Report) in January 2014 by Iteris.

- Ramp Truck Percent (%): Existing truck percentages for each ramp are based on existing peak hour classification counts conducted at interchange intersections. For locations where classification counts are not available, existing ramp truck percentages are calculated using the model as presented in the Traffic Volumes Report. Future truck percentages for each ramp are calculated using the model as presented in the Traffic Volumes Report.
- Existing and Future Recreational Vehicle Percent (%): Existing and future recreational vehicle percent are included in the truck percentages.
- Existing and Future Terrain Type: Terrain type is determined based on the grades on the I-10 mainline. Based on the review of the grades, segments west of the Cypress Avenue interchange are classified as level terrain since the grades in this area are 2% or less. Segments between Cypress Avenue and Wabash Avenue are classified as rolling terrain since the grades are higher than 2% but do not cause heavy vehicles to operate at crawl speed.
- Existing and Future Mainline Free Flow Speed (FFS): The mainline free flow speed is calculated using the HCM 2000 methodology. The resulting mainline FFS is approximately 70 miles-per-hour (mph).
- Existing and Future Ramp Free Flow Speed: Ramp free flow speeds assumed for this analysis are 25 mph, 30 mph and 45 mph for loop, hook, and tangent ramps, respectively.

On the basis of the flow rate,  $v_p$ , and average passenger-car speed, density is calculated as follows:

$$D = \frac{v_p}{S}$$

Where, D = density (pc/mi/ln),  
 $v_p$  = flow rate (pc/h/ln), and  
S = average passenger-car speed (mph).

LOS of the basic freeway segment is then determined by comparing the calculated density with the density ranges for LOS A through F. **Table 2.1.1** illustrates the freeway segment LOS thresholds for each density range utilized in this analysis. Pursuant to the HCM, descriptions of each LOS from A to F are as follows:

LOS "A" describes free-flow operations. Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. The effects of incidents or point breakdowns are easily absorbed at this level.

Table 2.1.1 Freeway Segment Level of Service (LOS) based on Density	
LOS	Density Range (pc/mi/ln)
A	0.0 – 11.0
B	11.1 – 18.0
C	18.1 – 26.0
D	26.1 – 35.0
E	35.1 – 45.0
F	> 45.0

Source: *Highway Capacity Manual (2000): Exhibit 23-2*

LOS "B" represents reasonably free flow, and free-flow speeds are maintained. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high. The effects of minor incidents and point breakdowns are still easily absorbed.

LOS "C" provides for flow with speeds at or near the free flow speed of the freeway. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Minor incidents may still be absorbed, but the local deterioration in service will be substantial. Queues may be expected to form behind any significant blockage.

LOS "D" is the level at which speeds begin to decline slightly with increasing flows and density begins to increase somewhat more quickly. Freedom to maneuver within the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort levels. Even minor incidents can be expected to create queuing, because the traffic stream has little space to absorb disruptions.

LOS "E" describes operation at capacity. Operations at this level are volatile, because there are virtually no usable gaps in the traffic stream with vehicles closely spaced, leaving little room to maneuver within the traffic stream. Any disruption of the traffic stream, such as vehicles entering from a ramp or a vehicle changing lanes, can establish a disruption wave that propagates throughout the upstream traffic flow. At capacity, the traffic stream has no ability to dissipate even the most minor disruption, and any incident can be expected to produce a serious breakdown with extensive queuing. Maneuverability within the traffic stream is extremely limited, and the level of physical and psychological comfort afforded the driver is poor.

LOS "F" is used to define breakdowns in vehicular flow. Breakdowns occur when traffic incidents cause a temporary reduction in the capacity, at merge or weaving segments that result in a greater number of vehicles arriving than the number of vehicles discharged and when the projected peak hour flow rate exceeds the estimated capacity of the location.

The speed and density of traffic have an impact on the flow rate of vehicles travelling on the freeway system. The flow rate is expressed in vehicles per hour for each lane of travel that is available on any

given freeway segment. As traffic flow increases, density also increases. As more vehicles enter the freeway, the speed of vehicles decreases because of the interaction among the vehicles. Capacity is reached when the product of speed and density results in the maximum flow rate.

Per the HCM 2000, a zero flow rate occurs under two different conditions. One is when there are no vehicles on the facility – density is zero, and flow rate is zero. Speed is theoretical for this condition and would be selected by the first driver (presumably at a high value). The second is when density becomes so high that all vehicles must stop – the speed is zero and the flow rate is zero, because there is no movement and vehicles cannot pass a point on the roadway.

Any flow rate other than capacity can occur under two different conditions, one with a high speed and low density and the other with high density and low speed. LOS A through E are defined on the low-density, high speed side of the curves (the upper portion of the speed/flow curve), with the maximum-flow boundary of LOS E placed at capacity. Sudden changes can occur in the state of traffic when at capacity (i.e. in speed, density and flow rate). By contrast, LOS F, which describes oversaturated and queue discharge traffic flow, is represented by the high density and low speed.

For existing (2012) conditions, peak hour speeds (from Caltrans Performance Monitoring System) are evaluated to determine if traffic flow is in the LOS A-E range (the upper portion of the speed/flow curve) or in the LOS F range (the lower portion of the speed/flow curve); for those segments whose speed indicates LOS F conditions, the HCM analysis is not conducted for existing (2012) conditions. Based on the Caltrans Standard Environmental Reference (<http://www.dot.ca.gov/ser/forms.htm>), speeds less than 53 mph are considered LOS F. Existing average speeds for I-10 for the AM and PM peak hours are provided in **Appendix A-2**.

The primary performance measure for the freeway mainline GP lanes and weaving sections is LOS, which is based on vehicle density. For freeway segments between interchanges, v/c ratios are also calculated. Because many freeway segments are forecast to operate at LOS F, v/c ratios are useful in comparing degrees of congestion under LOS F conditions; the HCM density method does not provide a density value under heavily congested LOS F conditions. The capacities assumed are as follows:

- *GP Lane* – Based on the review of the speed and flow relationship on the I-10 mainline within the project limits, the capacity of the I-10 freeway mainline is 1,850 vehicles/hour/lane (vphpl). See **Appendix A-2** for the speed and flow relationship.
- *Auxiliary Lane* – The HCM does not offer explicit guidance on the capacity benefit of auxiliary lanes. The SCAG and the SBTAM travel demand forecasting models (the latter was used for the I-10 project) use a uniform 1,000 vehicles/lane/hour for auxiliary lane capacity, which provides no differentiation between very short auxiliary lanes that have some operational benefits but very limited capacity benefits. For the I-10 traffic study, no capacity benefit is assumed for the shortest auxiliary lanes and the benefit is assumed to be the same capacity as a GP lane for the longest auxiliary lanes. The following represent reasonable assumptions for the capacity of auxiliary lanes:
  - < 0.5 miles in length, 0 vphpl
  - 0.5 to 1.0 miles in length, 1,000 vphpl
  - > 1.0 miles in length, 1,850 vphpl

### High Occupancy Vehicle (HOV) Lane Analysis

The HCM 2000 does not have an explicit methodology to evaluate single-lane HOV operations. Since no HCM 2000 method is available, v/c ratios (or d/c ratios) are calculated for HOV lanes to determine LOS. The HOV lane capacity is 1,600 vphpl. The v/c ratios (or d/c ratios) are used to identify HOV lane LOS using the conversion in **Table 2.1.2**.

### Express Lanes Analysis

The HCM 2000 Basic Freeway Segment methodology is applied to evaluate Express Lanes operation where dual Express Lanes in each direction are provided. The primary performance measure for dual Express Lanes is LOS, which is based on vehicle density. Key analysis parameters identified above are utilized for this analysis. The v/c ratios (or d/c ratios) are calculated using a capacity of 2,000 vphpl. It should be noted that the tolling policy for the Express Lanes will be developed to maintain a v/c at or below 0.85 and an LOS of D or better at all times. The capacity of 1,850 vphpl cited above for GP lanes is not applied to the Express Lanes because the reduction of capacity below 2,000 is due to the traffic flow turbulence created by the frequency of interchanges along the I-10 study corridor and the volume of heavy trucks; the Express Lanes will have less frequent ingress/egress and no heavy trucks. Similarly, the capacity of 1,600 vphpl for HOV lanes is not applied to the Express Lanes because the reduction of HOV lane capacity below 2,000 is due to the inability to pass in the single HOV lane in each direction; even if striped for continuous access, passing slower moving vehicles in the HOV lane by using the #1 GP lane is unlikely during peak periods because of the congestion anticipated in the GP lanes.

The HCM 2000 does not have an explicit methodology to evaluate single-lane Express Lane operations. Since no HCM 2000 method is available, v/c ratios will be calculated for single-lane Express Lanes to determine LOS. The capacity to be used is 2,000 vphpl. The v/c ratios (or d/c ratios) are used to identify single-lane Express Lane LOS using the conversion in **Table 2.1.2**. As noted above, the tolling policy for the Express Lanes are developed to maintain a v/c ratio at or below 0.85 and a LOS of D or better at all times.

### *Transition Areas/Intermediate Access Analysis*

The Express Lane transition area analysis is based on the HCM 2000 Basic Freeway Segment analysis method and is performed using the HCS 2000 computer program. Key analysis parameters identified above are utilized for this analysis.

Analysis for Express Lane intermediate access areas is based on the HCM 2000 Ramp Junction and/or Weaving analysis method depending upon the intermediate access design. Key analysis parameters identified above are utilized for this analysis. For “weaving” lanes between the number two Express Lane and the number one GP lane at intermediate access areas, queuing is evaluated to determine whether the length of the weaving lane is adequate to accommodate queues anticipated when the GP lanes are heavily congested.

Table 2.1.2 Freeway Mainline Level of Service at FFS = 70 mph based on Volume-to-Capacity (v/c)	
LOS	v/c
A	Less than or equal to 0.32
B	0.33 – 0.53
C	0.54 – 0.74
D	0.75 – 0.90
E	0.91 – 1.00
F	> 1.00

*Source: Highway Capacity Manual (2000): Exhibit 23-2*

## 2.1.2 Weaving Analysis Methodology

The HCM 2000 defines weaving as the crossing of two or more traffic streams traveling in the same general direction along a significant length of highway without the aid of traffic control devices. Weaving segments are formed when a merge area is closely followed by a diverge area, or when an on-ramp is closely followed by an off-ramp and the two are joined by an auxiliary lane. Weaving segments require intense lane-changing maneuvers as drivers must access lanes appropriate to their desired exit points. Weave analysis is conducted between an on-ramp and an off-ramp spaced less than 2,500 feet apart. The analyses are conducted using the HCS 2000 software. The results are calculated based on the existing or proposed design alternatives, as appropriate, for the I-10 Corridor.

Three geometric variables influence weaving segment operations: configuration, length, and width. The three types of geometric configurations of weaving are defined as follows:

- Type A – Weaving vehicles for both movements must make one lane change to successfully complete a weaving maneuver.
- Type B – Weaving vehicles in one movement may complete a weaving maneuver without making a lane change, whereas other vehicles in the weaving segment must make one lane change to successfully complete a weaving maneuver.
- Type C – Weaving vehicles in one movement may complete a weaving maneuver without making a lane change, whereas other vehicles in the weaving segment must make two or more lane changes to successfully complete a weaving maneuver.

The second geometric variable influencing the operation of a weaving segment is length. The length of the weaving segment constrains the time and space in which the driver must make all required lane changes. The third geometric variable influencing the operation of the weaving segment is its width, which is defined as the total number of lanes between the entry and exit gore areas, including an auxiliary lane, if present.

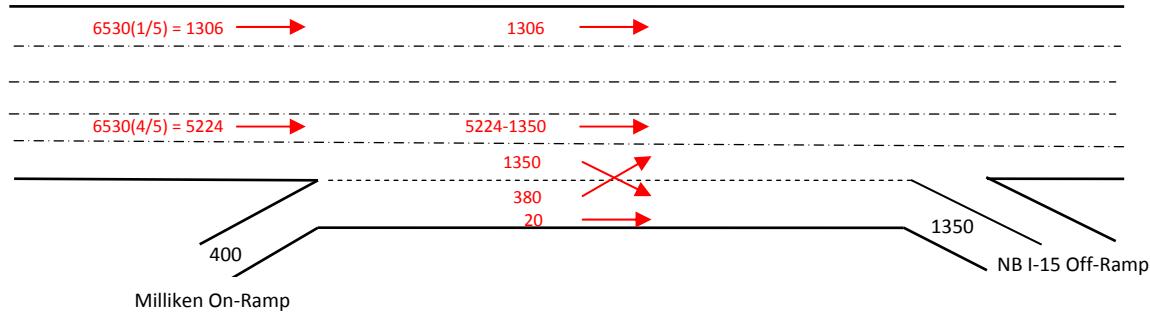
Table 2.1.3 Weaving Level of Service		
LOS	Density (pc/mi/ln)	
	Freeway Weaving Segment	Collector-Distributor Weaving Segments
A	≤ 10.0	≤ 12.0
B	> 10.0-20.0	> 12.0-24.0
C	> 20.0-28.0	> 24.0-32.0
D	> 28.0-35.0	> 32.0-36.0
E	> 35.0-43.0	> 36.0-40.0
F	> 43.0	> 40.0

Source: Highway Capacity Manual (2000); Exhibit 24-2

LOS of weaving segments is based on vehicle density (pc/mi/ln), which is computed using the traffic flow rates, free flow speeds, and weaving segment configuration type. The LOS criteria for weaving segments for freeways and collector distributor roads are provided in **Table 2.1.3**.

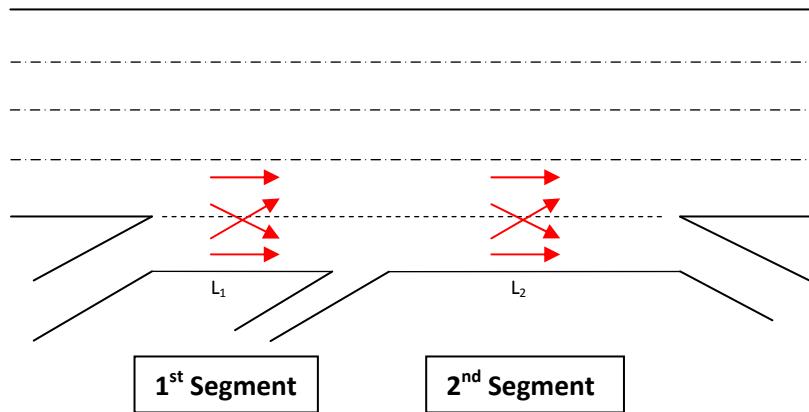
It should be noted that the HCS software used for the analysis is limited to a weaving segment with a maximum of 5 lanes. The volumes input into the HCS software for weaving segments having 6 or 7 lanes are adjusted to reflect a 5-lane weaving segment. This adjustment is based on removing from the software analysis the GP lane through volumes most isolated from the weaving maneuvers. For example, a 6 lane weaving segment is found on the I-10 eastbound segment between the Milliken Avenue on-ramp and the northbound I-15 off-ramp. At this location the weaving segment consists of 5

mainline GP lanes and 1 auxiliary lane. The existing condition morning peak hour weaving volume for this segment is adjusted by taking the upstream mainline GP volume of 6,530 vehicles and multiplying the volume by 4/5. The resulting volume of 5,224 vehicles is then used in calculating the weaving volume input to the HCS software. The calculation is shown in the diagram below:



#### Special Weaving Condition

Along the I-10 Corridor there are several mainline segments that consist of two consecutive on-ramps merging onto an auxiliary lane (with one of the on-ramps creating the auxiliary lane) and the auxiliary lane terminating at an adjacent off-ramp, creating a complex weaving segment. This lane configuration is shown in the diagram below.



The HCM 2000 does not have an explicit methodology to evaluate this special weaving condition. In order to provide a more robust analysis for this complex weaving segment, the analysis is conducted as two weaving segments using the HCM weave analysis method if the spaces between the ramps are less than 2,500 feet. The first weaving segment (segment 1) is from on-ramp to on-ramp. The second weaving segment (Segment 2) is from the second on-ramp to the off-ramp. In calculating the weaving volumes, it is assumed that a portion of vehicles from the freeway mainline exiting to the off-ramp will weave into the auxiliary lane within the first weaving segment and continue straight on the auxiliary lane towards the off-ramp through the second weaving segment. The rest of the vehicles from the freeway mainline exiting to the off-ramp will weave into the auxiliary lane within the second weaving segment. The portions of vehicles weaving within the first and second weaving segments are calculated

using the ratio of the length of the auxiliary lane for each individual weaving segment to the total length of the auxiliary lane (i.e.  $L_1/(L_1+L_2)$ ).

Similarly, a portion of the vehicles from the first on-ramp is assumed to weave from the auxiliary lane to the freeway mainline within the first weaving segment. The rest are assumed to remain on the auxiliary lane within the first weaving segment and weave from the auxiliary lane to the freeway mainline within the second weaving segment. In the second weaving segment, the second on-ramp is added to the weaving volume.

For example, a complex weaving segment is found on the I-10 eastbound segment between the I-15 on-ramps and the Etiwanda Avenue off-ramp. At this location the on-ramp from I-15 northbound creates an auxiliary lane and, approximately 740 feet downstream from this on-ramp, the on-ramp from I-15 southbound merges into the auxiliary lane. The auxiliary lane then terminates at the Etiwanda Avenue off-ramp approximately 2,250 feet downstream of the merge of the on-ramp from I-15 southbound. The total length of the auxiliary lane is approximately 2,990 feet. Based on the length of the auxiliary lanes, 25% ( $740/2,990$ ) of the total weaving volumes is assumed to weave within the first weaving segment and 75% ( $2,250/2,990$ ) within the second weaving segment. The existing morning peak hour weaving volumes are calculated as follows and shown in the diagram below:

#### 1st Segment Weave Volume Calculation

$$\text{Ramp to Ramp Volume} = 1,790 * (0.95) * (0.75) + 1,790 * (0.05) = 1,365 \text{ vehicles}$$

$$\text{Ramp to Freeway Volume} = 1,790 * (0.95) * (0.25) = 448 \text{ vehicles}$$

$$\text{Freeway to Ramp Volume} = 1,110 * (0.25) = 278 \text{ vehicles}$$

$$\text{Freeway to Freeway Volume} = \text{Upstream Mainline Volume} - 1,110 * (0.75)$$

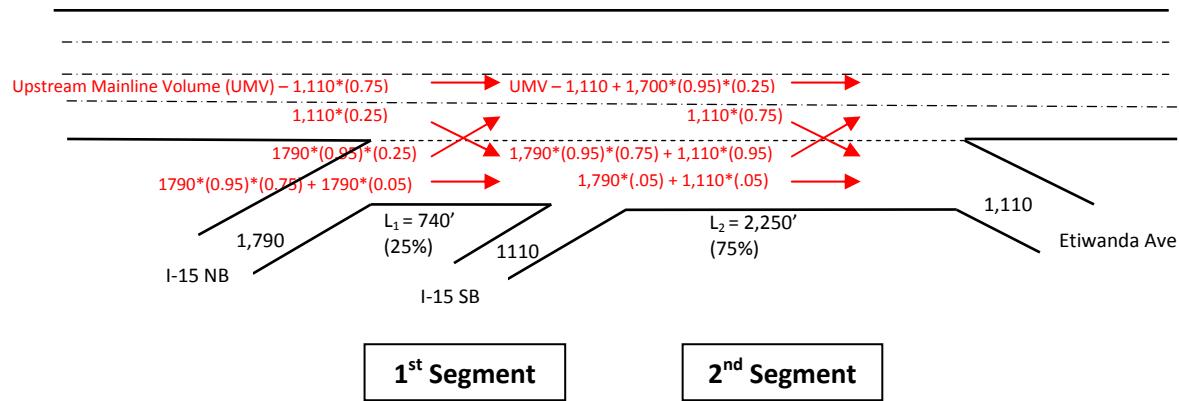
#### 2nd Segment Weave Volume Calculation

$$\text{Ramp to Ramp Volume} = 1,790 * (0.05) + 1,110 * (0.05) = 145 \text{ vehicles}$$

$$\text{Ramp to Freeway Volume} = 1,790 * (0.95) * (0.75) + 1,110 * (0.95) = 2,330 \text{ vehicles}$$

$$\text{Freeway to Ramp Volume} = 1,110 * (0.75) = 832 \text{ vehicles}$$

$$\text{Freeway to Freeway Volume} = \text{Upstream Mainline Volume} - 1,110 + 1,790 * (0.95) * (0.25)$$



### 2.1.3 Ramps and Ramp-Freeway Junction Analysis Methodology

Ramps and ramp-freeway junction operation analyses (merges and diverges) are also based on the HCM, specifically the HCM merge, diverge and/or weave analysis methodologies. The HCM weave analysis methodology (see [Section 2.1.2](#)) is conducted between an on-ramp and an off-ramp spaced less

than 2,500 feet apart, or a collector-distributor road less than 2,500 feet long. Per the HCM, for ramps of adjacent interchanges spaced greater than 2,500 feet apart, merge and diverge analysis methods are used for on-ramps and off-ramps, respectively. The ramps and ramp-freeway junction analyses are conducted using the HCS 2000 software.

A ramp consists of three geometric elements of interest: the ramp-freeway junction, the ramp roadway, and the ramp-street junction. The first two elements – ramp-freeway junction and ramp roadway – are discussed in **Section 2** (the Freeway Component) of this report. The ramp-street junctions are covered in Section 3 (the Arterial Component) of this report.

A number of variables influence the operation of ramp-freeway junctions. They include all of the variables affecting basic freeway segment operation: lane widths, lateral clearances, terrain, driver population, and the presence of heavy vehicles. Additional parameters of particular importance to the operation of ramp-freeway junctions include length of acceleration/deceleration lanes, ramp free-flow speed, and lane distribution of upstream traffic.

Free-flow speed is an influential factor, since it determines the speed at which entering/merging vehicles enter the acceleration lane and the speed at which exiting/diverging vehicles must enter the ramp. This, in turn, determines the amount of acceleration or deceleration that must take place. Ramp free flow speeds generally vary between 25 and 45 mph.

The HCM provides an approximate capacity of ramp roadways (see **Table 2.1.4**) in passenger cars per hour (pc/h) for various ramp free flow speeds for single-lane and two-lane ramps.

One capacity value that affects ramp-freeway junction operation is an effective maximum number of freeway vehicles that can enter the ramp junction influence area without causing local congestion and local queuing. For on-ramps, the total flow in the two right hand lanes of the freeway plus the on-ramp flow cannot exceed 4,600 pc/h. For off-ramps, the total flow in the two right hand lanes of the freeway (which includes the off-ramp flow) cannot exceed 4,400 pc/h. Demands exceeding these values will cause local congestion and queuing. However, as long as demand does not exceed the capacity of the upstream or downstream freeway sections or the off-ramp, breakdown will normally not occur. Thus, this condition is not labeled as LOS F, but rather at an appropriate LOS based on density in the section.

Table 2.1.4 Approximate Capacity of Ramp Roadways		
Free-Flow Speed of Ramp (mph)	Capacity (pc/h)	
	Single-Lane Ramps	Two-Lane Ramps
> 50	2,200	4,400
> 40-50	2,100	4,100
> 30-40	2,000	3,800
≥ 20-30	1,900	3,500
< 20	1,800	3,200

*Source: Highway Capacity Manual (2000): Exhibit 25-3*

The capacity of a merge area is determined primarily by the capacity of the downstream freeway segment. Thus, the total flow arriving on the upstream freeway and the on-ramp cannot exceed the basic freeway capacity of the departing downstream freeway segment. In essence, two capacities are checked: 1) Total flow from merge; and, 2) Total flow into merge influence areas.

**Table 2.1.5** lists capacity flow rates for the total downstream freeway flow and maximum desirable values for the total flow entering the ramp influence area. It should be noted that when the

downstream freeway capacity is exceeded, LOS F exists regardless of whether the flow rate entering the ramp influence area exceeds its capacity.

#### *Determining Capacity for Merge Areas*

Table 2.1.5 Capacity Values for Merge Areas						
Freeway Free-Flow Speed (mph)	Maximum Downstream Freeway Flow (pc/h)				Max Desirable Flow Entering Influence Area (pc/h)	
	Number of Lanes in One Direction					
	2	3	4	> 4		
≥ 70	4,800	7,200	9,600	2,400/ln	4,600	
65	4,700	7,050	9,400	2,350/ln	4,600	
60	4,600	6,900	9,200	2,300/ln	4,600	
55	4,500	6,750	9,000	2,250/ln	4,600	

Source: Highway Capacity Manual (2000): Exhibit 25-7

The three limiting values that are checked in a diverge area are the total flow that can depart from the diverge, the capacities of the departing freeway leg or legs or ramp, or both, and the maximum flow that can enter on the two right hand lanes just prior to the deceleration lane. **Table 2.1.6** lists capacity flow rates for total upstream or downstream freeway flow and maximum flow entering the ramp influence area.

#### *Determining Capacity for Diverge Areas*

Table 2.1.6 Capacity Values for Diverge Areas						
Freeway Free-Flow Speed (mph)	Max Upstream or Downstream Freeway Flow (pc/h)				Max Flow Entering Influence Area (pc/h)	
	Number of Lanes in One Direction					
	2	3	4	> 4		
≥ 70	4,800	7,200	9,600	2,400/ln	4,400	
65	4,700	7,050	9,400	2,350/ln	4,400	
60	4,600	6,900	9,200	2,300/ln	4,400	
55	4,500	6,750	9,000	2,250/ln	4,400	

Source: Highway Capacity Manual (2000): Exhibit 25-14

Failure of the diverge segment (LOS F) is expected if any one of the following conditions is found:

- Capacity of the upstream freeway segment is exceeded by total arriving demand flow;
- Capacity of the downstream freeway segment is exceeded by the demand flow proceeding on the downstream freeway; or,
- Capacity of the off-ramp is exceeded by the off-ramp demand flow.

### Ramps and Ramp-Freeway Junction Level of Service

LOS in merge and diverge influence areas is determined by density for all cases of stable operation, represented by LOS A through E. LOS F exists when the total flow departing from the merge or diverge area exceeds the capacity of the downstream freeway segment. No density is predicted by the HCM method for such cases.

**Table 2.1.7** illustrates the ramps and ramp-freeway junction level of service thresholds for each density range utilized in this analysis. As defined in the HCM:

LOS "A" represents unrestricted operations. Density is low enough to permit smooth merging and diverging, with virtually no turbulence in the traffic stream.

LOS "B" exists when merging and diverging maneuvers become noticeable to through drivers, and minimal turbulence occurs. Merging drivers must adjust speed to accomplish smooth transitions from the acceleration lane to the freeway.

LOS "C" exists when speed within the influence area begins to decline as turbulence levels become noticeable. Both ramp and freeway vehicles begin to adjust their speeds to accomplish smooth transitions.

LOS "D" exists when turbulence levels in the influence area become intrusive, and virtually all vehicles slow to accommodate merging and diverging. Some ramp queues may form at heavily used on-ramps, but freeway operation remains stable.

LOS "E" represents conditions approaching capacity. Speeds reduce significantly, and virtually all drivers feel turbulence. Flow levels approach capacity, and small changes in demand or disruptions within the traffic stream can cause both ramp and freeway queues to form.

LOS "F" exists when the demand exceeds the capacity of upstream or downstream freeway sections or the capacity of an off-ramp.

### Special Ramp Conditions

The ramp junction area is generally analyzed using the merge and diverge method (as discussed above). However, along the I-10 Corridor several on- or off-ramps are associated with lane addition and/or lane drops. Based on the lane configuration, a ramp junction can also be categorized as follows:

- Lane Addition
- Lane Drop/Major Diverge
- Weaving Segment

Per the HCM, where a single-lane on-ramp results in a lane addition, the capacity is governed by the ramp geometry itself and not by the ramp-freeway junction. The LOS of a ramp junction where a single-

Table 2.1.7 Merge and Diverge Level of Service	
LOS	Density Range (pc/mi/ln)
A	0.0 – 10.0
B	10.1 – 20.0
C	20.1 – 28.0
D	28.1 – 35.0
E	> 35.0
F	Demand exceeds capacity

*Source: Highway Capacity Manual (2000): Exhibit 25-4*

lane on-ramp adds a lane to the freeway mainline is based on the basic segment analysis of the downstream segment with the additional lane, unless the added lane is dropped at a diverge point within 2,500 ft of the point of addition, in which case a weaving configuration is formed and a weaving analysis is provided (see **Section 2.1.2**). If the downstream segment with the lane add is not a weaving segment, a basic freeway segment analysis for the downstream segment is reported even if the downstream segment is a segment within the body of an interchange; this represents an exception to the practice that mainline segments within the body of the interchange are not analyzed in this report.

When a single off-ramp results in a lane drop, the capacity of the ramp is governed by its geometry. When a lane drop occurs 2,500 ft or less from a merge point at which a lane was added, a weaving configuration is created and is analyzed using the weave method (see **Section 2.1.2**). The LOS of a ramp junction where a single-lane off-ramp drops a lane from the freeway mainline is based on the segment analysis upstream and downstream of the lane drop. The segment analysis for both segments is reported; the downstream segment is generally a segment within the body of an interchange and this represents an exception to the practice that mainline segments within the body of the interchange are not analyzed in this report.

For ramp junctions with lane adds and lane drops serving single-lane ramps, the ramp junction tables in the sections below show the text “Lane Add” or “Lane Drop” and refer the reader to the table presenting the mainline segment analysis.

When a two-lane off-ramp results in a lane drop it should be treated as a major diverge segment. The principal analysis of a major diverge area involves the capacity of entering and departing roadways, all of which are generally built to mainline standards. The entering demand and departing demand on each exit leg must be checked against the capacity of the appropriate entry or departure leg. The equation below (HCM 2000 Equation 25-12) allows the density across all freeway lanes to be estimated for a distance of 1,500 ft upstream of the gore area.

$$D = 0.0109 \left( \frac{v_F}{N} \right)$$

where,

D = average density across all freeway lanes for a distance of 1,500 ft upstream of diverge (pc/mi/ln),

$v_F$  = freeway flow rate approaching diverge area (pc/h/ln), and

N = number of lanes on freeway segment approaching the diverge area.

## 2.2 Freeway Traffic Volumes

This section presents the methodology used to develop existing and future traffic volumes for the I-10 Corridor Project. Traffic volumes were developed for the following alternatives and years:

- Existing Traffic Conditions – Year 2012
- Opening Year 2025 Alternative 1 – No Build
- Opening Year 2025 Alternative 2 – HOV Lanes
- Opening Year 2025 Alternative 3 – Express Lanes
- Design Year 2045 Alternative 1 – No Build
- Design Year 2045 Alternative 2 – HOV Lanes
- Design Year 2045 Alternative 3 – Express Lanes

Freeway traffic volumes are based on existing and projected volumes from the Traffic Volumes Report prepared by Iteris in January 2014. A summary of the methodology is provided below. [Appendix A-3](#) includes the Traffic Volumes Report prepared by Iteris in January 2014.

### 2.2.1 Existing (Year 2012) Freeway Traffic Volumes

Existing traffic volumes play a critical role in the overall analysis of infrastructure investments. An existing traffic profile has been developed to represent current traffic volume conditions along I-10 between the White Avenue interchange in Los Angeles County and the Wabash Avenue interchange in San Bernardino County. Ramp and intersection turning count volumes were collected in year 2010 (Counts Unlimited Tuesday-Thursday November 16-18, 2010). Mainline and interchange connector volumes were collected in February and March 2012 and peak hour and daily traffic volume information was extracted from the Caltrans Performance Monitoring System (PeMS). Counts Unlimited performed system interchange counts over a 7 day period and summarized count data for 15-minute intervals. Counts for the I-10/SR-210 system interchange direct connectors were performed from February 25, 2012 through March 2, 2012. I-10/I-15 system interchange direct connectors counts were performed from March 7, 2012 through March 13, 2012, while I-10/I-215 system interchange direct connectors counts were performed February 10, 2012 through February 16, 2012. Peak period traffic counts were averaged from Tuesday through Thursday and utilized as the existing condition peak period interchange direct connector traffic volumes.

Mainline counts were performed by Counts Unlimited for the eastbound and westbound segments of I-10 between Mountain View Avenue and California Street between February 25, 2012 and March 2, 2012. PeMS data were collected for 2008, 2009, 2010, 2011 and 2012 conditions to evaluate traffic volume trends through the I-10 corridor. PeMS data were extracted from October of each year with Tuesday-Thursday volumes summarized and averaged to obtain peak period, peak hour, and average daily volumes. Based on several count station locations, there was no discernible trend for volumes between 2008 and 2012. Consequently, the 2010 ramp counts were assumed to represent existing (2012) conditions. Mainline counts along with select PeMS station counts were used as existing condition (2012) count volumes.

Since the I-10 study corridor is over 30 miles long, it was not feasible to conserve traffic flow throughout the entire corridor. Over shorter segments with actual counts, traffic volume was conserved as

appropriate between interchanges by adding and subtracting ramp volumes and mainline volumes by direction.

Existing truck percentages along key segments of the I-10 Corridor developed from manual truck count data collected in March 2012 are summarized in **Table 2.2.1**. Manual traffic counts were performed at three overpass locations overlooking I-10 on three separate Thursdays in March 2012. Count personnel were stationed in both directions and recorded volumes for passenger cars vs. trucks. Passenger cars were further classified by occupancy level (single, two, three-or-more occupant, or unknown). Counts were recorded in 15-minute intervals from 6:00 a.m. to 10:00 a.m., 11:00 a.m. to 1:00 p.m., and 3:00 p.m. to 7:00 p.m.

Table 2.2.1 Existing (2012) Condition I-10 Freeway Mainline Truck Percentages									
Segment/Ramp	Eastbound			Westbound			Total		
	Peak Hour		ADT	Peak Hour		ADT	AM	PM	ADT
	AM	PM		AM	PM				
Archibald Ave Overpass	9%	7%	10%	10%	7%	10%	9%	7%	10%
Citrus Ave Overpass	10%	8%	11%	9%	8%	10%	10%	8%	11%
Alabama St Overpass	11%	5%	7%	3%	9%	7%	6%	6%	7%

*Source: Manual Counts*

Existing truck percentages for each ramp are based on existing peak hour classification counts conducted at interchange intersections. For locations where classification counts are not available, ramp truck percentages are calculated using the model presented in the Traffic Volumes Report. Existing truck percentages for freeway mainline segments and ramps are provided in the Traffic Volumes Report (See [Appendix A-3](#)).

## 2.2.2 Future Years Freeway Traffic Volumes

SANBAG has developed the San Bernardino County Transportation Analysis Model (SBTAM) based on the SCAG Regional Transportation Plan (RTP) model. SCAG has developed a subregional model development tool (SMDT) that provides a baseline for the development of subregional models and ensures consistency between the subregional model and the regional SCAG travel demand model. SBTAM, consistent with the SCAG RTP model, has been validated to Base Year 2008 conditions and has a horizon year of 2035. SBTAM, which utilizes the TransCAD platform, includes additional detail within San Bernardino County, maintains SCAG model zones within a five to ten mile buffer of San Bernardino County and aggregates zones external to the buffer area. An interim year 2025 model was also developed to evaluate opening year traffic conditions.

To facilitate the development of regional growth forecasts and the development of subregional models, SCAG developed a 3-tiered traffic analysis zone system with tier 1 zones representing larger geographic areas such as Regional Statistical Areas, tier 2 zones representing the historic SCAG model traffic analysis zones, and tier 3 representing a breakdown of the tier 2 zones into finer levels of detail. The SCAG regional model employs the tier 2 zones throughout the region including 402 tier 2 zones in San Bernardino County, while SBTAM employs the tier 3 zonal structure in San Bernardino County which includes 2,521 tier 3 zones, tier 2 zones within a five to ten mile buffer of San Bernardino County and tier 1 aggregated zones external to the buffer. The three tiers of SCAG zones aggregate into each

subsequent level. The finer level of detail for San Bernardino County zones ultimately results in a more accurate assessment of local trips, including non-motorized and transit trips.

As SBTAM was developed with additional detail throughout San Bernardino County with the most current information from the SCAG RTP model, it is the most appropriate tool to apply for development of future forecast volumes for the I-10 Corridor Study PA/ED. Prior to application of SBTAM, a detailed review and refined validation of the I-10 corridor was performed with respect to the traffic analysis zones, zonal connectors and network assumptions incorporated into SBTAM. Existing forecast traffic volumes at I-10 interchanges throughout San Bernardino County were evaluated to ensure that the model was effective at forecasting local distribution of traffic onto the I-10 corridor. Due to the manner in which SBTAM was developed through application of the SCAG SMDT, the level of detail in San Bernardino County is much greater than the level of detail within the SCAG RTP model. Due to the level of detail within SBTAM, only minor refinements were made to zonal connectors to more accurately connect traffic analysis zones to the local transportation system and reflect actual traffic distribution patterns that may impact the I-10 corridor. As truck activity is prevalent throughout the I-10 corridor, SBTAM incorporates the SCAG model Heavy Duty Truck component to ensure appropriate truck representation through the I-10 corridor. The truck model generates, distributes, and assigns trucks consistent with the treatment of trucks in the SCAG RTP model.

Since SBTAM is developed from the SCAG regional model, the SBTAM validation process included a comparison to observed data as well as forecasts from the SCAG model to ensure SBTAM was consistent with the SCAG model from a regional perspective. Trip generation, trip distribution, average trip lengths by purpose, and mode choice activity were all found to be consistent with the SCAG regional model following the development of the refined SBTAM model that disaggregates traffic analysis zones from the SCAG model within San Bernardino County and aggregates zones external to San Bernardino County.

#### Demographic Data

SBTAM incorporates the baseline demographic dataset developed by SANBAG for San Bernardino County. The demographic dataset includes over 50 variables consistent with the SCAG RTP 2012 model and includes population, housing, employment, income levels, household size, school and university enrollment among other variables required by the SCAG model to generate trip making activity estimates. The SANBAG demographic dataset was the basis for the RTP 2012 base year and future year demographic data for San Bernardino County. However, since the development of the base year 2008 demographic dataset, census results required revisions to the base year data throughout the SCAG region. SBTAM was refined to incorporate the most current adjusted base year 2008 dataset applied for the 2012 RTP. The refined validation of the I-10 corridor as noted above incorporates the refined base year 2012 SCAG region year 2008 demographic dataset. External to San Bernardino County, the refined RTP 2012 year 2008 demographic dataset was applied for consistency purposes.

The SBTAM horizon year 2035 conditions apply the recently adopted SCAG RTP 2012 "Plan" demographic dataset. However, the RTP Plan socioeconomic dataset varies from the local input data provided by the cities/Councils of Governments and orients more growth around transit. SANBAG has coordinated with SCAG to modify the draft RTP 2012 Plan dataset to be more consistent with the growth distribution expected by the cities and this modified dataset has been incorporated into SBTAM to generate future forecasts throughout San Bernardino County. It is possible that the demographic dataset recommended for SBTAM and the I-10 corridor study varies from the final SCAG RTP Plan

demographic data at the TAZ level; however the dataset maintains consistency with the RTP at the city and county level with San Bernardino County control totals maintained.

The key distinction between the SCAG model demographic dataset for San Bernardino County and the SBTAM dataset within San Bernardino is how the demographic data are allocated to the refined tier 3 San Bernardino County SBTAM zones. The SCAG model employs a generic allocation process when converting the regional model tier 2 zonal data to the refined tier 3 zones. The generic allocation process from tier 2 to tier 3 within the SMRT is based on geographic area. However, that results in local demographic allocation inconsistent with current land use patterns and future land use plans. As a result, the SMRT was developed to allow for refined local distribution of demographic data. SANBAG's local growth forecast model, which has a geographic basis at a finer level of detail than the tier 3 zone structure, was applied to generate the allocation of tier 2 data to the tier 3 zone structure. Application of the SANBAG growth model results in a more accurate local distribution of existing and future demographic activity, thereby producing more accurate local traffic forecast volumes.

In order to estimate traffic demand for opening year conditions, a 2025 interim year model was developed through direct cell by cell straight-line interpolation of origin-destination (OD) matrices. Annual growth for each cell was computed and 10 years of growth was subtracted from the 2035 trips to obtain 2025 traffic activity. This procedure was done for each of the four period (a.m., p.m., mid-day, night) OD matrices and traffic assignments were performed consistent with the existing and year 2035 models.

#### *Transportation Network Assumptions*

The RTP assumptions typically serve as the baseline assumptions for environmental documentation. A typical concern with corridor study assumptions is that RTP assumptions may change during the project life cycle for a project of this magnitude and duration. The RTP 2012 Project List served as the basis of the baseline assumptions for development of traffic forecasts for the I-10 HOV/Express Lane PA/ED study. Initially the draft RTP 2012 Project List was used as a basis for development of network assumptions; however, the 2012 RTP was adopted in April 2012 and the Final 2012 RTP Project List forms the basis for the network assumptions incorporated into the model. To develop intermediate year forecasts, demographic datasets were prepared along with corresponding transportation networks. The basis for future network assumptions is the Regional Transportation Plan (RTP) 2012 Project List provided by SCAG.

#### *Future Forecast Volume Post Processing*

SBTAM generates future forecast volumes by vehicle type for a variety of facilities. SBTAM assigns traffic for 6 vehicle types; drive alone, HOV 2, HOV 3+, light truck, medium-duty truck and heavy-duty truck. SBTAM considers passenger car equivalents (PCE) for the three truck classes when performing the highway assignment. Toll facility activity was forecast assuming tolling of single occupant passenger vehicles only. The forecast volumes were then post-processed to reflect a smooth and logical balance between the mainline freeway and express lanes. SBTAM, consistent with traditional travel demand models, often produces forecasts for facilities that exceed available capacity. However, the toll policy for the Express Lane scenario will ensure an efficient level of service and minimum travel speed. While the specific toll policy has yet to be defined, other managed lane facilities have identified practical capacities between 1,600 vphpl and 1,800 vphpl consistent with Section 8.2.2 of Freeway Management and Operations Handbook (FHWA 2003). It is anticipated that the maximum capacity of the I-10 Express Lanes to maintain a minimum speed of 60 miles per hour would be approximately 1,700 vphpl. As a

result, the Express Lanes capacity has been capped at 1,700 vphpl with vehicles forecast in excess of this capacity shifted into the GP lanes for analysis purposes.

Interim and future year forecast volumes, both daily and peak hour, were post-processed consistent with standard methodology that has been applied for forecast volumes obtained from various travel demand models throughout District 8. In addition, the traffic flow throughout the entire corridor was conserved. The flow was conserved for all the future post-processed volumes. Originally, the traffic modeling methodology memorandum, included in the Traffic Volumes Report, stated that it was not feasible to conserve the flow throughout the entire corridor. However, in order to facilitate the operational analysis, the flow was conserved for all future post-processed volumes. SBTAM generates peak period forecasts and the peak period forecasts were factored to peak hour forecasts based on morning and evening peak period to peak hour conversion factors determined through existing traffic counts along SCAG screenlines. The post-processing methodology compares the existing model and future model forecast volumes and applies the ratio or incremental difference between the forecasts to the model base year count volume. This methodology is consistent with methodologies applied by SCAG and other applications of the SCAG regional model.

SBTAM has a horizon year of 2035 but forecasts beyond 2035 are required for the I-10 PA/ED study. A post-2035 scenario was not developed for SBTAM; rather, 2035 forecast volumes were post-processed as necessary to 2045 conditions. The methodology for post-processing I-10 corridor forecast volumes was to evaluate annual growth on the corridor between 2010 and 2035 and apply the forecast annual growth rate in daily forecast volumes to 2035 forecast volumes to generate 2045 forecasts. The annual growth factor for the I-10 corridor used to develop the 2045 forecast was calculated to be 0.95% or 9.7% for ten years. This growth factor is the weighted average growth throughout the corridor for both eastbound and westbound directions and was calculated by comparing the existing and 2035 model volumes on the I-10 corridor.

Future forecast traffic volumes for the study intersections were developed using the output volumes from the SBTAM. The AM and PM peak period forecast traffic volumes were converted to peak hour volumes by applying peak hour conversion factors (0.372 for three hours in the AM and 0.272 for four hours in the PM peak periods). After the peak hour traffic volumes were calculated, intersection turning movements were developed using the “iterative” methodology as described in the “National Cooperative Highway Research Program Report (NCHRP) 255: Highway Traffic Data for Urbanized Area Project Planning and Design,” Chapter 8. The method uses the base year turning volume percentages (from the traffic counts) and the projected growth (difference) in the intersection’s approach/departure volumes between the existing and future models, then proceeds through an iterative computational technique to produce a balanced, final set of adjusted future year turning volumes.

Truck percentages for the future alternatives for the freeway and ramps are calculated using the model. These percentages are summarized in the Traffic Volumes Report (See [Appendix A-3](#)).

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## 2.3 Existing (Year 2012) Conditions Analysis

This section of the report provides an analysis of the mainline freeway, for both the GP and HOV lanes as well as the freeway ramp junction locations for existing (year 2012) conditions during the morning and evening peak hours. The HCS freeway LOS analysis worksheets for existing (2012) conditions are provided in [Appendix B-1](#).

Currently I-10 generally has four GP lanes in each direction within the project area limits and one HOV lane in each direction west of Haven Avenue. Existing lane configurations and morning and evening peak hour traffic volumes for the I-10 mainline and all interchange ramps within the project limits are illustrated on [Figure 2.3.1](#). A detailed discussion of the methodology to develop existing (2012) conditions freeway traffic volumes is presented in [Section 2.2.1](#) of this report.

Existing condition average daily traffic (ADT) volume ranges from 230,000 in the western portion of the corridor to 151,000 in the eastern portion of the corridor. Weekday daily vehicle miles of travel (VMT) on I-10 within the study area is 7.1 million vehicle miles. ADT and VMT data for the existing condition are presented in [Table 2.3.1](#).

Table 2.3.1 Existing (Year 2012) Condition I-10 Freeway Mainline Average Daily Traffic (ADT) and Vehicle Miles Travelled (VMT)		
Segment	ADT	Daily VMT
LA County Line to I-15	230,000	2,258,000
I-15 to I-215	168,000	2,773,000
I-215 to SR-210	181,000	1,102,000
SR-210 to Ford Street	151,000	988,000
<b>Total</b>	-	7,121,000

Source: SBTAM raw and post-processed data

### 2.3.1. Freeway Mainline Segment Analysis and Levels of Service

HCM 2000 basic freeway segment analysis was conducted for all I-10 study segments except that, based on the segment and ramp lane configuration under existing (2012) conditions, the HCM 2000 weaving analysis method was applied to the following segments and is presented in [Table 2.3.2](#):

#### I-10 Eastbound (EB) Segments

- Between Orange Grove Avenue On-Ramp and Towne Avenue Off-Ramp
- Between Monte Vista Avenue On-Ramp and Central Avenue Off-Ramp
- Between Vineyard Avenue On-Ramp and Archibald Avenue Off-Ramp
- Between Milliken Avenue Loop On-Ramp and NB I-15 Off-Ramp
- Between NB/SB I-15 On-Ramp and Etiwanda Avenue Off-Ramp
- Between 9<sup>th</sup> Street On-Ramp and Mt. Vernon Avenue Off-Ramp
- Between Mt. Vernon Avenue On-Ramp and NB/SB I-215 Off-Ramp
- Between SB I-215 On-Ramp and Redlands Boulevard Off-Ramp
- Between Waterman Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Mountain View Avenue Off-Ramp

- Between Mountain View Avenue On-Ramp and California Street Off-Ramp
- Between SB SR-210 On-Ramp and Eureka Street Off-Ramp

#### *I-10 Westbound (WB) Segments*

- Between Orange Avenue Direct/Loop On-Ramp and NB SR-210 Off-Ramp
- Between SB SR-210/Alabama Street On-Ramp and California Street Off-Ramp
- Between California Street On-Ramp and Mountain View Off-Ramp
- Between Mountain View Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Carnegie Drive/Waterman Avenue Off-Ramp
- Between Carnegie Drive/Waterman Avenue On-Ramp and NB/SB I-215 Off-Ramp
- Between SB I-215 On-Ramp and Sperry Drive Off-Ramp
- Between Mt. Vernon Avenue On-Ramp and 9<sup>th</sup> Street Off-Ramp
- Between Etiwanda Avenue Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp
- Between NB I-15 On-Ramp and Milliken Avenue Off-Ramp
- Between Archibald Avenue On-Ramp and Vineyard Avenue Off-Ramp
- Between Central Avenue On-Ramp and Monte Vista Avenue Off-Ramp
- Between Towne Avenue On-Ramp and Orange Grove Avenue Off-Ramp

As discussed in **Section 2.1.2** and noted in **Table 2.3.2**, some weaving segments are categorized as a complex weaving segment. The analysis conducted for the complex weaving segments consists of two weaving analyses.

**Table 2.3.2** presents the LOS of each freeway segment. Under existing (2012) conditions most of the GP lane segments operate at LOS E or better during the morning and evening peak hours in both directions. During the morning peak hour most of the failing segments occur in the eastbound direction and during the evening peak hour most occur in the westbound direction. The following eastbound and westbound segments operate at LOS F in the GP lanes during the morning or evening peak hours:

#### *I-10 EB GP Lane Segments*

- Between White Avenue Off-Ramp and Garey Avenue Off-Ramp
- Between Garey Avenue Off-Ramp and Orange Grove Avenue On-Ramp
- Between Orange Grove Avenue On-Ramp and Towne Avenue Off-Ramp
- Between Mountain Avenue Off-Ramp and Mountain Avenue On-Ramp
- Between Holt Boulevard On-Ramp and Archibald Avenue On-Ramp
- Between Archibald Avenue On-Ramp and Haven Avenue Off-Ramp
- Between NB/SB I-15 On-Ramp and Etiwanda Avenue Off-Ramp
- Between SB I-215 On-Ramp and Redlands Boulevard Off-Ramp
- Between Redlands Boulevard Off-Ramp and Waterman Avenue Off-Ramp
- Between Waterman Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Mountain View Avenue Off-Ramp
- Between Mountain View Avenue On-Ramp and California Street Off-Ramp
- Between 6th Street On-Ramp and University Street Off-Ramp

#### *I-10 WB GP Lane Segments*

- Between University Street On-Ramp and 6th Street Off-Ramp
- Between Orange Avenue Direct/Loop On-Ramp and NB SR-210 Off-Ramp

- Between California Street On-Ramp and Mountain View Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Carnegie Drive/Waterman Avenue Off-Ramp
- Between Carnegie Drive/Waterman Avenue On-Ramp and NB/SB I-215 Off-Ramp
- Between NB I-15 On-Ramp and Milliken Avenue Off-Ramp
- Between Euclid Avenue Direct On-Ramp and Mountain Avenue Off-Ramp
- Between Mountain Avenue On-Ramp and Central Avenue Off-Ramp
- Between Central Avenue On-Ramp and Monte Vista Avenue Off-Ramp
- Between Monte Vista Avenue On-Ramp and Indian Hill Boulevard Off-Ramp
- Between Indian Hill Boulevard On-Ramp and Towne Avenue Off-Ramp
- Between Towne Avenue On-Ramp and Orange Grove Avenue Off-Ramp
- Between Garey Avenue On-Ramp and White Avenue On-Ramp
- Between White Avenue On-Ramp and Dudley Street Off-Ramp

The freeway mainline segments listed above operate at LOS F in the GP lanes based on either existing low speed found in PeMS data or v/c ratios that are greater than 1.00. As shown in **Table 2.3.2**, under existing (2012) conditions HOV lane segments along I-10 within the project study area operate at LOS D or better during the morning and evening peak hours in both directions, except for the following I-10 eastbound segments during the evening peak hour:

- Between White Avenue Off-Ramp and Garey Avenue Off-Ramp
- Between Garey Avenue Off-Ramp and Orange Grove Avenue On-Ramp
- Between Orange Grove Avenue On-Ramp and Towne Avenue Off-Ramp
- Between Holt Boulevard On-Ramp and Archibald Avenue On-Ramp
- Between Archibald Avenue On-Ramp and Haven Avenue Off-Ramp

### **2.3.2. Ramps and Ramp-Freeway Junction Analysis and Levels of Service**

The density and LOS for each of the ramps along I-10 within the study area is based on existing traffic volumes. **Table 2.3.3** provides a summary of the findings from the analyses. The v/c ratio for each of the freeway ramps is also presented. It should be noted that when the GP lane segment is LOS F, the ramp junction also operates at LOS F, regardless of the flow rate entering the ramp influence area.

As discussed in **Section 2.1.3**, on- or off-ramps associated with lane addition and/or lane drops are not analyzed as a typical ramp junction (using the merge and diverge method). The operations of these special ramp conditions are based on the operation of the segment upstream and/or downstream of the ramp. Depending on the lane configuration, the basic freeway segment or the weave methods are used to determine the operation of the segment. The special ramp conditions are indicated with “Lane Add”, “Lane Drop” or “Weaving Segment” in **Table 2.3.3**. The operations of the segments are summarized in **Table 2.3.2**. For major diverge locations, when a two-lane off-ramp results in a lane drop, the density and LOS are determined based on the HCM major diverge method described in **Section 2.1.3**.

Under existing (2012) conditions, the ramp junction peak hour LOS varies from A to E, except that the following ramp junction locations operate at LOS F:

- White Avenue WB Direct On-Ramp
- Garey Avenue EB Direct Off-Ramp
- Garey Avenue WB Direct On-Ramp

- Towne Avenue EB Direct On-Ramp
- Towne Avenue WB Direct Off-Ramp
- Indian Hill Boulevard WB Direct Off-Ramp
- Indian Hill Boulevard WB Direct On-Ramp
- Monte Vista Avenue WB Direct On-Ramp
- Central Avenue WB Direct Off-Ramp
- Mountain Avenue EB Direct On-Ramp
- Mountain Avenue WB Direct Off-Ramp
- Mountain Avenue WB Direct On-Ramp
- Euclid Avenue WB Direct On-Ramp
- Archibald Avenue EB Direct On-Ramp
- Eureka Street/Orange Street/6<sup>th</sup> Street EB Direct On-Ramp
- Eureka Street/Orange Street/6<sup>th</sup> Street WB Direct Off-Ramp
- University Street/Cypress Avenue EB Direct Off-Ramp
- University Street/Cypress Avenue WB Direct On-Ramp

The ramp junction locations listed above operate at LOS F due to the LOS F condition for the GP lane segments upstream or downstream of the ramp. As shown in **Table 2.3.2**, the GP lane segments are currently operating at LOS F due to existing low speeds found in PeMS or existing volumes exceeding the capacity of the segment.

### 2.3.3. Average Peak Hour Speed, Vehicle Hours of Delay and Cost of Delay

Based on data available from the Caltrans Freeway Performance Management System (PeMS) and depending upon time of day and direction of travel, average speeds on I-10 during peak hours for a trip between the LA County line and the Ford Street interchange (a distance of approximately 33 miles) range from 48 to 60 miles-per-hour (mph) in the GP lanes. Average travel speeds in the HOV lanes west of Haven Avenue during peak hours are in excess of 60 mph. **Table 2.3.4** provides a summary of existing average travel speeds along the I-10 corridor.

Vehicle hours of delay on weekdays were calculated by comparing daily vehicle hours of travel (VHT) on I-10 forecast by the SBTAM under capacity constrained conditions that include congestion with VHT of the same traffic volumes assuming no congestion. The difference in VHT was considered delay. Daily delay was multiplied by 250 (weekdays per year less 10 holidays) to determine annual vehicle hours of delay. **Table 2.3.5** shows that there are approximately 19,000 vehicle hours of delay on I-10 within the study area on a typical weekday. On an annual basis there are approximately 4.8 million vehicle hours of delay on the freeway, which represents an annual cost of delay of approximately \$76 million.

**Table 2.3.4**  
Existing (Year 2012) Condition I-10 Freeway Mainline  
Average Peak Hour Speeds between the LA/SB County Line and Ford Street

Direction and Lane Type	AM Peak Hour	PM Peak Hour
Eastbound GP Lanes	60	53
Westbound GP Lanes	48	57
Eastbound HOV Lane*	65	63
Westbound HOV Lane*	62	65

Source: SBTAM post-processed data

\*HOV lanes exist only west of Haven Avenue

<b>Table 2.3.5</b> <b>Existing (Year 2012) Condition I-10 Freeway Mainline</b> <b>Vehicle Hours of Delay and Cost of Delay</b>	
Daily Vehicle Hours of Delay on Weekdays <sup>1</sup>	19,295
Annual Vehicle Hours of Delay on Weekdays <sup>2</sup>	4,823,646
Annual Costs of Delay <sup>3</sup>	\$76,000,000

1. Source: SBTAM.

2. Based on 250 weekdays per year.

3. Cost based on weekday hours of delay times cost of hourly delay from Caltrans "Life-Cycle Benefit-Cost Analysis Economic Parameters 2012", assuming 9% trucks (which is the corridor average) (available at [http://www.dot.ca.gov/hq/tpp/offices/eab/benefit\\_cost/LCBAeconomic\\_parameters.html](http://www.dot.ca.gov/hq/tpp/offices/eab/benefit_cost/LCBAeconomic_parameters.html))

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Table 2.3.2: Existing (Year 2012) Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	# of Lanes				Capacity <sup>2,3</sup>			AM Peak Hour				PM Peak Hour								
	AOH	5	XOH	6	X	2	HOV	v/c	Traffic Volume <sup>2</sup>	LOS <sup>4</sup>	Density <sup>5</sup>	LOS <sup>4</sup>	Traffic Volume <sup>2</sup>	v/c	LOS	Traffic Volume <sup>2</sup>	v/c	Density <sup>5</sup>	LOS <sup>4</sup>	
EASTBOUND																				
Between Dudley St On-Ramp and White Ave Off-Ramp	1	4	0	1,600	7,400	0	1,150	0.72	C	5,510	0.74	22.8	C	1,250	0.78	D	6,360	0.86	26.4	D
Between White Ave Off-Ramp and Garey Ave Off-Ramp	1	4	0	1,600	7,400	0	1,150	0.72	C	5,130	0.69	21.2	C	1,250	**	F	6,030	0.81	**	F
Between Garey Ave Off-Ramp and Orange Grove Ave On-Ramp	1	4	0	1,600	7,400	0	1,150	0.72	C	4,500	0.61	18.6	C	1,250	**	F	5,440	0.74	**	F
Between Orange Grove Ave On-Ramp and Towne Ave Off-Ramp	1	4	1	1,600	7,400	0	1,150	0.72	C	5,450	0.74	25.1	C	1,250	0.78	D	6,580	0.89	**	F
Between Towne Ave On-Ramp and Indian Hill Blvd Off-Ramp	1	4	0	1,600	7,400	0	1,150	0.72	C	5,400	0.73	22.3	C	1,250	0.78	D	6,560	0.89	27.4	D
Between Indian Hill Blvd On-Ramp and Monte Vista Ave Off-Ramp	1	4	0	1,600	7,400	0	560	0.35	B	6,060	0.82	25.3	C	1,120	0.70	C	6,900	0.93	28.1	D
Between Monte Vista Ave On-Ramp and Central Ave Off-Ramp	1	4	1	1,600	7,400	0	560	0.35	B	6,260	0.85	25.6	C	1,120	0.70	C	6,940	0.94	28.8	D
Between Central Ave On-Ramp and Mountain Ave Off-Ramp	1	4	1	1,600	7,400	1,000	560	0.35	B	5,170	0.62	16.7	B	1,120	0.70	C	5,200	0.62	16.7	B
Between Mountain Ave Off-Ramp and Mountain Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	570	0.36	B	5,170	0.70	24.2	C	1,170	0.73	C	5,200	0.70	**	F
Between Mountain Ave On-Ramp and Euclid Ave Off-Ramp	1	4	0	1,600	7,400	0	570	0.36	B	6,590	0.90	27.3	D	1,170	0.73	C	7,350	0.99	30.6	D
Between Euclid Ave On-Ramp and 4th St Off-Ramp	1	4	0	1,600	7,400	0	570	0.36	B	7,070	0.96	29.4	D	1,170	0.73	C	7,080	0.96	29.0	D
Between 4th St On-Ramp and Vineyard Ave Off-Ramp	1	4	0	1,600	7,400	0	530	0.33	B	7,010	0.95	29.0	D	1,100	0.69	C	6,720	0.91	27.2	D
Between Vineyard Ave On-Ramp and Archibald Ave Off-Ramp	1	4	1	1,600	7,400	0	490	0.31	A	7,380	1.00	25.1	C	1,030	0.64	C	6,980	0.94	23.5	C
Between Holt Blvd On-Ramp and Archibald Ave On-Ramp	1	4	1	1,600	7,400	0	490	0.31	A	5,460	0.74	17.7	B	1,030	**	F	5,490	0.74	**	F
Between Archibald Ave On-Ramp and Haven Ave Off-Ramp	1	4	1	1,600	7,400	0	480	0.30	A	5,470	0.74	19.5	C	1,110	**	F	5,410	0.73	**	F
Between Haven Ave Direct On-Ramp and Milliken Ave Off-Ramp	0	5	1	0	9,250	1,000	--	--	--	7,430	0.72	20.0	C	--	--	--	8,160	0.80	21.8	C
Between Milliken Ave Loop On-Ramp and NB I-15 Off-Ramp <sup>7</sup>	0	5	1	0	9,250	0	--	--	--	6,940	0.75	21.4	C	--	--	--	8,060	0.87	29.6	D
Between NB I-15 Off-Ramp and SB I-15 Off-Ramp <sup>7</sup>	0	5	0	0	9,250	0	--	--	--	5,580	0.60	18.1	C	--	--	--	5,640	0.61	18.1	C
Between SB I-15 Off-Ramp and NB I-15 On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	--	3,990	0.54	16.5	B	--	--	--	4,160	0.56	17.0	B
Between NB/SB I-15 On-Ramp and Etiwanda Ave Off-Ramp <sup>6</sup>	0	4	1	0	7,400	0	--	--	--	5,980	0.81	20.5	C	--	--	--	6,230	0.84	**	F
Between Etiwanda Ave On-Ramp and Cherry Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	7,090	0.96	28.4	D	--	--	--	7,200	0.97	**	F
Between Cherry Ave On-Ramp and Citrus Ave Off-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	--	5,960	0.81	24.9	C	--	--	--	6,680	0.90	27.1	D
Between Citrus Ave On-Ramp and Sierra Ave Off-Ramp	0	4	1	0	7,400	1,000	--	--	--	6,000	0.71	19.5	C	--	--	--	6,410	0.76	20.6	C
Between Sierra Ave On-Ramp and Cedar Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	5,470	0.74	22.7	C	--	--	--	6,250	0.84	26.0	D
Between Cedar Ave On-Ramp and Riverside Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	5,460	0.74	22.7	C	--	--	--	6,310	0.85	26.3	D
Between Riverside Ave On-Ramp and Pepper Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	5,430	0.73	22.6	C	--	--	--	6,220	0.84	25.9	C

Table 2.3.2: Existing (Year 2012) Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>4</sup>	# of Lanes				Capacity <sup>2,3</sup>			AM Peak Hour				PM Peak Hour							
	AOH	g	X <sub>24</sub>	AOH	X <sub>24</sub>	v/c	Traffic Volume <sup>2</sup>	LOS <sup>4</sup>	Traffic Volume <sup>2</sup>	v/c	Density <sup>5</sup>	LOS <sup>4</sup>	Traffic Volume <sup>2</sup>	v/c	LOS	Traffic Volume <sup>2</sup>	v/c	Density <sup>5</sup>	LOS <sup>4</sup>
Between Pepper Ave On-Ramp and Rancho Ave Off-Ramp	0	4	0	0	7,400	0	--	--	5,830	0.79	24.3	C	--	--	--	6,480	0.88	27.1	D
Between Rancho Ave On-Ramp and 9th St Off-Ramp	0	4	0	0	7,400	0	--	--	6,630	0.90	28.3	D	--	--	--	6,590	0.89	27.7	D
Between 9th St On-Ramp and Mt. Vernon Ave Off-Ramp	0	4	1	0	7,400	0	--	--	6,850	0.93	24.4	C	--	--	--	6,760	0.91	24.0	C
Between Mt. Vernon Ave On-Ramp and NB/SB I-215 Off-Ramp	0	4	1	0	7,400	0	--	--	6,600	0.89	28.9	D	--	--	--	6,660	0.90	30.0	D
Between NB I-215 On-Ramp and SB I-215 On-Ramp <sup>7</sup>	0	4	1	0	7,400	0	--	--	6,640	0.90	21.7	C	--	--	--	6,830	0.92	21.0	C
Between SB I-215 On-Ramp and Redlands Blvd Off-Ramp	0	4	1	0	7,400	0	--	--	7,840	1.06	*	F	--	--	--	8,590	1.16	*	F
Between Redlands Blvd Off-Ramp and Waterman Ave Off-Ramp	0	4	1	0	7,400	0	--	--	6,280	0.85	20.5	C	--	--	--	7,550	1.02	*	F
Between Waterman Ave Off-Ramp and Waterman On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	4,990	0.67	20.8	C	--	--	--	6,660	0.90	27.6	D
Between Waterman Ave On-Ramp and Tippicanoe Ave Off-Ramp	0	4	1	0	7,400	0	--	--	5,440	0.74	20.7	C	--	--	--	7,600	1.03	*	F
Between Tippecanoe Ave On-Ramp and Mountain View Ave Off-Ramp	0	4	1	0	7,400	0	--	--	4,920	0.66	19.0	B	--	--	--	7,570	1.02	**	F
Between Mountain View Ave On-Ramp and California St Off-Ramp	0	4	1	0	7,400	0	--	--	4,440	0.60	**	F	--	--	--	7,900	1.07	**	F
Between California St On-Ramp and Alabama St Off-Ramp	0	5	1	0	9,250	0	--	--	4,030	0.44	11.0	A	--	--	--	7,910	0.86	20.9	C
Between Alabama St Off-Ramp and NB SR-210 Off-Ramp	0	5	0	0	9,250	0	--	--	3,460	0.37	11.3	B	--	--	--	7,050	0.76	22.4	C
Between NB SR-210 Off-Ramp and Tennessee St Off-Ramp	0	4	0	0	7,400	0	--	--	2,710	0.37	11.3	B	--	--	--	5,510	0.74	22.4	C
Between SB SR-210 On-Ramp and Eureka St Off-Ramp	0	4	1	0	7,400	1,000	--	--	4,370	0.52	19.4	B	--	--	--	8,240	0.98	34.3	D
Between 6th St On-Ramp and University St Off-Ramp	0	4	0	0	7,400	0	--	--	3,440	0.46	14.4	B	--	--	--	7,540	1.02	*	F
Between Cypress Ave On-Ramp and Ford St Off-Ramp	0	4	0	0	7,400	0	--	--	2,830	0.38	13.1	B	--	--	--	6,620	0.89	29.1	D
Between Ford St On-Ramp and Wabash Ave On-Ramp	0	4	1	0	7,400	1,850	--	--	2,830	0.31	10.2	A	--	--	--	6,590	0.71	22.0	C
Between Wabash On-Ramp and Yucaipa Blvd Off-Ramp	0	4	1	0	7,400	1,850	--	--	2,880	0.31	10.4	A	--	--	--	6,630	0.72	22.1	C
<b>WESTBOUND</b>																			
Between Yucaipa Blvd On-Ramp and Wabash Ave Off-Ramp	0	4	0	0	7,400	0	--	--	6,250	0.845	26.2	D	--	--	--	3,970	0.536	17.8	B
Between Wabash Ave Off-Ramp and Ford St Off-Ramp	0	4	0	0	7,400	0	--	--	6,200	0.84	25.9	C	--	--	--	3,920	0.53	17.6	B
Between Ford St On-Ramp and Cypress Ave Off-Ramp	0	4	0	0	7,400	0	--	--	6,820	0.92	28.0	D	--	--	--	3,980	0.54	17.9	B
Between University St On-Ramp and 6th St Off-Ramp	0	4	0	0	7,400	0	--	--	7,960	1.08	*	F	--	--	--	4,570	0.62	18.9	C
Between Orange Ave Direct/Loop On-Ramp and NB SR-210 Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	8,270	0.98	27.3	C	--	--	--	4,980	0.59	17.2	B
Between SB SR-210/Alabama St On-Ramp and California St Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	8,080	0.96	25.7	C	--	--	--	4,240	0.50	13.5	B
Between SB SR-210/Alabama St On-Ramp and California St Off-Ramp <sup>6</sup>	0	5	1	0	9,250	1,000	--	--	8,840	0.86	25.5	C	--	--	--	5,230	0.51	16.2	B

Table 2.3.2: Existing (Year 2012) Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>4</sup>	# of Lanes				Capacity <sup>2,3</sup>			AM Peak Hour				PM Peak Hour				GP & AUX				
	AOH	Gr	XN	XN	AOH	Gr	XN	AOH	Traffic Volume <sup>2</sup>	v/c	LOS <sup>4</sup>	Traffic Volume <sup>2</sup>	v/c	LOS <sup>4</sup>	Traffic Volume <sup>2</sup>	v/c	LOS <sup>4</sup>	Traffic Volume <sup>2</sup>	v/c	LOS <sup>4</sup>
Between California St On-Ramp and Mountain View Ave Off-Ramp	0	4	1	0	7,400	0	--	--	8,630	1.17	*	F	--	--	--	--	5,680	0.77	23.2	C
Between Mountain View Ave On-Ramp and Tippecanoe Ave Off-Ramp	0	4	1	0	7,400	0	--	--	6,920	0.94	25.5	C	--	--	--	--	5,750	0.78	22.9	C
Between Tippecanoe Ave On-Ramp and Carnegie Dr/Waterman Ave Off-Ramp	0	4	1	0	7,400	0	--	--	8,630	1.17	*	F	--	--	--	--	6,620	0.89	27.7	C
Between Carnegie Dr/Waterman Ave On-Ramp and NB/SB I-215 Off-Ramp	0	4	1	0	7,400	0	--	--	8,040	1.09	*	F	--	--	--	--	7,310	0.99	35.4	E
Between SB I-215 On-Ramp and Sperry Dr Off-Ramp	0	4	1	0	7,400	0	--	--	6,040	0.82	21.3	C	--	--	--	--	6,950	0.94	24.7	C
Between Mt. Vernon Ave On-Ramp and 9th St Off-Ramp	0	4	1	0	7,400	0	--	--	6,060	0.82	23.2	C	--	--	--	--	6,960	0.94	27.0	C
Between La Cadena Dr On-Ramp and Rancho Ave Off-Ramp	0	4	0	0	7,400	0	--	--	4,370	0.59	18.1	C	--	--	--	--	5,270	0.71	21.7	C
Between Rancho Ave On-Ramp and Pepper Ave Off-Ramp	0	4	0	0	7,400	0	--	--	4,250	0.57	17.6	B	--	--	--	--	5,060	0.68	20.8	C
Between Pepper Ave On-Ramp and Riverside Ave Off-Ramp	0	4	0	0	7,400	0	--	--	4,570	0.62	18.9	C	--	--	--	--	5,160	0.70	21.2	C
Between Riverside Ave On-Ramp and Cedar Ave Off-Ramp	0	4	0	0	7,400	0	--	--	6,010	0.81	25.0	C	--	--	--	--	6,530	0.88	27.4	D
Between Cedar Ave On-Ramp and Sierra Ave Off-Ramp	0	4	0	0	7,400	0	--	--	5,400	0.73	22.3	C	--	--	--	--	5,350	0.72	22.0	C
Between Sierra Ave On-Ramp and Citrus Ave Off-Ramp	0	4	1	0	7,400	0	--	--	6,550	0.89	21.2	C	--	--	--	--	6,420	0.87	20.7	C
Between Citrus Ave Off-Ramp and Citrus Ave On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	6,000	0.81	25.0	C	--	--	--	--	5,880	0.79	24.3	C
Between Citrus Ave On-Ramp and Cherry Ave Off-Ramp	0	4	0	0	7,400	0	--	--	6,840	0.92	28.1	D	--	--	--	--	6,510	0.88	27.3	D
Between Cherry Ave On-Ramp and Etiwanda Ave Off-Ramp	0	4	0	0	7,400	0	--	--	6,920	0.94	28.5	D	--	--	--	--	6,540	0.88	27.5	D
Between Etiwanda Ave Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	7,100	0.85	27.8	C	--	--	--	--	7,130	0.85	24.3	C
Between SB I-15 On-Ramp and NB I-15 On-Ramp <sup>7</sup>	0	4	1	0	7,400	1,850	--	--	6,730	0.73	21.2	C	--	--	--	--	6,330	0.68	20.3	C
Between NB I-15 On-Ramp and Milliken Ave Off-Ramp	0	4	3	0	7,400	1,850	--	--	9,300	1.01	*	F	--	--	--	--	8,360	0.90	31.4	D
Between Milliken Ave On-Ramp and Haven Ave Off-Ramp	0	4	1	0	7,400	1,850	--	--	9,230	1.00	31.0	D	--	--	--	--	8,590	0.93	27.4	D
Between Haven Ave Direct On-Ramp and Archibald Ave Off-Ramp	1	4	1	1,600	7,400	1,000	900	0.56	C	6,610	0.79	21.5	C	730	0.46	B	7,340	0.87	23.6	C
Between Archibald Ave Off-Ramp and Holt Blvd Off-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	1,040	0.65	C	6,610	0.79	20.0	C	980	0.61	C	7,340	0.87	20.9	C
Between Holt Blvd Off-Ramp and Archibald Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	1,040	0.65	C	6,610	0.89	21.1	C	980	0.61	C	7,340	0.99	23.7	C
Between Archibald Ave On-Ramp and Vineyard Ave Off-Ramp	1	4	1	1,600	7,400	0	1,040	0.65	C	5,720	0.77	21.1	C	980	0.61	C	6,960	0.94	26.7	C
Between Vineyard Ave Direct On-Ramp and 4th St Off-Ramp	1	4	0	1,600	7,400	0	1,120	0.70	C	6,210	0.84	26.1	D	890	0.56	C	7,240	0.98	30.0	D
Between 4th St On-Ramp and 7th St Off-Ramp	1	4	0	1,600	7,400	0	1,200	0.75	D	7,310	0.99	31.0	D	1,010	0.63	C	7,450	1.01	*	F
Between Euclid Ave Direct On-Ramp and Mountain Ave Off-Ramp	1	4	0	1,600	7,400	0	1,200	0.75	D	7,540	1.02	*	F	1,010	0.63	C	7,340	0.99	30.5	D

Table 2.3.2: Existing (Year 2012) Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	# of Lanes				Capacity <sup>2,3</sup>			AM Peak Hour				PM Peak Hour				GP & AUX			
	AOH	AOA	AOH	AOA	Traffic Volume <sup>2</sup>	v/c	LOS <sup>4</sup>	Traffic Volume <sup>2</sup>	v/c	Density <sup>5</sup>	LOS <sup>4</sup>	Traffic Volume <sup>2</sup>	v/c	LOS	Traffic Volume <sup>2</sup>	v/c	Density <sup>5</sup>	GP & AUX	
Between Central Ave On-Ramp and Monte Vista Ave Off-Ramp	1	4	1	1,600	7,400	0	1,290	0.81	D	7,560	1.02	*	F	870	0.54	C	7,350	0.99	30.1 D
Between Monte Vista Ave On-Ramp and Indian Hill Blvd Off-Ramp	1	4	0	1,600	7,400	0	1,290	0.81	D	7,760	1.05	*	F	870	0.54	C	7,330	0.99	30.5 D
Between Indian Hill Blvd On-Ramp and Towne Ave Off-Ramp	1	4	0	1,600	7,400	0	1,290	0.81	D	7,390	1.07	*	F	870	0.54	C	7,220	0.98	29.8 D
Between Towne Ave On-Ramp and Orange Grove Ave Off-Ramp	1	4	1	1,600	7,400	0	1,220	0.76	D	7,950	1.07	*	F	960	0.60	C	7,060	0.95	30.1 D
Between Orange Grove Ave Off-Ramp and Garey Ave On-Ramp	1	4	0	1,600	7,400	0	1,220	0.76	D	7,080	0.96	29.3	D	960	0.60	C	6,190	0.84	25.6 C
Between Garey Ave On-Ramp and White Ave On-Ramp	1	4	0	1,600	7,400	0	1,200	0.75	D	7,700	1.04	*	F	920	0.58	C	6,900	0.93	28.1 D
Between White Ave On-Ramp and Dudley St Off-Ramp	1	4	0	1,600	7,400	0	1,200	0.75	D	8,250	1.11	*	F	920	0.58	C	7,260	0.98	30.1 D

## Notes:

- The freeway segments were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis or weaving analysis method, depending on the lane configuration.  
The weaving analysis method was applied to the segments highlighted in the table.
- Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).
- Peak hour capacities for freeway lanes include:
  - 1,850 vph for each General Purpose (GP) lane and 1,600 vph for a single High Occupancy Vehicle (HOV) lane.
  - 1,850 vph for an auxiliary (AUX) lane if the AUX length exceeds 1 mile.
  - 1,000 vph for an AUX lane if the AUX length is greater than 0.5 mile and less than 1 mile.
  - 0 vph for an AUX lane if the AUX length is less than 0.5 mile.
- Level of Service (LOS): GP lane LOS is based on density except when traffic volume-to-capacity (v/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*) in the density column). HOV lane LOS is based on volume-to-capacity (v/c) ratio.
- Density is shown in passenger cars/mile/lane (pc/mi/l).
- Based on the lane configuration, these segments are categorized as a complex weaving segment. In order to provide a more robust analysis for this complex weaving segment, the analysis is conducted as two weaving segments (for details on the methodology see [Section 2.4.2](#) of the report).
- Generally, freeway mainline segments within interchanges were not analyzed, since these are within the influence areas of the ramp junctions. As noted in [Section 2.1.3](#) under the heading "Special Ramp Conditions", mainline segments within interchanges are analyzed only when single-lane off-ramps are accompanied by a lane add and the segment downstream of the lane drop is not a weaving section; or when single-lane on-ramps are accompanied by a lane add and the segment downstream of the lane add is not a weaving section.

Table 2.3.3: Existing Condition (Year 2012) I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak						PM Peak				
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Ramp Junction Lanes	Traffic Volume <sup>1</sup>	v/c	Density <sup>4</sup>	LOS <sup>3</sup>	Traffic Volume <sup>1</sup>	v/c	Density <sup>4</sup>	LOS <sup>3</sup>
<b>White Ave</b>	<i>EB Off Direct</i>	1	1,500	1	380	0.25	26.7	C	330	0.22	29.7	D
	<i>WB On Direct</i>	1	1,500	1	550	0.37	*	F	360	0.24	27.8	C
<b>Garey Ave</b>	<i>EB Off Direct</i>	1	1,500	1	640	0.43	26.9	C	590	0.39	**	F
	<i>WB On Direct</i>	1	1,500	1	650	0.43	*	F	660	0.44	28.5	D
<b>Orange Grove Ave</b>	<i>EB On Direct</i>	1	1,500	1	960	0.64	<i>Weaving Segment</i> <sup>5</sup>		1,150	0.77	<i>Weaving Segment</i> <sup>5</sup>	
	<i>WB Off Direct</i>	1	1,500	1	920	0.61	<i>Weaving Segment</i> <sup>5</sup>		870	0.58	<i>Weaving Segment</i> <sup>5</sup>	
<b>Towne Ave</b>	<i>EB Off Direct</i>	1	1,500	1	660	0.44	<i>Weaving Segment</i> <sup>5</sup>		790	0.53	<i>Weaving Segment</i> <sup>5</sup>	
	<i>EB On Direct</i>	1	1,500	1	600	0.40	24.5	C	760	0.51	**	F
<b>Indian Hill Blvd</b>	<i>WB Off Direct</i>	1	1,500	1	870	0.58	*	F	740	0.49	35.2	E
	<i>WB On Direct</i>	1	1,500	1	850	0.57	<i>Weaving Segment</i> <sup>5</sup>		660	0.44	<i>Weaving Segment</i> <sup>5</sup>	
<b>Monte Vista Ave</b>	<i>EB Off Direct</i>	1	1,500	1	720	0.48	28.1	D	780	0.52	32.9	D
	<i>WB On Direct</i>	1	1,500	1	790	0.53	27.3	C	1,000	0.67	30.9	D
<b>Central Ave</b>	<i>WB Off Direct</i>	1	1,500	1	730	0.49	*	F	890	0.59	35.3	E
	<i>WB On Direct</i>	1	1,500	1	860	0.57	*	F	790	0.53	30.7	D
<b>Mountain Ave</b>	<i>EB Off Direct</i>	1	1,500	1	560	0.37	30.4	D	810	0.54	33.8	D
	<i>EB On Direct</i>	1	1,500	1	760	0.51	<i>Weaving Segment</i> <sup>5</sup>		850	0.57	<i>Weaving Segment</i> <sup>5</sup>	
<b>Euclid Ave</b>	<i>WB Off Direct</i>	1	1,500	1	500	0.33	<i>Weaving Segment</i> <sup>5</sup>		710	0.47	<i>Weaving Segment</i> <sup>5</sup>	
	<i>WB On Direct</i>	1	1,500	1	710	0.47	*	F	690	0.46	30.1	D
<b>4th St</b>	<i>EB Off Direct</i>	1	1,500	1	540	0.36	<i>Weaving Segment</i> <sup>5</sup>		820	0.55	<i>Weaving Segment</i> <sup>5</sup>	
	<i>EB On Direct</i>	1	1,500	1	570	0.38	<i>Lane Add</i> <sup>6</sup>		1,090	0.73	<i>Lane Add</i> <sup>6</sup>	
<b>WB Off Direct</b>	<i>WB On Direct</i>	1	1,500	1	690	0.46	*	F	920	0.61	36.6	E
	<i>WB Off Direct</i>	1	1,500	1	800	0.53	<i>Weaving Segment</i> <sup>5</sup>		790	0.53	<i>Weaving Segment</i> <sup>5</sup>	
<b>WB On Direct</b>	<i>WB Off Direct</i>	1	1,500	1	640	0.43	<i>Lane Drop</i> <sup>7</sup>		1,050	0.70	<i>Lane Drop</i> <sup>7</sup>	
	<i>WB On Direct</i>	1	1,500	1	1,080	0.72	*	F	990	0.66	**	F
<b>WB Off Direct</b>	<i>WB On Loop</i>	1	1,500	1	880	0.59	33.6	D	1,360	0.91	38.4	E
	<i>WB On Direct</i>	1	1,500	1	410	0.27	26.0	C	460	0.31	26.9	C
<b>WB Off Direct</b>	<i>WB Off Direct (7th St)</i>	1	1,500	1	660	0.44	32.5	D	870	0.58	34.0	E
	<i>WB On Direct</i>	1	1,500	1	950	0.63	30.2	D	900	0.60	30.1	D
<b>WB Off Direct</b>	<i>WB Off Direct</i>	1	1,500	1	550	0.37	33.1	D	860	0.57	34.4	D
	<i>WB On Direct</i>	1	1,500	1	450	0.30	28.3	D	430	0.29	27.1	C
<b>WB Off Direct</b>	<i>WB Off Direct</i>	1	1,500	1	320	0.21	29.8	D	430	0.29	33.3	D
	<i>WB On Direct</i>	1	1,500	1	660	0.44	26.6	C	530	0.35	27.6	C

Table 2.3.3: Existing Condition (Year 2012) I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak						PM Peak				
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Ramp Junction Lanes	Traffic Volume <sup>1</sup>	v/c	Density <sup>4</sup>	LOS <sup>3</sup>	Traffic Volume <sup>1</sup>	v/c	Density <sup>4</sup>	LOS <sup>3</sup>
Vineyard Ave	EB Off Direct	1	1,500	1	500	0.33	33.1	D	370	0.25	31.0	D
	EB On Direct	1	1,500	1	650	0.43	Weaving Segment <sup>5</sup>	550	0.37	Weaving Segment <sup>5</sup>		
	WB Off Direct	1	1,500	1	500	0.33	Weaving Segment <sup>5</sup>	720	0.48	Weaving Segment <sup>5</sup>		
	WB On Loop	1	1,500	1	180	0.12	C	270	0.18	24.5	C	
	WB On Direct	1	1,500	1	270	0.18	C	290	0.19	25.2	C	
	EB Off Direct	2	3,000	1	920	0.31	Weaving Segment <sup>5</sup>	950	0.32	Weaving Segment <sup>5</sup>		
Archibald Ave	EB On Direct (Holt Blvd)	1	1,500	1	1,090	0.73	Lane Add <sup>6</sup>	1,630	1.09	Lane Add <sup>6</sup>		
	EB On Direct	1	1,500	1	550	0.37	C	770	0.51	**	F	
	WB Off Direct	1	1,500	11	610	0.41	33.0	D	480	0.32	34.9	D
	WB Off Direct (Holt Blvd)	1	1,500	1	1,060	0.71	Lane Drop <sup>7</sup>	760	0.51	Lane Drop <sup>7</sup>		
	WB On Direct	1	1,500	1	630	0.42	Weaving Segment <sup>5</sup>	1,000	0.67	Weaving Segment <sup>5</sup>		
	EB Off Direct <sup>8</sup>	2	3,000	2	1,130	0.38	14.4	B	980	0.33	14.7	B
Haven Ave	EB On Loop	1	1,500	1	480	0.32	21.9	C	580	0.39	23.6	C
	EB Off Direct	1	1,500	1	1,580	1.05	Lane Add <sup>6</sup>	1,260	0.84	Lane Add <sup>6</sup>		
	WB Off Direct <sup>8</sup>	2	3,000	2	1,580	0.53	21.6	C	1,230	0.41	19.8	B
	WB On Loop	1	1,500	1	330	0.22	25.5	C	500	0.33	26.4	C
	WB On Direct	1	1,500	1	470	0.31	Lane Add <sup>6</sup>	1,070	0.71	Lane Add <sup>6</sup>		
	EB Off Direct <sup>8</sup>	2	3,000	2	890	0.30	14.8	B	870	0.29	16.2	B
Milliken Ave	EB On Loop	1	1,500	1	400	0.27	Weaving Segment <sup>5</sup>	770	0.51	Weaving Segment <sup>5</sup>		
	WB Off Loop	2	3,000	2	720	0.24	Weaving Segment <sup>5</sup>	850	0.28	Weaving Segment <sup>5</sup>		
	WB On Direct	1	1,500	1	650	0.43	28.7	D	1,070	0.71	28.6	D
	EB Off Direct (NB I-15)	2	3,000	2	1,350	0.45	Weaving Segment <sup>5</sup>	2,420	0.81	Weaving Segment <sup>5</sup>		
	EB Off Direct (SB I-15)	1	1,500	1	1,810	1.21	Lane Drop <sup>7</sup>	1,780	1.19	Lane Drop <sup>7</sup>		
	EB On Direct (NB I-15)	1	1,500	1	1,790	1.19	Weaving Segment <sup>5</sup>	1,770	1.18	Weaving Segment <sup>5</sup>		
I-15	EB On Direct (SB I-15)	1	1,500	1	1,110	0.74	Weaving Segment <sup>5</sup>	970	0.65	Weaving Segment <sup>5</sup>		
	WB Off Direct (NB/SB I-15)	2	3,000	2	2,800	0.93	Weaving Segment <sup>5</sup>	2,590	0.86	Weaving Segment <sup>5</sup>		
	WB On Loop (NB Etwanda Ave)	1	1,500	1	2,710	1.81	Lane Add <sup>6</sup>	1,840	1.23	Lane Add <sup>6</sup>		
	WB On Direct (SB Etwanda Ave)	1	1,500	1	590	0.39	31.6	D	690	0.46	34.1	D
	EB Off Direct	1	1,500	1	420	0.28	23.8	C	490	0.33	26.4	C
	EB On Direct	1	1,500	1	300	0.20	19.3	B	900	0.60	25.0	C
Etwanda Ave	WB Off Direct	1	1,500	1	620	0.41	33.4	D	440	0.29	31.7	D
	WB On Loop (NB Etwanda Ave)	1	1,500	1	630	0.42	Weaving Segment <sup>5</sup>	1,040	0.69	Weaving Segment <sup>5</sup>		
	WB On Direct (SB Etwanda Ave)	1	1,500	1	180	0.12	Weaving Segment <sup>5</sup>	280	0.19	Weaving Segment <sup>5</sup>		
	EB Off Direct	1	1,500	1	590	0.39	31.6	D	690	0.46	34.1	D
Cherry Ave	EB On Direct	1	1,500	1	420	0.28	23.8	C	490	0.33	26.4	C
	EB Off Direct (Etwanda Commerce)	2	3,000	2	1,110	0.37	Weaving Segment <sup>5</sup>	1,010	0.34	Weaving Segment <sup>5</sup>		

Table 2.3.3: Existing Condition (Year 2012) I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak						PM Peak				
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Ramp Junction Lanes	Traffic Volume <sup>1</sup>	v/c	Density <sup>4</sup>	LOS <sup>3</sup>	Traffic Volume <sup>1</sup>	v/c	Density <sup>4</sup>	LOS <sup>3</sup>
Cherry Ave	WB Off Direct	1	1,500	1	670	0.45	33.6	D	550	0.37	32.5	D
	WB On Direct	1	1,500	1	750	0.50	27.9	C	570	0.38	25.7	C
	EB Off Direct	1	1,500	1	470	0.31	29.6	D	810	0.54	33.1	D
	EB On Direct	1	1,500	1	510	0.34	Lane Add <sup>6</sup>		540	0.36	Lane Add <sup>6</sup>	
	WB Off Direct	1	1,500	1	550	0.37	Lane Drop <sup>7</sup>		540	0.36	Lane Drop <sup>7</sup>	
	WB On Direct	1	1,500	1	840	0.56	28.2	D	640	0.43	26.2	C
Citrus Ave	WB Off Direct	2	3,000	2	1,410	0.47	14.5	B	1,270	0.42	15.3	B
	EB On Direct	1	1,500	1	880	0.59	18.8	B	1,110	0.74	22.2	C
	WB Off Direct	2	3,000	2	870	0.29	0.1	A	910	0.30	0.4	A
	WB On Direct	1	1,500	1	1,210	0.81	Lane Add <sup>6</sup>		1,430	0.95	Lane Add <sup>6</sup>	
	EB Off Direct	1	1,500	1	670	0.45	28.6	D	850	0.57	32.5	D
	EB On Direct	1	1,500	1	730	0.49	23.2	C	860	0.57	26.4	C
Cedar Ave	WB Off Direct	1	1,500	1	650	0.43	31.5	D	640	0.43	33.5	D
	WB On Direct	1	1,500	1	960	0.64	25.4	C	740	0.49	25.5	C
	EB Off Direct	2	3,000	2	570	0.19	5.7	A	660	0.22	8.7	A
	EB On Direct	1	1,500	1	550	0.37	22.8	C	570	0.38	25.5	C
	WB Off Direct	1	1,500	1	570	0.38	18.4	B	720	0.48	21.5	C
	WB On Direct	1	1,500	1	680	0.45	26.0	C	560	0.37	27.1	C
Riverside Ave	EB Off Direct	1	1,500	1	400	0.27	26.2	C	460	0.31	29.5	D
	EB On Direct	1	1,500	1	790	0.53	24.6	C	720	0.48	26.4	C
	WB Off Direct	1	1,500	1	590	0.39	23.0	C	540	0.36	26.0	C
	WB On Direct	1	1,500	1	730	0.49	19.3	B	550	0.37	20.7	C
	EB Off Direct	1	1,500	1	320	0.21	28.3	D	560	0.37	32.0	D
	EB On Direct	1	1,500	1	500	0.33	25.1	C	660	0.44	26.5	C
Pepper Ave	WB Off Direct	1	1,500	1	460	0.31	23.3	C	500	0.33	27.1	C
	WB On Direct	1	1,500	1	330	0.22	17.4	B	300	0.20	20.0	C
	EB Off Direct	1	1,500	1	120	0.08	29.7	D	190	0.13	29.6	D
	EB On Direct	1	1,500	1	340	0.23	Weaving Segment <sup>5</sup>		360	0.24	Weaving Segment <sup>5</sup>	
	WB Off Direct (9th St)	1	1,500	1	340	0.23	Weaving Segment <sup>5</sup>		370	0.25	Weaving Segment <sup>5</sup>	
	WB On Direct (La Cadena Dr)	1	1,500	1	230	0.15	21.1	C	300	0.20	24.4	C
La Cadena Dr/9th St	EB Off Direct	1	1,500	1	520	0.35	Weaving Segment <sup>5</sup>		590	0.39	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	1	270	0.18	Weaving Segment <sup>5</sup>		480	0.32	Weaving Segment <sup>5</sup>	
	WB Off Direct (Sperry Dr)	1	1,500	1	340	0.23	Weaving Segment <sup>5</sup>		540	0.36	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	1	360	0.24	Weaving Segment <sup>5</sup>		550	0.37	Weaving Segment <sup>5</sup>	
	WB Off Direct (9th St)	1	1,500	1	330	0.22	Weaving Segment <sup>5</sup>		300	0.20	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	1	230	0.15	Weaving Segment <sup>5</sup>		190	0.13	Weaving Segment <sup>5</sup>	
Mt Vernon Ave	EB Off Direct	1	1,500	1	340	0.23	Weaving Segment <sup>5</sup>		550	0.37	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	1	360	0.24	Weaving Segment <sup>5</sup>		300	0.20	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	1	330	0.22	Weaving Segment <sup>5</sup>		200	0.20	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	1	230	0.15	Weaving Segment <sup>5</sup>		190	0.13	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	1	340	0.23	Weaving Segment <sup>5</sup>		550	0.37	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	1	360	0.24	Weaving Segment <sup>5</sup>		300	0.20	Weaving Segment <sup>5</sup>	

Table 2.3.3: Existing Condition (Year 2012) I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak						PM Peak				
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Ramp Junction Lanes	Traffic Volume <sup>1</sup>	v/c	Density <sup>4</sup>	LOS <sup>3</sup>	Traffic Volume <sup>1</sup>	v/c	Density <sup>4</sup>	LOS <sup>3</sup>
I-215	EB Off Direct (NB/SB I-215)	3	4,500	3	2,370	0.53	Weaving Segment <sup>5</sup>		2,420	0.54	Weaving Segment <sup>5</sup>	
	EB On Direct (NB I-215)	1	1,500	2	2,420	<b>1.61</b>	Lane Add <sup>6</sup>		2,590	<b>1.73</b>	Lane Add <sup>6</sup>	
	EB On Direct (SB I-215)	1	1,500	1	1,200	0.80	Weaving Segment <sup>5</sup>		1,760	<b>1.17</b>	Weaving Segment <sup>5</sup>	
	WB Off Direct (NB/SB I-215)	2	3,000	2	3,860	<b>1.29</b>	Weaving Segment <sup>5</sup>		3,470	<b>1.16</b>	Weaving Segment <sup>5</sup>	
	WB On Loop (NB I-215)	1	1,500	1	790	0.53	21.1	C	1,270	0.85	24.3	C
	WB On Direct (SB I-215)	1	1,500	1	1,280	0.85	Weaving Segment <sup>5</sup>		1,550	<b>1.03</b>	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	1	230	0.15	18.5	B	750	0.50	21.3	C
	EB Off Direct	1	1,500	1	1,560	<b>1.04</b>	Weaving Segment <sup>5</sup>		1,040	0.69	Weaving Segment <sup>5</sup>	
	EB Off (Waterman Ave)	1	1,500	1	1,290	0.86	Lane Drop <sup>7</sup>		900	0.60	Lane Drop <sup>7</sup>	
	EB On (Waterman Ave)	1	1,500	1	450	0.30	Weaving Segment <sup>5</sup>		940	0.63	Weaving Segment <sup>5</sup>	
Redlands Blvd	WB Off (Carnegie Dr)	1	1,500	1	880	0.59	Weaving Segment <sup>5</sup>		550	0.37	Weaving Segment <sup>5</sup>	
	WB On (Carnegie Dr)	1	1,500	1	290	0.19	Weaving Segment <sup>5</sup>		1,250	0.83	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	1	880	0.59	Weaving Segment <sup>5</sup>		950	0.63	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	1	360	0.24	Weaving Segment <sup>5</sup>		920	0.61	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	1	730	0.49	Weaving Segment <sup>5</sup>		660	0.44	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	1	770	0.51	Weaving Segment <sup>5</sup>		1,250	0.83	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	1	940	0.63	Weaving Segment <sup>5</sup>		570	0.38	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	1	440	0.29	Weaving Segment <sup>5</sup>		880	0.59	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	1	750	0.50	Weaving Segment <sup>5</sup>		460	0.31	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	1	640	0.43	Weaving Segment <sup>5</sup>		800	0.53	Weaving Segment <sup>5</sup>	
Tippecanoe Ave	WB Off Direct	1	1,500	1	720	0.48	Weaving Segment <sup>5</sup>		740	0.49	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	1	310	0.21	Lane Add <sup>6</sup>		750	0.50	Lane Add <sup>6</sup>	
	EB Off Direct	1	1,500	1	740	0.49	Weaving Segment <sup>5</sup>		470	0.31	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	1	530	0.35	Weaving Segment <sup>5</sup>		920	0.61	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	1	570	0.38	Lane Drop <sup>7</sup>		860	0.57	Lane Drop <sup>7</sup>	
	EB Off Direct	1	1,500	1	520	0.35	30.0	D	300	0.20	16.8	B
	WB Off Direct	1	1,500	1	760	0.51	Weaving Segment <sup>5</sup>		990	0.66	Weaving Segment <sup>5</sup>	
	EB Off Direct (NB SR-210) <sup>8</sup>	2	3,000	2	760	0.25	8.4	A	1,540	0.51	16.6	B
	EB On Direct (SB SR-210)	1	1,500	2	1,620	<b>1.08</b>	Weaving Segment <sup>5</sup>		2,130	<b>1.42</b>	Weaving Segment <sup>5</sup>	
	WB Off Direct (NB SR-210)	2	3,000	2	2,050	0.68	Weaving Segment <sup>5</sup>		1,800	0.60	Weaving Segment <sup>5</sup>	
SR-210	WB On Direct (SB SR-210)	1	1,500	1	1,610	<b>1.07</b>	Weaving Segment <sup>5</sup>		930	0.62	Weaving Segment <sup>5</sup>	
	EB Off Direct (Tennessee St)	1	1,500	1	270	0.18	14.2	B	390	0.26	25.9	C
	EB On Direct (Tennessee St)	1	1,500	1	310	0.21	13.2	B	1,010	0.67	27.4	C
	WB Off Direct (Tennessee St)	1	1,500	1	360	0.24	30.8	D	350	0.23	18.9	B

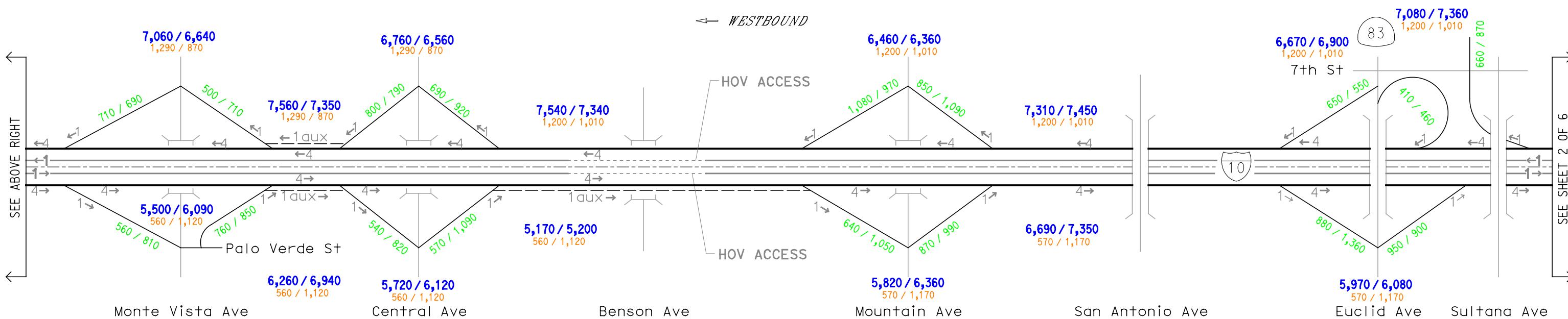
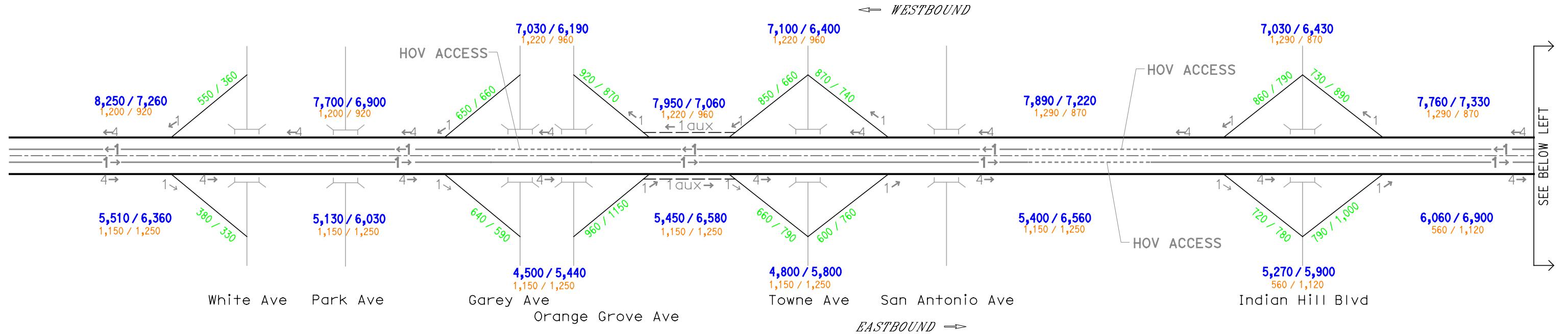
Table 2.3.3: Existing Condition (Year 2012) I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak						PM Peak			
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Ramp Junction Lanes	Traffic Volume <sup>1</sup>	v/c	Density <sup>4</sup>	LOS <sup>3</sup>	Traffic Volume <sup>1</sup>	v/c	Density <sup>4</sup>
Eureka St/ Orange St/6th St	EB Off Direct (Eureka St)	1	1,500	1	1,130	0.75	Weaving Segment <sup>5</sup>	1,260	0.84	Weaving Segment <sup>5</sup>	
	EB On Direct (6th St)	1	1,500	1	190	0.13	B	560	0.37	*	F
	WB Off Direct (6th St)	1	1,500	1	400	0.27	*	F	350	0.23	C
	WB On Loop (NB Orange St)	1	1,500	1	710	0.47	Weaving Segment <sup>5</sup>	760	0.51	Weaving Segment <sup>5</sup>	
	WB On Direct (SB Orange St)	1	1,500	1	610	0.41	Weaving Segment <sup>5</sup>	380	0.25	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	1	770	0.51	20.3	C	1,140	0.76	*
University St/ Cypress Ave	EB On Direct	1	1,500	1	160	0.11	15.7	B	220	0.15	28.5
	WB Off Direct	1	1,500	1	250	0.17	31.0	D	220	0.15	21.4
	WB On Direct	1	1,500	1	1,390	0.93	*	F	800	0.53	22.1
	EB Off Direct	1	1,500	1	350	0.23	16.8	B	670	0.45	33.5
	EB On Direct	1	1,500	1	360	0.24	Lane Add <sup>6</sup>	640	0.43	Lane Add <sup>6</sup>	
	WB Off Direct	1	1,500	1	340	0.23	29.8	D	310	0.21	21.6
Ford St	WB On Direct	1	1,500	1	970	0.65	31.2	D	380	0.25	20.0
	EB On Direct	1	1,500	1	50	0.03	13.0	B	40	0.03	21.5
	WB Off Direct	1	1,500	1	50	0.03	28.5	D	50	0.03	20.5
											C

## Notes:

- Capacity and peak hour traffic volumes are shown in vehicles per hour (vph). On-ramp traffic volumes are assumed to be unmetered volumes. LOS - Level of Service; v/c - Volume-to-Capacity
- Peak hour capacities for freeway ramps are 1,500 vph for each freeway ramp lane.
- LOS is F under either two conditions: (1) if the total flow of the merge/diverge area exceeds the capacity of the freeway section, denoted with an asterisk (\*) in the density column; (2) if the measured freeway speed is less than 53 mph (freeway LOS F), denoted with double asterisks (\*\*\*) in the density column.
- Density is shown in passenger cars/mile/lane (pc/mi/in). The density LOS criteria for merge and diverge sections are per HCM 2000.
- Weaving Segment : Based on the lane configuration, ramp junction analysis is not applicable for this location. See [Table 2.3.1](#).
- Lane Add : Analysis for a single-lane addition is a basic freeway segment analysis for the segment downstream of the lane addition with an additional lane. See [Table 2.3.1](#).
- Lane Drop : Analysis for a single-lane drop is basic freeway segment analysis for the segments upstream and downstream of the lane drop. See [Table 2.3.1](#).
- Major Diverge : A major diverge exists when a two-lane off-ramp results in a lane drop. Density and LOS are calculated using the HCM 2000 Major Diverge Area analysis.
- Number of lanes on the ramp at the gore point (off-ramp) or 6-foot point (on-ramp).

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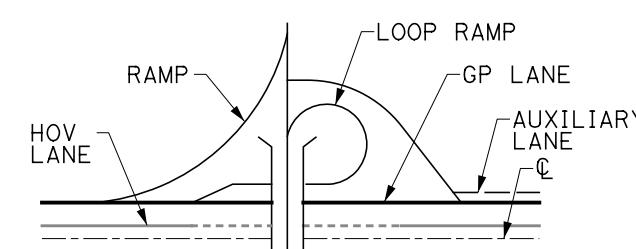
AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES

AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

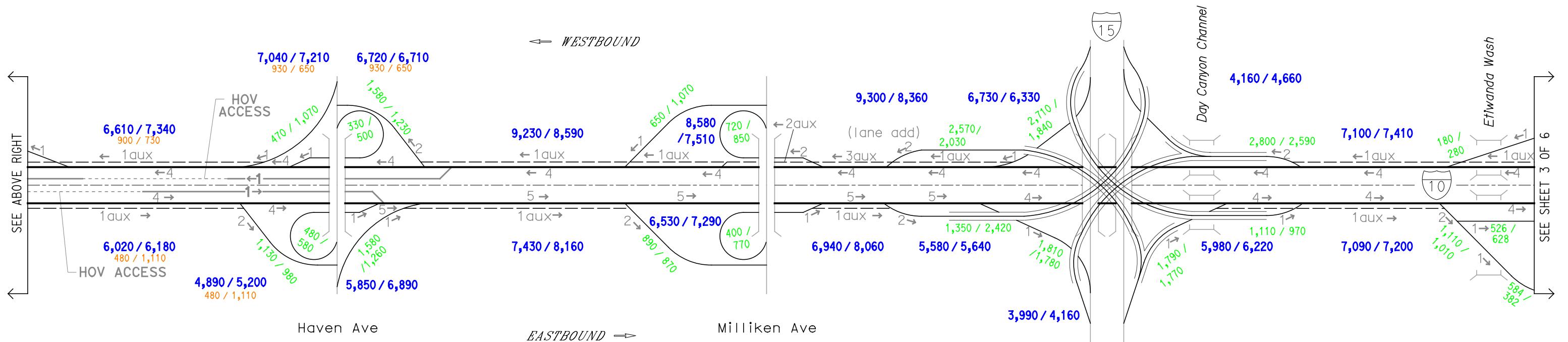
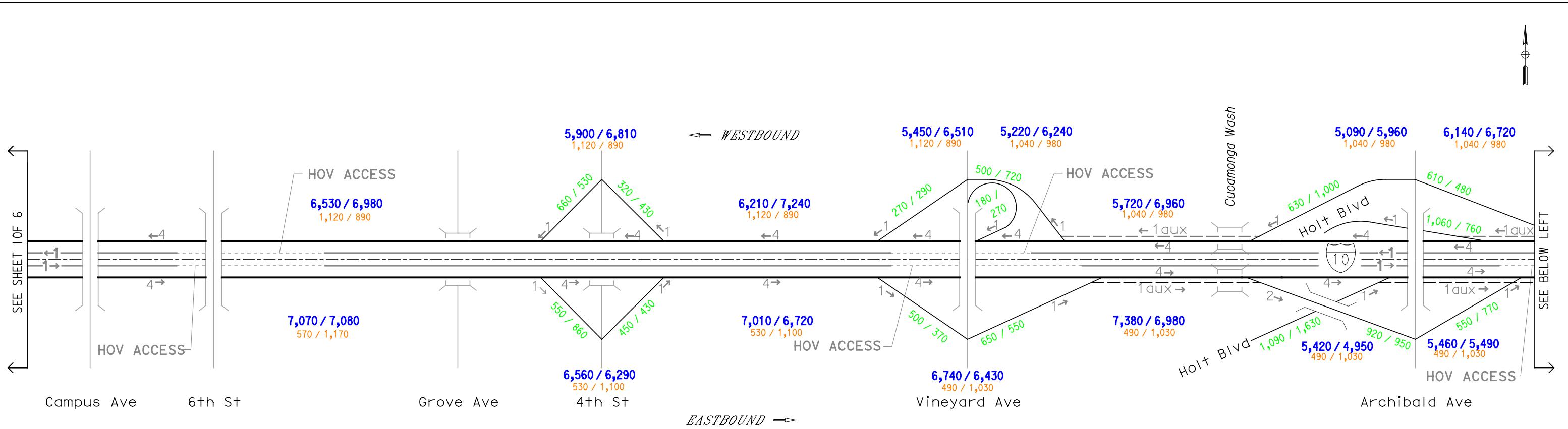
AM / PM - HIGH OCCUPANT VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES

↔1 - # OF GP, RAMP OR HOV LANES

↔1aux - # OF AUXILIARY LANES



**FIGURE 2.3.1**  
I-10 CORRIDOR STUDY PA/ED  
EXISTING (YEAR 2012) CONDITIONS  
FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
SHEET 1 OF 6



#### LEGEND

AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES

AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

AM / PM - HIGH OCCUPANT VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES

↔ 1 - # OF GP, RAMP OR HOV LANES

↔ 1aux - # OF AUXILIARY LANES

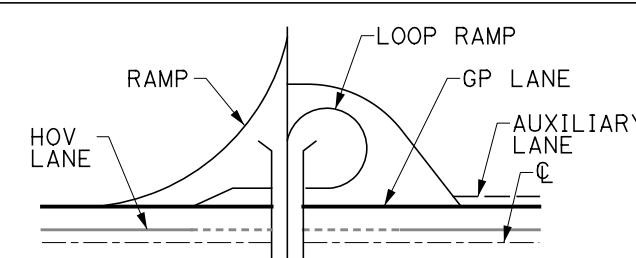
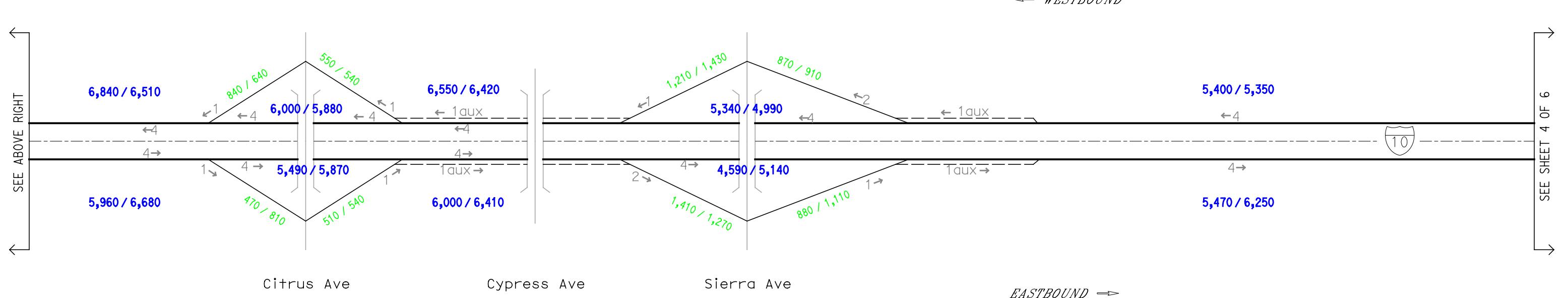
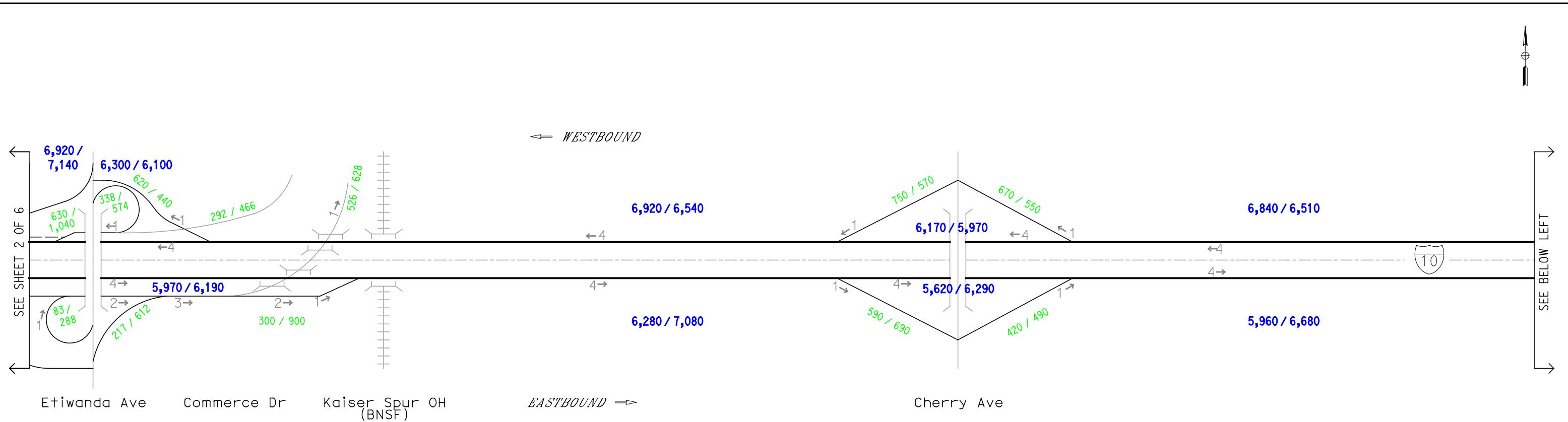


FIGURE 2.3.1  
I-10 CORRIDOR STUDY PA/ED  
EXISTING (YEAR 2012) CONDITIONS  
FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
SHEET 2 OF 6



## **LEGEND**

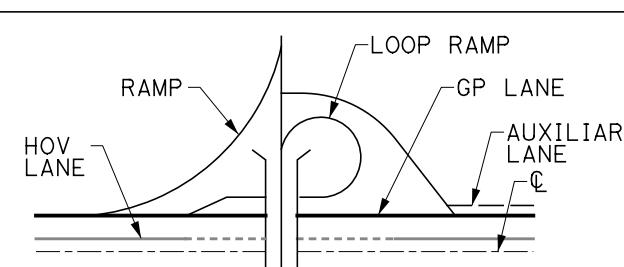
AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES

#### **AM / PM – RAMP PEAK HOUR TRAFFIC VOLUMES**

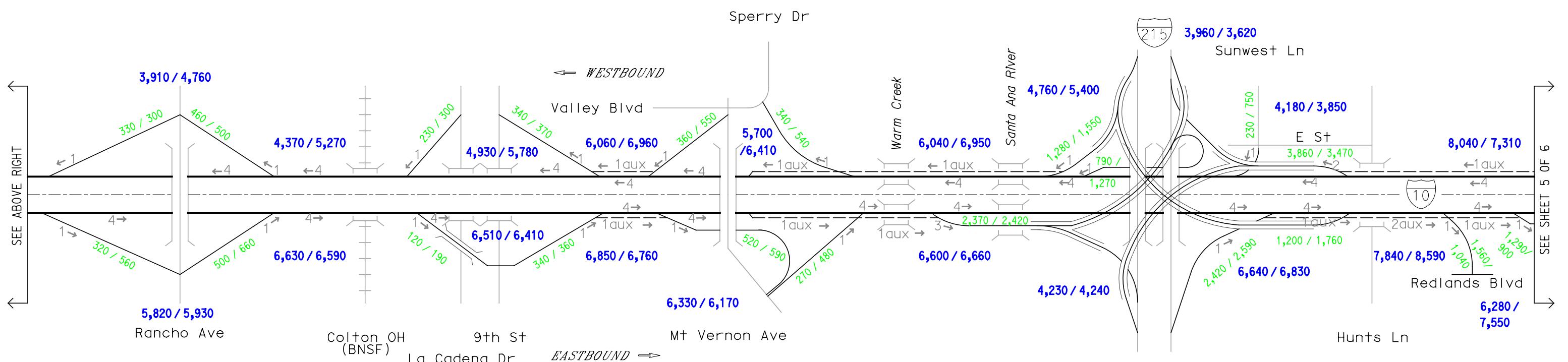
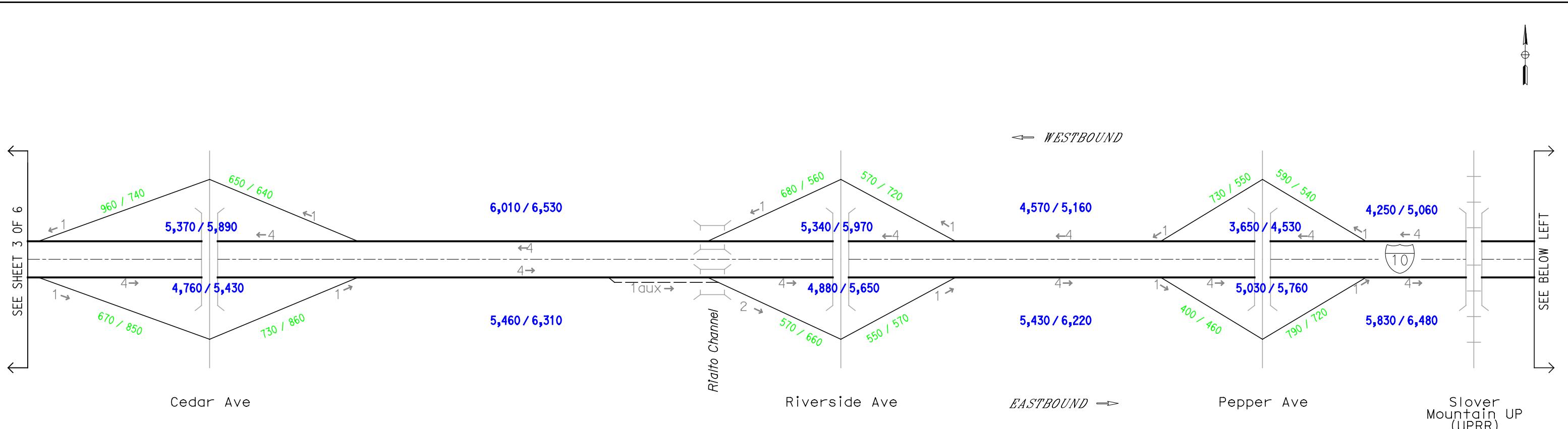
#### **AM / PM - HIGH OCCUPANT VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES**

←1 - # OF GP, RAMP OR HOV LANES

← 1AUX - # OF AUXILIARY LANES



**FIGURE 2.3.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**EXISTING (YEAR 2012) CONDITIONS**  
**FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION**  
**SHEET 3 OF 6**



#### LEGEND

AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES

AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

AM / PM - HIGH OCCUPANT VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES

←1 - # OF GP, RAMP OR HOV LANES

←1aux - # OF AUXILIARY LANES

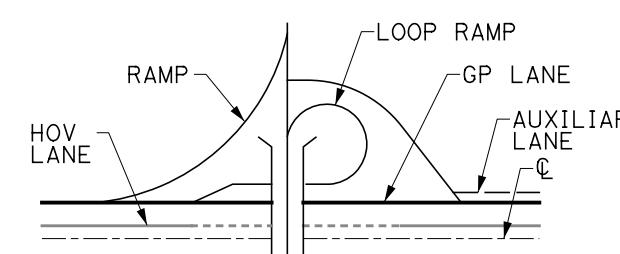
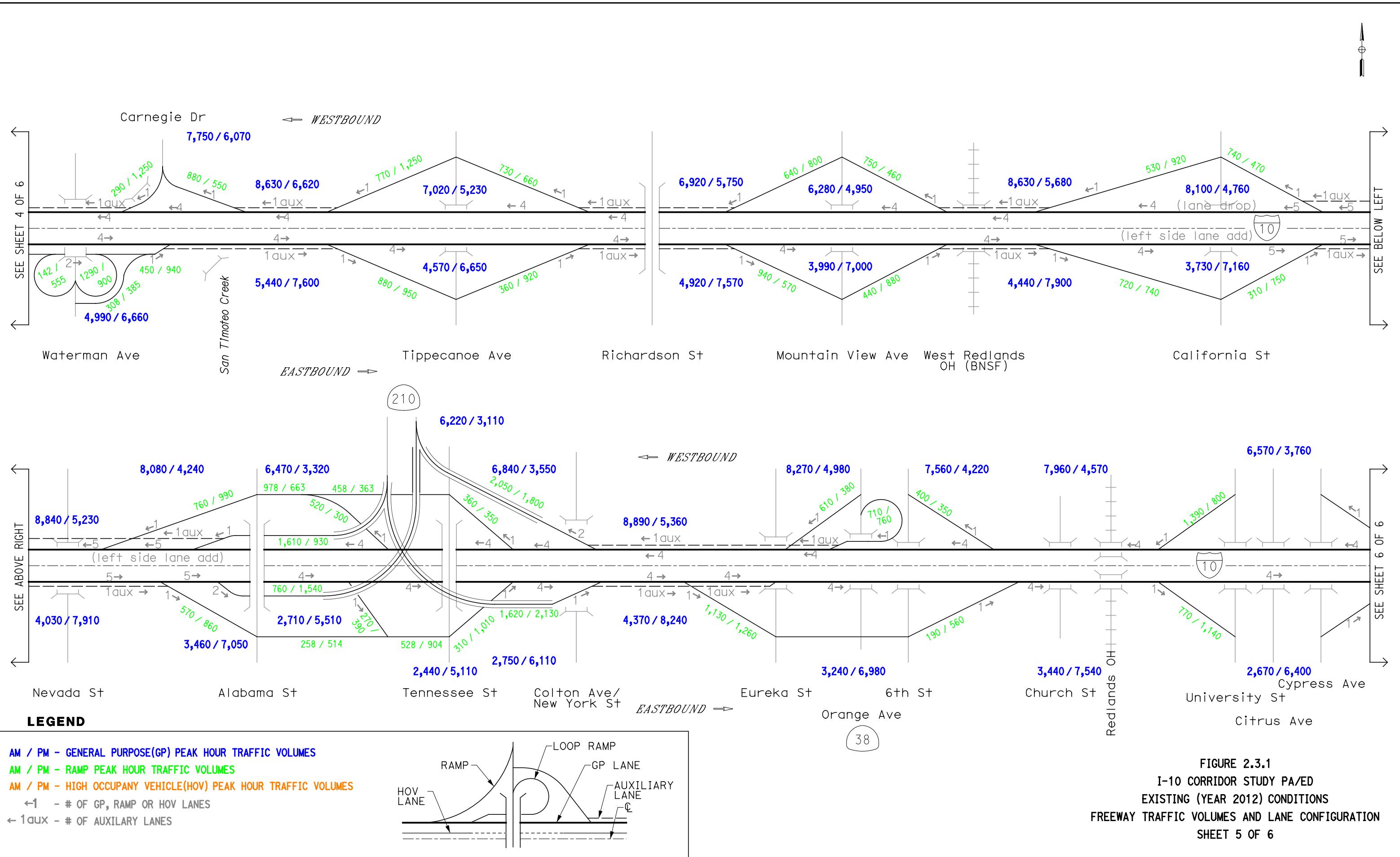
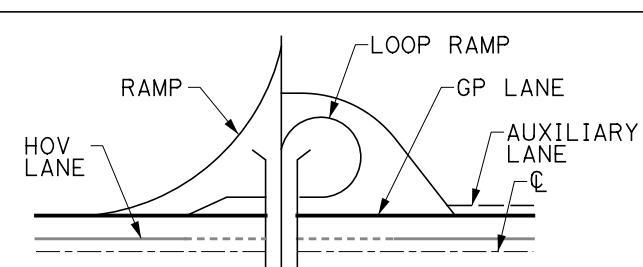
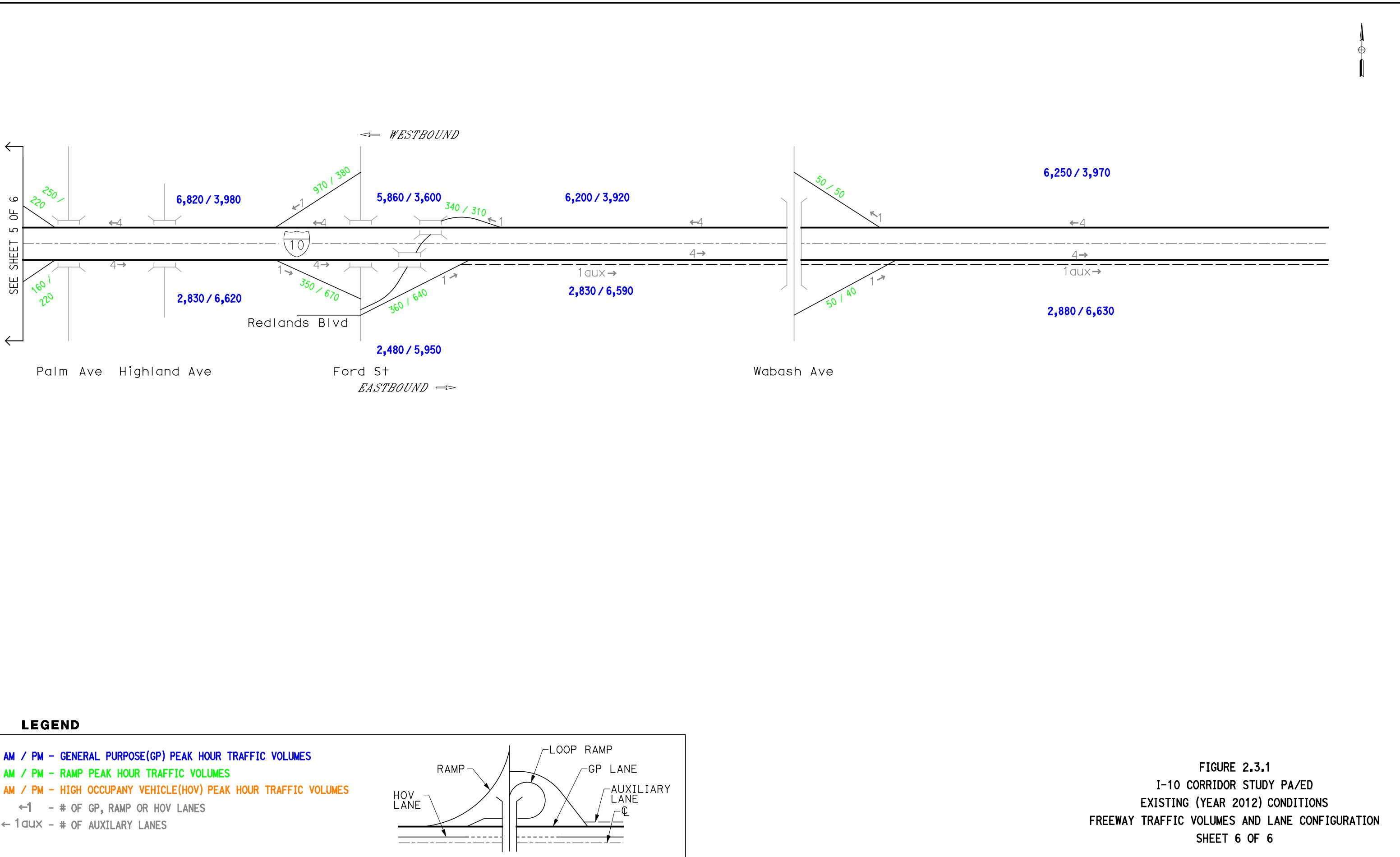


FIGURE 2.3.1  
I-10 CORRIDOR STUDY PA/ED  
EXISTING (YEAR 2012) CONDITIONS  
FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
SHEET 4 OF 6



**FIGURE 2.3.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**EXISTING (YEAR 2012) CONDITIONS**  
**FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION**  
**SHEET 5 OF 6**



## 2.4 Alternative 1: No Build Conditions Analysis

This section of the report provides an analysis of the mainline freeway, for the GP and HOV lanes as well as the freeway ramp junction locations for Alternative 1 (No Build) conditions using projected Opening Year (2025) and Design Year (2045) traffic volumes. The HCS freeway LOS analysis worksheets for Alternative 1 (No Build) conditions for Opening Year (2025) and Design Year (2045) are provided in [Appendix C-1](#) and [Appendix C-2](#), respectively.

Alternative 1, the No Build Alternative assumes that the I-10 corridor will not be widened from the LA/SB County line to Ford Street. However, ramp junction and auxiliary lane improvements associated with other improvement projects planned by SANBAG, Caltrans and local agencies are assumed to be completed as discussed in [Section 1.4.1](#). The following are the ramp junction and auxiliary lane improvements associated with other planned improvement projects that are assumed to be completed by year 2025 included in Alternative 1:

### I-10/Grove Avenue Interchange Project

- Removal of 4<sup>th</sup> Street interchange
- Construction of Grove Avenue interchange (diamond interchange assumed)

### I-10/Cherry Avenue Interchange Project

- Construction of westbound loop on-ramp from Cherry Avenue
- Construction of a 3,300 feet westbound auxiliary lane from the Cherry Avenue loop on-ramp
- Modification of eastbound off-ramp to 2-lanes
- Modification of westbound off-ramp to 2-lanes

### I-10/Beech Avenue Interchange Project

- Construction of Beech Avenue interchange (diamond interchange assumed)

### I-10/Citrus Avenue Interchange Project

- Construction of westbound loop on-ramp from Citrus Avenue

### I-10/Cedar Avenue Interchange Project

- Modification of eastbound off-ramp to 2-lanes

### I-10/Tippecanoe Avenue Interchange Project

- Construction of westbound loop on-ramp from Tippecanoe Avenue
- Modification of eastbound off-ramp to 2-lanes

### I-10 Eastbound Lane Shift from California Street to SR-210

- Shifting of eastbound median lane add to a right-side auxiliary lane add within the body of the California Street interchange

### I-10 Auxiliary Lane Project from Etiwanda Avenue to Riverside Avenue

- Construction of a eastbound auxiliary lane from Etiwanda Avenue to Cherry Avenue
- Construction of westbound auxiliary lane from Beech Avenue to Cherry Avenue
- Construction of eastbound auxiliary lane from Beech Avenue to Citrus Avenue
- Construction of a 450 feet eastbound auxiliary lane to the Cedar Avenue off-ramp
- Construction of westbound auxiliary lane from Riverside Avenue to Cedar Avenue

In addition, by year 2045 a new interchange at Alder Avenue and an HOV lane in each direction with continuous access from Ford Street to the San Bernardino/Riverside County line are assumed to be constructed.

Year 2025 and 2045 Alternative 1 (No Build) lane configurations and morning and evening peak hour traffic volumes for the I-10 mainline and all interchange ramps within the project limits are illustrated on **Figure 2.4.1** and **Figure 2.4.2**. A detailed discussion of the methodology to develop future conditions freeway traffic volumes is presented in **Section 2.2.2** of this report.

Alternative 1 ADT in 2025 is forecast to range from 288,000 in the western portion of the corridor to 191,000 in the eastern portion of the corridor and from 313,000 to 241,000 in 2045. Weekday daily VMT on I-10 within the study area is forecast to be 8.2 million vehicle miles in 2025 and 9.7 million vehicle miles in 2045 under Alternative 1. ADT and VMT data for Alternative 1 in 2025 and 2045 are presented in **Table 2.4.1**.

Segment	Alternative 1 Condition I-10 Freeway Mainline Average Daily Traffic (ADT) and Vehicle Miles Travelled (VMT)			
	2025		2045	
	ADT	Daily VMT	ADT	Daily VMT
LA County Line to I-15	288,000	2,736,000	313,000	3,067,000
I-15 to I-215	219,000	3,067,000	254,000	3,779,000
I-215 to SR-210	221,000	1,246,000	257,000	1,524,000
SR-210 to Ford Street	191,000	1,146,000	241,000	1,376,000
<b>Total</b>	-	8,196,000	-	9,746,000

Source: SBTAM raw and post-processed data

## 2.4.1 Year 2025 Freeway Mainline Segment Analysis and Levels of Service

HCM 2000 basic freeway segment analysis was conducted for all I-10 segments except that, based on the segment and ramp lane configuration under year 2025 Alternative 1 (No Build) conditions, the HCM 2000 weaving analysis method is applied to two additional segments compared to existing (2012) conditions:

- I-10 eastbound segment between Beech Avenue On-Ramp and Citrus Avenue Off-Ramp
- I-10 westbound segment between Beech Avenue On-Ramp and Cherry Off-Ramp

As discussed in **Section 2.1.2** and noted in **Table 2.4.2**, some weaving segments are categorized as a complex weaving segment. The analysis conducted for the complex weaving segments consists of two weaving analyses.

**Table 2.4.2** presents the LOS of each freeway segment. Under year 2025 Alternative 1 (No Build) conditions the majority of the GP lane segments are expected to operate at LOS F during the morning or the evening peak hours in both directions. In the eastbound direction, the majority of the LOS F condition segments are located between the I-15 and SR-210 interchanges. In the westbound direction, LOS F conditions are expected throughout the I-10 corridor within the project study limits during either the morning or evening peak hour except for the segment within the Cedar Avenue interchange. As shown in the table, the GP lane segments are operating at LOS F due to the traffic demand volume exceeding capacity.

In the eastbound direction, the following GP lane segments are expected to operate at LOS F during the morning and/or evening peak hours in 2025:

- Between Mountain Avenue On-Ramp and Euclid Avenue Off-Ramp
- Between Haven Avenue Direct On-Ramp and Milliken Avenue Off-Ramp
- Between Milliken Avenue Loop On-Ramp and NB I-5 Off-Ramp
- Between NB/SB I-15 On-Ramp and Etiwanda Avenue Off-Ramp
- Between Cherry Avenue Off-Ramp and Cherry Avenue On-Ramp
- Between Cherry Avenue On-Ramp and Beech Avenue Off-Ramp
- Between Beech Avenue On-Ramp and Citrus Avenue Off-Ramp
- Between Citrus Avenue On-Ramp and Sierra Avenue Off-Ramp
- Between Sierra Avenue On-Ramp and Cedar Avenue Off-Ramp
- Between Cedar Avenue On-ramp and Riverside Avenue Off-Ramp
- Between Riverside Avenue On-Ramp and Pepper Avenue Off-Ramp
- Between Pepper Avenue On-Ramp and Rancho Avenue Off-Ramp
- Between Rancho Avenue On-Ramp and 9<sup>th</sup> Street Off-Ramp
- Between 9<sup>th</sup> Street On-Ramp and Mt Vernon Avenue Off-Ramp
- Between Mt Vernon Avenue On-Ramp and NB/SB I-215 Off-Ramp
- Between NB I-215 On-Ramp and SB I-215 On-Ramp
- Between SB I-215 On-Ramp and Redlands Boulevard Off-Ramp
- Between Redlands Boulevard Off-Ramp and Waterman Avenue Off-Ramp
- Between Waterman Avenue Off-Ramp and Waterman Avenue On-Ramp
- Between Waterman Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Mountain View Avenue Off-Ramp
- Between Mountain View Avenue On-Ramp and California Street Off-Ramp
- Between California Street On-Ramp and Alabama Street Off-Ramp
- Between SB SR-210 On-Ramp and Eureka Street Off-Ramp
- Between 6<sup>th</sup> Street On-Ramp and University Street Off-Ramp
- Between Cypress Avenue On-Ramp and Ford Street Off-Ramp

Similarly, LOS F conditions are expected on the following westbound GP lane segments:

- Between Yucaipa Blvd On-Ramp and Wabash Avenue Off-Ramp
- Between Wabash Avenue Off-Ramp and Ford Street Off-Ramp
- Between Ford Street On-Ramp and Cypress Avenue Off-Ramp
- Between University Street On-Ramp and 6<sup>th</sup> Street Off-Ramp
- Between Orange Avenue Direct/Loop On-Ramp and NB SR-210 Off-Ramp
- Between SB SR-210/Alabama Street On-Ramp and California Street Off-Ramp
- Between California Street On-Ramp and Mountain View Avenue Off-Ramp
- Between Mountain View Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Carnegie Drive/Waterman Avenue Off-Ramp
- Between Carnegie Drive/Waterman Avenue On-Ramp and NB/SB I-215 Off-Ramp
- Between SB I-215 On-Ramp and Sperry Drive Off-Ramp
- Between Mt Vernon Avenue On-Ramp and 9<sup>th</sup> Street Off-Ramp
- Between La Cadena Drive On-Ramp and Rancho Avenue Off-Ramp
- Between Rancho Avenue On-Ramp and Pepper Avenue Off-Ramp

- Between Pepper Avenue On-Ramp and Riverside Avenue Off-Ramp
- Between Cedar Avenue On-Ramp and Sierra Avenue Off-Ramp
- Between Sierra Avenue On-Ramp and Citrus Avenue Off-Ramp
- Between Citrus Avenue On-Ramp and Beech Avenue Off-Ramp
- Between Beech Avenue On-Ramp and Cherry Avenue Off-Ramp
- Between Cherry Avenue On-Ramp and Etiwanda Avenue Off-Ramp
- Between Etiwanda Avenue Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp
- Between SB I-15 On-Ramp and NB I-15 On-Ramp
- Between NB I-15 On-Ramp and Milliken Avenue Off-Ramp
- Between Milliken Avenue On-Ramp and Haven Avenue Off-Ramp
- Between Haven Avenue Direct On-Ramp and Archibald Avenue Off-Ramp
- Between Archibald Avenue Off-Ramp and Holt Boulevard Off-Ramp
- Between Holt Boulevard Off-Ramp and Archibald Avenue On-Ramp
- Between Archibald Avenue On-Ramp and Vineyard Avenue Off-Ramp
- Between Vineyard Avenue Direct On-Ramp and Grove Avenue Off-Ramp
- Between Grove Avenue On-Ramp and 7<sup>th</sup> Street Off-Ramp
- Between Euclid Avenue Direct On-Ramp and Mountain Avenue Off-Ramp
- Between Mountain Avenue On-Ramp and Central Avenue Off-Ramp
- Between Central Avenue On-Ramp and Monte Vista Avenue Off-Ramp
- Between Monte Vista Avenue On-Ramp and Indian Hill Boulevard Off-Ramp
- Between Indian Hill Boulevard On-Ramp and Towne Avenue Off-Ramp
- Between Towne Avenue On-Ramp and Orange Grove Avenue Off-Ramp
- Between Orange Grove Avenue Off-Ramp and Garey Avenue On-Ramp
- Between Garey Avenue On-Ramp and White Avenue On-Ramp
- Between White Avenue On-Ramp and Dudley Street Off-Ramp

As shown in **Table 2.4.2**, under year 2025 Alternative 1 (No Build) conditions all HOV lane segments along I-10 within the project study area are expected to operate at LOS E or better during the morning peak hour in both directions. During the evening peak hour, the eastbound HOV lane segments are expected to operate at LOS E or better, except for the segment between the Archibald Avenue on-ramp and the Haven Avenue off-ramp. In the westbound direction during the evening peak hour, the HOV lane segments are expected to operate at LOS E or better during the evening peak hour except for the following segments:

- Between Haven Avenue Direct On-Ramp and Archibald Avenue Off-Ramp
- Between Archibald Avenue Off-Ramp and Holt Boulevard Off-Ramp
- Between Holt Boulevard Off-Ramp and Archibald Avenue On-Ramp
- Between Archibald Avenue On-Ramp and Vineyard Avenue Off-Ramp
- Between Vineyard Avenue Direct On-Ramp and Grove Avenue Off-Ramp
- Between Grove Avenue On-Ramp and 7<sup>th</sup> Street Off-Ramp
- Between Euclid Avenue Direct On-Ramp and Mountain Avenue Off-Ramp
- Between Mountain Avenue On-Ramp and Central Avenue Off-Ramp
- Between Central Avenue On-Ramp and Monte Vista Avenue Off-Ramp
- Between Monte Vista Avenue On-Ramp and Indian Hill Boulevard Off-Ramp

## 2.4.2 Year 2025 Ramps and Ramp-Freeway Junction Analysis and Levels of Service

The density and LOS for each of the ramps along I-10 within the study area is based on the forecasted year 2025 Alternative 1 (No Build) traffic volumes. **Table 2.4.3** provides a summary of the findings from the analyses. The v/c ratio for each of the freeway ramps is also presented. It should be noted that when the GP lane segment is LOS F, the ramp junction also operates at LOS F, regardless of the flow rate entering the ramp influence area.

As discussed in **Section 2.1.3**, on- or off-ramps associated with lane addition and/or lane drops are not analyzed as a typical ramp junction (using the merge and diverge method). The operations of these special ramp conditions are based on the operation of the segment upstream and/or downstream of the ramp. Depending on the lane configuration, the basic freeway segment or the weave method is used to determine the operation of the segment. The special ramp conditions are indicated with “Lane Add”, “Lane Drop” or “Weaving Segment” in **Table 2.4.3**. The operations of the segments are summarized in **Table 2.4.2**. For major diverge locations, when a two-lane off-ramp results in a lane drop, the density and LOS are determined based on the HCM major diverge method described in **Section 2.1.3**.

Under year 2025 Alternative 1-No Build conditions, the ramp junction peak hour LOS varies from B to E, except that the following ramp junction locations operate at LOS F during either the morning or evening peak hour:

- White Avenue WB Direct On-Ramp
- Garey Avenue WB Direct On-Ramp
- Towne Avenue WB Direct Off-Ramp
- Indian Hill Boulevard WB Direct Off-Ramp
- Indian Hill Boulevard WB Direct On-Ramp
- Monte Vista Avenue WB Direct On-Ramp
- Central Avenue WB Direct Off-Ramp
- Mountain Avenue EB Direct On-Ramp
- Mountain Avenue WB Direct Off-Ramp
- Mountain Avenue WB Direct On-Ramp
- Euclid Avenue EB Direct Off-Ramp
- Euclid Avenue WB Direct Off-Ramp to 7<sup>th</sup> Street
- Euclid Avenue WB Loop On-Ramp
- Euclid Avenue WB Direct On-Ramp
- Grove Avenue WB Direct Off-Ramp
- Grove Avenue WB Direct On-Ramp
- Vineyard Avenue WB Loop On-Ramp
- Vineyard Avenue WB Direct On-Ramp
- Archibald Avenue WB Direct Off-Ramp
- Haven Avenue EB Loop On-Ramp
- Haven Avenue WB Direct Off-Ramp
- Haven Avenue WB Loop On-Ramp
- Milliken Avenue EB Direct Off-Ramp
- Milliken Avenue WB Direct On-Ramp
- Etiwanda Avenue WB Direct Off-Ramp
- Cherry Avenue EB Direct On-Ramp

- Cherry Avenue WB Direct On-Ramp
- Beech Avenue EB Direct Off-Ramp
- Beech Avenue WB Direct Off-Ramp
- Citrus Avenue WB Loop On-Ramp
- Citrus Avenue WB Direct On-Ramp
- Sierra Avenue EB Direct Off-Ramp
- Sierra Avenue EB Direct On-Ramp
- Sierra Avenue WB Direct Off-Ramp
- Cedar Avenue EB Direct Off-Ramp
- Cedar Avenue EB Direct On-Ramp
- Cedar Avenue WB Direct On-Ramp
- Riverside Avenue EB Direct Off-Ramp
- Riverside Avenue EB Direct On-Ramp
- Riverside Avenue WB Direct Off-Ramp
- Pepper Avenue EB Direct Off-Ramp
- Pepper Avenue EB Direct On-Ramp
- Pepper Avenue WB Direct Off-Ramp
- Pepper Avenue WB Direct On-Ramp
- Rancho Avenue EB Direct Off-Ramp
- Rancho Avenue EB Direct On-Ramp
- Rancho Avenue WB Direct Off-Ramp
- La Cadena Drive/9<sup>th</sup> Street EB Direct Off-Ramp
- La Cadena Drive/9<sup>th</sup> Street WB Direct On-Ramp
- Tippecanoe Avenue WB Loop On-Ramp
- Alabama Street WB Direct Off-Ramp
- SR-210 EB Direct Off-Ramp
- Tennessee Street EB Direct On-Ramp
- Tennessee Street WB Direct Off-Ramp
- Eureka Street/Orange Street/6<sup>th</sup> Street EB Direct On-Ramp
- Eureka Street/Orange Street/6<sup>th</sup> Street WB Direct Off-Ramp
- University Street/Cypress Avenue EB Direct Off-Ramp
- University Street/Cypress Avenue EB Direct On-Ramp
- University Street/Cypress Avenue WB Direct Off-Ramp
- University Street/Cypress Avenue WB Direct On-Ramp
- Ford Street EB Direct Off-Ramp
- Ford Street WB Direct Off-Ramp
- Ford Street WB Direct On-Ramp
- Wabash Avenue WB Off-Ramp

The majority of the ramp junction locations listed above are expected to operate at LOS F due to the LOS F condition expected for the GP lane segments upstream of the ramp. As shown in **Table 2.4.2**, the traffic demand volumes for the majority of the GP lane segments are expected to exceed the capacity of the segment resulting in a LOS F condition.

### 2.4.3 Year 2045 Freeway Mainline Segment Analysis and Levels of Service

HCM 2000 basic freeway segment analysis was conducted for all I-10 segments except that, based on the segment and ramp lane configuration under year 2045 Alternative 1 (No Build) conditions, the HCM 2000 weaving analysis method is applied to the same segments indicated in year 2025 Alternative 1 (No Build) condition. As discussed in **Section 2.1.2** and noted in **Table 2.4.4**, some weaving segments are categorized as a complex weaving segment. The analysis conducted for the complex weaving segments consists of two weaving analyses.

**Table 2.4.4** presents the LOS of each freeway segment. Under year 2045 Alternative 1 (No Build) conditions the majority of the GP lane segments are expected to operate at LOS F during the morning or the evening peak hours in both directions. In the eastbound direction, the majority of the LOS F condition segments are located east of the Indian Hill Boulevard interchange. In the westbound direction, LOS F conditions are expected throughout the I-10 corridor within the project study limits. As shown in the table, the GP lane segments are operating at LOS F due to the traffic demand volume exceeding capacity.

In the eastbound direction, the following additional GP lane segments are expected to operate at LOS F during the morning and/or evening peak hours in comparison to the year 2025 Alternative 1 (No Build) condition:

- Between Dudley Street On-Ramp and White Avenue Off-Ramp
- Between Orange Grove Avenue On-Ramp and Towne Avenue Off-Ramp
- Between Towne Avenue On-Ramp and Indian Hill Boulevard Off-Ramp
- Between Indian Hill Boulevard On-Ramp and Monte Vista Avenue Off-Ramp
- Between Monte Vista Avenue On-Ramp and Central Avenue Off-Ramp
- Between Euclid Avenue On-Ramp and Grove Avenue Off-Ramp
- Between Grove Avenue On-Ramp and Vineyard Avenue Off-Ramp
- Between Vineyard Avenue On-Ramp and Archibald Avenue Off-Ramp
- Between Holt Boulevard On-Ramp and Archibald Avenue On-Ramp
- Between Archibald Avenue On-Ramp to Haven Avenue Off-Ramp
- Between Etiwanda Avenue On-Ramp and Cherry Avenue Off-Ramp
- Between Citrus Avenue On-Ramp and Sierra Avenue Off-Ramp
- Between Sierra Avenue On-Ramp and Alder Avenue Off-Ramp
- Between Alder Avenue On-Ramp and Cedar Avenue Off-Ramp
- Between Alabama Street Off-Ramp and NB SR-210 Off-Ramp
- Between NB SR-210 Off-Ramp and Tennessee Street Off-Ramp

In the westbound direction, the following additional GP lane segments are expected to operate at LOS F during the morning and/or evening peak hours in comparison to the year 2025 Alternative 1 (No Build) condition:

- Between Riverside Avenue On-Ramp and Cedar Avenue Off-Ramp
- Between Cedar Avenue Off-Ramp and Cedar Avenue On-Ramp
- Between Cedar Avenue On-Ramp and Alder Avenue Off-Ramp
- Between Alder Avenue On-Ramp and Sierra Avenue Off-Ramp
- Between Citrus Avenue Off-Ramp and Citrus Avenue Loop On-Ramp

- Between Cherry Avenue Loop On-Ramp and Cherry Avenue On-Ramp

As shown in **Table 2.4.4**, under year 2045 Alternative 1 (No Build) conditions the eastbound HOV lane segments along I-10 within the project study area are expected to operate at LOS E or better during the morning and evening peak hour except for the segment between the Archibald Avenue on-ramp and the Haven Avenue off-ramp. In the westbound direction, the majority of HOV lane segments are expected to operate at LOS F during the morning and/or evening peak hour. The following are the additional westbound HOV lane segments expected to operate at LOS F in comparison to the year 2025 Alternative 1 (No Build) condition:

- Between Indian Hill Boulevard On-Ramp and Towne Avenue Off-Ramp
- Between Garey Avenue On-Ramp and White Avenue On-Ramp
- Between White Avenue On-Ramp and Dudley Street Off-Ramp

#### **2.4.4 Year 2045 Ramps and Ramp-Freeway Junction Analysis and Levels of Service**

The density and LOS for each of the ramps along I-10 within the study area is based on the forecasted year 2045 Alternative 1 (No Build) traffic volumes. **Table 2.4.5** provides a summary of the findings from the analyses. The v/c ratio for each of the freeway ramps is also presented. It should be noted that when the GP lane segment is LOS F, the ramp junction also operates at LOS F, regardless of the flow rate entering the ramp influence area.

As discussed in **Section 2.1.3**, on- or off-ramps associated with lane addition and/or lane drops are not analyzed as a typical ramp junction (using the merge and diverge method). The operations of these special ramp conditions are based on the operation of the segment upstream and/or downstream of the ramp. Depending on the lane configuration, the basic freeway segment or the weave methods are used to determine the operation of the segment. The special ramp conditions are indicated with “Lane Add”, “Lane Drop” or “Weaving Segment” in **Table 2.4.5**. The operations of the segments are summarized in **Table 2.4.4**. For major diverge locations, when a two-lane off-ramp results in a lane drop, the density and LOS are determined based on the HCM major diverge method described in **Section 2.1.3**.

Under year 2045 Alternative 1-No Build conditions, the ramp junction peak hour LOS varies from B to E, except that the following additional ramp junction locations operate at LOS F in comparison to the year 2025 Alternative 1 (No Build) condition:

- White Avenue EB Direct Off-Ramp
- Towne Avenue EB Direct On-Ramp
- Indian Hill Boulevard EB Direct Off-Ramp
- Indian Hill Boulevard EB Direct On-Ramp
- Monte Vista Avenue EB Direct Off-Ramp
- Euclid Avenue EB Direct On-Ramp
- Grove Avenue EB Direct Off-Ramp
- Grove Avenue EB Direct On-Ramp
- Vineyard Avenue EB Direct Off-Ramp
- Archibald Avenue EB Direct On-Ramp
- Haven Avenue EB Direct Off-Ramp
- Cherry Avenue EB Direct Off-Ramp

- Sierra Avenue EB Direct Off-Ramp
- Alder Avenue EB Direct Off-Ramp
- Alder Avenue EB Direct On-Ramp
- Alder Avenue WB Direct Off-Ramp
- Alder Avenue WB Direct On-Ramp
- Tennessee Street EB Direct Off-Ramp
- Wabash Avenue WB On-Ramp

The majority of the ramp junction locations listed above operate at LOS F due to the LOS F condition for the GP lane segments upstream of the ramp. As shown in **Table 2.4.4**, the majority of the GP lane segments are expected to operate at LOS F due to traffic demand volume exceeding capacity.

#### **2.4.5 Average Peak Hour Speed, Vehicle Hours of Delay and Cost of Delay**

Based on SBTAM forecast data for Alternative 1 and depending upon time of day and direction of travel, average speeds on I-10 during peak hours for a trip between the LA County line and the Ford Street interchange (a distance of approximately 33 miles) are anticipated to range from 32 to 52 mph in the GP lanes in 2025 and 21 to 29 mph in 2045. Average travel speeds in the HOV lanes west of Haven Avenue during peak hours are anticipated to range from 13 to 65 mph in 2025 and from 10 to 56 mph in 2045. **Table 2.4.6** provides a summary of the average travel speeds anticipated along the I-10 corridor under Alternative 1 in 2025 and 2045.

<b>Table 2.4.6</b> Alternative 1 Condition I-10 Freeway Mainline Average Peak Hour Speeds between the LA/SB County Line and Ford Street				
Direction and Lane Type	2025		2045	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Eastbound GP Lanes	52	33	29	21
Westbound GP Lanes	32	38	21	24
Eastbound HOV Lane*	65	52	57	44
Westbound HOV Lane*	53	13	45	10

Source: SBTAM post-processed data

\*HOV lanes exist only west of Haven Avenue

**Table 2.4.7** shows that approximately 22,000 vehicle hours of delay are anticipated on I-10 within the study area on a typical weekday in 2025 under Alternative 1 and approximately 32,000 vehicle hours of delay in 2045. On an annual basis approximately 5.4 million vehicle hours of delay are anticipated in year 2025 and 8.0 million vehicle hours in 2045. The annual cost of those hours of delay in 2025 is estimated at \$85 million and \$125 million in 2045.

<b>Table 2.4.7</b> <b>Alternative 1 Condition I-10 Freeway Mainline</b> <b>Vehicle Hours of Delay and Cost of Delay</b>		
	<b>2025</b>	<b>2045</b>
Daily Vehicle Hours of Delay on Weekdays <sup>1</sup>	21,705	31,871
Annual Vehicle Hours of Delay on Weekdays <sup>2</sup>	5,426,194	7,967,850
Annual Costs of Delay <sup>3</sup>	\$85,000,000	\$125,000,000

1. Source: SBTAM.

2. Based on 250 weekdays per year.

3. Cost based on weekday hours of delay times cost of hourly delay from Caltrans “Life-Cycle Benefit-Cost Analysis Economic Parameters 2012” (available at

[http://www.dot.ca.gov/hq/tpp/offices/eab/benefit\\_cost/LCBCA-economic\\_parameters.html](http://www.dot.ca.gov/hq/tpp/offices/eab/benefit_cost/LCBCA-economic_parameters.html)) assuming 9% trucks, which is the corridor average.

Table 2.4.2.: Year 2025 Alternative 1 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	# of Lanes				Capacity <sup>2,3</sup>		AM Peak Hour				PM Peak Hour					
	HOH		XOH		X <sub>d/c</sub>		HOV		GP & AUX		HOV		GP & AUX			
	HO	OH	XO	XH	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>	LOS <sup>4</sup>	
EASTBOUND																
Between Dudley St On-Ramp and White Ave Off-Ramp	1	4	0	1,600	7,400	0	900	0.56	C	6,870	0.93	27.9	D	1,100	0.69	C
Between White Ave Off-Ramp and Garey Ave Off-Ramp	1	4	0	1,600	7,400	0	900	0.56	C	6,230	0.84	25.8	C	1,100	0.69	C
Between Garey Ave Off-Ramp and Orange Grove Ave On-Ramp	1	4	0	1,600	7,400	0	900	0.56	C	5,480	0.74	22.5	C	1,100	0.69	C
Between Orange Grove Ave On-Ramp and Towne Ave Off-Ramp	1	4	1	1,600	7,400	0	900	0.56	C	6,540	0.88	31.4	D	1,100	0.69	C
Between Towne Ave On-Ramp and Indian Hill Blvd Off-Ramp	1	4	0	1,600	7,400	0	860	0.54	B	6,360	0.86	26.4	D	1,060	0.66	C
Between Indian Hill Blvd On-Ramp and Monte Vista Ave Off-Ramp	1	4	0	1,600	7,400	0	690	0.43	B	6,380	0.86	26.6	D	1,310	0.82	D
Between Monte Vista Ave On-Ramp and Central Ave Off-Ramp	1	4	1	1,600	7,400	0	690	0.43	B	6,580	0.89	27.7	C	1,310	0.82	D
Between Central Ave On-Ramp and Mountain Ave Off-Ramp	1	4	1	1,600	7,400	1,000	690	0.43	B	6,740	0.80	21.7	C	1,310	0.82	D
Between Mountain Ave Off-Ramp and Mountain Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	810	0.51	B	6,070	0.82	24.6	C	1,320	0.83	D
Between Mountain Ave On-Ramp and Euclid Ave Off-Ramp	1	4	0	1,600	7,400	0	810	0.51	B	6,900	0.93	28.1	D	1,320	0.83	D
Between Euclid Ave On-Ramp and Grove Ave Off-Ramp	1	4	0	1,600	7,400	0	810	0.51	B	6,980	0.94	28.6	D	1,320	0.83	D
Between Grove Ave On-Ramp and Vineyard Ave Off-Ramp	1	4	0	1,600	7,400	0	970	0.61	C	6,810	0.92	27.7	D	1,360	0.85	D
Between Vineyard Ave On-Ramp and Archibald Ave Off-Ramp	1	4	1	1,600	7,400	0	930	0.58	C	6,980	0.94	24.9	C	1,420	0.89	D
Between Holt Blvd On-Ramp and Archibald Ave On-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	930	0.58	C	7,040	0.84	22.0	C	1,420	0.89	D
Between Archibald Ave On-Ramp and Haven Ave Off-Ramp	1	4	1	1,600	7,400	1,000	1,090	0.68	C	7,450	0.89	23.3	C	1,630	1.02	F
Between Haven Ave Direct On-Ramp and Milliken Ave Off-Ramp	0	5	1	0	9,250	1,000	--	--	--	9,240	0.90	24.1	C	--	--	--
Between Milliken Ave Loop On-Ramp and NB I-15 Off-Ramp	0	5	1	0	9,250	0	--	--	--	8,790	0.95	26.1	C	--	--	--
Between NB I-15 Off-Ramp and SB I-15 Off-Ramp <sup>7</sup>	0	5	0	0	9,250	0	--	--	--	7,380	0.80	23.8	C	--	--	--
Between SB I-15 Off-Ramp and NB I-15 On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	--	5,320	0.72	21.9	C	--	--	--
Between NB/SB I-15 On-Ramp and Etiwanda Ave Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	--	7,370	0.88	24.2	C	--	--	--
Between Etiwanda Ave On-Ramp and Cherry Ave Off-Ramp	0	4	1	0	7,400	1,850	--	--	--	8,520	1.01	*	F	--	--	--
Between Cherry Ave Off-Ramp and Cherry Ave On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	--	6,850	0.93	27.4	D	--	--	--
Between Cherry Ave On-Ramp and Beach Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	7,430	1.01	*	F	--	--	--
Between Beach Ave On-Ramp and Citrus Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	7,570	1.02	*	F	--	--	--
Between Citrus Ave On-Ramp and Sierra Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	7,650	1.03	*	F	--	--	--
Between Sierra Ave On-Ramp and Cedar Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	7,130	0.96	28.8	D	--	--	--

Table 2.4.2.: Year 2025 Alternative 1 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	# of Lanes						Capacity <sup>2,3</sup>			AM Peak Hour						PM Peak Hour					
	HOV			GP & AUX			HOV			GP & AUX			HOV			GP & AUX			HOV		
	AOH	d	X <sub>24</sub>	AOH	d	X <sub>24</sub>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>	LOS <sup>4</sup>	
Between Cedar Ave On-Ramp and Riverside Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	7,160	0.97	29.0	D	--	--	7,840	1.06	--	* F		
Between Riverside Ave On-Ramp and Pepper Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	7,290	0.99	29.7	D	--	--	7,970	1.08	--	* F		
Between Pepper Ave On-Ramp and Rancho Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	7,720	1.04	*	F	--	--	8,240	1.11	--	* F		
Between Rancho Ave On-Ramp and 9th St Off-Ramp	0	4	0	0	7,400	0	--	--	--	7,880	1.06	*	F	--	--	8,410	1.14	--	* F		
Between 9th St On-Ramp and Mt. Vernon Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	8,120	1.10	*	F	--	--	8,660	1.17	--	* F		
Between Mt. Vernon Ave On-Ramp and NB I-215 Off-Ramp	0	4	1	0	7,400	0	--	--	--	7,800	1.05	*	F	--	--	8,490	1.15	--	* F		
Between NB I-215 On-Ramp and SB I-215 On-Ramp <sup>7</sup>	0	4	1	0	7,400	0	--	--	--	7,740	1.05	*	F	--	--	8,440	1.14	--	* F		
Between SB I-215 On-Ramp and Redlands Blvd Off-Ramp	0	4	1	0	7,400	0	--	--	--	9,380	1.27	*	F	--	--	10,280	1.39	--	* F		
Between Redlands Blvd Off-Ramp and Waterman Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	7,720	1.04	*	F	--	--	9,200	1.24	--	* F		
Between Waterman Ave Off-Ramp and Waterman On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	--	6,270	0.85	25.6	C	--	--	8,250	1.11	--	* F		
Between Waterman Ave On-Ramp and Tippecanoe Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	6,740	0.91	24.4	C	--	--	9,230	1.25	--	* F		
Between Tippecanoe Ave On-Ramp and Mountain View Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	6,150	0.83	23.8	C	--	--	9,200	1.24	--	* F		
Between Mountain View Ave On-Ramp and California St Off-Ramp	0	4	1	0	7,400	0	--	--	--	5,460	0.74	22.0	C	--	--	9,700	1.31	--	* F		
Between California St On-Ramp and Alabama St Off-Ramp	0	4	2	0	7,400	1,850	--	--	--	4,900	0.53	12.9	B	--	--	9,770	1.06	--	* F		
Between Alabama St Off-Ramp and NB SR-210 Off-Ramp	0	4	1	0	7,400	1,850	--	--	--	4,180	0.45	13.2	B	--	--	8,860	0.96	28.1	D		
Between NB SR-210 Off-Ramp and Tennessee St Off-Ramp	0	4	0	0	7,400	0	--	--	--	3,210	0.43	13.0	B	--	--	6,890	0.93	27.6	D		
Between SB SR-210 On-Ramp and Eureka St Off-Ramp	0	4	1	0	7,400	1,000	--	--	--	4,850	0.58	21.7	C	--	--	9,840	1.17	--	* F		
Between 6th St On-Ramp and University St Off-Ramp	0	4	0	0	7,400	0	--	--	--	3,860	0.52	15.6	B	--	--	9,100	1.23	--	* F		
Between Cypress Ave On-Ramp and Ford St Off-Ramp	0	4	0	0	7,400	0	--	--	--	3,230	0.44	13.6	B	--	--	8,140	1.10	--	* F		
Between Ford St On-Ramp and Wabash Ave On-Ramp	0	4	1	0	7,400	1,850	--	--	--	3,130	0.34	10.3	A	--	--	8,050	0.87	27.2	D		
Between Wabash On-Ramp and Yucaipa Blvd Off-Ramp	0	4	1	0	7,400	1,850	--	--	--	3,220	0.35	10.6	A	--	--	8,160	0.88	27.6	D		
<b>WESTBOUND</b>																					
Between Yucaipa Blvd On-Ramp and Wabash Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	8,060	1.09	*	F	--	--	4,670	0.63	19.9	C		
Between Wabash Ave Off-Ramp and Ford St Off-Ramp	0	4	0	0	7,400	0	--	--	--	7,950	1.07	*	F	--	--	4,550	0.61	19.4	C		
Between Ford St On-Ramp and Cypress Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	8,530	1.15	*	F	--	--	4,770	0.64	20.4	C		
Between University St On-Ramp and 6th St Off-Ramp	0	4	0	0	7,400	0	--	--	--	9,670	1.31	*	F	--	--	5,350	0.72	21.8	C		
Between Orange Ave Direct/Loop On-Ramp and NB SR-210 Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	--	10,030	1.19	*	F	--	--	5,770	0.69	19.8	B		
Between Orange Ave Direct/Loop On-Ramp and NB SR-210 Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	--	10,660	1.27	*	F	--	--	6,160	0.73	23.0	C		

Table 2.4.2.: Year 2025 Alternative 1 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>4</sup>	# of Lanes				Capacity <sup>2,3</sup>			AM Peak Hour				PM Peak Hour								
	HOV		GP & AUX		HOV		GP & AUX		HOV		GP & AUX		PM Peak Hour							
	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>					
Between SB SR-210/Alabama St On-Ramp and California St Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	8,730	1.04	*	F	--	--	4,400	0.52	13.9	B		
Between California St On-Ramp and Mountain View Ave Off-Ramp	0	5	1	0	9,250	1,000	--	--	9,770	0.95	29.9	D	--	--	5,600	0.55	18.0	B		
Between Mountain View Ave On-Ramp and Tippecanoe Ave Off-Ramp	0	4	1	0	7,400	0	--	--	9,370	1.27	*	F	--	--	6,230	0.84	26.9	C		
Between Tippecanoe Ave On-Ramp and Carmegie Dr/Waterman Ave Off-Ramp	0	4	1	0	7,400	0	--	--	9,070	1.23	*	F	--	--	6,920	0.94	28.3	D		
Between Carnegie Dr/Waterman Ave On-Ramp and NB/SB I-215 Off-Ramp	0	4	1	0	7,400	0	--	--	9,110	1.23	*	F	--	--	7,550	1.02	*	F		
Between SB I-215 On-Ramp and Sperry Dr Off-Ramp	0	4	1	0	7,400	0	--	--	8,560	1.16	*	F	--	--	8,330	1.13	*	F		
Between Mt. Vernon Ave On-Ramp and 9th St Off-Ramp	0	4	1	0	7,400	0	--	--	7,090	0.96	25.7	C	--	--	8,330	1.13	*	F		
Between La Cadena Dr On-Ramp and Rancho Ave Off-Ramp	0	4	0	0	7,400	0	--	--	7,010	0.95	26.4	C	--	--	8,120	1.10	*	F		
Between Rancho Ave On-Ramp and Pepper Ave Off-Ramp	0	4	0	0	7,400	0	--	--	6,900	0.93	27.8	D	--	--	7,930	1.07	*	F		
Between Pepper Ave On-Ramp and Riverside Ave Off-Ramp	0	4	0	0	7,400	0	--	--	6,700	0.91	26.8	D	--	--	7,660	1.04	*	F		
Between Riverside Ave On-Ramp and Cedar Ave Off-Ramp	0	4	1	0	7,400	1,000	--	--	6,740	0.91	27.0	D	--	--	7,580	1.02	*	F		
Between Cedar Ave Off-Ramp and Cedar Ave On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	6,760	0.80	20.9	C	--	--	7,530	0.90	23.2	C		
Between Cedar Ave On-Ramp and Sierra Ave Off-Ramp	0	4	0	0	7,400	0	--	--	5,920	0.80	24.2	C	--	--	6,510	0.88	26.7	D		
Between Sierra Ave On-Ramp and Citrus Ave Off-Ramp	0	4	1	0	7,400	0	--	--	7,220	0.98	29.5	D	--	--	7,490	1.01	*	F		
Between Citrus Ave Off-Ramp and Citrus Ave On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	7,510	1.01	*	F	--	--	7,890	1.07	*	F		
Between Citrus Ave On-Ramp and Beech Ave Off-Ramp	0	4	0	0	7,400	0	--	--	6,940	0.94	28.0	D	--	--	7,270	0.98	29.6	D		
Between Beech Ave On-Ramp and Cherry Ave Off-Ramp	0	4	1	0	7,400	0	--	--	8,150	1.10	*	F	--	--	8,050	1.09	*	F		
Between Cherry Ave Loop On-Ramp and Cherry Ave On-Ramp <sup>7</sup>	0	4	1	0	7,400	1,000	--	--	7,880	0.94	24.5	C	--	--	7,730	0.92	23.9	C		
Between Cherry Ave On-Ramp and Etiwanda Ave Off-Ramp	0	4	0	0	7,400	0	--	--	8,630	1.17	*	F	--	--	8,100	1.09	*	F		
Between Etiwanda Ave Direct/Loop On-Ramp and NB I-15 Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	8,640	1.03	*	F	--	--	8,700	1.04	*	F		
Between NB I-15 On-Ramp and NB I-15 On-Ramp <sup>7</sup>	0	4	1	0	7,400	1,000	--	--	9,000	1.07	*	F	--	--	9,310	1.11	*	F		
Between Milliken Ave On-Ramp and Haven Ave Off-Ramp	0	4	1	0	7,400	1,850	--	--	9,220	1.00	*	F	--	--	9,180	0.99	*	F		
Between Haven Ave Direct On-Ramp and Archibald Ave Off-Ramp	1	4	1	1,600	7,400	1,000	1,470	0.92	E	9,570	1.14	*	F	2,100	1.31	F	10,000	1.19	*	F
Between Archibald Ave Off-Ramp and Holt Blvd Off-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	1,470	0.92	E	8,940	1.06	*	F	2,100	1.31	F	9,500	1.13	*	F
Between Holt Blvd Off-Ramp and Archibald Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	1,470	0.92	E	7,520	1.02	*	F	2,100	1.31	F	8,360	1.13	*	F

Table 2.4.2.: Year 2025 Alternative 1 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	# of Lanes				Capacity <sup>2,3</sup>			AM Peak Hour				PM Peak Hour								
	HOH	GP	XW	AOH	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>				
Between Archibald Ave On-Ramp and Vineyard Ave Off-Ramp	1	4	1	1,600	7,400	0	1,470	0.92	E	8,240	1.11	*	F	2,100	1.31	F	9,770	1.32	*	F
Between Vineyard Ave Direct On-Ramp and Grove Ave Off-Ramp	1	4	0	1,600	7,400	0	1,240	0.78	D	8,190	1.11	*	F	1,760	1.10	F	9,460	1.28	*	F
Between Grove Ave On-Ramp and 7th St Off-Ramp	1	4	0	1,600	7,400	0	1,240	0.78	D	8,530	1.15	*	F	1,750	1.09	F	9,390	1.27	*	F
Between Euclid Ave Direct On-Ramp and Mountain Ave Off-Ramp	1	4	0	1,600	7,400	0	1,280	0.80	D	8,710	1.18	*	F	1,820	1.14	F	9,280	1.25	*	F
Between Mountain Ave On-Ramp and Central Ave Off-Ramp	1	4	0	1,600	7,400	0	1,280	0.80	D	8,670	1.17	*	F	1,820	1.14	F	8,860	1.20	*	F
Between Central Ave On-Ramp and Monte Vista Ave Off-Ramp	1	4	1	1,600	7,400	0	1,430	0.89	D	8,490	1.15	*	F	1,710	1.07	F	8,510	1.15	*	F
Between Monte Vista Ave On-Ramp and Indian Hill Blvd Off-Ramp	1	4	0	1,600	7,400	0	1,430	0.89	D	8,550	1.16	*	F	1,710	1.07	F	8,310	1.12	*	F
Between Indian Hill Blvd On-Ramp and Towne Ave Off-Ramp	1	4	0	1,600	7,400	0	1,520	0.95	E	8,560	1.16	*	F	1,530	0.96	E	8,380	1.13	*	F
Between Towne Ave On-Ramp and Orange Grove Ave Off-Ramp	1	4	1	1,600	7,400	0	1,360	0.85	D	8,800	1.19	*	F	1,390	0.87	D	8,480	1.15	*	F
Between Orange Grove Ave Off-Ramp and Garey Ave On-Ramp	1	4	0	1,600	7,400	0	1,360	0.85	D	7,820	1.06	*	F	1,390	0.87	D	7,580	1.02	*	F
Between Garey Ave On-Ramp and White Ave On-Ramp	1	4	0	1,600	7,400	0	1,520	0.95	E	8,340	1.13	*	F	1,500	0.94	E	8,150	1.10	*	F
Between White Ave On-Ramp and Dudley St Off-Ramp	1	4	0	1,600	7,400	0	1,520	0.95	E	8,910	1.20	*	F	1,500	0.94	E	8,530	1.15	*	F

Notes:

1. The freeway segments were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis or weaving analysis method, depending on the lane configuration.

The weaving analysis method was applied to the segments highlighted in the table.

2. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).

3. Peak hour capacities for freeway lanes include:

- 1,850 vph for each General Purpose (GP) lane and 1,600 vph for a single High Occupancy Vehicle (HOV) lane.

- 1,850 vph for an auxiliary (AU) lane if the AU length exceeds 1 mile.

- 1,000 vph for an AU lane if the AU length is greater than 0.5 mile and less than 1 mile.

- 0 vph for an AU lane if the AU length is less than 0.5 mile.

4. Level of Service (LOS); GP lane LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*) in the density column).

HOV lane LOS is based on demand volume-to-capacity (d/o) ratio.

5. Density is shown in passenger cars/mile/lane (pc/mi/h).

6. Based on the lane configuration, these segments are categorized as a complex weaving segment. In order to provide a more robust analysis for this complex weaving segment, the analysis is conducted as two weaving segments (for details on the methodology see [Section 2.1.2](#) of the report).7. Generally, freeway mainline segments within interchanges were not analyzed, since these are within the influence areas of the ramp junctions. As noted in [Section 2.1.3](#) under the heading "Special Ramp Conditions", mainline segments within interchanges are analyzed only when single-lane off-ramps accompanied by a lane drop and the segment upstream of the lane drop is not a weaving section or single-lane on-ramps accompanied by a lane add and the segment downstream of the lane add is not a weaving section.

Table 2.4.3: Year 2025 Alternative 1 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak				PM Peak					
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
White Ave	EB Off Direct	1	1,500	640	0.43	32.4	D	350	0.23	32.3	D
	WB On Direct	1	1,500	570	0.38	**	F	380	0.25	**	F
Garey Ave	EB Off Direct	1	1,500	750	0.50	31.8	D	620	0.41	32.7	D
	WB On Direct	1	1,500	680	0.45	**	F	680	0.45	**	F
Orange Grove Ave	EB On Direct	1	1,500	1,060	0.71	Weaving Segment <sup>5</sup>		1,190	0.79	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	980	0.65	Weaving Segment <sup>5</sup>		900	0.60	Weaving Segment <sup>5</sup>	
Towne Ave	EB Off Direct	1	1,500	850	0.57	Weaving Segment <sup>5</sup>		890	0.59	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	630	0.42	27.6	C	790	0.53	31.8	D
Indian Hill Blvd	WB Off Direct	1	1,500	900	0.60	**	F	770	0.51	**	F
	WB On Direct	1	1,500	990	0.66	Weaving Segment <sup>5</sup>		720	0.48	Weaving Segment <sup>5</sup>	
Monte Vista Ave	EB Off Direct	1	1,500	970	0.65	33.1	D	860	0.57	35.6	E
	WB On Direct	1	1,500	820	0.55	27.8	C	1,040	0.69	33.4	D
Central Ave	WB Off Direct	1	1,500	800	0.53	**	F	930	0.62	**	F
	WB On Direct	1	1,500	890	0.59	**	F	820	0.55	**	F
Mountain Ave	EB Off Direct	1	1,500	700	0.47	32.1	D	840	0.56	35.6	E
	EB On Direct	1	1,500	900	0.60	Weaving Segment <sup>5</sup>		950	0.63	Weaving Segment <sup>5</sup>	
Euclid Ave	WB Off Direct	1	1,500	560	0.37	Weaving Segment <sup>5</sup>		820	0.55	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	740	0.49	**	F	780	0.52	**	F
Grove Ave	EB Off Direct	1	1,500	610	0.41	Weaving Segment <sup>5</sup>		850	0.57	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	770	0.51	Lane Add <sup>6</sup>		1,150	0.77	Lane Add <sup>6</sup>	
WB On Loop	WB Off Direct	1	1,500	860	0.57	**	F	1,270	0.85	**	F
	WB On Direct	1	1,500	830	0.55	Weaving Segment <sup>5</sup>		820	0.55	Weaving Segment <sup>5</sup>	
WB Off Direct (7th St)	WB On Direct	1	1,500	670	0.45	Lane Drop <sup>7</sup>		1,090	0.73	Lane Drop <sup>7</sup>	
	WB Off Direct	1	1,500	950	0.63	29.3	D	1,030	0.69	**	F
WB On Direct	WB Off Direct	1	1,500	1,160	0.77	**	F	1,440	0.96	**	F
	WB Off Direct	1	1,500	1,120	0.75	**	F	1,010	0.67	**	F
WB On Direct	WB Off Direct	1	1,500	930	0.62	34.4	D	1,420	0.95	**	F
	WB Off Direct	1	1,500	1,010	0.67	30.5	D	980	0.65	31.2	D
WB Off Direct	WB On Loop	1	1,500	430	0.29	**	F	480	0.32	**	F
	WB On Direct	1	1,500	670	0.45	**	F	590	0.39	**	F
WB Off Direct	WB On Direct	1	1,500	840	0.56	31.6	D	1,310	0.87	34.8	D
	WB Off Direct	1	1,500	830	0.55	29.1	D	620	0.41	27.1	C
WB On Direct	WB Off Direct	1	1,500	620	0.41	**	F	940	0.63	**	F
	WB On Direct	1	1,500	960	0.64	**	F	860	0.57	**	F

Table 2.4.3: Year 2025 Alternative 1 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak				PM Peak					
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
Vineyard Ave	EB Off Direct	1	1,500	740	0.49	33.2	D	380	0.25	30.9	D
	EB On Direct	1	1,500	870	0.58	Weaving Segment <sup>5</sup>		870	0.58	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	640	0.43	Weaving Segment <sup>5</sup>		1,040	0.69	Weaving Segment <sup>5</sup>	
	WB On Loop	1	1,500	210	0.14	**	F	290	0.19	**	F
	WB On Direct	1	1,500	280	0.19	**	F	310	0.21	**	F
	EB Off Direct	2	3,000	1,240	0.41	Weaving Segment <sup>5</sup>		1,160	0.39	Weaving Segment <sup>5</sup>	
Archibald Ave	EB On Direct (Holt Blvd)	1	1,500	1,300	0.87	Lane Add <sup>6</sup>		1,820	1.21	Lane Add <sup>6</sup>	
	EB On Direct	1	1,500	570	0.38	23.3	C	810	0.54	26.0	C
	WB Off Direct	1	1,500	630	0.42	**	F	500	0.33	**	F
	WB Off Direct (Holt Blvd)	1	1,500	1,420	0.95	Lane Drop <sup>7</sup>		1,140	0.76	Lane Drop <sup>7</sup>	
	WB On Direct	1	1,500	720	0.48	Weaving Segment <sup>5</sup>		1,410	0.94	Weaving Segment <sup>5</sup>	
	EB Off Direct <sup>8</sup>	2	3,000	1,440	0.48	17.2	B	1,110	0.37	18.8	B
Haven Ave	EB On Loop	1	1,500	500	0.33	25.7	C	610	0.41	**	F
	EB On Direct	1	1,500	1,640	1.09	Lane Add <sup>6</sup>		1,310	0.87	Lane Add <sup>6</sup>	
	WB Off Direct <sup>8</sup>	2	3,000	1,640	0.55	**	F	1,280	0.43	**	F
	WB On Loop	1	1,500	480	0.32	**	F	740	0.49	**	F
	WB On Direct	1	1,500	490	0.33	Lane Add <sup>6</sup>		1,110	0.74	Lane Add <sup>6</sup>	
	EB Off Direct <sup>8</sup>	2	3,000	950	0.32	17.7	B	930	0.31	**	F
Milliken Ave	EB On Loop	1	1,500	500	0.33	Weaving Segment <sup>5</sup>		810	0.54	Weaving Segment <sup>5</sup>	
	WB Off Loop	2	3,000	890	0.30	Weaving Segment <sup>5</sup>		880	0.29	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	710	0.47	**	F	1,120	0.75	**	F
	EB Off Direct (NB I-15)	2	3,000	1,410	0.47	Weaving Segment <sup>5</sup>		2,520	0.84	Weaving Segment <sup>5</sup>	
	EB Off Direct (SB I-15)	1	1,500	2,060	1.37	Lane Drop <sup>7</sup>		1,850	1.23	Lane Drop <sup>7</sup>	
	EB On Direct (NB I-15)	1	1,500	2,050	1.37	Weaving Segment <sup>5</sup>		2,060	1.37	Weaving Segment <sup>5</sup>	
I-15	EB On Direct (SB I-15)	1	1,500	1,150	0.77	Weaving Segment <sup>5</sup>		1,010	0.67	Weaving Segment <sup>5</sup>	
	WB Off Direct (NB/SB I-15)	2	3,000	2,750	0.92	Weaving Segment <sup>5</sup>		2,430	0.81	Weaving Segment <sup>5</sup>	
	WB On Direct (SB I-15)	1	1,500	2,970	1.98	Lane Add <sup>6</sup>		2,300	1.53	Lane Add <sup>6</sup>	
	WB On Direct (NB I-15)	2	3,000	2,670	0.89	Weaving Segment <sup>5</sup>		2,110	0.70	Weaving Segment <sup>5</sup>	
	EB Off Direct (Etiwanda/Commerce)	2	3,000	1,160	0.39	Weaving Segment <sup>5</sup>		1,050	0.35	Weaving Segment <sup>5</sup>	
	EB On Direct (Commerce)	1	1,500	320	0.21	Lane Add <sup>7</sup>		930	0.62	Lane Add <sup>7</sup>	
Etiwanda Ave	WB Off Direct	1	1,500	640	0.43	**	F	480	0.32	**	F
	WB On Loop (NB Etiwanda Ave)	1	1,500	650	0.43	Weaving Segment <sup>5</sup>		1,080	0.72	Weaving Segment <sup>5</sup>	
	WB On Direct (SB Etiwanda Ave)	1	1,500	360	0.24	Weaving Segment <sup>5</sup>		610	0.41	Weaving Segment <sup>5</sup>	
	EB Off Direct <sup>8</sup>	2	3,000	830	0.28	18.2	B	1,090	0.36	20.9	C
	EB On Direct	1	1,500	580	0.39	**	F	880	0.59	**	F

Table 2.4.3: Year 2025 Alternative 1 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak				PM Peak				
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>
Cherry Ave	WB Off Direct	2	3,000	1,000	0.33	Weaving Segment <sup>5</sup>	760	0.25	Weaving Segment <sup>5</sup>	
	WB On Loop	1	1,500	270	0.18	Lane Add <sup>6</sup>	240	0.16	Lane Add <sup>6</sup>	
	WB On Direct	1	1,500	750	0.50	** F	370	0.25	** F	
	EB Off Direct	1	1,500	320	0.21	** F	580	0.39	** F	
Beech Ave	EB On Direct	1	1,500	460	0.31	Weaving Segment <sup>5</sup>	420	0.28	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	320	0.21	** F	430	0.29	** F	
	WB On Direct	1	1,500	780	0.52	Weaving Segment <sup>5</sup>	630	0.42	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	490	0.33	Weaving Segment <sup>5</sup>	920	0.61	Weaving Segment <sup>5</sup>	
Citrus Ave	EB On Direct	1	1,500	580	0.39	Lane Add <sup>6</sup>	560	0.37	Lane Add <sup>6</sup>	
	WB Off Direct	1	1,500	570	0.38	Lane Drop <sup>7</sup>	620	0.41	Lane Drop <sup>7</sup>	
	WB On Loop	1	1,500	520	0.35	** F	390	0.26	** F	
	WB On Direct	1	1,500	690	0.46	** F	390	0.26	** F	
Sierra Ave	EB Off Direct <sup>8</sup>	2	3,000	1,550	0.52	** F	1,350	0.45	** F	
	EB On Direct	1	1,500	1,030	0.69	24.5 C	1,160	0.77	** F	
	WB Off Direct	2	3,000	960	0.32	5.5 A	1,090	0.36	** F	
	WB On Direct	1	1,500	1,260	0.84	Lane Add <sup>6</sup>	1,490	0.99	Lane Add <sup>6</sup>	
Cedar Ave	EB Off Direct	2	3,000	910	0.30	22.1 C	1,310	0.44	** F	
	EB On Direct	1	1,500	940	0.63	29.3 D	1,000	0.67	** F	
	WB Off Direct	1	1,500	840	0.56	Lane Drop <sup>7</sup>	1,020	0.68	Lane Drop <sup>7</sup>	
	WB On Direct	1	1,500	1,300	0.87	29.6 D	980	0.65	** F	
Riverside Ave	EB Off Direct	2	3,000	630	0.21	10.5 B	700	0.23	** F	
	EB On Direct	1	1,500	750	0.50	29.5 D	830	0.55	** F	
	WB Off Direct	1	1,500	690	0.46	26.5 C	780	0.52	** F	
	WB On Direct	1	1,500	700	0.47	Lane Add <sup>6</sup>	730	0.49	Lane Add <sup>6</sup>	
Pepper Ave	EB Off Direct	1	1,500	410	0.27	32.1 D	480	0.32	** F	
	EB On Direct	1	1,500	850	0.57	** F	750	0.50	** F	
	WB Off Direct	1	1,500	720	0.48	32.3 D	650	0.43	** F	
	WB On Direct	1	1,500	760	0.51	26.8 C	580	0.39	** F	
Rancho Ave	EB Off Direct	1	1,500	370	0.25	** F	520	0.35	** F	
	EB On Direct	1	1,500	520	0.35	** F	680	0.45	** F	
	WB Off Direct	1	1,500	630	0.42	33.1 D	630	0.42	** F	
	WB On Direct	1	1,500	430	0.29	25.9 C	360	0.24	** F	
La Cadena Dr/9th St	EB Off Direct (9th St)	1	1,500	140	0.09	** F	190	0.13	** F	
	EB On Direct (9th St)	1	1,500	390	0.26	Weaving Segment <sup>5</sup>	440	0.29	Weaving Segment <sup>5</sup>	

Table 2.4.3: Year 2025 Alternative 1 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
La Cadena Dr/9th St	WB Off Direct (9th St)	1	1,500	350	0.23	Weaving Segment <sup>5</sup>	510	0.34	Weaving Segment <sup>5</sup>
	WB On Direct (La Cadena Dr)	1	1,500	240	0.16	26.6	C	310	0.21
	EB Off Direct	1	1,500	650	0.43	Weaving Segment <sup>5</sup>	670	0.45	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	330	0.22	Weaving Segment <sup>5</sup>	500	0.33	Weaving Segment <sup>5</sup>
	WB Off Direct (Sperry Dr)	1	1,500	560	0.37	Weaving Segment <sup>5</sup>	860	0.57	Weaving Segment <sup>5</sup>
	WB On Direct	1	1,500	480	0.32	Weaving Segment <sup>5</sup>	650	0.43	Weaving Segment <sup>5</sup>
Mt Vernon Ave	EB Off Direct (NB/SB I-215)	3	4,500	2,700	0.60	Weaving Segment <sup>5</sup>	2,930	0.65	Weaving Segment <sup>5</sup>
	EB On Direct (NB I-215)	1	1,500	2,640	1.76	Lane Add <sup>6</sup>	2,880	1.92	Lane Add <sup>6</sup>
	EB On Direct (SB I-215)	1	1,500	1,640	1.09	Weaving Segment <sup>5</sup>	1,840	1.23	Weaving Segment <sup>5</sup>
	WB Off Direct (NB/SB I-215)	2	3,000	4,380	1.46	Weaving Segment <sup>5</sup>	4,330	1.44	Weaving Segment <sup>5</sup>
	WB On Loop (NB I-215)	1	1,500	820	0.55	22.7	C	1,320	0.88
	WB On Direct (SB I-215)	1	1,500	1,850	1.23	Weaving Segment <sup>5</sup>	2,240	1.49	Weaving Segment <sup>5</sup>
I-215	WB On Direct	1	1,500	240	0.16	17.3	B	780	0.52
	EB Off Direct	1	1,500	1,660	1.11	Weaving Segment <sup>5</sup>	1,080	0.72	Weaving Segment <sup>5</sup>
	EB On (Waterman Ave)	1	1,500	1,450	0.97	Lane Drop <sup>7</sup>	950	0.63	Lane Drop <sup>7</sup>
	EB Off (Waterman Ave)	1	1,500	470	0.31	Weaving Segment <sup>5</sup>	980	0.65	Weaving Segment <sup>5</sup>
	WB Off (Carnegie Dr)	1	1,500	960	0.64	Weaving Segment <sup>5</sup>	580	0.39	Weaving Segment <sup>5</sup>
	WB On (Carnegie Dr)	1	1,500	410	0.27	Weaving Segment <sup>5</sup>	1,360	0.91	Weaving Segment <sup>5</sup>
Sunwest Ln	EB Off Direct	2	3,000	960	0.32	Weaving Segment <sup>5</sup>	990	0.33	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	370	0.25	Weaving Segment <sup>5</sup>	960	0.64	Weaving Segment <sup>5</sup>
	WB Off Direct	1	1,500	760	0.51	Weaving Segment <sup>5</sup>	690	0.46	Weaving Segment <sup>5</sup>
	WB On Loop	1	1,500	350	0.23	**	F	670	0.45
	WB Off Direct	1	1,500	460	0.31	Weaving Segment <sup>5</sup>	650	0.43	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	1,150	0.77	Weaving Segment <sup>5</sup>	660	0.44	Weaving Segment <sup>5</sup>
Redlands Blvd	EB On Direct	1	1,500	460	0.31	Weaving Segment <sup>5</sup>	1,160	0.77	Weaving Segment <sup>5</sup>
	WB Off Direct	1	1,500	1,020	0.68	Weaving Segment <sup>5</sup>	580	0.39	Weaving Segment <sup>5</sup>
	WB On Direct	1	1,500	720	0.48	Weaving Segment <sup>5</sup>	1,270	0.85	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	900	0.60	Weaving Segment <sup>5</sup>	880	0.59	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	340	0.23	Lane Add <sup>6</sup>	950	0.63	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	1,060	0.71	Weaving Segment <sup>5</sup>	560	0.37	Weaving Segment <sup>5</sup>
Tippecanoe Ave	WB On Direct	1	1,500	650	0.43	Weaving Segment <sup>5</sup>	1,190	0.79	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	720	0.48	Lane Drop <sup>7</sup>	910	0.61	Lane Drop <sup>7</sup>
	EB On Direct	1	1,500	900	0.60	Weaving Segment <sup>5</sup>	320	0.21	B
	EB Off Direct	1	1,500	1,040	0.69	Weaving Segment <sup>5</sup>	1,200	0.80	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	340	0.23	Lane Add <sup>6</sup>	950	0.63	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	1,060	0.71	Weaving Segment <sup>5</sup>	560	0.37	Weaving Segment <sup>5</sup>
Mountain View Ave	WB On Direct	1	1,500	650	0.43	Weaving Segment <sup>5</sup>	1,270	0.85	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	720	0.48	Lane Drop <sup>7</sup>	910	0.61	Lane Drop <sup>7</sup>
	EB On Direct	1	1,500	900	0.60	Weaving Segment <sup>5</sup>	320	0.21	B
	EB Off Direct	1	1,500	1,040	0.69	Weaving Segment <sup>5</sup>	1,200	0.80	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	340	0.23	Lane Add <sup>6</sup>	950	0.63	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	1,060	0.71	Weaving Segment <sup>5</sup>	560	0.37	Weaving Segment <sup>5</sup>
California St	WB On Direct	1	1,500	650	0.43	Weaving Segment <sup>5</sup>	1,190	0.79	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	720	0.48	Lane Drop <sup>7</sup>	910	0.61	Lane Drop <sup>7</sup>
	EB On Direct	1	1,500	900	0.60	Weaving Segment <sup>5</sup>	320	0.21	B
	EB Off Direct	1	1,500	1,040	0.69	Weaving Segment <sup>5</sup>	1,200	0.80	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	340	0.23	Lane Add <sup>6</sup>	950	0.63	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	1,060	0.71	Weaving Segment <sup>5</sup>	560	0.37	Weaving Segment <sup>5</sup>
Alabama St	WB On Direct	1	1,500	650	0.43	Weaving Segment <sup>5</sup>	1,190	0.79	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	720	0.48	Lane Drop <sup>7</sup>	910	0.61	Lane Drop <sup>7</sup>
	EB On Direct	1	1,500	900	0.60	Weaving Segment <sup>5</sup>	320	0.21	B
	EB Off Direct	1	1,500	1,040	0.69	Weaving Segment <sup>5</sup>	1,200	0.80	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	340	0.23	Lane Add <sup>6</sup>	950	0.63	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	1,060	0.71	Weaving Segment <sup>5</sup>	560	0.37	Weaving Segment <sup>5</sup>

Table 2.4.3: Year 2025 Alternative 1 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
SR-210	EB Off Direct (NB SR-210) <sup>8</sup>	2	3,000	970	0.32	9.8	A	1,970	0.66
	EB On Direct (SB SR-210)	1	1,500	1,740	<b>1.16</b>	Weaving Segment <sup>5</sup>	2,250	<b>1.50</b>	Weaving Segment <sup>5</sup>
	WB Off Direct (NB SR-210)	2	3,000	2,530	0.84	Weaving Segment <sup>5</sup>	2,030	0.68	Weaving Segment <sup>5</sup>
	WB On Direct (SB SR-210)	1	1,500	1,670	<b>1.11</b>	Weaving Segment <sup>5</sup>	970	0.65	Weaving Segment <sup>5</sup>
	EB Off Direct (Tennessee St)	1	1,500	420	0.28	16.7	B	430	0.29
	EB On Direct (Tennessee St)	1	1,500	320	0.21	14.2	B	1,130	0.75
Tennessee St	WB Off Direct (Tennessee St)	1	1,500	420	0.28	**	F	380	0.25
	EB Off Direct (Eureka St)	1	1,500	1,230	0.82	Weaving Segment <sup>5</sup>	1,320	0.88	Weaving Segment <sup>5</sup>
	EB On Direct (6th St)	1	1,500	240	0.16	16.0	B	580	0.39
	WB Off Direct (6th St)	1	1,500	440	0.29	**	F	390	0.26
	WB On Loop (NB Orange St)	1	1,500	800	0.53	Weaving Segment <sup>5</sup>	810	0.54	Weaving Segment <sup>5</sup>
	WB On Direct (SB Orange St)	1	1,500	640	0.43	Weaving Segment <sup>5</sup>	390	0.26	Weaving Segment <sup>5</sup>
University St/ Cypress Ave	EB Off Direct	1	1,500	800	0.53	21.7	C	1,180	0.79
	EB On Direct	1	1,500	170	0.11	16.2	B	230	0.15
	WB Off Direct	1	1,500	310	0.21	**	F	260	0.17
	WB On Direct	1	1,500	1,440	0.96	**	F	840	0.56
	EB Off Direct	1	1,500	570	0.38	18.5	B	750	0.50
	EB On Direct	1	1,500	470	0.31	Lane Add <sup>6</sup>		670	0.45
Ford St	WB Off Direct	1	1,500	560	0.37	**	F	370	0.25
	WB On Direct	1	1,500	1,140	0.76	**	F	590	0.39
	EB Off Direct	1	1,500	90	0.06	13.4	B	100	0.07
	EB On Direct	1	1,500	110	0.07	**	F	120	0.08
Wabash Ave	WB Off Direct	1	1,500	110	0.07	Lane Add <sup>6</sup>		22.9	C

Notes:

1. Capacity and peak hour traffic volumes are shown in vehicles per hour (vph). On-ramp traffic volumes are assumed to be unmetered volumes. LOS - Level of Service; d/c - Demand Volume-to-Capacity

2. Peak hour capacities for freeway ramps are 1,500 vph for each freeway ramp lane.

3. LOS is F under either two conditions: (1) if the total flow of the merge/diverge area exceeds the capacity of the freeway section, denoted with an asterisk (\*) in the density column;

(2) if the mainline demand volume to capacity is greater than 1.00, denoted with double asterisks (\*\*) in the density column.

4. Density is shown in passenger cars/mile/lane (pc/mi/m). The density LOS criteria for merge and diverge sections are per HCM 2000.

5. Weaving Segment : Based on the lane configuration, ramp junction analysis is not applicable for this location. See [Table 2.4.1](#).6. Lane Add : Analysis for a single-lane addition is a basic freeway segment analysis for the segment downstream of the lane addition with an additional lane. See [Table 2.4.1](#).7. Lane Drop : Analysis for a single-lane drop is basic freeway segment analysis for the segments upstream and downstream of the lane drop. See [Table 2.4.1](#).

8. Major Diverge : A major diverge exists when a two-lane off-ramp results in a lane drop. Density and LOS are calculated using the HCM 2000 Major Diverge Area analysis.

9. Number of lanes on the ramp at the gore point (off-ramp) or 6-foot point (on-ramp).

Table 2.4.41: Year 2045 Alternative 1 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	# of Lanes				Capacity <sup>2,3</sup>		AM Peak Hour				PM Peak Hour									
	HOH		XOH		X <sub>d/c</sub>		HOV		GP & AUX		HOV		GP & AUX							
	HO	OH	XO	XH	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>	LOS <sup>4</sup>		
EASTBOUND																				
Between Dudley St On-Ramp and White Ave Off-Ramp	1	4	0	1,600	7,400	0	1,100	0.69	C	7,820	1.06	*	F	1,220	0.76	D	7,140	0.96	29.4	D
Between White Ave Off-Ramp and Garey Ave Off-Ramp	1	4	0	1,600	7,400	0	1,100	0.69	C	7,170	0.97	29.3	D	1,220	0.76	D	6,760	0.91	27.4	D
Between Garey Ave Off-Ramp and Orange Grove Ave On-Ramp	1	4	0	1,600	7,400	0	1,100	0.69	C	6,360	0.86	26.2	D	1,220	0.76	D	6,070	0.82	25.0	C
Between Orange Grove Ave On-Ramp and Towne Ave Off-Ramp	1	4	1	1,600	7,400	0	1,100	0.69	C	7,550	1.02	*	F	1,220	0.76	D	7,390	1.00	35.9	E
Between Towne Ave On-Ramp and Indian Hill Blvd Off-Ramp	1	4	0	1,600	7,400	0	1,060	0.66	C	7,410	1.01	*	F	1,180	0.74	C	7,400	1.00	30.9	D
Between Indian Hill Blvd On-Ramp and Monte Vista Ave Off-Ramp	1	4	0	1,600	7,400	0	950	0.59	C	7,610	1.03	*	F	1,360	0.85	D	7,650	1.03	*	F
Between Monte Vista Ave On-Ramp and Central Ave Off-Ramp	1	4	1	1,600	7,400	0	950	0.59	C	7,910	1.07	*	F	1,360	0.85	D	7,850	1.06	*	F
Between Central Ave On-Ramp and Mountain Ave Off-Ramp	1	4	1	1,600	7,400	1,000	950	0.59	C	8,150	0.97	25.8	C	1,360	0.85	D	8,190	0.98	25.5	C
Between Mountain Ave Off-Ramp and Mountain Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	1,300	0.81	D	7,070	0.96	22.1	C	1,440	0.90	D	6,900	0.93	21.2	C
Between Mountain Ave On-Ramp and Euclid Ave Off-Ramp	1	4	0	1,600	7,400	0	1,300	0.81	D	8,180	1.11	*	F	1,440	0.90	D	8,040	1.09	*	F
Between Euclid Ave On-Ramp and Grove Ave Off-Ramp	1	4	0	1,600	7,400	0	1,300	0.81	D	8,330	1.13	*	F	1,440	0.90	D	7,580	1.02	*	F
Between Grove Ave On-Ramp and Vineyard Ave Off-Ramp	1	4	0	1,600	7,400	0	1,520	0.95	E	8,210	1.11	*	F	1,440	0.90	D	6,970	0.94	28.0	D
Between Vineyard Ave On-Ramp and Archibald Ave Off-Ramp	1	4	1	1,600	7,400	0	1,240	0.78	D	8,680	1.17	*	F	1,540	0.96	E	7,720	1.04	*	F
Between Holt Blvd On-Ramp and Archibald Ave On-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	1,240	0.78	D	8,580	1.02	*	F	1,540	0.96	E	8,230	0.98	25.7	C
Between Archibald Ave On-Ramp and Haven Ave Off-Ramp	1	4	1	1,600	7,400	1,000	1,460	0.91	E	9,040	1.08	*	F	1,790	1.12	F	8,930	1.06	*	F
Between Haven Ave Direct On-Ramp and Milliken Ave Off-Ramp	0	5	1	0	9,250	1,000	--	--	--	11,170	1.09	*	F	--	--	--	11,720	1.14	*	F
Between Milliken Ave Loop On-Ramp and NB I-15 Off-Ramp <sup>7</sup>	0	5	1	0	9,250	0	--	--	--	10,560	1.14	*	F	--	--	--	11,490	1.24	*	F
Between NB I-15 Off-Ramp and SB I-15 Off-Ramp <sup>7</sup>	0	5	0	0	9,250	0	--	--	--	8,980	0.97	29.2	D	--	--	--	8,700	0.94	27.5	D
Between SB I-15 Off-Ramp and NB I-15 On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	--	6,640	0.90	27.9	D	--	--	--	6,650	0.90	27.5	D
Between NB/SB I-15 On-Ramp and Etiwanda Ave Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	--	9,260	1.10	*	F	--	--	--	9,230	1.10	*	F
Between Etiwanda Ave On-Ramp and Cherry Ave Off-Ramp	0	4	1	0	7,400	1,850	--	--	--	10,530	1.25	*	F	--	--	--	10,350	1.23	*	F
Between Cherry Ave Off-Ramp and Cherry Ave On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	--	8,560	1.16	*	F	--	--	--	8,990	1.21	*	F
Between Cherry Ave On-Ramp and Beach Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	9,390	1.27	*	F	--	--	--	10,120	1.37	*	F
Between Beach Ave On-Ramp and Citrus Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	9,640	1.30	*	F	--	--	--	10,090	1.36	*	F
Between Citrus Ave On-Ramp and Sierra Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	9,810	1.33	*	F	--	--	--	9,600	1.30	*	F
Between Sierra Ave On-Ramp and Alder Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	9,320	1.26	*	F	--	--	--	9,410	1.27	*	F

Table 2.4.41: Year 2045 Alternative 1 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	# of Lanes				Capacity <sup>2,3</sup>		AM Peak Hour				PM Peak Hour							
	On-H	Off-H	On-A	Off-A	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>		
Between Alder Ave On-Ramp and Cedar Ave Off-Ramp	0	4	0	0	7,400	0	--	9,490	1.28	*	F	--	--	9,270	1.25	*	F	
Between Cedar Ave On-Ramp and Riverside Ave Off-Ramp	0	4	0	0	7,400	0	--	9,200	1.24	*	F	--	--	8,770	1.19	*	F	
Between Riverside Ave On-Ramp and Pepper Ave Off-Ramp	0	4	0	0	7,400	0	--	9,210	1.24	*	F	--	--	8,840	1.19	*	F	
Between Pepper Ave On-Ramp and Rancho Ave Off-Ramp	0	4	0	0	7,400	0	--	9,580	1.29	*	F	--	--	9,140	1.24	*	F	
Between Rancho Ave On-Ramp and 9th St Off-Ramp	0	4	0	0	7,400	0	--	9,680	1.31	*	F	--	--	9,240	1.25	*	F	
Between 9th St On-Ramp and Mt. Vernon Ave Off-Ramp	0	4	1	0	7,400	0	--	9,960	1.35	*	F	--	--	9,480	1.28	*	F	
Between Mt. Vernon Ave On-Ramp and NB/SB I-215 Off-Ramp	0	4	1	0	7,400	0	--	9,580	1.29	*	F	--	--	9,240	1.25	*	F	
Between NB I-215 On-Ramp and SB I-215 On-Ramp <sup>7</sup>	0	4	1	0	7,400	1,000	--	9,550	1.14	*	F	--	--	9,220	1.10	*	F	
Between SB I-215 On-Ramp and Redlands Blvd Off-Ramp	0	4	1	0	7,400	1,000	--	11,530	1.37	*	F	--	--	11,240	1.34	*	F	
Between Redlands Blvd Off-Ramp and Waterman Ave Off-Ramp	0	4	1	0	7,400	1,000	--	9,670	1.15	*	F	--	--	9,960	1.19	*	F	
Between Waterman Ave Off-Ramp and Waterman On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	8,010	1.08	*	F	--	--	8,860	1.20	*	F	
Between Waterman Ave On-Ramp and Tippecanoe Ave Off-Ramp	0	4	1	0	7,400	0	--	8,530	1.15	*	F	--	--	9,950	1.34	*	F	
Between Tippecanoe Ave On-Ramp and Mountain View Ave Off-Ramp	0	4	1	0	7,400	0	--	7,840	1.06	*	F	--	--	9,980	1.35	*	F	
Between Mountain View Ave On-Ramp and California St Off-Ramp	0	4	1	0	7,400	0	--	7,010	0.95	28.5	D	--	--	10,430	1.41	*	F	
Between California St On-Ramp and Alabama St Off-Ramp	0	4	2	0	7,400	1,850	--	6,330	0.68	16.8	B	--	--	10,690	1.16	*	F	
Between Alabama St Off-Ramp and NB SR-210 Off-Ramp	0	4	1	0	7,400	1,850	--	5,490	0.59	17.5	B	--	--	9,670	1.05	*	F	
Between NB SR-210 Off-Ramp and Tennessee St Off-Ramp	0	4	0	0	7,400	0	--	4,280	0.58	17.4	B	--	--	7,420	1.00	*	F	
Between SB SR-210 On-Ramp and Eureka St Off-Ramp	0	4	1	0	7,400	1,000	--	6,590	0.78	33.8	D	--	--	11,230	1.34	*	F	
Between 6th St On-Ramp and University St Off-Ramp	0	4	0	0	7,400	0	--	5,470	0.74	22.3	C	--	--	10,510	1.42	*	F	
Between Cypress Ave On-Ramp and Ford St Off-Ramp	0	4	0	0	7,400	0	--	4,780	0.65	20.4	C	--	--	9,860	1.33	*	F	
Between Ford St On-Ramp and Wabash Ave Off-Ramp	1	4	1	1,600	7,400	1,850	960	0.60	C	3,760	0.41	12.6	B	1,460	0.91	E	9,140	0.99
Between Wabash On-Ramp and Yucaipa Blvd Off-Ramp	1	4	1	1,600	7,400	1,850	960	0.60	C	3,850	0.42	12.9	B	1,460	0.91	E	9,080	0.98
<b>WESTBOUND</b>																		
Between Yucaipa Blvd On-Ramp and Wabash Ave Off-Ramp	1	4	0	1,600	7,400	0	1,250	0.78	D	8,770	1.19	*	F	1,460	0.91	E	4,450	0.60
Between Wabash Ave On-Ramp and Ford St Off-Ramp	1	4	0	1,600	7,400	0	1,250	0.78	D	8,850	1.20	*	F	1,460	0.91	E	4,620	0.62
Between Ford St On-Ramp and Cypress Ave Off-Ramp	0	4	0	0	7,400	0	--	10,300	1.39	*	F	--	--	6,160	0.83	D	26.3	
Between University St On-Ramp and 6th St Off-Ramp	0	4	0	0	7,400	0	--	11,430	1.54	*	F	--	--	6,750	0.91	D	26.9	

Table 2.4.41: Year 2045 Alternative 1 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>4</sup>	# of Lanes						Capacity <sup>2,3</sup>			AM Peak Hour						PM Peak Hour						
	HOV			GP & AUX			HOV			GP & AUX			HOV			GP & AUX			HOV			
	AOH	SG	X <sub>2A</sub>	AOH	SG	X <sub>2A</sub>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	
Between Orange Ave Direct/Loop On-Ramp and NB SR-210 Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	--	11,870	1.41	*	F	--	--	--	--	--	7,160	0.85	25.0	C
Between SB SR-210/Alabama St On-Ramp and California St Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	--	12,600	1.50	*	F	--	--	--	--	--	7,610	0.91	46.9	F
Between California St On-Ramp and Mountain View Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	9,750	1.16	*	F	--	--	--	--	--	5,040	0.60	16.4	B
Between Mountain View Ave On-Ramp and Tippecanoe Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	10,970	1.07	*	F	--	--	--	--	--	6,410	0.63	21.8	C
Between Tippecanoe Ave On-Ramp and Waterman Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	10,350	1.40	*	F	--	--	--	--	--	7,160	0.97	31.9	D
Between Carnegie Dr/Waterman Ave On-Ramp and NB/SB I-215 Off-Ramp	0	4	1	0	7,400	0	--	--	--	9,960	1.35	*	F	--	--	--	--	--	8,120	1.10	*	F
Between SB I-215 On-Ramp and Sperry Dr Off-Ramp	0	4	1	0	7,400	0	--	--	--	9,600	1.30	*	F	--	--	--	--	--	8,840	1.19	*	F
Between Mt. Vernon Ave On-Ramp and 9th St Off-Ramp	0	4	1	0	7,400	0	--	--	--	7,900	1.07	*	F	--	--	--	--	--	9,660	1.31	*	F
Between La Cadena Dr On-Ramp and Rancho Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	7,850	1.06	*	F	--	--	--	--	--	9,530	1.29	*	F
Between Rancho Ave On-Ramp and Pepper Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	7,730	1.04	*	F	--	--	--	--	--	9,260	1.25	*	F
Between Pepper Ave On-Ramp and Riverside Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	7,710	1.04	*	F	--	--	--	--	--	9,110	1.23	*	F
Between Riverside Ave On-Ramp and Cedar Ave Off-Ramp	0	4	1	0	7,400	1,000	--	--	--	7,670	0.91	23.7	C	--	--	--	--	--	9,020	1.22	*	F
Between Cedar Ave Off-Ramp and Cedar Ave On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	--	6,860	0.93	27.5	D	--	--	--	--	--	8,130	1.10	*	F
Between Cedar Ave On-Ramp and Alder Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	8,340	1.13	*	F	--	--	--	--	--	9,350	1.26	*	F
Between Alder Ave On-Ramp and Sierra Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	8,600	1.16	*	F	--	--	--	--	--	9,210	1.24	*	F
Between Sierra Ave On-Ramp and Citrus Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	8,890	1.20	*	F	--	--	--	--	--	9,590	1.30	*	F
Between Citrus Ave Off-Ramp and Citrus Ave Loop On-Ramp <sup>7</sup>	0	4	0	0	7,400	0	--	--	--	8,260	1.12	*	F	--	--	--	--	--	8,810	1.19	*	F
Between Citrus Ave On-Ramp and Beech Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	9,540	1.29	*	F	--	--	--	--	--	9,680	1.31	*	F
Between Beech Ave On-Ramp and Cherry Ave Off-Ramp	0	4	1	0	7,400	0	--	--	--	9,890	1.34	*	F	--	--	--	--	--	9,770	1.32	*	F
Between Cherry Ave Loop On-Ramp and Cherry Ave On-Ramp <sup>7</sup>	0	4	1	0	7,400	1,000	--	--	--	8,910	1.06	*	F	--	--	--	--	--	9,040	1.08	*	F
Between Cherry Ave On-Ramp and Etiwanda Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	9,720	1.31	*	F	--	--	--	--	--	9,540	1.29	*	F
Between Etiwanda Ave Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp <sup>6</sup>	0	4	1	0	7,400	1,000	--	--	--	10,140	1.21	*	F	--	--	--	--	--	10,180	1.21	*	F
Between SB I-15 On-Ramp and NB I-15 On-Ramp <sup>7</sup>	0	4	3	0	7,400	1,850	--	--	--	10,320	1.12	*	F	--	--	--	--	--	10,370	1.12	*	F
Between NB I-15 On-Ramp and Milliken Ave Off-Ramp	0	4	1	0	7,400	1,850	--	--	--	12,280	1.44	*	F	--	--	--	--	--	12,710	1.37	*	F
Between Milliken Ave On-Ramp and Haven Ave Off-Ramp	0	4	1	0	7,400	1,850	--	--	--	12,880	1.39	*	F	--	--	--	--	--	12,900	1.39	*	F

Table 2.4.41: Year 2045 Alternative 1 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	# of Lanes				Capacity <sup>2,3</sup>		AM Peak Hour				PM Peak Hour									
	HOH	GP	XW	AH	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	GP & AUX	HOV	Demand Volume <sup>2</sup>	d/c	LOS	Demand Volume <sup>2</sup>	d/c	GP & AUX			
Between Haven Ave Direct On-Ramp and Archibald Ave Off-Ramp	1	4	1	1,600	7,400	1,000	1,630	1.02	F	10,350	1.23	*	F	2,330	1.46	F	11,250	1.34	*	F
Between Archibald Ave Off-Ramp and Holt Blvd Off-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	1,630	1.02	F	9,650	1.15	*	F	2,330	1.46	F	10,700	1.27	*	F
Between Holt Blvd Off-Ramp and Archibald Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	1,630	1.02	F	7,910	1.07	*	F	2,330	1.46	F	9,280	1.25	*	F
Between Archibald Ave On-Ramp and Vineyard Ave Off-Ramp	1	4	1	1,600	7,400	0	1,630	1.02	F	8,920	1.21	*	F	2,330	1.46	F	11,020	1.49	*	F
Between Vineyard Ave Direct On-Ramp and Grove Ave Off-Ramp	1	4	0	1,600	7,400	0	1,350	0.84	D	8,700	1.18	*	F	1,950	1.22	F	10,650	1.44	*	F
Between Grove Ave On-Ramp and 7th St Off-Ramp	1	4	0	1,600	7,400	0	1,370	0.86	D	8,870	1.20	*	F	1,970	1.23	F	10,280	1.39	*	F
Between Euclid Ave Direct On-Ramp and Mountain Ave Off-Ramp	1	4	0	1,600	7,400	0	1,320	0.83	D	8,990	1.21	*	F	1,940	1.21	F	10,010	1.35	*	F
Between Mountain Ave On-Ramp and Central Ave Off-Ramp	1	4	0	1,600	7,400	0	1,400	0.88	D	8,920	1.21	*	F	2,070	1.29	F	9,590	1.30	*	F
Between Central Ave On-Ramp and Monte Vista Ave Off-Ramp	1	4	1	1,600	7,400	0	1,550	0.97	E	8,700	1.18	*	F	1,910	1.19	F	9,202	1.24	*	F
Between Monte Vista Ave On-Ramp and Indian Hill Blvd Off-Ramp	1	4	0	1,600	7,400	0	1,550	0.97	E	8,650	1.17	*	F	1,740	1.09	F	9,000	1.22	*	F
Between Indian Hill Blvd On-Ramp and Towne Ave Off-Ramp	1	4	0	1,600	7,400	0	1,590	0.99	E	8,500	1.15	*	F	1,670	1.04	F	8,800	1.19	*	F
Between Towne Ave On-Ramp and Orange Grove Ave Off-Ramp	1	4	1	1,600	7,400	0	1,470	0.92	E	8,710	1.18	*	F	1,000	0.63	C	8,890	1.20	*	F
Between Orange Grove Ave Off-Ramp and Garey Ave On-Ramp	1	4	0	1,600	7,400	0	1,470	0.92	E	7,620	1.03	*	F	1,570	0.98	E	7,890	1.07	*	F
Between Garey Ave On-Ramp and White Ave On-Ramp	1	4	0	1,600	7,400	0	1,660	1.04	F	8,180	1.11	*	F	1,680	1.05	F	8,540	1.15	*	F
Between White Ave On-Ramp and Dudley St Off-Ramp	1	4	0	1,600	7,400	0	1,660	1.04	F	8,810	1.19	*	F	1,680	1.05	F	8,960	1.21	*	F

Notes:

- The freeway segments were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis or weaving analysis method, depending on the lane configuration.  
The weaving analysis method was applied to the segments highlighted in the table.
- Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).
- Peak hour capacities for freeway lanes include:
  - 1,850 vph for each General Purpose (GP) lane and 1,600 vph for a single High Occupancy Vehicle (HOV) lane.
  - 1,850 vph for an auxiliary (AUX) lane if the AUX length exceeds 1 mile.
  - 1,000 vph for an AUX lane if the AUX length is greater than 0.5 mile and less than 1 mile.
  - 0 vph for an AUX lane if the AUX length is less than 0.5 mile.
- Level of Service (LOS), GP lane LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*) in the density column).  
HOV lane LOS is based on demand volume-to-capacity (d/c) ratio.
- Density is shown in passenger cars/mile/lane (pc/mi/h).
- Based on the lane configuration, these segments are categorized as a complex weaving segment. In order to provide a more robust analysis for this complex weaving segment, the analysis is conducted as two weaving segments (for details on the methodology see [Section 2.1.2](#) of the report).
- Generally, freeway mainline segments within interchanges were not analyzed, since these are within the influence areas of the ramp junctions. As noted in [Section 2.1.3](#) under the heading "Special Ramp Conditions", mainline segments within interchanges are analyzed only when single-lane off-ramps, accompanied by a lane drop and the segment upstream of the lane drop is not a weaving section or single-lane on-ramps accompanied by a lane add and the segment downstream of the lane add is not a weaving section.

Table 2.4.5: Year 2045 Alternative 1 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak				PM Peak					
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
<b>White Ave</b>	EB Off Direct	1	1,500	660	0.44	**	F	380	0.25	32.2	D
	WB On Direct	1	1,500	630	0.42	**	F	420	0.28	**	F
<b>Garey Ave</b>	EB Off Direct	1	1,500	800	0.53	34.7	D	680	0.45	32.6	D
	WB On Direct	1	1,500	750	0.50	**	F	760	0.51	**	F
<b>Orange Grove Ave</b>	EB On Direct	1	1,500	1,180	0.79	Weaving Segment <sup>5</sup>		1,120	0.75	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	1,090	0.73	Weaving Segment <sup>5</sup>		1,000	0.67	Weaving Segment <sup>5</sup>	
<b>Towne Ave</b>	EB Off Direct	1	1,500	880	0.59	Weaving Segment <sup>5</sup>		900	0.60	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	690	0.46	**	F	870	0.58	32.3	D
<b>Indian Hill Blvd</b>	WB Off Direct	1	1,500	1,000	0.67	**	F	850	0.57	**	F
	WB On Direct	1	1,500	1,090	0.73	Weaving Segment <sup>5</sup>		830	0.55	Weaving Segment <sup>5</sup>	
<b>Monte Vista Ave</b>	EB Off Direct	1	1,500	840	0.56	**	F	900	0.60	35.9	E
	WB On Direct	1	1,500	940	0.63	**	F	1,330	0.89	**	F
<b>Central Ave</b>	EB Off Direct	1	1,500	1,100	0.73	**	F	1,170	0.78	**	F
	WB On Direct	1	1,500	990	0.66	**	F	910	0.61	**	F
<b>Mountain Ave</b>	EB Off Direct	1	1,500	760	0.51	**	F	930	0.62	**	F
	WB On Direct	1	1,500	1,050	0.70	Weaving Segment <sup>5</sup>		1,130	0.75	Weaving Segment <sup>5</sup>	
<b>Euclid Ave</b>	EB Off Direct	1	1,500	720	0.48	Weaving Segment <sup>5</sup>		1,030	0.69	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	810	0.54	**	F	830	0.55	**	F
<b>Grove Ave</b>	EB Off Direct	1	1,500	660	0.44	Weaving Segment <sup>5</sup>		940	0.63	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	900	0.60	Lane Add <sup>6</sup>		1,280	0.85	Lane Add <sup>6</sup>	
<b>Euclid Ave</b>	EB Off Direct	1	1,500	730	0.49	Lane Drop <sup>7</sup>		1,210	0.81	Lane Drop <sup>7</sup>	
	WB On Direct	1	1,500	1,110	0.74	**	F	1,140	0.76	**	F
<b>Grove Ave</b>	WB Off Direct	1	1,500	1,300	0.87	**	F	1,480	0.99	**	F
	EB Off Direct	1	1,500	1,030	0.69	**	F	1,070	0.71	**	F
<b>Euclid Ave</b>	EB On Direct	1	1,500	1,180	0.79	**	F	1,110	0.74	**	F
	WB Off Direct (7th St)	1	1,500	1,550	1.03	**	F	1,330	0.89	**	F
<b>Grove Ave</b>	WB On Loop	1	1,500	470	0.31	**	F	530	0.35	**	F
	WB On Direct	1	1,500	750	0.50	**	F	650	0.43	**	F
<b>Euclid Ave</b>	EB Off Direct	1	1,500	970	0.65	**	F	1,420	0.95	**	F
	EB On Direct	1	1,500	1,060	0.71	**	F	800	0.53	29.3	D
<b>Grove Ave</b>	WB Off Direct	1	1,500	870	0.58	**	F	1,290	0.86	**	F
	WB On Direct	1	1,500	1,040	0.69	**	F	920	0.61	**	F

Table 2.4.5: Year 2045 Alternative 1 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak				PM Peak					
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
Vineyard Ave	EB Off Direct	2	3,000	920	0.31	**	F	420	0.14	31.8	D
	EB On Direct	1	1,500	1,110	0.74	Weaving Segment <sup>5</sup>		1,270	0.85	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	840	0.56	Weaving Segment <sup>5</sup>		1,340	0.89	Weaving Segment <sup>5</sup>	
	WB On Loop	1	1,500	210	0.14	**	F	300	0.20	**	F
	WB On Direct	1	1,500	310	0.21	**	F	420	0.28	**	F
	EB Off Direct	2	3,000	1,660	0.55	Weaving Segment <sup>5</sup>		1,550	0.52	Weaving Segment <sup>5</sup>	
Archibald Ave	EB On Direct (Holt Blvd)	1	1,500	1,560	1.04	Lane Add <sup>6</sup>		2,050	1.37	Lane Add <sup>6</sup>	
	EB On Direct	1	1,500	680	0.45	**	F	950	0.63	**	F
	WB Off Direct	1	1,500	700	0.47	**	F	560	0.37	**	F
	WB Off Direct (Holt Blvd)	1	1,500	1,740	1.16	Lane Drop <sup>7</sup>		1,420	0.95	Lane Drop <sup>7</sup>	
	WB On Direct	1	1,500	1,010	0.67	Weaving Segment <sup>5</sup>		1,830	1.22	Weaving Segment <sup>5</sup>	
	EB Off Direct <sup>8</sup>	2	3,000	1,700	0.57	**	F	1,130	0.38	**	F
Haven Ave	EB On Loop	1	1,500	560	0.37	**	F	670	0.45	**	F
	EB On Direct	1	1,500	1,810	1.21	Lane Add <sup>6</sup>		1,450	0.97	Lane Add <sup>6</sup>	
	WB Off Direct <sup>8</sup>	2	3,000	1,820	0.61	**	F	1,420	0.47	**	F
	WB On Loop	1	1,500	380	0.25	**	F	860	0.57	**	F
	WB On Direct	1	1,500	540	0.36	Lane Add <sup>6</sup>		1,240	0.83	Lane Add <sup>6</sup>	
	EB Off Direct <sup>8</sup>	2	3,000	1,180	0.39	**	F	1,120	0.37	**	F
Milliken Ave	EB On Loop	1	1,500	580	0.39	Weaving Segment <sup>5</sup>		890	0.59	Weaving Segment <sup>5</sup>	
	WB Off Loop	2	3,000	1,150	0.38	Weaving Segment <sup>5</sup>		1,040	0.35	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	750	0.50	**	F	1,230	0.82	**	F
	EB Off Direct (NB I-15)	2	3,000	1,580	0.53	Weaving Segment <sup>5</sup>		2,790	0.93	Weaving Segment <sup>5</sup>	
	EB Off Direct (SB I-15)	1	1,500	2,350	1.57	Lane Drop <sup>7</sup>		2,050	1.37	Lane Drop <sup>7</sup>	
	EB On Direct (NB I-15)	1	1,500	2,620	1.75	Weaving Segment <sup>5</sup>		2,580	1.72	Weaving Segment <sup>5</sup>	
I-15	EB On Direct (SB I-15)	1	1,500	1,270	0.85	Weaving Segment <sup>5</sup>		1,120	0.75	Weaving Segment <sup>5</sup>	
	WB Off Direct (NB/SB I-15)	2	3,000	3,020	1.01	Weaving Segment <sup>5</sup>		2,820	0.94	Weaving Segment <sup>5</sup>	
	WB On Direct (SB I-15)	1	1,500	3,200	2.13	Lane Add <sup>6</sup>		2,410	1.61	Lane Add <sup>6</sup>	
	WB On Direct (NB I-15)	2	3,000	2,960	0.99	Weaving Segment <sup>5</sup>		2,340	0.78	Weaving Segment <sup>5</sup>	
	EB Off Direct (Etiwanda/Commerce)	2	3,000	1,280	0.43	Weaving Segment <sup>5</sup>		1,160	0.39	Weaving Segment <sup>5</sup>	
	EB On Direct (Commerce)	1	1,500	350	0.23	Lane Add <sup>6</sup>		1,050	0.70	Lane Add <sup>6</sup>	
Etiwanda Ave	WB Off Direct	1	1,500	730	0.49	**	F	550	0.37	**	F
	WB On Loop (NB Etiwanda Ave)	1	1,500	720	0.48	Weaving Segment <sup>5</sup>		1,200	0.80	Weaving Segment <sup>5</sup>	
	WB On Direct (SB Etiwanda Ave)	1	1,500	440	0.29	Weaving Segment <sup>5</sup>		590	0.39	Weaving Segment <sup>5</sup>	
	EB Off Direct <sup>8</sup>	2	3,000	1,040	0.35	**	F	1,250	0.42	**	F
	EB On Direct	1	1,500	830	0.55	**	F	1,130	0.75	**	F
	EB On Direct	1	1,500	1,500	1.04	**	F	1,050	0.70	**	F

Table 2.4.5: Year 2045 Alternative 1 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
Cherry Ave	WB Off Direct	2	3,000	1,270	0.42	Weaving Segment <sup>5</sup>	970	0.32	Weaving Segment <sup>5</sup>
	WB On Loop	1	1,500	290	0.19	Lane Add <sup>6</sup>	240	0.16	Lane Add <sup>6</sup>
	WB On Direct	1	1,500	810	0.54	** F	490	0.33	** F
	EB Off Direct	1	1,500	370	0.25	** F	530	0.35	** F
Beech Ave	EB On Direct	1	1,500	630	0.42	Weaving Segment <sup>5</sup>	500	0.33	Weaving Segment <sup>5</sup>
	WB Off Direct	1	1,500	390	0.26	** F	560	0.37	** F
	WB On Direct	1	1,500	750	0.50	Weaving Segment <sup>5</sup>	650	0.43	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	550	0.37	Weaving Segment <sup>5</sup>	1,120	0.75	Weaving Segment <sup>5</sup>
Citrus Ave	EB On Direct	1	1,500	710	0.47	Lane Add <sup>6</sup>	620	0.41	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	630	0.42	Lane Drop <sup>7</sup>	780	0.52	Lane Drop <sup>7</sup>
	WB On Loop	1	1,500	520	0.35	** F	380	0.25	** F
	WB On Direct	1	1,500	760	0.51	** F	490	0.33	** F
Sierra Ave	EB Off Direct <sup>8</sup>	2	3,000	1,630	0.54	** F	1,470	0.49	** F
	EB On Direct	1	1,500	1,140	0.76	** F	1,280	0.85	** F
	WB Off Direct	2	3,000	1,100	0.37	** F	1,270	0.42	** F
	WB On Direct	1	1,500	1,390	0.93	Lane Add <sup>6</sup>	1,650	1.10	Lane Add <sup>6</sup>
Alder Ave	EB Off Direct	1	1,500	460	0.31	** F	600	0.40	** F
	EB On Direct	1	1,500	630	0.42	** F	460	0.31	** F
	WB Off Direct	1	1,500	440	0.29	** F	600	0.40	** F
	WB On Direct	1	1,500	690	0.46	** F	470	0.31	** F
Cedar Ave	EB Off Direct	2	3,000	1,150	0.38	** F	1,540	0.51	** F
	EB On Direct	1	1,500	870	0.58	** F	1,040	0.69	** F
	WB Off Direct	1	1,500	810	0.54	Lane Drop <sup>7</sup>	910	0.61	Lane Drop <sup>7</sup>
	WB On Direct	1	1,500	1,480	0.99	** F	1,220	0.81	** F
Riverside Ave	EB Off Direct	2	3,000	910	0.30	** F	940	0.31	** F
	EB On Direct	1	1,500	870	0.58	** F	1,010	0.67	** F
	WB Off Direct	1	1,500	890	0.59	** F	890	0.59	** F
	WB On Direct	1	1,500	860	0.57	Lane Add <sup>6</sup>	910	0.61	Lane Add <sup>6</sup>
Pepper Ave	EB Off Direct	1	1,500	490	0.33	** F	530	0.35	** F
	EB On Direct	1	1,500	910	0.61	** F	830	0.55	** F
	WB Off Direct	1	1,500	840	0.56	** F	730	0.49	** F
	WB On Direct	1	1,500	840	0.56	** F	640	0.43	** F
Rancho Ave	EB Off Direct	1	1,500	470	0.31	** F	660	0.44	** F
	EB On Direct	1	1,500	570	0.38	** F	750	0.50	** F

Table 2.4.5: Year 2045 Alternative 1 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
Rancho Ave	WB Off Direct	1	1,500	530	0.35	**	F	630	0.42
	WB On Direct	1	1,500	500	0.33	**	F	480	0.32
	EB Off Direct (9th St)	1	1,500	160	0.11	**	F	220	0.15
	EB On Direct (9th St)	1	1,500	450	0.30	Weaving Segment <sup>5</sup>		460	0.31
	WB Off Direct (Sperry Dr)	1	1,500	390	0.26	Weaving Segment <sup>5</sup>		610	0.41
	WB On Direct (La Cadena Dr)	1	1,500	270	0.18	**	F	340	0.23
Mt Vernon Ave	EB Off Direct	1	1,500	750	0.50	Weaving Segment <sup>5</sup>		800	0.53
	EB On Direct	1	1,500	360	0.24	Weaving Segment <sup>5</sup>		560	0.37
	WB Off Direct (Sperry Dr)	1	1,500	650	0.43	Weaving Segment <sup>5</sup>		910	0.61
	WB On Direct	1	1,500	590	0.39	Weaving Segment <sup>5</sup>		780	0.52
	EB Off Direct (NB/SB I-215)	3	4,500	3,120	0.69	Weaving Segment <sup>5</sup>		3,210	0.71
	EB On Direct (NB I-215)	1	1,500	3,080	2.05	Lane Add <sup>6</sup>		3,190	2.13
I-215	EB On Direct (SB I-215)	1	1,500	1,990	1.33	Weaving Segment <sup>5</sup>		2,030	1.35
	WB Off Direct (NB/SB I-215)	2	3,000	5,000	1.67	Weaving Segment <sup>5</sup>		4,940	1.65
	WB On Loop (NB I-215)	1	1,500	910	0.61	24.8	C	1,460	0.97
	WB On Direct (SB I-215)	1	1,500	2,140	1.43	Weaving Segment <sup>5</sup>		2,520	1.68
	WB On Direct (SB I-215)	1	1,500	260	0.17	19.7	B	890	0.59
	WB On Direct	1	1,500	1,860	1.24	Weaving Segment <sup>5</sup>		1,280	0.85
Redlands Blvd	EB Off Direct	1	1,500	1,660	1.11	Lane Drop <sup>7</sup>		1,100	0.73
	EB Off (Waterman Ave)	1	1,500	520	0.35	Weaving Segment <sup>5</sup>		1,090	0.73
	WB Off (Carnegie Dr)	1	1,500	1,040	0.69	Weaving Segment <sup>5</sup>		680	0.45
	WB On (Carnegie Dr)	1	1,500	540	0.36	Weaving Segment <sup>5</sup>		1,560	1.04
	EB Off Direct	2	3,000	1,100	0.37	Weaving Segment <sup>5</sup>		1,090	0.36
	EB On Direct	1	1,500	410	0.27	Weaving Segment <sup>5</sup>		1,120	0.75
Tippecanoe Ave	WB Off Direct	1	1,500	840	0.56	Weaving Segment <sup>5</sup>		760	0.51
	WB On Loop	1	1,500	400	0.27	**	F	643	0.43
	WB On Direct	1	1,500	590	0.39	Weaving Segment <sup>5</sup>		840	0.56
	EB Off Direct	1	1,500	1,360	0.91	Weaving Segment <sup>5</sup>		770	0.51
	EB On Direct	1	1,500	530	0.35	Weaving Segment <sup>5</sup>		1,220	0.81
	WB Off Direct	1	1,500	1,200	0.80	Weaving Segment <sup>5</sup>		750	0.50
Mountain View Ave	WB On Direct	1	1,500	800	0.53	Weaving Segment <sup>5</sup>		1,710	1.14
	EB Off Direct	1	1,500	1,090	0.73	Weaving Segment <sup>5</sup>		1,030	0.69
	EB On Direct	1	1,500	410	0.27	Lane Add <sup>6</sup>		1,290	0.86
	WB Off Direct	1	1,500	1,340	0.89	Weaving Segment <sup>5</sup>		720	0.48
	WB On Direct	1	1,500	720	0.48	Weaving Segment <sup>5</sup>		1,470	0.98
									Weaving Segment <sup>5</sup>

Table 2.4.5: Year 2045 Alternative 1 Condition I-10 Ramp Junction Peak Hour Level of Service

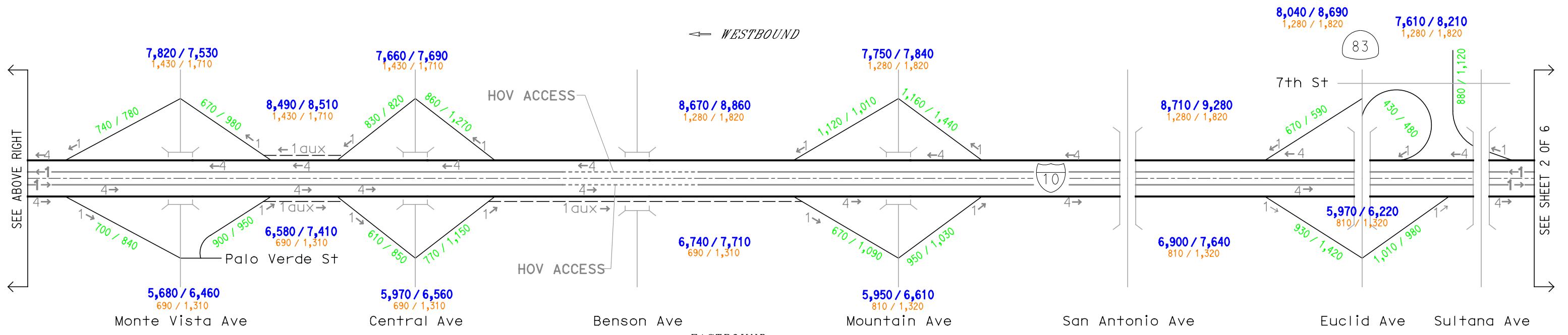
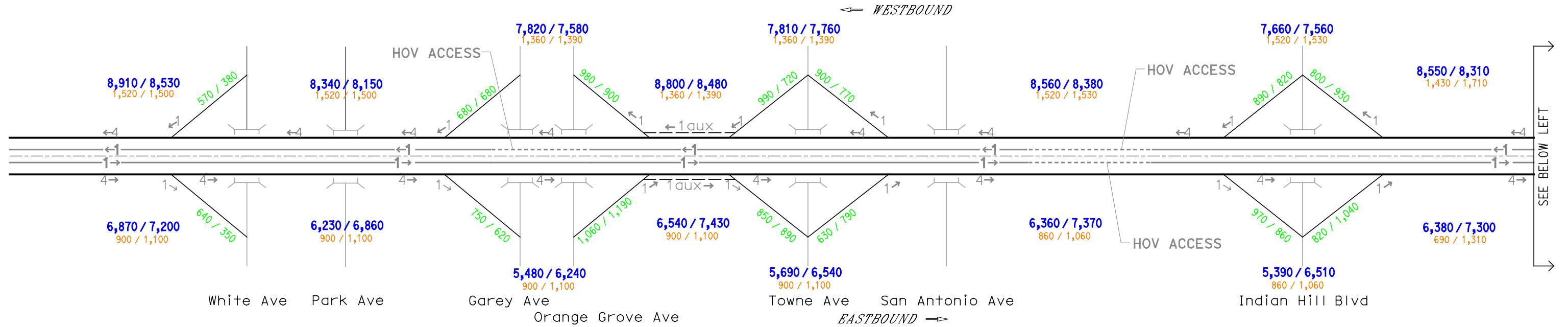
Interchange	Ramp Type	AM Peak				PM Peak					
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
Alabama St	EB Off Direct	1	1,500	840	0.56		Lane Drop <sup>7</sup>	1,020	0.68		Lane Drop <sup>7</sup>
	WB Off Direct	1	1,500	830	0.55	**	F	490	0.33	21.7	C
	WB On Direct	1	1,500	1,220	0.81		Weaving Segment <sup>5</sup>	1,370	0.91		Weaving Segment <sup>5</sup>
	EB Off Direct (NB SR-210) <sup>8</sup>	2	3,000	1,210	0.40	14.9	B	2,250	0.75	**	F
	EB On Direct (SB SR-210)	1	1,500	2,440	1.63		Weaving Segment <sup>5</sup>	3,130	2.09		Weaving Segment <sup>5</sup>
	WB Off Direct (NB SR-210)	2	3,000	3,610	1.20		Weaving Segment <sup>5</sup>	3,030	1.01		Weaving Segment <sup>5</sup>
SR-210	WB On Direct (SB SR-210)	1	1,500	2,050	1.37		Weaving Segment <sup>5</sup>	1,380	0.92		Weaving Segment <sup>5</sup>
	EB Off Direct (Tennessee St)	1	1,500	500	0.33	21.5	C	480	0.32	**	F
	EB On Direct (Tennessee St)	1	1,500	380	0.25	18.0	B	1,160	0.77	**	F
	WB Off Direct (Tennessee St)	1	1,500	460	0.31	**	F	430	0.29	23.1	C
	EB Off Direct (Eureka St)	1	1,500	1,390	0.93		Weaving Segment <sup>5</sup>	1,470	0.98		Weaving Segment <sup>5</sup>
	EB On Direct (6th St)	1	1,500	270	0.18	21.6	C	760	0.51	**	F
Tennessee St	WB Off Direct (6th St)	1	1,500	460	0.31	**	F	490	0.33	29.4	D
	WB On Loop (NB Orange St)	1	1,500	900	0.60		Weaving Segment <sup>5</sup>	900	0.60		Weaving Segment <sup>5</sup>
	WB On Direct (SB Orange St)	1	1,500	730	0.49		Weaving Segment <sup>5</sup>	450	0.30		Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	880	0.59	28.7	D	1,310	0.87	**	F
	EB On Direct	1	1,500	190	0.13	21.9	C	660	0.44	**	F
	WB Off Direct	1	1,500	470	0.31	**	F	340	0.23	30.0	D
Eureka St/Orange St/6th St	WB On Direct	1	1,500	1,600	1.07	**	F	930	0.62	29.7	D
	EB Off Direct	1	1,500	660	0.44	25.7	C	770	0.51	**	F
	EB On Direct	1	1,500	600	0.40		Lane Add <sup>6</sup>	1,500	1.00		Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	910	0.61	**	F	450	0.30	24.1	C
	WB On Direct	1	1,500	1,110	0.74	**	F	540	0.36	22.3	C
	EB Off Direct	1	1,500	60	0.04	17.1	B	280	0.19	33.5	D
University St/Cypress Ave	EB On Direct	1	1,500	150	0.10	15.6	B	220	0.15	28.0	C
	WB Off Direct	1	1,500	120	0.08	**	F	130	0.09	21.7	C
	WB On Direct	1	1,500	200	0.13	**	F	300	0.20	21.6	C

Notes:

- Capacity and peak hour traffic volumes are shown in vehicles per hour (vph). On-ramp traffic volumes are assumed to be unmetered volumes. LOS - Level of Service; d/c - Demand Volume-to-Capacity
- Peak hour capacities for freeway ramps are 1,500 vph for each freeway ramp lane.
- LOS is F under either two conditions: (1) if the total flow of the merge/diverge area exceeds the capacity of the freeway section, denoted with an asterisk (\*) in the density column;

- (2) if the mainline demand volume to capacity is greater than 1.00, denoted with double asterisks (\*\* ) in the density column.
- Density is shown in passenger cars/mile/lane (pc/mi/h). The density LOS criteria for merge and diverge sections are per HCM 2000.

- Weaving Segment : Based on the lane configuration, ramp junction analysis is not applicable for this location. See Table 2.4.3.
- Lane Add : Analysis for a single-lane addition is a basic freeway segment analysis for the segment downstream of the lane addition with an additional lane. See Table 2.4.3.
- Lane Drop : Analysis for a single-lane drop is basic freeway segment analysis for the segments upstream and downstream of the lane drop. See Table 2.4.3.
- Major Diverge : A major diverge exists when a two-lane off-ramp results in a lane drop. Density and LOS are calculated using the HCM 2000 Major Diverge Area analysis.
- Number of lanes on the ramp at the gore point (off-ramp) or 6-foot point (on-ramp).



#### LEGEND

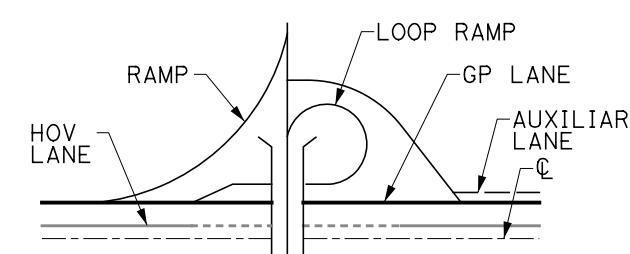
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AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

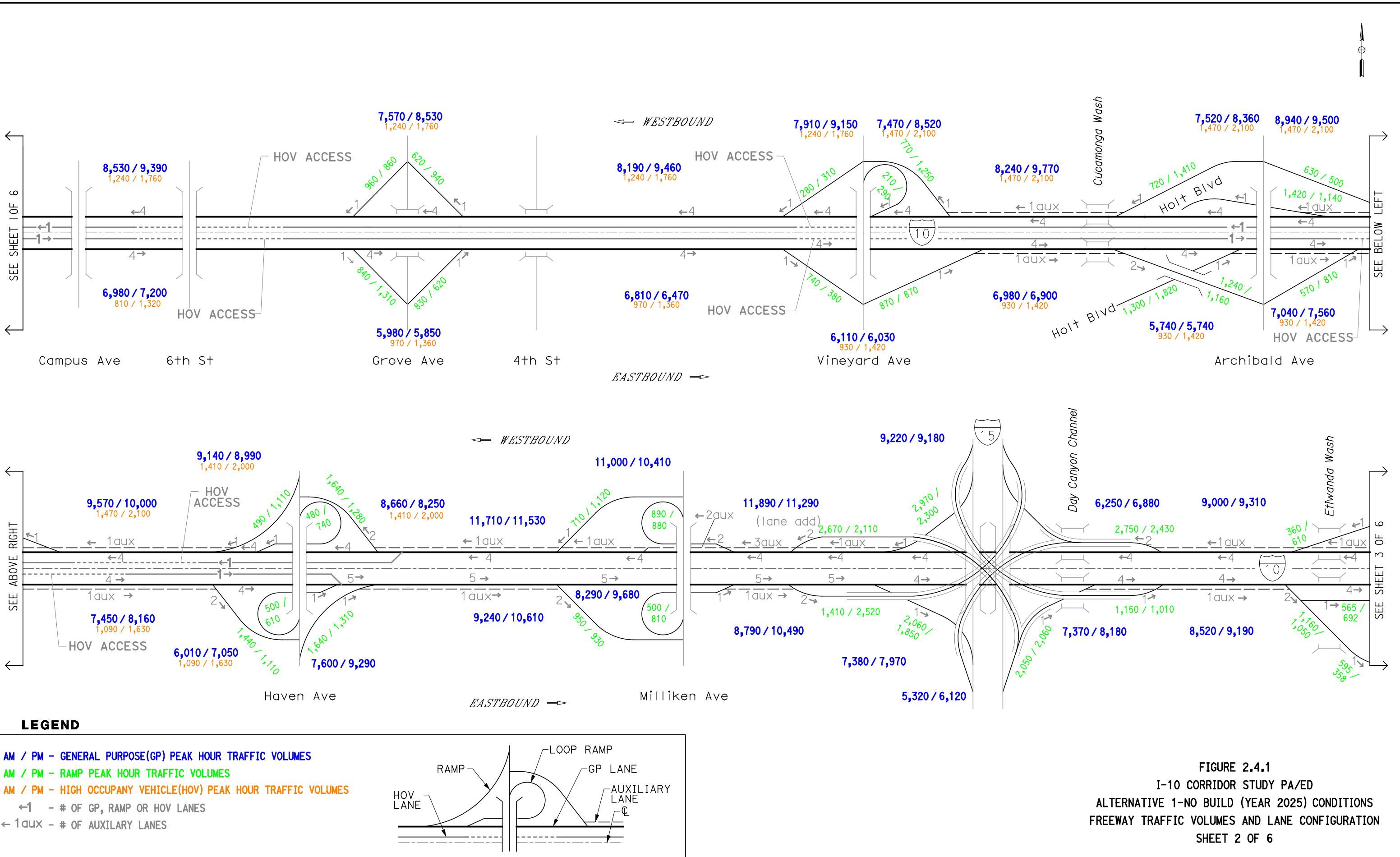
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↔ 1 - # OF GP, RAMP OR HOV LANES

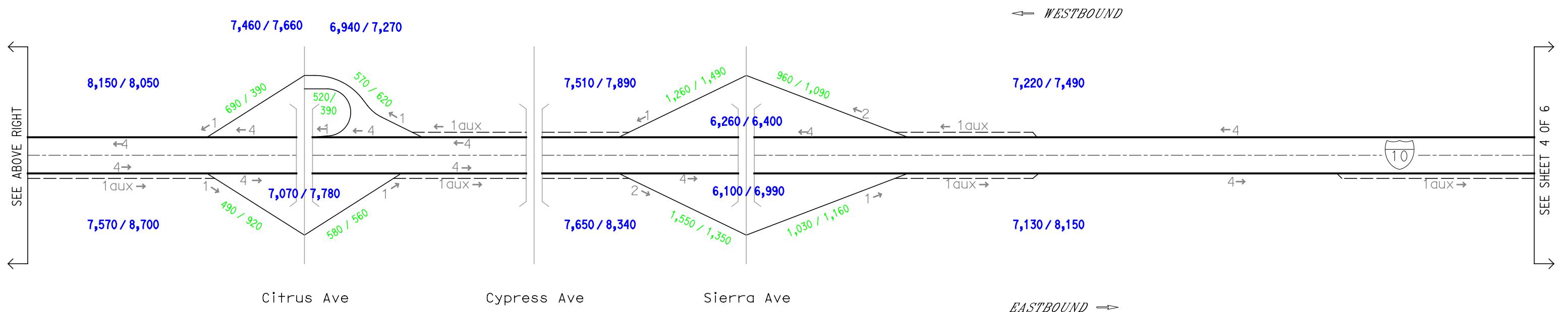
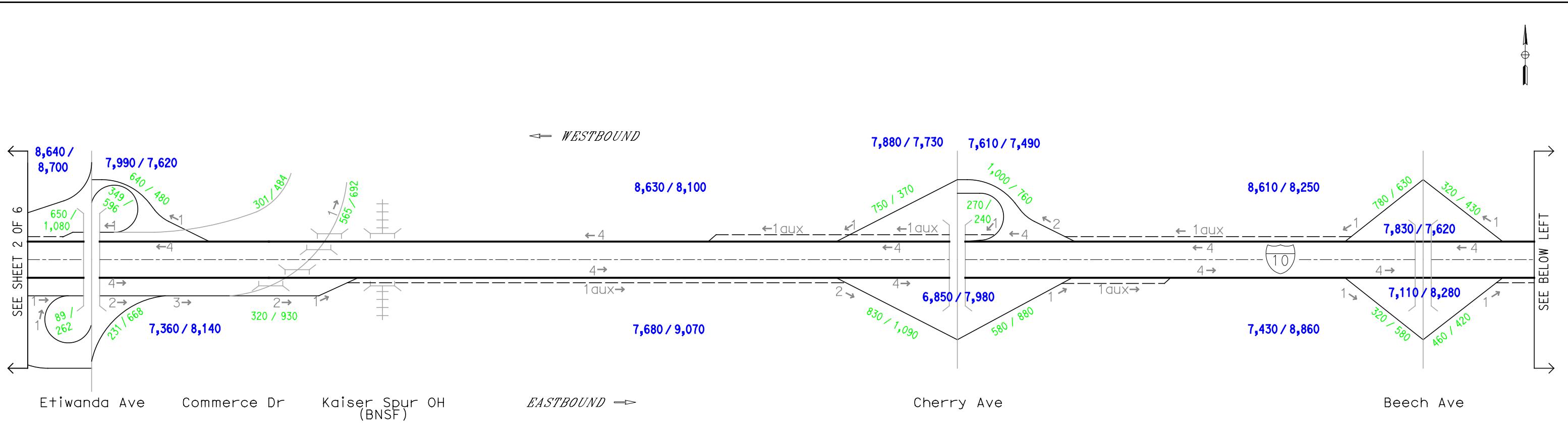
↔ 1aux - # OF AUXILIARY LANES



**FIGURE 2.4.1**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1-NO BUILD (YEAR 2025) CONDITIONS  
FREWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
SHEET 1 OF 6



**FIGURE 2.4.1**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1-NO BUILD (YEAR 2025) CONDITIONS  
FREWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
SHEET 2 OF 6



#### LEGEND

AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES  
 AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES  
 AM / PM - HIGH OCCUPY VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES  
 ←1 - # OF GP, RAMP OR HOV LANES  
 ←1aux - # OF AUXILIARY LANES

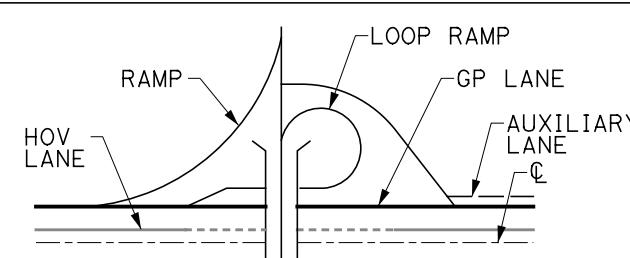
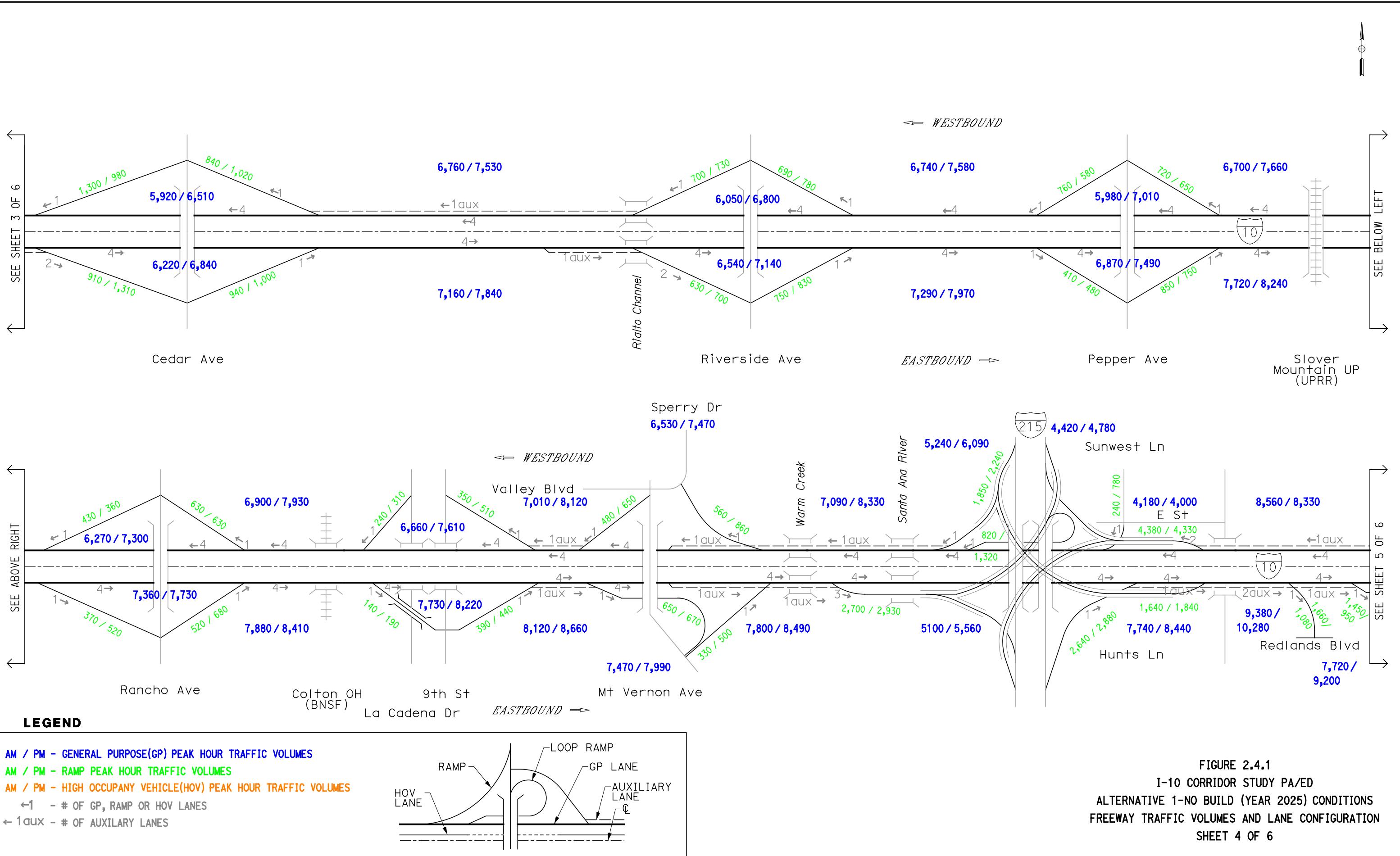
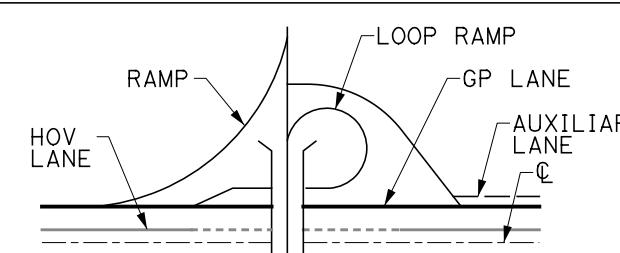
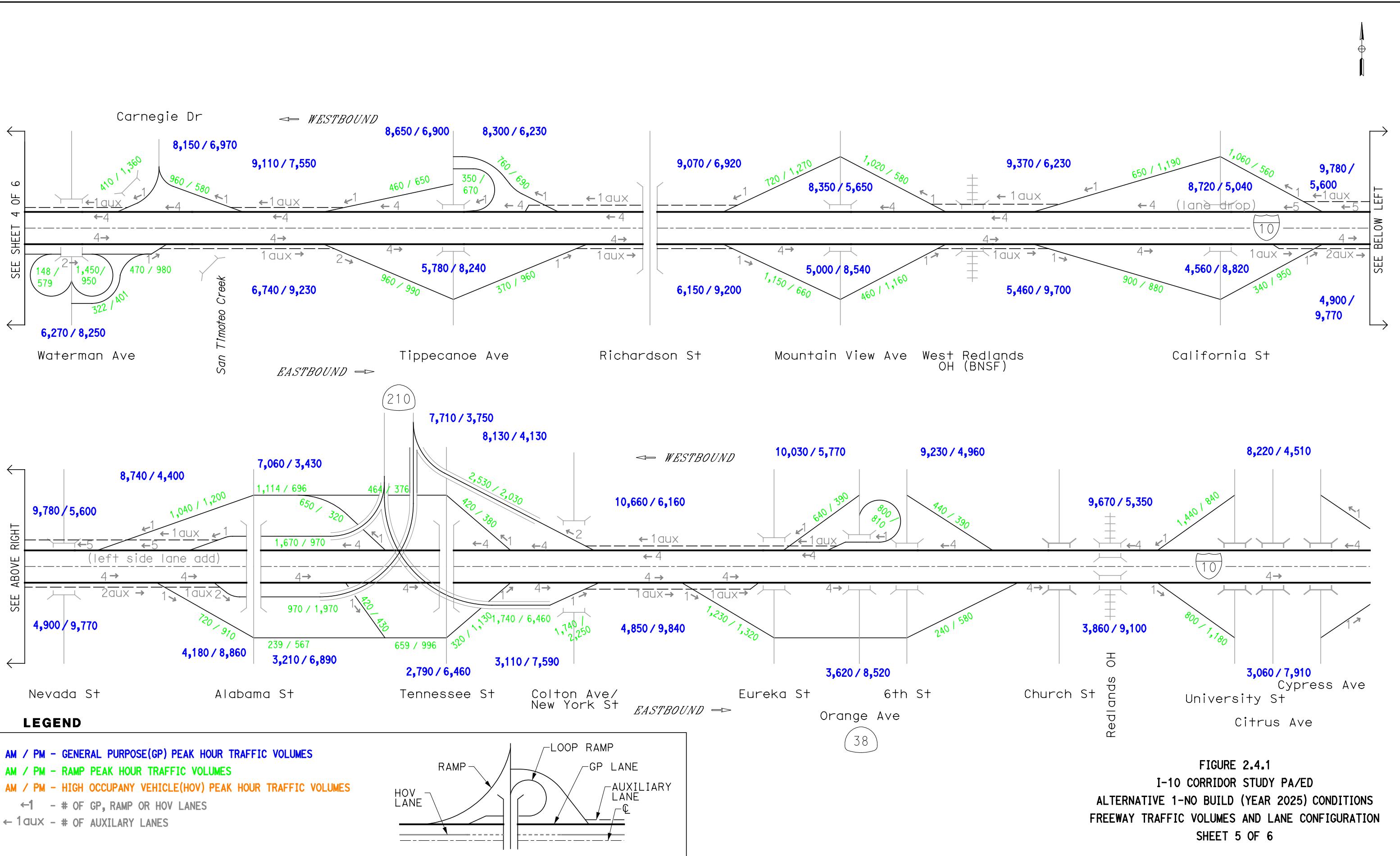
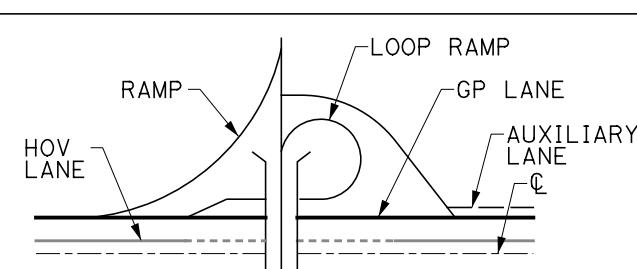
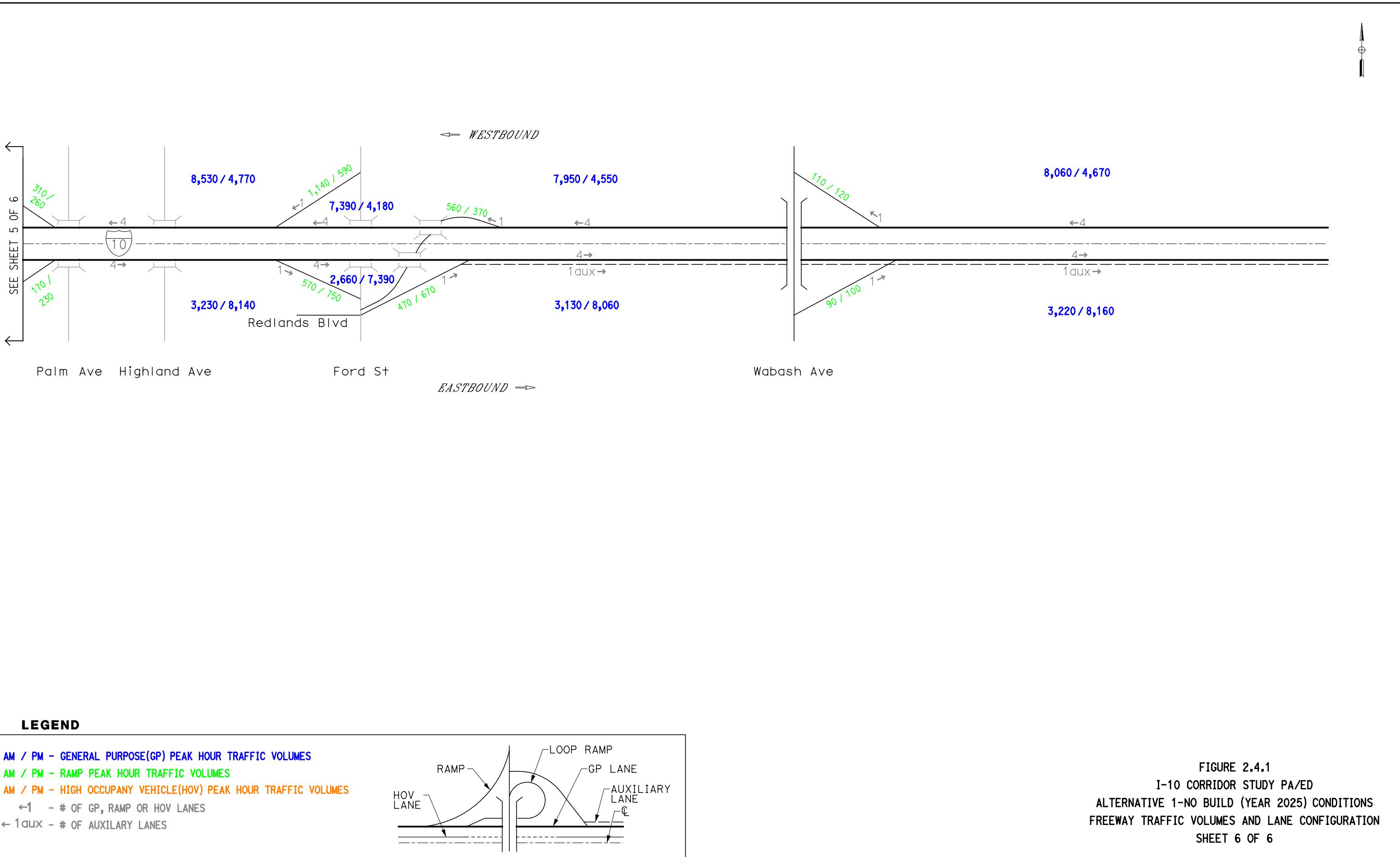
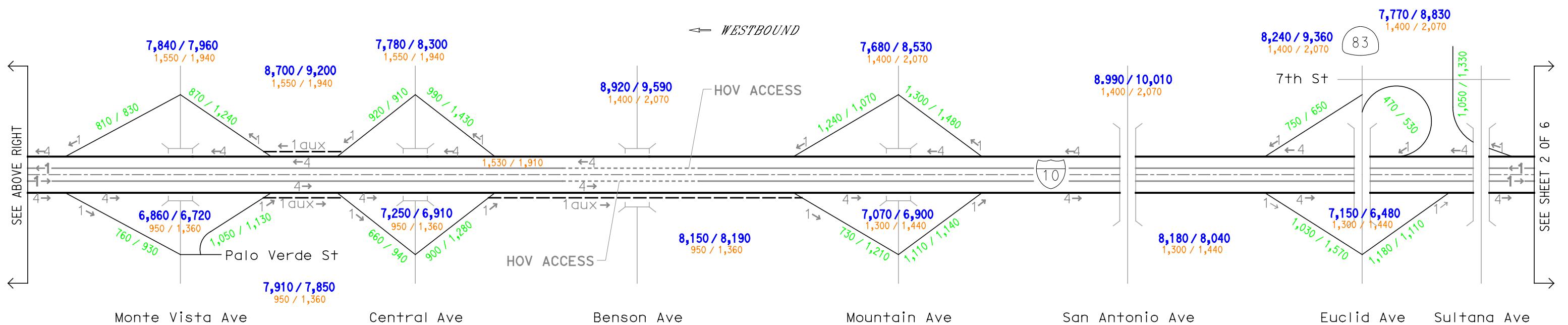
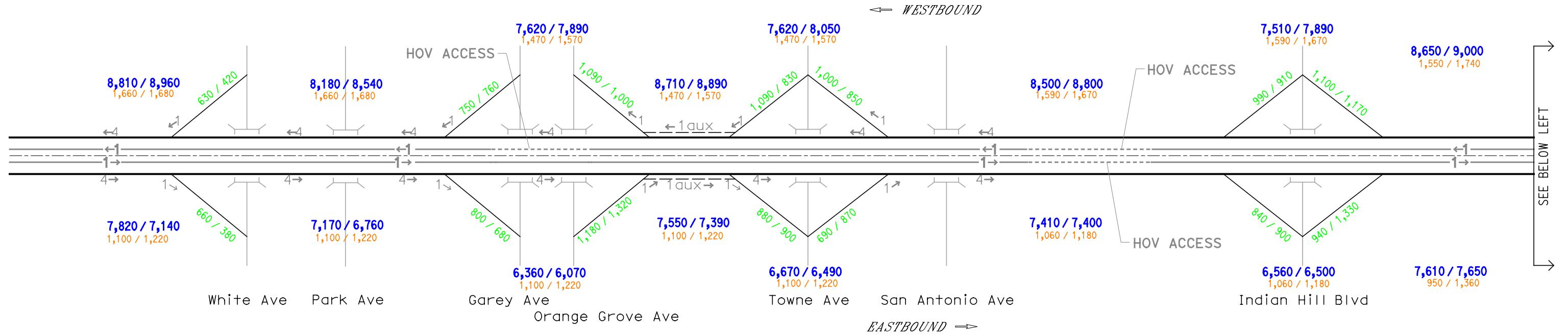


FIGURE 2.4.1  
 I-10 CORRIDOR STUDY PA/ED  
 ALTERNATIVE 1-NO BUILD (YEAR 2025) CONDITIONS  
 FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
 SHEET 3 OF 6









#### LEGEND

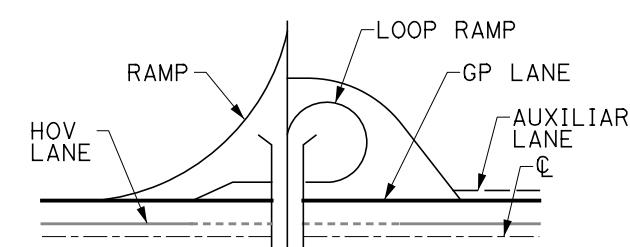
AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES

AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

AM / PM - HIGH OCCUPANT VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES

←1 - # OF GP, RAMP OR HOV LANES

←1aux - # OF AUXILIARY LANES



**FIGURE 2.4.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1-NO BUILD (YEAR 2045) CONDITIONS  
FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
SHEET 1 OF 6

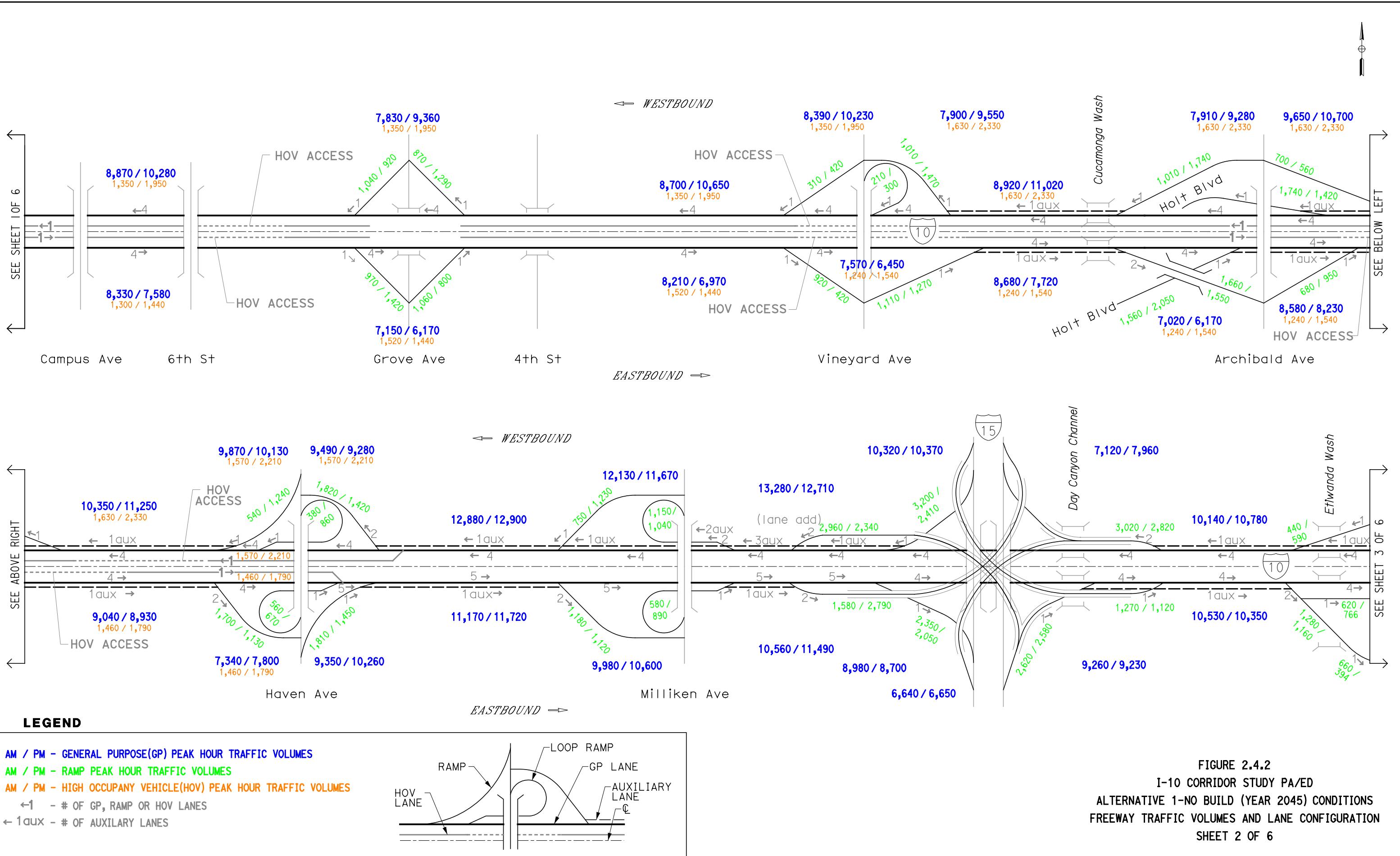
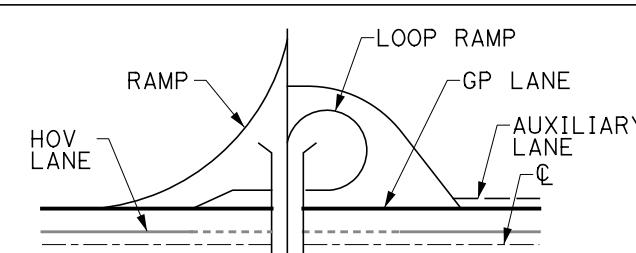
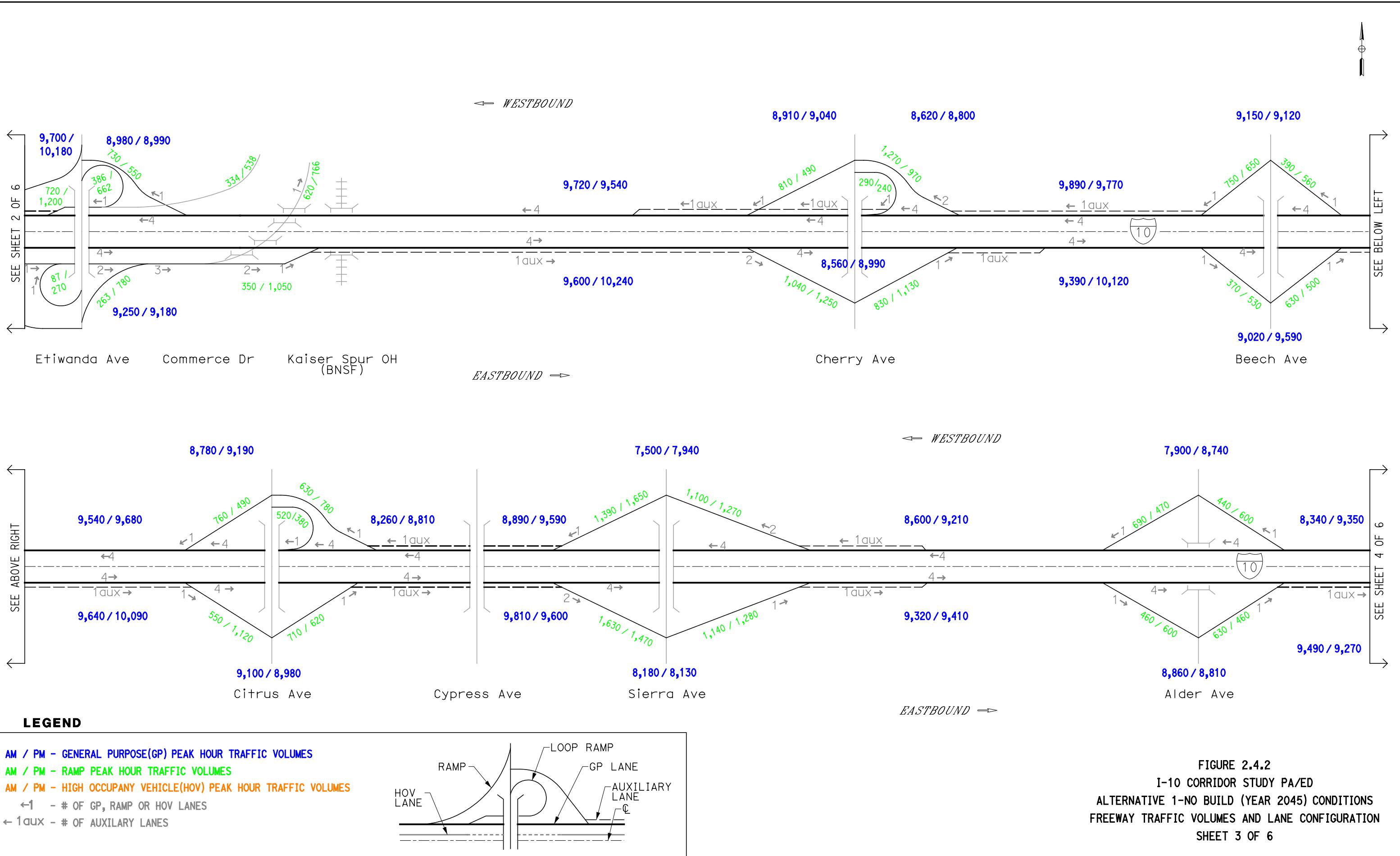
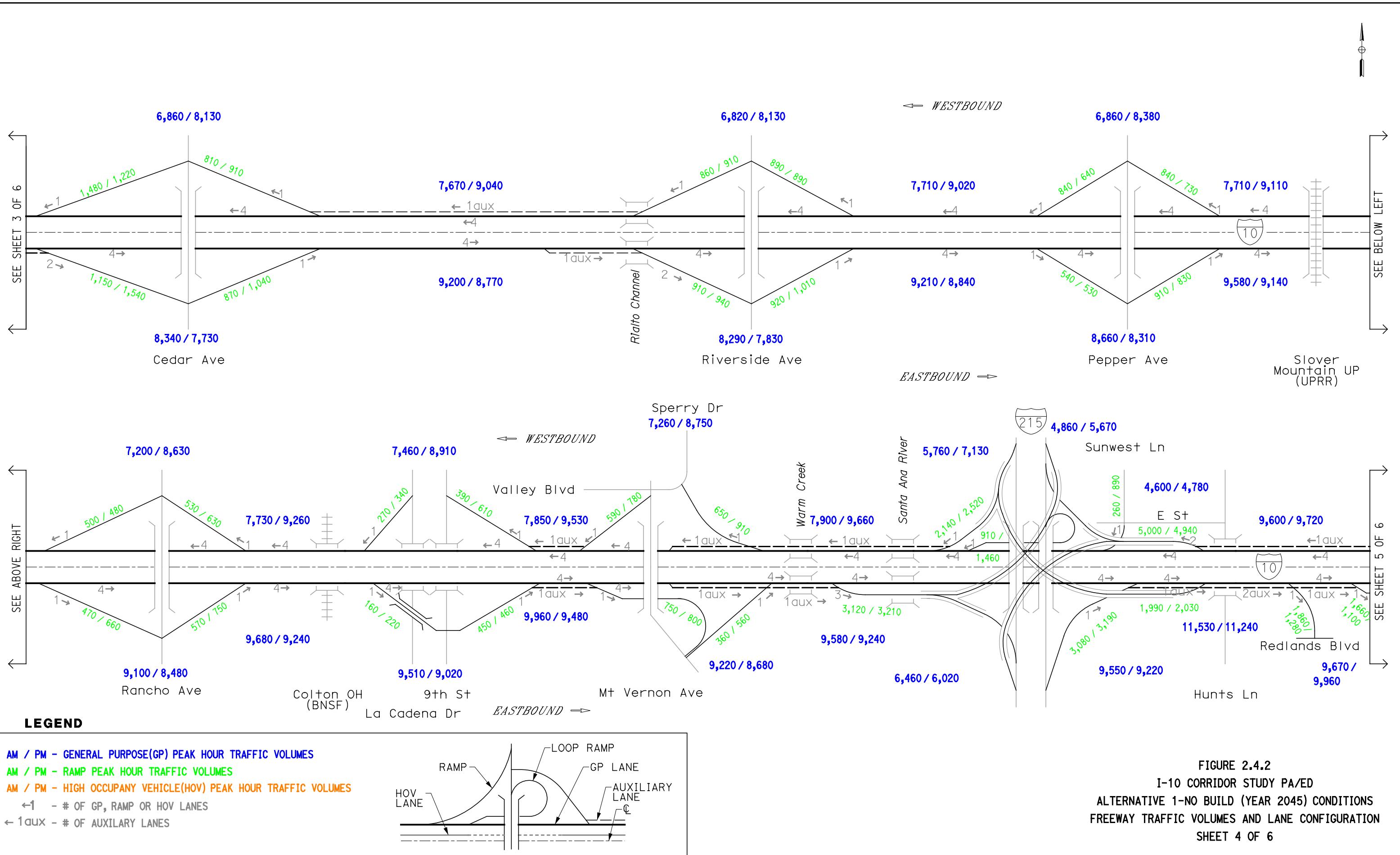
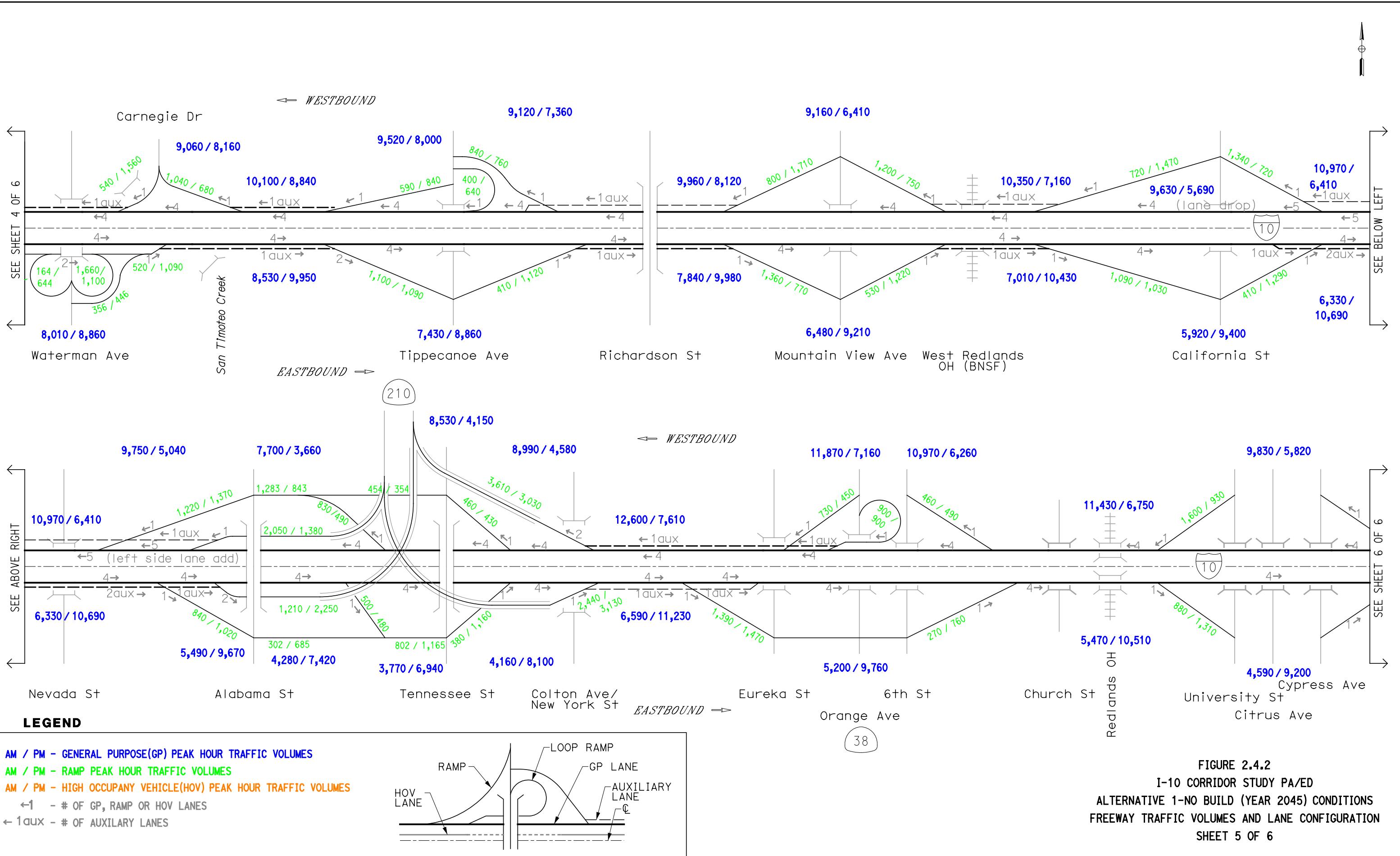


FIGURE 2.4.2  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1-NO BUILD (YEAR 2045) CONDITIONS  
FREWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
SHEET 2 OF 6

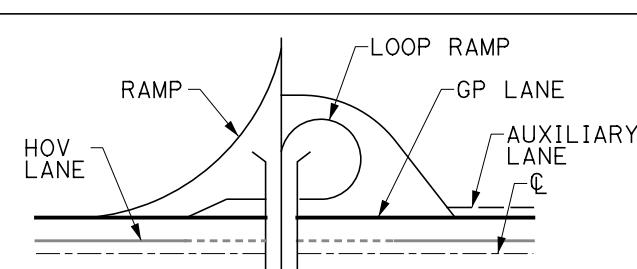
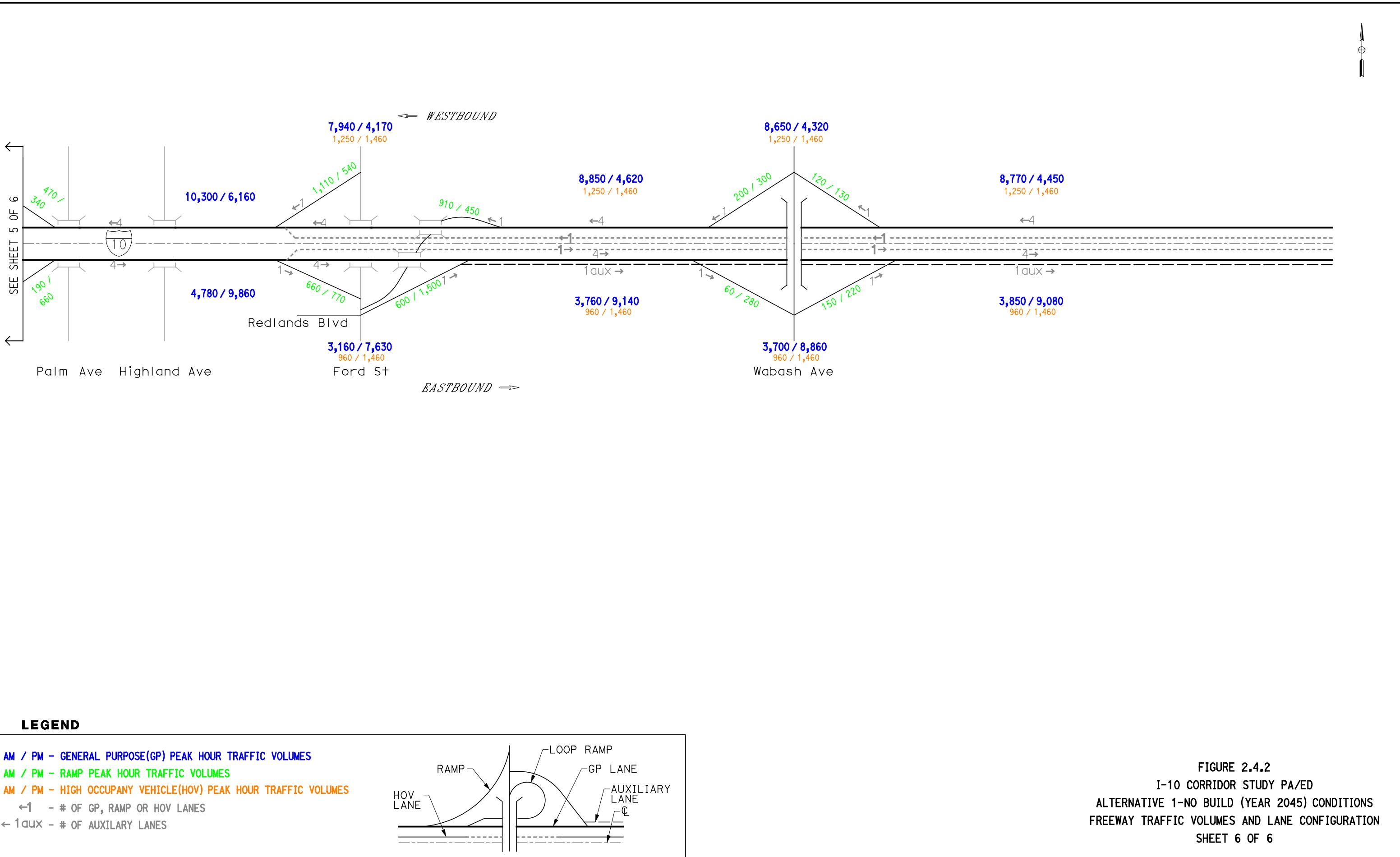




**FIGURE 2.4.2**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 1-NO BUILD (YEAR 2045) CONDITIONS**  
**FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION**  
**SHEET 4 OF 6**



**FIGURE 2.4.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1-NO BUILD (YEAR 2045) CONDITIONS  
FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
SHEET 5 OF 6



## 2.5 Alternative 2: One HOV in Each Direction Conditions Analysis

This section of the report provides an analysis of the mainline freeway, for the GP and HOV lanes as well as the freeway ramp junction locations for Alternative 2 (HOV) conditions using projected Opening Year (2025) and Design Year (2045) traffic volumes. The HCS freeway LOS analysis worksheets for Alternative 2 (HOV) conditions for Opening Year (2025) and Design Year (2045) are provided in [Appendix D-1](#) and [Appendix D-2](#), respectively.

As discussed in [Section 1.4.2](#), Alternative 2 extends the existing HOV lane in each direction of I-10 from the current HOV terminus near Haven Avenue in the City of Ontario to Ford Street in the City of Redlands. In addition to the extension of the HOV lane, Alternative 2 would also provide the following freeway improvements:

- Construct westbound auxiliary lane between Rancho Avenue and La Cadena Drive
- Modify one-lane off-ramps to two-lane off-ramps at the Waterman Avenue/Carnegie Drive westbound Off-Ramp

Year 2025 and 2045 Alternative 2 (HOV) lane configurations and morning and evening peak hour traffic volumes for the I-10 mainline and all interchange ramps within the project limits are illustrated on [Figure 2.5.1](#) and [Figure 2.5.2](#). A detailed discussion of the methodology to develop future conditions freeway traffic volumes is presented in [Section 2.2.2](#) of this report.

Alternative 2 ADT in 2025 is forecast to range from 302,000 in the western portion of the corridor to 214,000 in the eastern portion of the corridor and from 322,000 to 254,000 in 2045. Weekday daily VMT on I-10 within the study area is forecast to be 8.5 million vehicle miles in 2025 and 10.0 million vehicle miles in 2045 under Alternative 2. ADT and VMT data for Alternative 2 in 2025 and 2045 are presented in [Table 2.5.1](#).

Segment	Alternative 2 Condition I-10 Freeway Mainline Average Daily Traffic (ADT) and Vehicle Miles Travelled (VMT)			
	2025		2045	
	ADT	Daily VMT	ADT	Daily VMT
LA County Line to I-15	302,000	2,858,000	322,000	3,163,000
I-15 to I-215	235,000	3,160,000	268,000	3,873,000
I-215 to SR-210	247,000	1,282,000	283,000	1,551,000
SR-210 to Ford Street	214,000	1,151,000	254,000	1,426,000
<b>Total</b>	-	8,451,000	-	10,013,000

Source: SBTAM raw and post-processed data

### 2.5.1 Year 2025 Freeway Mainline Segment Analysis and Levels of Service

HCM 2000 basic freeway segment analysis was conducted for all I-10 segments except that, based on the segment and ramp lane configuration under year 2025 Alternative 1 (No Build) conditions, the HCM 2000 weaving analysis method is applied to segments where an on-ramp is closely followed by an off-ramp and the two are joined by an auxiliary lane. As discussed in [Section 2.1.2](#) and noted in [Table 2.5.2](#),

some weaving segments are categorized as a complex weaving segment. The analysis conducted for the complex weaving segments consists of two weaving analyses.

**Table 2.5.2** presents the LOS of each freeway segment with the proposed improvement for Alternative 2 (HOV). For the year 2025 Alternative 2 (HOV) condition the majority of the GP lane segments are expected to operate at LOS F during the morning or evening peak hours in both directions. In the eastbound direction, the majority of the LOS F condition segments are located west of the I-10/I-215 interchange. In the westbound direction, LOS F conditions are expected throughout the I-10 corridor within the project study limits during either the morning or evening peak hour except for the segment within the Cedar Avenue interchange. As shown in **Table 2.5.2**, a majority of the GP lane segments are anticipated to operate at LOS F due to the traffic demand volume exceeding capacity.

In the eastbound direction, the following GP lane segments are expected to operate at LOS F during the morning and/or evening peak hours in 2025:

- Between Dudley Street On-Ramp and White Avenue Off-Ramp
- Between Orange Grove Avenue On-Ramp and Towne Avenue Off-Ramp
- Between Towne Avenue On-Ramp and Indian Hill Boulevard Off-Ramp
- Between Indian Hill Boulevard On-Ramp and Monte Vista Avenue Off-Ramp
- Between Monte Vista Avenue On-Ramp and Central Avenue Off-Ramp
- Between Mountain Avenue On-Ramp and Euclid Avenue Off-Ramp
- Between Euclid Avenue On-Ramp and Grove Avenue Off-Ramp
- Between Grove Avenue On-Ramp and Vineyard Avenue Off-Ramp
- Between Vineyard Avenue On-Ramp and Archibald Avenue Off-Ramp
- Between Archibald Avenue On-Ramp and Haven Avenue Off-Ramp
- Between Haven Avenue Loop On-Ramp and Haven Avenue On-Ramp
- Between Haven Avenue Direct On-Ramp and Milliken Avenue Off-Ramp
- Between Milliken Avenue Loop On-Ramp and NB I-5 Off-Ramp
- Between NB/SB I-15 On-Ramp and Etiwanda Avenue Off-Ramp
- Between Cherry Avenue Off-Ramp and Cherry Avenue On-Ramp
- Between Cherry Avenue On-Ramp and Beech Avenue Off-Ramp
- Between Beech Avenue On-Ramp and Citrus Avenue Off-Ramp
- Between Citrus Avenue On-Ramp and Sierra Avenue On-Ramp
- Between Sierra Avenue On-Ramp and Cedar Avenue Off-Ramp
- Between Riverside Avenue On-Ramp and Pepper Avenue Off-Ramp
- Between Pepper Avenue On-Ramp and Rancho Avenue Off-Ramp
- Between Rancho Avenue On-Ramp and 9<sup>th</sup> Street Off-Ramp
- Between 9<sup>th</sup> Street On-Ramp and Mt Vernon Avenue Off-Ramp
- Between Mt Vernon Avenue On-Ramp and NB/SB I-215 Off-Ramp
- Between SB I-215 On-Ramp and Redlands Boulevard Off-Ramp
- Between Redlands Boulevard Off-Ramp and Waterman Avenue Off-Ramp
- Between Waterman Avenue Off-Ramp and Waterman Avenue On-Ramp
- Between Waterman Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Mountain View Avenue Off-Ramp
- Between Mountain View Avenue On-Ramp and California Street Off-Ramp
- Between California Street On-Ramp and Alabama Street Off-Ramp

- Between SB SR-210 On-Ramp and Eureka Street Off-Ramp
- Between 6<sup>th</sup> Street On-Ramp and University Street Off-Ramp

Similarly, LOS F conditions are expected on the following westbound GP lane segments:

- Between Yucaipa Blvd On-Ramp and Wabash Off-Ramp
- Between Wabash Avenue Off-Ramp and Ford Street Off-Ramp
- Between Ford Street On-Ramp and Cypress Avenue Off-Ramp
- Between University Street On-Ramp and 6<sup>th</sup> Street Off-Ramp
- Between Orange Avenue Direct/Loop On-Ramp and NB SR-210 Off-Ramp
- Between Alabama Street On-Ramp and California Street Off-Ramp
- Between California Street On-Ramp and Mountain View Avenue Off-Ramp
- Between Mountain View Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Carnegie Drive/Waterman Avenue Off-Ramp
- Between Carnegie Drive/Waterman Avenue On-Ramp and NB/SB I-215 Off-Ramp
- Between SB I-215 On-Ramp and Sperry Drive Off-Ramp
- Between Pepper Avenue On-Ramp and Riverside Avenue Off-Ramp
- Between Cedar Avenue On-Ramp to Sierra Avenue Off-Ramp
- Between Sierra Avenue On-Ramp and Citrus Avenue Off-Ramp
- Between Citrus Avenue On-Ramp and Beech Avenue Off-Ramp
- Between Beech Avenue On-Ramp and Cherry Avenue Off-Ramp
- Between Cherry Avenue On-Ramp and Etiwanda Avenue Off-Ramp
- Between Etiwanda Avenue Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp
- Between NB I-15 On-Ramp and Milliken Avenue Off-Ramp
- Between Milliken Avenue On-Ramp and Haven Avenue Off-Ramp
- Between Haven Avenue Direct On-Ramp and Archibald Avenue Off-Ramp
- Between Archibald Avenue Off-Ramp and Holt Boulevard Off-Ramp
- Between Holt Boulevard Off-Ramp and Archibald Avenue On-Ramp
- Between Archibald Avenue On-Ramp and Vineyard Avenue Off-Ramp
- Between Vineyard Avenue Direct On-Ramp and Grove Avenue Off-Ramp
- Between Grove Avenue On-Ramp and 7<sup>th</sup> Street Off-Ramp
- Between Euclid Avenue Direct On-Ramp and Mountain Avenue Off-Ramp
- Between Mountain Avenue On-Ramp and Central Avenue Off-Ramp
- Between Central Avenue On-Ramp and Monte Vista Avenue Off-Ramp
- Between Monte Vista Avenue On-Ramp and Indian Hill Boulevard Off-Ramp
- Between Indian Hill Boulevard On-Ramp and Towne Avenue Off-Ramp
- Between Towne Avenue On-Ramp and Orange Grove Avenue Off-Ramp
- Between Orange Grove Avenue Off-Ramp and Garey Avenue On-Ramp
- Between Garey Avenue On-Ramp and White Avenue On-Ramp
- Between White Avenue On-Ramp and Dudley Street Off-Ramp

As shown in **Table 2.5.2**, under the year 2025 Alternative 2 (HOV) condition the majority of HOV lane segments along I-10 within the project study area are expected to operate at LOS E or better during the peak hours in both directions. In the eastbound direction, the HOV segments are expected to operate at LOS C or better during the morning peak hour. During the evening peak hour, the following HOV lane segments are expected to operate at LOS F with d/c ratios ranging from 1.01 to 1.05:

- Between Indian Hill Boulevard On-Ramp and Monte Vista Avenue Off-Ramp
- Between Central Avenue On-Ramp and Mountain Avenue Off-Ramp
- Between Mountain Avenue Off-Ramp and Mountain Avenue On-Ramp
- Between Mountain Avenue On-Ramp and Euclid Avenue Off-Ramp
- Between Cypress Avenue On-Ramp and Ford Street Off-Ramp

In the westbound direction, the following HOV lane segments are expected to operate at LOS F during the morning and/or evening peak hour with d/c ratios ranging from 1.03 to 1.40:

- Between NB I-15 On-Ramp and Milliken Avenue Off-Ramp
- Between Milliken Avenue On-Ramp and Haven Avenue Off-Ramp
- Between Haven Avenue On-Ramp and Archibald Avenue Off-Ramp
- Between Archibald Avenue Off-Ramp and Holt Boulevard Off-Ramp
- Between Holt Boulevard Off-Ramp and Archibald Avenue On-Ramp
- Between Archibald Avenue On-Ramp and Vineyard Avenue Off-Ramp
- Between Vineyard Avenue Direct On-Ramp and Grove Avenue Off-Ramp
- Between Grove Avenue On-Ramp and 7<sup>th</sup> Street Off-Ramp
- Between Euclid Avenue Direct On-Ramp and Mountain Avenue Off-Ramp
- Between Mountain Avenue On-Ramp and Central Avenue Off-Ramp
- Between Central Avenue On-Ramp and Monte Vista Avenue Off-Ramp
- Between Monte Vista Avenue On-Ramp and Indian Hill Boulevard Off-Ramp
- Between Indian Hill Boulevard On-Ramp and Towne Avenue Off-Ramp
- Between Garey Avenue On-Ramp and White Avenue On-Ramp
- Between White Avenue On-Ramp and Dudley Street Off-Ramp

### **2.5.2 Year 2025 Ramps and Ramp-Freeway Junction Analysis and Levels of Service**

The density and LOS for each of the ramps along I-10 within the study area are based on the forecasted year 2025 Alternative 2 (HOV) traffic volumes. **Table 2.5.3** provides a summary of the findings from the analyses. The d/c ratio for each of the freeway ramps is also presented. It should be noted that when the GP lane segment is LOS F, the ramp junction also operates at LOS F, regardless of the flow rate entering the ramp influence area.

As discussed in **Section 2.1.3**, on- or off-ramps associated with lane additions and/or lane drops are not analyzed as a typical ramp junction (using the merge and diverge method). The operations of these special ramp conditions are based on the operation of the segment upstream and/or downstream of the ramp. Depending on the lane configuration, the basic freeway segment or the weave method is used to determine the operation of the segment. The special ramp conditions are indicated with “Lane Add”, “Lane Drop” or “Weaving Segment” in **Table 2.5.3**. The operations of the segments are summarized in **Table 2.5.2**. For major diverge locations, when a two-lane off-ramp results in a lane drop, the density and LOS are determined based on the HCM major diverge method described in **Section 2.1.3**.

Under the year 2025 Alternative 2 (HOV) condition, the ramp junction peak hour LOS varies from B to E, except that the following ramp junction locations operate at LOS F:

- White Avenue EB Direct Off-Ramp

- White Avenue WB Direct On-Ramp
- Garey Avenue WB Direct On-Ramp
- Towne Avenue EB Direct On-Ramp
- Towne Avenue WB Direct Off-Ramp
- Indian Hill Boulevard EB Direct Off-Ramp
- Indian Hill Boulevard EB Direct On-Ramp
- Indian Hill Boulevard WB Direct Off-Ramp
- Indian Hill Boulevard WB Direct On-Ramp
- Monte Vista Avenue EB Direct Off-Ramp
- Monte Vista Avenue WB Direct On-Ramp
- Central Avenue WB Direct Off-Ramp
- Mountain Avenue EB Direct On-Ramp
- Mountain Avenue WB Direct Off-Ramp
- Mountain Avenue WB Direct On-Ramp
- Euclid Avenue EB Direct Off-Ramp
- Euclid Avenue EB Direct On-Ramp
- Euclid Avenue WB Direct Off-Ramp to 7<sup>th</sup> Street
- Euclid Avenue WB Loop On-Ramp
- Euclid Avenue WB Direct On-Ramp
- Grove Avenue EB Direct Off-Ramp
- Grove Avenue EB Direct On-Ramp
- Grove Avenue WB Direct Off-Ramp
- Grove Avenue WB Direct On-Ramp
- Vineyard Avenue EB Direct Off-Ramp
- Vineyard Avenue WB Loop On-Ramp
- Vineyard Avenue WB Direct On-Ramp
- Archibald Avenue EB Direct On-Ramp
- Archibald Avenue WB Direct Off-Ramp
- Haven Avenue EB Direct Off-Ramp
- Haven Avenue EB Loop On-Ramp
- Haven Avenue WB Direct Off-Ramp
- Haven Avenue WB Loop On-Ramp
- Milliken Avenue EB Direct Off-Ramp
- Milliken Avenue WB Direct On-Ramp
- Etiwanda Avenue WB Direct Off-Ramp
- Cherry Avenue EB Direct On-Ramp
- Cherry Avenue WB Direct On-Ramp
- Beech Avenue EB Direct Off-Ramp
- Beech Avenue WB Direct Off-Ramp
- Citrus Avenue WB Loop On-Ramp
- Citrus Avenue WB Direct On-Ramp
- Sierra Avenue EB Direct Off-Ramp
- Sierra Avenue EB Direct On-Ramp
- Sierra Avenue WB Direct Off-Ramp
- Cedar Avenue EB Direct Off-Ramp
- Cedar Avenue WB Direct On-Ramp

- Riverside Avenue EB Direct On-Ramp
- Riverside Avenue WB Direct Off-Ramp
- Pepper Avenue EB Direct Off-Ramp
- Pepper Avenue EB Direct On-Ramp
- Pepper Avenue WB Direct On-Ramp
- Rancho Avenue EB Direct Off-Ramp
- Rancho Avenue EB Direct On-Ramp
- La Cadena Drive/9<sup>th</sup> Street EB Direct Off-Ramp
- Tippecanoe Avenue WB Loop On-Ramp
- Alabama Street EB Direct Off-Ramp
- Tennessee Street WB Direct Off-Ramp
- Eureka Street/Orange Street/6<sup>th</sup> Street EB Direct On-Ramp
- Eureka Street/Orange Street/6<sup>th</sup> Street WB Direct Off-Ramp
- University Street/Cypress Avenue EB Direct Off-Ramp
- University Street/Cypress Avenue WB Direct Off-Ramp
- University Street/Cypress Avenue WB Direct On-Ramp
- Ford Street WB Direct Off-Ramp
- Ford Street WB Direct On-Ramp
- Wabash Avenue WB Direct Off-Ramp

The majority of the ramp junction locations listed above are expected to operate at LOS F due to the LOS F condition expected for the GP lane segments upstream of the ramp. As shown in **Table 2.5.2**, the traffic demand volumes for the majority of the GP lane segments are expected to exceed the capacity of the segments resulting in a LOS F condition.

### 2.5.3 Year 2045 Freeway Mainline Segment Analysis and Levels of Service

HCM 2000 basic freeway segment analysis was conducted for all I-10 segments except that, based on the segment and ramp lane configuration under year 2045 Alternative 2 (HOV) conditions, the HCM 2000 weaving analysis method was applied to the same segments indicated in year 2025 Alternative 2 (HOV) condition. As discussed in **Section 2.1.2** and noted in **Table 2.5.4**, some weaving segments are categorized as a complex weaving segment. The analysis conducted for the complex weaving segments consists of two weaving analyses.

**Table 2.5.4** presents the LOS of each freeway segment. Under year 2045 Alternative 2 (HOV) conditions the majority of the GP lane segments are expected to operate at LOS F during the morning or the evening peak hours in both directions. As shown in the table, the GP lane segments are generally operating at LOS F due to the traffic demand volume exceeding capacity.

In the eastbound direction, the following additional GP lane segments are expected to operate at LOS F during the morning and/or evening peak hours in comparison to the year 2025 Alternative 2 (HOV) condition:

- Between White Avenue Off-Ramp and Garey Avenue Off-Ramp
- Between Central Avenue On-Ramp and Mountain Avenue Off-Ramp
- Between Mountain Avenue Off-Ramp and Mountain Avenue On-Ramp
- Between Holt Boulevard On-Ramp and Archibald Avenue On-Ramp

- Between Etiwanda Avenue On-Ramp and Cherry Avenue Off-Ramp
- Between Sierra Avenue On-Ramp and Alder Avenue Off-Ramp
- Between Alder Avenue On-Ramp and Cedar Avenue Off-Ramp
- Between Cedar Avenue On-Ramp and Riverside Avenue Off-Ramp
- Between NB I-215 On-Ramp and SB I-215 On-Ramp
- Between Alabama Street Off-Ramp and NB SR-210 Off-Ramp
- Between Cypress Avenue On-Ramp and Ford Street Off-Ramp
- Between Ford Street On-Ramp and Wabash Avenue Off-Ramp
- Between Wabash Avenue On-Ramp and Yucaipa Boulevard Off-Ramp

In the westbound direction, the following additional GP lane segments are expected to operate at LOS F during the morning and/or evening peak hours in comparison to the year 2025 Alternative 2 (HOV) condition:

- Between SB SR-210 On-Ramp and Alabama Street On-Ramp
- Between Mt Vernon Avenue On-Ramp and 9<sup>th</sup> Street Off-Ramp
- Between La Cadena Drive On-Ramp and Rancho Avenue Off-Ramp
- Between Rancho Avenue On-Ramp and Pepper Avenue Off-Ramp
- Between Riverside Avenue On-Ramp and Cedar Avenue Off-Ramp
- Between Cedar Avenue Off-Ramp and Cedar Avenue On-Ramp
- Between Cedar Avenue On-Ramp and Alder Avenue Off-Ramp
- Between Alder Avenue On-Ramp and Sierra Avenue Off-Ramp
- Between Citrus Avenue Off-Ramp and Citrus Avenue Loop On-Ramp
- Between Cherry Avenue Loop On-Ramp and Cherry Avenue On-Ramp

As shown in **Table 2.5.4**, under year 2045 Alternative 2 (HOV) conditions the eastbound and westbound HOV lane segments along I-10 within the project study area are expected to operate at LOS E or better during the morning and evening peak hour between the I-15 and I-215 interchanges. LOS F conditions are expected west of the I-15 interchange and east of the I-215 interchange.

In the eastbound direction, the following are the additional HOV lane segments expected to operate at LOS F in comparison to the year 2025 Alternative 2 (HOV) condition:

- Between Dudley Street On-Ramp and White Avenue Off-Ramp
- Between White Avenue Off-Ramp and Garey Avenue Off-Ramp
- Between Garey Avenue Off-Ramp and Orange Grove Avenue On-Ramp
- Between Orange Grove Avenue On-Ramp and Towne Avenue Off-Ramp
- Between Towne Avenue On-Ramp and Indian Hill Boulevard Off-Ramp
- Between Monte Vista Avenue On-Ramp and Central Avenue Off-Ramp
- Between Euclid Avenue On-Ramp and Grove Avenue Off-Ramp
- Between Grove Avenue On-Ramp and Vineyard Avenue Off-Ramp
- Between Archibald Avenue On-Ramp and Haven Avenue Off-Ramp
- Between Haven Avenue Loop On-Ramp and Haven Avenue On-Ramp
- Between Haven Avenue Direct On-Ramp and Milliken Avenue Off-Ramp
- Between SB I-215 On-Ramp and Redlands Boulevard Off-Ramp
- Between Redlands Boulevard Off-Ramp and Waterman Avenue Off-Ramp

- Between Waterman Avenue Off-Ramp and Waterman Avenue On-Ramp
- Between Waterman Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Mountain View Avenue Off-Ramp
- Between Mountain View Avenue On-Ramp and California Street Off-Ramp
- Between California Street On-Ramp and Alabama Street Off-Ramp
- Between Alabama Street Off-Ramp and NB SR-210 Off-Ramp
- Between NB SR-210 Off-Ramp and Tennessee Street Off-Ramp
- Between SB SR-210 On-Ramp and Eureka Street Off-Ramp
- Between 6<sup>th</sup> Street On-Ramp and University Street Off-Ramp
- Between Ford Street On-Ramp and Wabash Avenue Off-Ramp
- Between Wabash Avenue On-Ramp and Yucaipa Boulevard Off-Ramp

In the westbound direction, the following are the additional HOV lane segments expected to operate at LOS F in comparison to the year 2025 Alternative 2 (HOV) condition:

- Between Ford Street On-Ramp and Cypress Avenue Off-Ramp
- Between University Street On-Ramp and 6<sup>th</sup> Street Off-Ramp
- Between Orange Avenue Direct/Loop On-Ramp and NB SR-210 Off-Ramp
- Between SB SR-210/Alabama Street On-Ramp and California Street Off-Ramp
- Between California Street On-Ramp and Mountain View Avenue Off-Ramp
- Between Mountain View Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Carnegie Drive/Waterman Avenue Off-Ramp
- Between Carnegie Drive/Waterman Avenue On-Ramp and NB/SB I-215 Off-Ramp
- Between SB I-215 On-Ramp and Sperry Drive Off-Ramp
- Between Etiwanda Avenue Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp
- Between SB I-15 On-Ramp and NB I-15 On-Ramp

#### **2.5.4 Year 2045 Ramps and Ramp-Freeway Junction Analysis and Levels of Service**

The density and LOS for each of the ramps along I-10 within the study area are based on the forecasted year 2045 Alternative 2 (HOV) traffic volumes. **Table 2.5.5** provides a summary of the findings from the analyses. The d/c ratio for each of the freeway ramps is also presented. It should be noted that when the GP lane segment is LOS F, the ramp junction also operates at LOS F, regardless of the flow rate entering the ramp influence area.

As discussed in **Section 2.1.3**, on- or off-ramps associated with lane additions and/or lane drops are not analyzed as a typical ramp junction (using the merge and diverge method). The operations of these special ramp conditions are based on the operation of the segment upstream and/or downstream of the ramp. Depending on the lane configuration, the basic freeway segment or the weave methods are used to determine the operation of the segment. The special ramp conditions are indicated with “Lane Add”, “Lane Drop” or “Weaving Segment” in **Table 2.5.5**. The operations of the segments are summarized in **Table 2.5.4**. For major diverge locations, when a two-lane off-ramp results in a lane drop, the density and LOS are determined based on the HCM major diverge method described in **Section 2.1.3**.

Under year 2045 Alternative 2 (HOV) conditions, the ramp junction peak hour LOS varies from B to E, except that the following additional ramp junction locations operate at LOS F in comparison to the year 2025 Alternative 2 (HOV) condition:

- Garey Avenue EB Direct Off-Ramp
- Cherry Avenue EB Direct off-Ramp
- Alder Avenue EB Direct Off-Ramp
- Alder Avenue EB Direct On-Ramp
- Alder Avenue WB Direct Off-Ramp
- Alder Avenue WB Direct On-Ramp
- Cedar Avenue EB Direct On-Ramp
- Riverside Avenue EB Direct Off-Ramp
- Pepper Avenue WB Direct Off-Ramp
- Rancho Avenue WB Direct On-Ramp
- Alabama Street WB Direct Off-Ramp
- SR-210 EB Direct Off-Ramp
- University Street/Cypress Avenue EB Direct On-Ramp
- Ford Street EB Direct Off-Ramp
- Ford Street EB Direct On-Ramp
- Wabash Avenue EB Direct Off-Ramp
- Wabash Avenue EB Direct On-Ramp
- Wabash Avenue WB Direct On-Ramp

The majority of the ramp junction locations listed above operate at LOS F due to the LOS F condition for the GP lane segments upstream of the ramp. As shown in **Table 2.5.4**, the majority of the GP lane segments are expected to operate at LOS F due to traffic demand volume exceeding capacity.

### **2.5.5 Average Peak Hour Speed, Vehicle Hours of Delay and Cost of Delay**

Based on SBTAM forecast data for Alternative 2 and depending upon time of day and direction of travel, average speeds on I-10 during peak hours for a trip between the LA County line and the Ford Street interchange (a distance of approximately 33 miles) are anticipated to range from 36 to 48 mph in the GP lanes in 2025 and 24 to 30 mph in 2045. Average travel speeds in the HOV lanes during peak hours are anticipated to range from 43 to 65 mph in 2025 and from 29 to 57 mph in 2045. **Table 2.5.6** provides a summary of the average travel speeds anticipated along the I-10 corridor under Alternative 2 in 2025 and 2045.

**Table 2.5.7** shows that approximately 20,000 vehicle hours of delay are anticipated on I-10 within the study area on a typical weekday in 2025 under Alternative 2 and approximately 27,000 vehicle hours of delay in 2045. On an annual basis approximately 5.1 million vehicle hours of delay are anticipated in year 2025 and 6.8 million vehicle hours in 2045. The annual cost of those hours of delay in 2025 is estimated at \$80 million and \$107 million in 2045.

Direction and Lane Type	Table 2.5.6 Alternative 2 Condition I-10 Freeway Mainline Average Peak Hour Speeds between the LA/SB County Line and Ford Street			
	2025		2045	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Eastbound GP Lanes	48	40	30	29
Westbound GP Lanes	36	41	24	30
Eastbound HOV Lane	65	54	57	38
Westbound HOV Lane	56	43	32	29

Source: SBTAM post-processed data

	Table 2.5.7 Alternative 2 Condition I-10 Freeway Mainline Vehicle Hours of Delay and Cost of Delay	
	2025	2045
Daily Vehicle Hours of Delay on Weekdays <sup>1</sup>	20,349	27,281
Annual Vehicle Hours of Delay on Weekdays <sup>2</sup>	5,087,245	6,820,185
Annual Costs of Delay <sup>3</sup>	\$80,000,000	\$107,000,000

1. Source: SBTAM.

2. Based on 250 weekdays per year.

3. Cost based on weekday hours of delay times cost of hourly delay from Caltrans "Life-Cycle Benefit-Cost Analysis Economic Parameters 2012" (available at [http://www.dot.ca.gov/hq/tpp/offices/eab/benefit\\_cost/LCBCA-economic\\_parameters.html](http://www.dot.ca.gov/hq/tpp/offices/eab/benefit_cost/LCBCA-economic_parameters.html)) assuming 9% trucks, which is the corridor average.

Table 2.5.2: Year 2025 Alternative 2 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type				Capacity <sup>2,3</sup>		AM Peak Hour				PM Peak Hour									
	HOV		GP & AUX		HOV		GP & AUX		HOV		GP & AUX									
	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c						
EASTBOUND																				
Between Dudley St On-Ramp and White Ave Off-Ramp	1	4	0	1,600	7,400	0	1,100	0.69	C	7,550	1.02	*	F	1,300	0.81	D	7,350	1.00	30.8	D
Between White Ave Off-Ramp and Garey Ave Off-Ramp	1	4	0	1,600	7,400	0	1,100	0.69	C	6,980	0.94	28.5	D	1,300	0.81	D	7,050	0.95	28.9	D
Between Garey Ave Off-Ramp and Orange Grove Ave On-Ramp	1	4	0	1,600	7,400	0	1,100	0.69	C	6,240	0.84	25.8	C	1,300	0.81	D	6,450	0.87	26.7	D
Between Orange Grove Ave On-Ramp and Towne Ave Off-Ramp	1	4	1	1,600	7,400	0	1,100	0.69	C	7,300	0.99	31.1	D	1,300	0.81	D	7,620	1.03	*	F
Between Towne Ave On-Ramp and Indian Hill Blvd Off-Ramp	1	4	0	1,600	7,400	0	1,100	0.69	C	7,120	0.96	29.3	D	1,300	0.81	D	7,580	1.02	*	F
Between Indian Hill Blvd On-Ramp and Monte Vista Ave Off-Ramp	1	4	0	1,600	7,400	0	1,130	0.71	C	7,110	0.96	29.3	D	1,660	1.04	F	7,440	1.01	*	F
Between Monte Vista Ave On-Ramp and Central Ave Off-Ramp	1	4	1	1,600	7,400	0	790	0.49	B	7,620	1.03	*	F	1,590	0.99	E	7,620	1.03	*	F
Between Central Ave On-Ramp and Mountain Ave Off-Ramp	1	4	1	1,600	7,400	1,000	840	0.53	B	7,640	0.91	23.9	C	1,680	1.05	F	7,820	0.93	24.6	C
Between Mountain Ave Off-Ramp and Mountain Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	840	0.53	B	6,930	0.94	28.3	D	1,680	1.05	F	6,730	0.91	27.3	D
Between Mountain Ave On-Ramp and Euclid Ave Off-Ramp	1	4	0	1,600	7,400	0	880	0.55	C	7,830	1.06	*	F	1,610	1.01	F	7,830	1.06	*	F
Between Euclid Ave On-Ramp and Grove Ave Off-Ramp	1	4	0	1,600	7,400	0	810	0.51	B	7,970	1.08	*	F	1,500	0.94	E	7,510	1.01	*	F
Between Grove Ave On-Ramp and Vineyard Ave Off-Ramp	1	4	0	1,600	7,400	0	1,120	0.70	C	7,450	1.01	*	F	1,580	0.99	E	6,680	0.90	27.0	D
Between Vineyard Ave On-Ramp and Archibald Ave Off-Ramp	1	4	1	1,600	7,400	0	890	0.56	C	7,750	1.05	*	F	1,400	0.88	D	7,380	1.00	26.6	C
Between Holt Blvd On-Ramp and Archibald Ave On-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	890	0.56	C	7,680	0.91	24.1	C	1,400	0.88	D	7,900	0.94	24.9	C
Between Archibald Ave On-Ramp and Haven Ave Off-Ramp	1	4	1	1,600	7,400	1,000	680	0.43	B	8,450	1.01	*	F	1,330	0.83	D	8,840	1.05	*	F
Between Haven Ave Loop On-Ramp and Haven Ave On-Ramp	1	4	0	1,600	7,400	0	680	0.43	B	7,170	0.97	22.4	C	1,330	0.83	D	7,960	1.08	*	F
Between Haven Ave Direct On-Ramp and Milliken Ave Off-Ramp	1	4	1	1,600	7,400	1,000	620	0.39	B	8,870	1.06	*	F	1,250	0.78	D	9,350	1.11	*	F
Between Milliken Ave Loop On-Ramp and NB I-15 Off-Ramp	1	4	2	1,600	7,400	1,000	420	0.26	A	8,660	1.03	*	F	940	0.59	C	9,630	1.15	*	F
Between NB I-15 Off-Ramp and SB I-15 Off-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	420	0.26	A	7,250	0.86	23.4	C	940	0.59	C	7,110	0.85	22.9	C
Between SB I-15 Off-Ramp and NB I-15 On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	370	0.23	A	5,280	0.71	21.7	C	880	0.55	C	5,320	0.72	21.9	C
Between NB/SB I-15 On-Ramp and Etiwanda Ave Off-Ramp	1	4	1	1,600	7,400	1,000	370	0.23	A	7,310	0.87	25.1	C	880	0.55	C	7,450	0.89	25.6	C
Between Etiwanda Ave On-Ramp and Cherry Ave Off-Ramp	1	4	1	1,600	7,400	1,850	310	0.19	A	7,680	0.83	23.7	C	810	0.51	B	8,420	0.91	26.3	D
Between Cherry Ave Off-Ramp and Cherry Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	310	0.19	A	6,940	0.94	27.8	D	670	0.42	B	7,520	1.02	*	F
Between Cherry Ave On-Ramp and Beach Ave Off-Ramp	1	4	0	1,600	7,400	0	310	0.19	A	7,470	1.01	*	F	670	0.42	B	8,240	1.11	*	F
Between Beach Ave On-Ramp and Citrus Ave Off-Ramp	1	4	1	1,600	7,400	0	320	0.20	A	7,590	1.03	*	F	660	0.41	B	8,070	1.09	*	F
Between Citrus Ave On-Ramp and Sierra Ave On-Ramp	1	4	1	1,600	7,400	0	380	0.24	A	7,590	1.03	*	F	780	0.49	B	7,600	1.03	*	F

Table 2.5.2: Year 2025 Alternative 2 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type						Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour							
	HOV			GP & AUX			HOV			GP & AUX			GP & AUX							
	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>					
Between Sierra Ave On-Ramp and Cedar Ave Off-Ramp	1	4	0	1,600	7,400	0	350	0.22	A	7,150	0.97	28.9	D	720	0.45	B	7,460	1.01	*	F
Between Cedar Ave On-Ramp and Riverside Ave Off-Ramp	1	4	0	1,600	7,400	0	340	0.21	A	7,290	0.99	29.7	D	710	0.44	B	7,280	0.98	29.6	D
Between Riverside Ave On-Ramp and Pepper Ave Off-Ramp	1	4	0	1,600	7,400	0	360	0.23	A	7,600	1.03	*	F	730	0.46	B	7,570	1.02	*	F
Between Pepper Ave On-Ramp and Rancho Ave Off-Ramp	1	4	0	1,600	7,400	0	410	0.26	A	7,970	1.08	*	F	750	0.47	B	7,830	1.06	*	F
Between Rancho Ave On-Ramp and 9th St Off-Ramp	1	4	0	1,600	7,400	0	390	0.24	A	8,170	1.10	*	F	760	0.48	B	8,000	1.08	*	F
Between 9th St On-Ramp and Mt. Vernon Ave Off-Ramp	1	4	1	1,600	7,400	0	410	0.26	A	8,450	1.14	*	F	820	0.51	B	8,180	1.11	*	F
Between Mt. Vernon Ave On-Ramp and NB/SB I-215 Off-Ramp	1	4	1	1,600	7,400	0	430	0.27	A	8,240	1.11	*	F	880	0.55	C	8,140	1.10	*	F
Between NB I-215 On-Ramp and SB I-215 On-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	460	0.29	A	8,220	0.98	25.6	C	950	0.59	C	8,140	0.97	25.3	C
Between SB I-215 On-Ramp and Redlands Blvd Off-Ramp	1	4	2	1,600	7,400	1,000	480	0.30	A	9,810	1.17	*	F	1,010	0.63	C	10,090	1.20	*	F
Between Redlands Blvd Off-Ramp and Waterman Ave Off-Ramp	1	4	1	1,600	7,400	1,000	490	0.31	A	8,130	0.97	25.3	C	1,030	0.64	C	8,970	1.07	*	F
Between Waterman Ave Off-Ramp and Waterman Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	490	0.31	A	6,670	0.90	26.5	D	1,030	0.64	C	8,000	1.08	*	F
Between Waterman Ave On-Ramp and Tippecanoe Ave Off-Ramp	1	4	1	1,600	7,400	0	660	0.41	B	6,970	0.94	24.4	C	1,270	0.79	D	8,740	1.18	*	F
Between Tippecanoe Ave On-Ramp and Mountain View Ave Off-Ramp	1	4	1	1,600	7,400	0	660	0.41	B	6,370	0.86	23.1	C	1,190	0.74	C	8,830	1.19	*	F
Between Mountain View Ave On-Ramp and California St Off-Ramp	1	4	1	1,600	7,400	0	670	0.42	B	5,680	0.77	20.2	C	1,320	0.83	D	9,120	1.23	*	F
Between California St On-Ramp and Alabama St Off-Ramp	1	4	1	1,600	7,400	1,000	690	0.43	B	5,140	0.61	16.3	B	1,380	0.86	D	9,180	1.09	*	F
Between Alabama St Off-Ramp and NB SR-210 Off-Ramp	1	4	1	1,600	7,400	1,000	690	0.43	B	4,450	0.53	14.1	B	1,380	0.86	D	8,250	0.98	26.7	D
Between NB SR-210 Off-Ramp and Tennessee St Off-Ramp	1	4	0	1,600	7,400	0	770	0.48	B	3,510	0.47	14.2	B	1,440	0.90	D	6,140	0.83	25.0	C
Between SR-210 On-Ramp and Eureka St Off-Ramp	1	4	1	1,600	7,400	1,000	850	0.53	B	5,170	0.62	23.0	C	1,500	0.94	E	9,030	1.08	*	F
Between 6th St On-Ramp and University St Off-Ramp	1	4	0	1,600	7,400	0	930	0.58	C	4,100	0.55	16.6	B	1,560	0.98	E	8,230	1.11	*	F
Between Cypress Ave On-Ramp and Ford St Off-Ramp	1	4	0	1,600	7,400	0	1,000	0.63	C	3,410	0.46	14.3	B	1,610	1.01	F	7,270	0.98	31.3	D
Between Ford St On-Ramp and Wabash Ave On-Ramp	0	5	0	0	9,250	0	--	--	--	4,200	0.45	13.8	B	--	--	--	8,680	0.94	28.8	D
Between Wabash Ave On-Ramp and Yucaipa Blvd Off-Ramp	0	5	0	0	9,250	0	--	--	--	4,280	0.46	14.1	B	--	--	--	8,770	0.95	29.2	D
<b>WESTBOUND</b>																				
Between Yucaipa Blvd On-Ramp and Wabash Ave Off-Ramp	0	4	0	0	7,400	0	--	--	--	8,160	1.10	*	F	--	--	--	4,980	0.67	21.3	C
Between Wabash Ave Off-Ramp and Ford St Off-Ramp	0	4	0	0	7,400	0	--	--	--	8,050	1.09	*	F	--	--	--	4,860	0.66	20.7	C
Between Ford St On-Ramp and Cypress Ave Off-Ramp	1	4	0	1,600	7,400	0	860	0.54	B	7,920	1.07	*	F	1,030	0.64	C	4,050	0.55	17.3	B
Between University St On-Ramp and 6th St Off-Ramp	1	4	0	1,600	7,400	0	920	0.58	C	9,010	1.22	*	F	1,050	0.66	C	4,620	0.62	18.8	C

Table 2.5.2: Year 2025 Alternative 2 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type						Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour			
	HOV			GP & AUX			HOV			GP & AUX			GP & AUX			
	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	
Between Orange Ave Direct/Loop On-Ramp and NB SR-210 Off-Ramp	1	4	1	1,600	7,400	1,000	1,140	0.71	C	9,190	1.09	*	F	1,090	0.68	C
Between SB SR-210 On-Ramp and Alabama St On-Ramp	1	4	1	1,600	7,400	1,000	1,140	0.71	C	9,830	1.17	*	F	1,090	0.68	C
Between Alabama St On-Ramp and California St Off-Ramp	1	4	2	1,600	7,400	1,000	840	0.53	B	9,390	1.12	*	F	1,330	0.83	D
Between California St On-Ramp and Mountain View Ave Off-Ramp	1	4	1	1,600	7,400	0	740	0.46	B	9,020	1.22	*	F	1,400	0.88	D
Between Mountain View Ave On-Ramp and Tippecano Ave Off-Ramp	1	4	1	1,600	7,400	0	1,040	0.65	C	8,440	1.14	*	F	1,370	0.86	D
Between Tippecano Ave On-Ramp and Waterman Ave Off-Ramp	1	4	1	1,600	7,400	0	1,100	0.69	C	8,420	1.14	*	F	1,520	0.95	E
Between Carnegie Dr/Waterman Ave On-Ramp and NB/SB I-215 Off-Ramp	1	4	1	1,600	7,400	0	560	0.35	B	8,360	1.13	*	F	1,200	0.75	D
Between SB I-215 On-Ramp and Sperry Dr Off-Ramp	1	4	1	1,600	7,400	0	650	0.41	B	6,620	0.89	25.1	C	1,220	0.76	D
Between Mt. Vernon Ave On-Ramp and 9th St Off-Ramp	1	4	1	1,600	7,400	0	720	0.45	B	6,410	0.87	25.0	C	1,190	0.74	C
Between La Cadena Dr On-Ramp and Rancho Ave Off-Ramp	1	4	1	1,600	7,400	0	740	0.46	B	6,280	0.85	22.2	C	1,220	0.76	D
Between Rancho Ave On-Ramp and Pepper Ave Off-Ramp	1	4	0	1,600	7,400	0	760	0.48	B	6,170	0.83	25.3	C	1,250	0.78	D
Between Pepper Ave On-Ramp and Riverside Ave Off-Ramp	1	4	0	1,600	7,400	0	430	0.27	A	6,570	0.89	27.2	D	580	0.36	B
Between Riverside Ave On-Ramp and Cedar Ave Off-Ramp	1	4	1	1,600	7,400	1,000	450	0.28	A	6,550	0.78	20.8	C	570	0.36	B
Between Cedar Ave Off-Ramp and Cedar Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	450	0.28	A	5,660	0.76	23.1	C	570	0.36	B
Between Cedar Ave On-Ramp and Sierra Ave Off-Ramp	1	4	0	1,600	7,400	0	470	0.29	A	6,950	0.94	28.0	D	550	0.34	B
Between Sierra Ave On-Ramp and Citrus Ave Off-Ramp	1	4	1	1,600	7,400	0	530	0.33	B	7,220	0.98	22.3	C	590	0.37	B
Between Citrus Ave Off-Ramp and Citrus Ave Loop On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	530	0.33	B	6,650	0.90	27.6	D	590	0.37	B
Between Citrus Ave On-Ramp and Beech Ave Off-Ramp	1	4	0	1,600	7,400	0	460	0.29	A	7,950	1.07	*	F	450	0.28	A
Between Beech Ave On-Ramp and Cherry Ave Off-Ramp	1	4	1	1,600	7,400	0	440	0.28	A	8,440	1.14	*	F	380	0.24	A
Between Cherry Ave Loop On-Ramp and Cherry Ave On-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	440	0.28	A	7,660	0.91	23.8	C	380	0.24	A
Between Cherry Ave On-Ramp and Etiwanda Ave Off-Ramp	1	4	0	1,600	7,400	0	720	0.45	B	8,150	1.10	*	F	1,050	0.66	C
Between Etiwanda Ave Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp	1	4	1	1,600	7,400	1,000	890	0.56	C	8,020	0.95	26.8	C	1,230	0.77	D
Between SB I-15 On-Ramp and NB I-15 On-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,850	1,220	0.76	D	8,480	0.92	27.2	D	1,480	0.93	E
Between NB I-15 On-Ramp and Milliken Ave Off-Ramp	1	4	3	1,600	7,400	1,850	1,720	1.08	F	10,650	1.15	*	F	1,860	1.16	F
Between Milliken Ave On-Ramp and Haven Ave Off-Ramp	1	4	1	1,600	7,400	1,850	2,210	1.38	F	9,970	1.08	*	F	2,230	1.39	F
Between Haven Ave Direct On-Ramp and Archibald Ave Off-Ramp	1	4	1	1,600	7,400	1,000	1,970	1.23	F	9,480	1.13	*	F	2,240	1.40	F

Table 2.5.2: Year 2025 Alternative 2 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type				Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour			GP & AUX					
	HOH	GP	XVA	OH	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	HOV	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	GP & AUX	
Between Archibald Ave Off-Ramp and Holt Blvd Off-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	1,970	1.23	F	8,850	1.05	*	F	2,240	1.40	F	10,080	1.20	*
Between Holt Blvd Off-Ramp and Archibald Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	1,200	0.75	D	8,090	1.09	*	F	2,210	1.38	F	8,820	1.19	*
Between Archibald Ave On-Ramp and Vineyard Ave Off-Ramp	1	4	1	1,600	7,400	0	1,200	0.75	D	8,780	1.19	*	F	2,210	1.38	F	10,160	1.37	*
Between Vineyard Ave Direct On-Ramp and Grove Ave Off-Ramp	1	4	0	1,600	7,400	0	1,460	0.91	E	8,110	1.10	*	F	2,280	1.43	F	9,350	1.26	*
Between Grove Ave On-Ramp and 7th St Off-Ramp	1	4	0	1,600	7,400	0	1,240	0.78	D	8,670	1.17	*	F	2,120	1.33	F	9,420	1.27	*
Between Euclid Ave Direct On-Ramp and Mountain Ave Off-Ramp	1	4	0	1,600	7,400	0	1,330	0.83	D	8,730	1.18	*	F	2,060	1.29	F	9,390	1.27	*
Between Mountain Ave On-Ramp and Central Ave Off-Ramp	1	4	0	1,600	7,400	0	1,720	1.08	F	8,260	1.12	*	F	2,060	1.29	F	8,990	1.21	*
Between Central Ave On-Ramp and Monte Vista Ave Off-Ramp	1	4	1	1,600	7,400	0	1,560	0.98	E	8,390	1.13	*	F	1,700	1.06	F	8,880	1.20	*
Between Monte Vista Ave On-Ramp and Indian Hill Blvd Off-Ramp	1	4	0	1,600	7,400	0	1,590	0.99	E	8,390	1.13	*	F	1,730	1.08	F	8,580	1.16	*
Between Indian Hill Blvd On-Ramp and Towne Ave Off-Ramp	1	4	0	1,600	7,400	0	1,600	1.00	E	8,440	1.14	*	F	1,640	1.03	F	8,560	1.16	*
Between Towne Ave On-Ramp and Orange Grove Ave Off-Ramp	1	4	1	1,600	7,400	0	1,420	0.89	D	8,730	1.18	*	F	1,520	0.95	E	8,650	1.17	*
Between Orange Grove Ave Off-Ramp and Garey Ave On-Ramp	1	4	0	1,600	7,400	0	1,420	0.89	D	7,760	1.05	*	F	1,520	0.95	E	7,740	1.05	*
Between Garey Ave On-Ramp and White Ave On-Ramp	1	4	0	1,600	7,400	0	1,660	1.04	F	8,200	1.11	*	F	1,700	1.06	F	8,250	1.11	*
Between White Ave On-Ramp and Dudley St Off-Ramp	1	4	0	1,600	7,400	0	1,660	1.04	F	8,770	1.19	*	F	1,700	1.06	F	8,630	1.17	*

Notes:

1. The freeway segments were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis or weaving analysis method, depending on the lane configuration.

The weaving analysis method was applied to the segments highlighted in the table.

2. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).

3. Peak hour capacities for freeway lanes include:

- 1,850 vph for each General Purpose (GP) lane and 1,600 vph for a single High Occupancy Vehicle (HOV) lane.

- 1,850 vph for an auxiliary (AUX) lane if the AUX length exceeds 1 mile.

- 1,000 vph for an AUX lane if the AUX length is greater than 0.5 mile and less than 1 mile.

- 0 vph for an AUX lane if the AUX length is less than 0.5 mile.

4. Level of Service (LOS): GP lane LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*) in the density column). HOV lane LOS is based on demand volume-to-capacity (d/c) ratio.

5. Density is shown in passenger cars/mile/lane (pc/mi/n).

6. Based on the lane configuration, these segments are categorized as a complex weaving segment. In order to provide a more robust analysis for this complex weaving segment, the analysis is conducted as two weaving segments (for details on the methodology see [Section 2.1.2](#) of the report).7. Generally, freeway mainline segments within interchanges were not analyzed, since these are within the influence areas of the ramp junctions. As noted in [Section 2.1.3](#) under the heading "Special Ramp Conditions", mainline segments within interchanges are analyzed only when single-lane off-ramps accompanied by a lane drop and the segment upstream of the lane drop is not a weaving section or single-lane on-ramps accompanied by a lane add and the segment downstream of the lane add is not a weaving section.

Table 2.5.3: Year 2025 Alternative 2 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak				PM Peak			
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
<b>White Ave</b>	EB Off Direct	1	1,500	570	0.38	**	F	350	0.23	33.0	D
	WB On Direct	1	1,500	570	0.38	**	F	380	0.25	**	F
<b>Garey Ave</b>	EB Off Direct	1	1,500	740	0.49	33.8	D	620	0.41	33.5	D
	WB On Direct	1	1,500	680	0.45	**	F	680	0.45	**	F
<b>Orange Grove Ave</b>	EB On Direct	1	1,500	1,060	0.71	Weaving Segment <sup>5</sup>		1,190	0.79	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	970	0.65	Weaving Segment <sup>5</sup>		900	0.60	Weaving Segment <sup>5</sup>	
<b>Towne Ave</b>	EB Off Direct	1	1,500	810	0.54	Weaving Segment <sup>5</sup>		830	0.55	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	630	0.42	30.3	D	790	0.53	**	F
<b>Indian Hill Blvd</b>	WB Off Direct	1	1,500	900	0.60	**	F	770	0.51	**	F
	WB On Direct	1	1,500	1,010	0.67	Weaving Segment <sup>5</sup>		730	0.49	Weaving Segment <sup>5</sup>	
<b>Monte Vista</b>	EB Off Direct	1	1,500	800	0.53	35.3	E	810	0.54	**	F
	WB On Direct	1	1,500	820	0.55	30.6	D	1,040	0.69	**	F
<b>Central Ave</b>	WB Off Direct	1	1,500	830	0.55	**	F	930	0.62	**	F
	WB On Direct	1	1,500	890	0.59	**	F	820	0.55	**	F
<b>Mountain Ave</b>	EB Off Direct	1	1,500	720	0.48	34.2	D	840	0.56	**	F
	EB On Direct	1	1,500	890	0.59	Weaving Segment <sup>5</sup>		950	0.63	Weaving Segment <sup>5</sup>	
<b>Grove Ave</b>	WB Off Direct	1	1,500	700	0.47	Weaving Segment <sup>5</sup>		1,000	0.67	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	740	0.49	**	F	720	0.48	**	F
<b>Euclid Ave</b>	EB Off Direct	1	1,500	700	0.47	Weaving Segment <sup>5</sup>		890	0.59	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	770	0.51	Lane Add <sup>6</sup>		1,180	0.79	Lane Add <sup>6</sup>	
<b>Euclid Ave</b>	WB Off Direct	1	1,500	860	0.57	**	F	1,280	0.85	**	F
	WB On Direct	1	1,500	830	0.55	Weaving Segment <sup>5</sup>		820	0.55	Weaving Segment <sup>5</sup>	
<b>Euclid Ave</b>	WB On Direct	1	1,500	940	0.63	**	F	1,030	0.69	**	F
	EB Off Direct	1	1,500	1,120	0.75	**	F	1,050	0.70	**	F
<b>Euclid Ave</b>	EB Off Direct	1	1,500	940	0.63	**	F	1,420	0.95	**	F
	EB On Direct	1	1,500	1,010	0.67	**	F	980	0.65	**	F
<b>Euclid Ave</b>	WB Off Direct (7th St)	1	1,500	950	0.63	**	F	1,150	0.77	**	F
	WB On Loop	1	1,500	430	0.29	**	F	480	0.32	**	F
<b>Euclid Ave</b>	WB On Direct	1	1,500	670	0.45	**	F	580	0.39	**	F
	EB Off Direct	1	1,500	1,050	0.70	**	F	1,400	0.93	**	F
<b>Grove Ave</b>	EB On Direct	1	1,500	840	0.56	**	F	650	0.43	28.2	D
	WB Off Direct	1	1,500	600	0.40	**	F	920	0.61	**	F
<b>Grove Ave</b>	WB On Direct	1	1,500	940	0.63	**	F	830	0.55	**	F

Table 2.5.3: Year 2025 Alternative 2 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
Vineyard Ave	EB Off Direct	1	1,500	750	0.50	**	F	380	0.25
	EB On Direct	1	1,500	820	0.55	Weaving Segment <sup>5</sup>		900	0.60
	WB Off Direct	1	1,500	900	0.60	Weaving Segment <sup>5</sup>		1,330	0.89
	WB On Loop	1	1,500	210	0.14	**	F	290	0.19
	WB On Direct	1	1,500	280	0.19	**	F	310	0.21
	EB Off Direct	2	3,000	1,290	0.43	Weaving Segment <sup>5</sup>		1,320	0.44
Archibald Ave	EB On Direct (Holt Blvd)	1	1,500	1,220	0.81	Lane Add <sup>6</sup>		1,840	1.23
	EB On Direct	1	1,500	570	0.38	**	F	870	0.58
	WB Off Direct	1	1,500	630	0.42	**	F	500	0.33
	WB Off Direct (Holt Blvd)	1	1,500	1,530	1.02	Lane Drop <sup>7</sup>		1,290	0.86
	WB On Direct	1	1,500	690	0.46	Weaving Segment <sup>5</sup>		1,340	0.89
	EB Off Direct <sup>8</sup>	2	3,000	1,790	0.60	**	F	1,490	0.50
Haven Ave	EB On Loop	1	1,500	500	0.33	28.0	C	610	0.41
	EB On Direct	1	1,500	1,640	1.09	Lane Add <sup>6</sup>		1,310	0.87
	WB Off Direct <sup>8</sup>	2	3,000	1,640	0.55	**	F	1,280	0.43
	WB On Loop	1	1,500	420	0.28	**	F	720	0.48
	WB On Direct	1	1,500	490	0.33	Lane Add <sup>6</sup>		1,110	0.74
	EB Off Direct <sup>8</sup>	2	3,000	930	0.31	**	F	900	0.30
Milliken Ave	EB On Loop	1	1,500	520	0.35	Weaving Segment <sup>5</sup>		870	0.58
	WB Off Loop	2	3,000	900	0.30	Weaving Segment <sup>5</sup>		890	0.30
	WB On Direct	1	1,500	710	0.47	**	F	1,120	0.75
	EB Off Direct (NB I-15)	2	3,000	1,410	0.47	Weaving Segment <sup>5</sup>		2,520	0.84
	EB Off Direct (SB I-15)	1	1,500	2,020	1.35	Lane Drop <sup>7</sup>		1,850	1.23
	EB On Direct (NB I-15)	1	1,500	2,030	1.35	Weaving Segment <sup>5</sup>		2,130	1.42
I-15	EB On Direct (SB I-15)	1	1,500	1,150	0.77	Weaving Segment <sup>5</sup>		1,010	0.67
	WB Off Direct (NB/SB I-15)	2	3,000	2,600	0.87	Weaving Segment <sup>5</sup>		2,380	0.79
	WB On Direct (SB I-15)	1	1,500	2,950	1.97	Lane Add <sup>6</sup>		2,360	1.57
	WB On Direct (NB I-15)	2	3,000	2,670	0.89	Weaving Segment <sup>5</sup>		2,110	0.70
	EB Off Direct (Etiwanda/Commerce)	2	3,000	1,160	0.39	Weaving Segment <sup>5</sup>		1,050	0.35
	EB On Direct (Commerce)	1	1,500	320	0.21	Lane Add <sup>6</sup>		940	0.63
Etiwanda Ave	WB Off Direct	1	1,500	670	0.45	**	F	560	0.37
	WB On Loop (NB Etiwanda Ave)	1	1,500	710	0.47	Weaving Segment <sup>5</sup>		1,130	0.75
	WB On Direct (SB Etiwanda Ave)	1	1,500	440	0.29	Weaving Segment <sup>5</sup>		790	0.53
	EB Off Direct <sup>8</sup>	2	3,000	740	0.25	18.0	B	1,040	0.35
	EB On Direct	1	1,500	530	0.35	**	F	720	0.48
									F

Table 2.5.3: Year 2025 Alternative 2 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak				PM Peak			
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
<b>Cherry Ave</b>	WB Off Direct	2	3,000	1,070	0.36	Weaving Segment <sup>5</sup>		1,030	0.34	Weaving Segment <sup>5</sup>	
	WB On Loop	1	1,500	290	0.19	Lane Add <sup>6</sup>		310	0.21	Lane Add <sup>6</sup>	
	WB On Direct	1	1,500	770	0.51	**	F	490	0.33	**	F
	EB Off Direct	1	1,500	300	0.20	**	F	620	0.41	**	F
	EB On Direct	1	1,500	430	0.29	Weaving Segment <sup>5</sup>		440	0.29	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	330	0.22	**	F	460	0.31	**	F
<b>Beech Ave</b>	WB On Direct	1	1,500	800	0.53	Weaving Segment <sup>5</sup>		660	0.44	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	490	0.33	Weaving Segment <sup>5</sup>		910	0.61	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	550	0.37	Lane Add <sup>6</sup>		560	0.37	Lane Add <sup>6</sup>	
	WB Off Direct	1	1,500	570	0.38	Lane Drop <sup>7</sup>		640	0.43	Lane Drop <sup>7</sup>	
	WB On Loop	1	1,500	530	0.35	28.2	D	410	0.27	**	F
	WB On Direct	1	1,500	700	0.47	**	F	340	0.23	**	F
<b>Citrus Ave</b>	WB Off Direct	1	1,500	570	0.38	Lane Drop <sup>7</sup>		640	0.43	Lane Drop <sup>7</sup>	
	WB On Loop	1	1,500	530	0.35	28.2	D	410	0.27	**	F
	WB On Direct	1	1,500	700	0.47	**	F	340	0.23	**	F
	EB Off Direct <sup>8</sup>	2	3,000	1,470	0.49	**	F	1,360	0.45	**	F
	EB On Direct	1	1,500	1,000	0.67	24.4	C	1,160	0.77	**	F
	WB Off Direct	2	3,000	920	0.31	4.5	A	1,090	0.36	**	F
<b>Sierra Ave</b>	WB On Direct	1	1,500	1,260	0.84	Lane Add <sup>6</sup>		1,490	0.99	Lane Add <sup>6</sup>	
	EB Off Direct	2	3,000	800	0.27	34.4	D	1,230	0.41	**	F
	EB On Direct	1	1,500	930	0.62	29.6	D	1,040	0.69	30.1	D
	WB Off Direct	1	1,500	890	0.59	Lane Drop <sup>7</sup>		1,040	0.69	Lane Drop <sup>7</sup>	
	WB On Direct	1	1,500	1,310	0.87	28.8	D	980	0.65	**	F
	EB Off Direct	2	3,000	610	0.20	11.0	B	620	0.21	11.0	B
<b>Cedar Ave</b>	EB On Direct	1	1,500	940	0.63	**	F	950	0.63	**	F
	WB Off Direct	1	1,500	710	0.47	26.8	C	830	0.55	**	F
	WB On Direct	1	1,500	710	0.47	Lane Add <sup>6</sup>		770	0.51	Lane Add <sup>6</sup>	
	EB Off Direct	1	1,500	410	0.27	**	F	470	0.31	**	F
	EB On Direct	1	1,500	830	0.55	**	F	750	0.50	**	F
	WB Off Direct	1	1,500	700	0.47	31.0	D	620	0.41	32.9	D
<b>Riverside Ave</b>	WB On Direct	1	1,500	760	0.51	25.1	C	580	0.39	**	F
	EB Off Direct	1	1,500	330	0.22	**	F	510	0.34	**	F
	EB On Direct	1	1,500	520	0.35	**	F	680	0.45	**	F
	WB Off Direct	1	1,500	530	0.35	Weaving Segment <sup>5</sup>		560	0.37	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	440	0.29	24.2	C	380	0.25	25.9	C
	EB Off Direct (9th St)	1	1,500	80	0.05	**	F	190	0.13	**	F
<b>La Cadena Dr/9th St</b>	EB On Direct (9th St)	1	1,500	380	0.25	Weaving Segment <sup>5</sup>		430	0.29	Weaving Segment <sup>5</sup>	

Table 2.5.3: Year 2025 Alternative 2 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
La Cadena Dr/9th St	WB Off Direct (9th St)	1	1,500	350	0.23	Weaving Segment <sup>5</sup>	400	0.27	Weaving Segment <sup>5</sup>
	WB On Direct (La Cadena Dr)	1	1,500	240	0.16	Weaving Segment <sup>5</sup>	310	0.21	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	580	0.39	Weaving Segment <sup>5</sup>	600	0.40	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	390	0.26	Weaving Segment <sup>5</sup>	610	0.41	Weaving Segment <sup>5</sup>
	WB Off Direct (Sperry Dr)	1	1,500	680	0.45	Weaving Segment <sup>5</sup>	990	0.66	Weaving Segment <sup>5</sup>
	WB On Direct	1	1,500	540	0.36	Weaving Segment <sup>5</sup>	720	0.48	Weaving Segment <sup>5</sup>
Mt Vernon Ave	EB Off Direct (NB/SB I-215)	3	4,500	2,600	0.58	Weaving Segment <sup>5</sup>	2,840	0.63	Weaving Segment <sup>5</sup>
	EB On Direct (NB I-215)	1	1,500	2,610	1.74	Lane Add <sup>6</sup>	2,910	1.94	Lane Add <sup>6</sup>
	EB Off Direct (SB I-215)	1	1,500	1,610	1.07	Weaving Segment <sup>5</sup>	2,010	1.34	Weaving Segment <sup>5</sup>
	WB Off Direct (NB/SB I-215)	2	3,000	4,550	1.52	Weaving Segment <sup>5</sup>	4,400	1.47	Weaving Segment <sup>5</sup>
	WB On Loop (NB I-215)	1	1,500	820	0.55	21.4   C	1,320	0.88	25.3   C
	WB On Direct (SB I-215)	1	1,500	1,850	1.23	Weaving Segment <sup>5</sup>	2,220	1.48	Weaving Segment <sup>5</sup>
I-215	WB On Direct	1	1,500	240	0.16	17.0   B	780	0.52	19.5   B
	EB Off Direct	1	1,500	1,670	1.11	Weaving Segment <sup>5</sup>	1,100	0.73	Weaving Segment <sup>5</sup>
	EB Off (Waterman Ave)	1	1,500	1,460	0.97	Lane Drop <sup>7</sup>	970	0.65	Lane Drop <sup>7</sup>
	WB On (Waterman Ave)	1	1,500	470	0.31	Weaving Segment <sup>5</sup>	980	0.65	Weaving Segment <sup>5</sup>
	WB Off (Carnegie Dr)	2	3,000	970	0.32	Weaving Segment <sup>5</sup>	570	0.19	Weaving Segment <sup>5</sup>
	WB On (Carnegie Dr)	1	1,500	370	0.25	Weaving Segment <sup>5</sup>	1,350	0.90	Weaving Segment <sup>5</sup>
Redlands Blvd	EB Off Direct	2	3,000	970	0.32	Weaving Segment <sup>5</sup>	990	0.33	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	370	0.25	Weaving Segment <sup>5</sup>	1,000	0.67	Weaving Segment <sup>5</sup>
	WB Off Direct	1	1,500	760	0.51	Weaving Segment <sup>5</sup>	690	0.46	Weaving Segment <sup>5</sup>
	WB On Loop	1	1,500	340	0.23	**   F	740	0.49	26.3   C
	WB On Direct	1	1,500	460	0.31	Weaving Segment <sup>5</sup>	590	0.39	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	1,130	0.75	Weaving Segment <sup>5</sup>	690	0.46	Weaving Segment <sup>5</sup>
Waterman Ave/Carnegie Dr	EB On Direct	1	1,500	450	0.30	Weaving Segment <sup>5</sup>	1,120	0.75	Weaving Segment <sup>5</sup>
	WB Off Direct	1	1,500	1,070	0.71	Weaving Segment <sup>5</sup>	700	0.47	Weaving Segment <sup>5</sup>
	WB On Direct	1	1,500	790	0.53	Weaving Segment <sup>5</sup>	1,360	0.91	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	880	0.59	Weaving Segment <sup>5</sup>	860	0.57	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	360	0.24	Lane Add <sup>6</sup>	970	0.65	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	1,080	0.72	Weaving Segment <sup>5</sup>	560	0.37	Weaving Segment <sup>5</sup>
Tippecanoe Ave	WB On Direct	1	1,500	610	0.41	Weaving Segment <sup>5</sup>	1,170	0.78	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	690	0.46	20.9   C	930	0.62	**   F
	EB Off Direct	1	1,500	610	0.41	33.0   D	320	0.21	16.8   B
	WB Off Direct	1	1,500	1,030	0.69	Weaving Segment <sup>5</sup>	1,200	0.80	Weaving Segment <sup>5</sup>
	WB On Direct	1	1,500	1,030	0.69	Weaving Segment <sup>5</sup>			
	California St								
Mountain View Ave	EB Off Direct								
	WB Off Direct								
	WB On Direct								
	EB Off Direct								
	EB Off Direct								
	WB On Direct								
Alabama St	EB Off Direct								
	WB Off Direct								
	WB On Direct								
	EB Off Direct								
	WB On Direct								
	WB On Direct								

**Table 2.5.3: Year 2025 Alternative 2 Condition I-10 Ramp Junction Peak Hour Level of Service**

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
SR-210	EB Off Direct (NB SR-210) <sup>8</sup>	2	3,000	860	0.29	10.4	B	2,050	0.68
	EB On Direct (SB SR-210)	1	1,500	1,810	<b>1.21</b>	Weaving Segment <sup>5</sup>		2,230	<b>1.49</b>
	WB Off Direct (NB SR-210)	2	3,000	2,400	0.80	Weaving Segment <sup>5</sup>		1,870	0.62
	WB On Direct (SB SR-210)	1	1,500	1,720	<b>1.15</b>	Lane Add <sup>6</sup>		1,020	0.68
Tennessee St	EB Off Direct (Tennessee St)	1	1,500	390	0.26	17.7	B	450	0.30
	EB On Direct (Tennessee St)	1	1,500	320	0.21	15.3	B	1,170	0.78
	WB Off Direct (Tennessee St)	1	1,500	480	0.32	**	F	370	0.25
	EB On Direct (Eureka St)	1	1,500	1,210	0.81	Weaving Segment <sup>5</sup>		1,320	0.88
Eureka St/Orange St/6th St	WB Off Direct (6th St)	1	1,500	220	0.15	16.7	B	580	0.39
	WB On Loop (NB Orange St)	1	1,500	830	0.55	Weaving Segment <sup>5</sup>		830	0.55
	WB On Direct (SB Orange St)	1	1,500	640	0.43	Weaving Segment <sup>5</sup>		410	0.27
	EB Off Direct	1	1,500	800	0.53	22.6	C	1,180	0.79
University St/Cypress Ave	EB On Direct	1	1,500	170	0.11	16.8	B	270	0.18
	WB Off Direct	1	1,500	300	0.20	**	F	250	0.17
	WB On Direct	1	1,500	1,440	0.96	**	F	840	0.56
	EB Off Direct	1	1,500	680	0.45	19.8	B	860	0.57
Ford St	EB On Direct	1	1,500	480	0.32	19.0	B	670	0.45
	WB Off Direct	1	1,500	430	0.29	**	F	330	0.22
	WB On Direct	1	1,500	1,160	0.77	**	F	550	0.37
	EB On Direct	1	1,500	80	0.05	16.2	B	90	0.06
Wabash Ave	WB Off Direct	1	1,500	110	0.07	**	F	120	0.08
	WB On Direct	1	1,500	110	0.07	**	F	120	0.08

Notes:

1. Capacity and peak hour traffic volumes are shown in vehicles per hour (vph). On-ramp traffic volumes are assumed to be unmetered volumes. LOS - Level of Service; d/c - Demand Volume-to-Capacity

2. Peak hour capacities for freeway ramps are 1,500 vph for each freeway ramp lane.

3. LOS is F under either two conditions: (1) if the total flow of the merge/diverge area exceeds the capacity of the freeway section, denoted with an asterisk (\*) in the density column;

(2) if the mainline demand volume to capacity is greater than 1.00, denoted with double asterisks (\*\*\*) in the density column.

4. Density is shown in passenger cars/mile/lane [pc/mi/in]. The density LOS criteria for merge and diverge sections are per HCM 2000.

5. Weaving Segment : Based on the lane configuration, ramp junction analysis is not applicable for this location. See [Table 2.5.1](#).

6. Lane Add : Analysis for a single-lane addition is a basic freeway segment analysis for the segment downstream of the lane addition with an additional lane. See [Table 2.5.1](#).

7. Lane Drop : Analysis for a single-lane drop is basic freeway segment analysis for the segments upstream and downstream of the lane drop. See [Table 2.5.1](#).

8. Major Diverge : A major diverge exists when a two-lane off-ramp results in a lane drop. Density and LOS are calculated using the HCM 2000 Major Diverge Area analysis.

9. Number of lanes on the ramp at the gore point (off-ramp) or 6-foot point (on-ramp).

Table 2.5.4: Year 2045 Alternative 2 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type				Capacity <sup>2,3</sup>		AM Peak Hour				PM Peak Hour									
	HO		HOV		GP & AUX		HOV		GP & AUX		HOV		GP & AUX							
	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS	Demand Volume <sup>2</sup>	d/c	Demand Volume <sup>2</sup>	d/c						
EASTBOUND																				
Between Dudley St On-Ramp and White Ave Off-Ramp	1	4	0	1,600	7,400	0	1,620	1.01	F	8,570	1.16	*	F	1,420	0.89	D	7,690	1.04	*	F
Between White Ave Off-Ramp and Garey Ave Off-Ramp	1	4	0	1,600	7,400	0	1,620	1.01	F	7,920	1.07	*	F	1,420	0.89	D	7,300	0.99	29.7	D
Between Garey Ave Off-Ramp and Orange Grove Ave On-Ramp	1	4	0	1,600	7,400	0	1,620	1.01	F	7,120	0.96	29.3	D	1,420	0.89	D	6,620	0.89	27.2	D
Between Orange Grove Ave On-Ramp and Towne Ave Off-Ramp	1	4	1	1,600	7,400	0	1,620	1.01	F	8,300	1.12	*	F	1,420	0.89	D	7,940	1.07	*	F
Between Towne Ave On-Ramp and Indian Hill Blvd Off-Ramp	1	4	0	1,600	7,400	0	1,620	1.01	F	8,110	1.10	*	F	1,420	0.89	D	7,910	1.07	*	F
Between Indian Hill Blvd On-Ramp and Monte Vista Ave Off-Ramp	1	4	0	1,600	7,400	0	1,350	0.84	D	8,440	1.14	*	F	1,720	1.08	F	7,860	1.06	*	F
Between Monte Vista Ave On-Ramp and Central Ave Off-Ramp	1	4	1	1,600	7,400	0	1,000	0.63	C	9,030	1.22	*	F	1,620	1.01	F	8,160	1.10	*	F
Between Central Ave On-Ramp and Mountain Ave Off-Ramp	1	4	1	1,600	7,400	1,000	1,100	0.69	C	9,080	1.08	*	F	1,750	1.09	F	8,380	1.00	26.2	D
Between Mountain Ave Off-Ramp and Mountain Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	1,100	0.69	C	8,310	1.12	*	F	1,750	1.09	F	7,170	0.97	29.1	D
Between Mountain Ave On-Ramp and Euclid Ave Off-Ramp	1	4	0	1,600	7,400	0	1,860	1.16	F	8,640	1.17	*	F	1,710	1.07	F	8,350	1.13	*	F
Between Euclid Ave On-Ramp and Grove Ave Off-Ramp	1	4	0	1,600	7,400	0	1,910	1.19	F	8,750	1.18	*	F	1,570	0.98	E	8,040	1.09	*	F
Between Grove Ave On-Ramp and Vineyard Ave Off-Ramp	1	4	0	1,600	7,400	0	1,920	1.20	F	8,580	1.16	*	F	1,690	1.06	F	7,260	0.98	29.6	D
Between Vineyard Ave On-Ramp and Archibald Ave Off-Ramp	1	4	1	1,600	7,400	0	1,370	0.86	D	9,270	1.25	*	F	1,430	0.89	D	8,440	1.14	*	F
Between Holt Blvd On-Ramp and Archibald Ave On-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	1,370	0.86	D	8,990	1.07	*	F	1,430	0.89	D	8,870	1.06	*	F
Between Archibald Ave On-Ramp and Haven Ave Off-Ramp	1	4	1	1,600	7,400	1,000	1,480	0.93	E	9,570	1.14	*	F	1,890	1.18	F	9,470	1.13	*	F
Between Haven Ave Loop On-Ramp and Haven Ave On-Ramp	1	4	0	1,600	7,400	0	1,480	0.93	E	8,010	1.08	*	F	1,890	1.18	F	8,570	1.16	*	F
Between Haven Ave Direct On-Ramp and Milliken Ave Off-Ramp	1	4	1	1,600	7,400	1,000	810	0.51	B	10,490	1.25	*	F	1,630	1.02	F	10,290	1.23	*	F
Between Milliken Ave Loop On-Ramp and NB I-15 Off-Ramp	1	4	2	1,600	7,400	1,000	560	0.35	B	10,270	1.22	*	F	1,520	0.95	E	10,350	1.23	*	F
Between NB I-15 Off-Ramp and SB I-15 Off-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	560	0.35	B	8,710	1.04	28.0	D	1,520	0.95	E	7,560	0.90	23.3	C
Between SB I-15 Off-Ramp and NB I-15 On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	500	0.31	A	6,440	0.87	26.9	D	1,440	0.90	D	5,590	0.76	22.7	C
Between NB/SB I-15 On-Ramp and Etiwanda Ave Off-Ramp	1	4	1	1,600	7,400	1,000	500	0.31	A	9,030	1.08	*	F	1,440	0.90	D	8,190	0.98	27.6	C
Between Etiwanda Ave On-Ramp and Cherry Ave Off-Ramp	1	4	1	1,600	7,400	1,850	430	0.27	A	9,400	1.02	*	F	1,360	0.85	D	9,380	1.01	*	F
Between Cherry Ave Off-Ramp and Cherry Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	450	0.28	A	8,420	1.14	*	F	1,200	0.75	D	8,240	1.11	*	F
Between Cherry Ave On-Ramp and Beach Ave Off-Ramp	1	4	0	1,600	7,400	0	450	0.28	A	9,160	1.24	*	F	1,200	0.75	D	9,250	1.25	*	F
Between Beach Ave On-Ramp and Citrus Ave Off-Ramp	1	4	1	1,600	7,400	0	440	0.28	A	9,420	1.27	*	F	990	0.62	C	9,360	1.26	*	F
Between Citrus Ave On-Ramp and Sierra Ave Off-Ramp	1	4	1	1,600	7,400	0	570	0.36	B	9,420	1.27	*	F	1,180	0.74	C	8,670	1.17	*	F

Table 2.5.4: Year 2045 Alternative 2 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type						Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour							
	HOV			GP & AUX			HOV			GP & AUX										
	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>								
Between Sierra Ave On-Ramp and Alder Ave Off-Ramp	1	4	0	1,600	7,400	0	480	0.30	A	8,990	1.21	*	F	1,020	0.64	C	8,640	1.17	*	F
Between Alder Ave On-Ramp and Cedar Ave Off-Ramp	1	4	0	1,600	7,400	0	490	0.31	A	9,180	1.24	*	F	950	0.59	C	8,500	1.15	*	F
Between Cedar Ave On-Ramp and Riverside Ave Off-Ramp	1	4	0	1,600	7,400	0	540	0.34	B	8,920	1.21	*	F	860	0.54	B	8,110	1.10	*	F
Between Riverside Ave On-Ramp and Pepper Ave Off-Ramp	1	4	0	1,600	7,400	0	500	0.31	A	8,990	1.21	*	F	880	0.55	C	8,200	1.11	*	F
Between Pepper Ave Off-Ramp and Rancho Ave Off-Ramp	1	4	0	1,600	7,400	0	740	0.46	B	9,110	1.23	*	F	910	0.57	C	8,460	1.14	*	F
Between Rancho Ave On-Ramp and 9th St Off-Ramp	1	4	0	1,600	7,400	0	1,010	0.63	C	9,000	1.22	*	F	920	0.58	C	8,570	1.16	*	F
Between 9th St On-Ramp and Mt. Vernon Ave Off-Ramp	1	4	1	1,600	7,400	0	1,100	0.69	C	9,190	1.24	*	F	1,100	0.69	C	8,590	1.16	*	F
Between Mt. Vernon Ave On-Ramp and NB/SB I-215 Off-Ramp	1	4	1	1,600	7,400	0	1,190	0.74	C	8,820	1.19	*	F	1,280	0.80	D	8,380	1.13	*	F
Between NB I-215 On-Ramp and SB I-215 On-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	1,280	0.80	D	8,690	1.03	*	F	1,470	0.92	E	8,200	0.98	25.6	C
Between SB I-215 On-Ramp and Redlands Blvd Off-Ramp	1	4	2	1,600	7,400	1,000	1,360	0.85	D	10,650	1.27	*	F	1,650	1.03	F	10,400	1.24	*	F
Between Redlands Blvd Off-Ramp and Waterman Ave Off-Ramp	1	4	1	1,600	7,400	1,000	1,387	0.87	D	8,730	1.04	*	F	1,683	1.05	F	9,100	1.08	*	F
Between Waterman Ave Off-Ramp and Waterman On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	1,387	0.87	D	7,080	0.96	28.8	D	1,683	1.05	F	7,970	1.08	*	F
Between Waterman Ave On-Ramp and Tippecanoe Ave Off-Ramp	1	4	1	1,600	7,400	0	850	0.53	B	8,140	1.10	*	F	1,670	1.04	F	9,100	1.23	*	F
Between Tippecanoe Ave On-Ramp and Mountain View Ave Off-Ramp	1	4	1	1,600	7,400	0	850	0.53	B	7,460	1.01	*	F	1,610	1.01	F	9,160	1.24	*	F
Between Mountain View Ave On-Ramp and California St Off-Ramp	1	4	1	1,600	7,400	0	860	0.54	B	6,650	0.90	24.7	C	1,930	1.21	F	9,440	1.28	*	F
Between California St On-Ramp and Alabama St Off-Ramp	1	4	1	1,600	7,400	1,000	880	0.55	C	5,990	0.71	19.1	C	1,890	1.18	F	9,760	1.16	*	F
Between Alabama St Off-Ramp and NB SR-210 Off-Ramp	1	4	1	1,600	7,400	1,000	880	0.55	C	5,180	0.62	16.5	B	1,890	1.18	F	8,770	1.04	*	F
Between NB SR-210 Off-Ramp and Tennessee St Off-Ramp	1	4	0	1,600	7,400	0	980	0.61	C	3,950	0.53	16.1	B	1,920	1.20	F	6,340	0.86	26.0	C
Between SB SR-210 On-Ramp and Eureka St Off-Ramp	1	4	1	1,600	7,400	1,000	1,080	0.68	C	6,140	0.73	31.9	D	1,950	1.22	F	10,070	1.20	*	F
Between 6th St On-Ramp and University St Off-Ramp	1	4	0	1,600	7,400	0	1,270	0.79	D	4,850	0.66	19.8	C	2,000	1.25	F	9,250	1.25	*	F
Between Cypress Ave On-Ramp and Ford St Off-Ramp	1	4	0	1,600	7,400	0	1,290	0.81	D	4,130	0.56	17.7	B	1,890	1.18	F	8,520	1.15	*	F
Between Ford St On-Ramp and Wabash Ave Off-Ramp	1	4	0	1,600	7,400	0	1,290	0.81	D	3,950	0.53	16.9	B	1,890	1.18	F	8,880	1.20	*	F
Between Wabash Ave On-Ramp and Yucaipa Blvd Off-Ramp	1	4	0	1,600	7,400	0	1,290	0.81	D	4,020	0.54	17.2	B	1,890	1.18	F	8,690	1.17	*	F
<b>WESTBOUND</b>																				
Between Yucaipa Blvd On-Ramp and Wabash Ave Off-Ramp	1	4	0	1,600	7,400	0	1,520	0.95	E	9,190	1.24	*	F	1,310	0.82	D	4,950	0.67	20.9	C
Between Wabash Ave On-Ramp and Ford St Off-Ramp	1	4	0	1,600	7,400	0	1,520	0.95	E	9,320	1.26	*	F	1,310	0.82	D	5,100	0.69	21.5	C
Between Ford St On-Ramp and Cypress Ave Off-Ramp	1	4	0	1,600	7,400	0	1,750	1.09	F	9,440	1.28	*	F	1,330	0.83	D	5,120	0.69	21.6	C
Between University St On-Ramp and 6th St Off-Ramp	1	4	0	1,600	7,400	0	2,260	1.41	F	10,160	1.37	*	F	1,360	0.85	D	5,700	0.77	23.2	C

Table 2.5.4: Year 2045 Alternative 2 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type						Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour			
	HOV			GP & AUX			HOV			GP & AUX			GP & AUX			
	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	
Between Orange Ave Direct/Loop On-Ramp and NB SR-210 Off-Ramp	1	4	1	1,600	7,400	1,000	2,260	1.41	F	9,650	1.15	*	F	1,360	0.85	D
Between SB SR-210 On-Ramp and Alabama St On-Ramp	1	4	1	1,600	7,400	1,000	2,110	1.32	F	8,920	1.06	*	F	1,500	0.94	E
Between Alabama St On-Ramp and California St Off-Ramp	1	4	2	1,600	7,400	1,000	2,000	1.25	F	10,230	1.22	*	F	1,550	0.97	E
Between California St On-Ramp and Mountain View Ave Off-Ramp	1	4	1	1,600	7,400	0	1,880	1.18	F	9,710	1.31	*	F	1,600	1.00	E
Between Mountain View Ave On-Ramp and Tippecanoe Ave Off-Ramp	1	4	1	1,600	7,400	0	1,920	1.20	F	9,400	1.27	*	F	1,670	1.04	F
Between Tippecanoe Ave On-Ramp and Waterman Ave Off-Ramp	1	4	1	1,600	7,400	0	2,020	1.26	F	9,380	1.27	*	F	1,810	1.13	F
Between Carnegie Dr/Waterman Ave On-Ramp and NB/SB I-215 Off-Ramp	1	4	1	1,600	7,400	0	1,310	0.82	D	9,470	1.28	*	F	1,970	1.23	F
Between SB I-215 On-Ramp and Sperry Dr Off-Ramp	1	4	1	1,600	7,400	0	1,170	0.73	C	7,530	1.02	*	F	1,790	1.12	F
Between Mt. Vernon Ave On-Ramp and 9th St Off-Ramp	1	4	1	1,600	7,400	0	950	0.59	C	7,530	1.02	*	F	1,480	0.93	E
Between La Cadena Dr On-Ramp and Rancho Ave Off-Ramp	1	4	1	1,600	7,400	0	970	0.61	C	7,390	1.00	25.7	C	1,510	0.94	E
Between Rancho Ave On-Ramp and Pepper Ave Off-Ramp	1	4	0	1,600	7,400	0	990	0.62	C	7,350	0.99	30.1	D	1,540	0.96	E
Between Pepper Ave On-Ramp and Riverside Ave Off-Ramp	1	4	0	1,600	7,400	0	590	0.37	B	7,790	1.05	*	F	890	0.56	C
Between Riverside Ave On-Ramp and Cedar Ave Off-Ramp	1	4	1	1,600	7,400	1,000	640	0.40	B	7,790	0.93	24.1	C	960	0.60	C
Between Cedar Ave Off-Ramp and Cedar Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	640	0.40	B	6,920	0.94	27.8	D	960	0.60	C
Between Cedar Ave On-Ramp and Alder Ave Off-Ramp	1	4	0	1,600	7,400	0	680	0.43	B	8,420	1.14	*	F	1,030	0.64	C
Between Alder Ave On-Ramp and Sierra Ave Off-Ramp	1	4	0	1,600	7,400	0	1,040	0.65	C	8,320	1.12	*	F	1,590	0.99	E
Between Sierra Ave On-Ramp and Citrus Ave Off-Ramp	1	4	1	1,600	7,400	0	810	0.51	B	8,900	1.20	*	F	1,200	0.75	D
Between Citrus Ave Off-Ramp and Citrus Ave Loop On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	810	0.51	B	8,270	1.12	*	F	1,200	0.75	D
Between Citrus Ave On-Ramp and Beech Ave Off-Ramp	1	4	0	1,600	7,400	0	1,050	0.66	C	9,320	1.26	*	F	1,100	0.69	C
Between Beech Ave On-Ramp and Cherry Ave Off-Ramp	1	4	1	1,600	7,400	0	1,260	0.79	D	9,530	1.29	*	F	1,100	0.69	C
Between Cherry Ave Loop On-Ramp and Cherry On-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	1,260	0.79	D	8,450	1.01	*	F	1,100	0.69	C
Between Cherry Ave On-Ramp and Etiwanda Ave Off-Ramp	1	4	0	1,600	7,400	0	1,260	0.79	D	9,310	1.26	*	F	1,290	0.81	D
Between Etiwanda Ave Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp	1	4	1	1,600	7,400	1,000	1,850	1.16	F	8,650	1.03	*	F	2,120	1.33	F
Between SB I-15 On-Ramp and NB I-15 On-Ramp	1	4	3	1,600	7,400	1,850	2,240	1.40	F	11,790	1.27	*	F	2,340	1.46	F
Between Milliken Ave On-Ramp and Haven Ave Off-Ramp	1	4	1	1,600	7,400	1,850	2,470	1.54	F	11,100	1.20	*	F	2,460	1.54	F

Table 2.5.4: Year 2045 Alternative 2 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type				Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour						GP & AUX		
	HOH	SH	XVA	G	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Density <sup>5</sup>	GP & AUX	
Between Haven Ave Direct On-Ramp and Archibald Ave Off-Ramp	1	4	1	1,600	7,400	1,000	2,170	1.36	F	10,500	1.25	*	F	2,470	1.54	F	11,680	1.39	*
Between Archibald Ave Off-Ramp and Holt Blvd Off-Ramp <sup>7</sup>	1	4	1	1,600	7,400	1,000	2,170	1.36	F	9,800	1.17	*	F	2,470	1.54	F	11,120	1.32	*
Between Holt Blvd Off-Ramp and Archibald Ave On-Ramp <sup>7</sup>	1	4	0	1,600	7,400	0	1,680	1.05	F	8,480	1.15	*	F	2,410	1.51	F	9,630	1.30	*
Between Archibald Ave On-Ramp and Vineyard Ave Off-Ramp	1	4	1	1,600	7,400	0	1,680	1.05	F	9,400	1.27	*	F	2,410	1.51	F	11,350	1.53	*
Between Vineyard Ave Direct On-Ramp and Grove Ave Off-Ramp	1	4	0	1,600	7,400	0	1,860	1.16	F	8,450	1.14	*	F	2,480	1.55	F	10,490	1.42	*
Between Grove Ave On-Ramp and 7th St Off-Ramp	1	4	0	1,600	7,400	0	1,760	1.10	F	8,730	1.18	*	F	2,290	1.43	F	10,280	1.39	*
Between Euclid Ave Direct On-Ramp and Mountain Ave Off-Ramp	1	4	0	1,600	7,400	0	1,510	0.94	E	9,080	1.23	*	F	2,160	1.35	F	10,220	1.38	*
Between Mountain Ave On-Ramp and Central Ave Off-Ramp	1	4	0	1,600	7,400	0	1,960	1.23	F	8,500	1.15	*	F	2,100	1.31	F	9,900	1.34	*
Between Central Ave On-Ramp and Monte Vista Ave Off-Ramp	1	4	1	1,600	7,400	0	1,680	1.05	F	8,700	1.18	*	F	1,940	1.21	F	9,480	1.28	*
Between Monte Vista Ave On-Ramp and Indian Hill Blvd Off-Ramp	1	4	0	1,600	7,400	0	1,710	1.07	F	8,570	1.16	*	F	1,980	1.24	F	8,980	1.21	*
Between Indian Hill Blvd On-Ramp and Towne Ave Off-Ramp	1	4	0	1,600	7,400	0	1,700	1.06	F	8,660	1.17	*	F	1,700	1.06	F	9,140	1.24	*
Between Towne Ave On-Ramp and Orange Grove Ave Off-Ramp	1	4	1	1,600	7,400	0	1,500	0.94	E	8,970	1.21	*	F	1,580	0.99	E	9,210	1.24	*
Between Orange Grove Ave Off-Ramp and Garey Ave On-Ramp	1	4	0	1,600	7,400	0	1,500	0.94	E	7,900	1.07	*	F	1,580	0.99	E	8,220	1.11	*
Between Garey Ave On-Ramp and White Ave On-Ramp	1	4	0	1,600	7,400	0	1,700	1.06	F	8,460	1.14	*	F	1,700	1.06	F	8,850	1.20	*
Between White Ave On-Ramp and Dudley St Off-Ramp	1	4	0	1,600	7,400	0	1,700	1.06	F	9,080	1.23	*	F	1,700	1.06	F	9,270	1.25	*

Notes:

1. The freeway segments were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis or weaving analysis method, depending on the lane configuration.  
The weaving analysis method was applied to the segments highlighted in the table.

2. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).

3. Peak hour capacities for freeway lanes include:

- 1,850 vph for each General Purpose (GP) lane and 1,600 vph for a single High Occupancy Vehicle (HOV) lane.
- 1,850 vph for an auxiliary/AUX lane if the AUX length exceeds 1 mile.

- 1,000 vph for an AUX lane if the AUX length is greater than 0.5 mile and less than 1 mile.
- 0 vph for an AUX lane if the AUX length is less than 0.5 mile.

4. Level of Service (LOS): GP lane LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*) in the density column).  
HOV lane LOS is based on demand volume-to-capacity (d/c) ratio.

5. Density is shown in passenger cars/mile/lane (pc/mi/h).

6. Based on the lane configuration, these segments are categorized as a complex weaving segment. In order to provide a more robust analysis for this complex weaving segment, the analysis is conducted as two weaving segments (for details on the methodology see [Section 2.1.2](#) of the report).

7. Generally, freeway mainline segments within interchanges were not analyzed, since these are within the influence areas of the ramp junctions. As noted in [Section 2.1.3](#) under the heading "Special Ramp Conditions", mainline segments within interchanges are analyzed only when single-lane off-ramps accompanied by a lane drop and the segment upstream of the lane drop is not a weaving section or single-lane on-ramps accompanied by a lane add and the segment downstream of the lane add is not a weaving section.

Table 2.5.5: Year 2045 Alternative 2 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
<b>White Ave</b>	EB Off Direct	1	1,500	660	0.44	**	F	380	0.25
	WB On Direct	1	1,500	630	0.42	**	F	420	0.28
<b>Garey Ave</b>	EB Off Direct	1	1,500	800	0.53	**	F	680	0.45
	WB On Direct	1	1,500	750	0.50	**	F	760	0.51
<b>Orange Grove Ave</b>	EB On Direct	1	1,500	1,180	0.79	Weaving Segment <sup>5</sup>		1,320	0.88
	WB Off Direct	1	1,500	1,060	0.71	Weaving Segment <sup>5</sup>		1,000	0.67
<b>Towne Ave</b>	EB Off Direct	1	1,500	890	0.59	Weaving Segment <sup>5</sup>		900	0.60
	EB On Direct	1	1,500	690	0.46	**	F	870	0.58
<b>Indian Hill Blvd</b>	WB Off Direct	1	1,500	1,000	0.67	**	F	850	0.57
	WB On Direct	1	1,500	1,110	0.74	Weaving Segment <sup>5</sup>		800	0.53
<b>Monte Vista</b>	EB Off Direct	1	1,500	880	0.59	**	F	900	0.60
	EB On Direct	1	1,500	940	0.63	**	F	1,150	0.77
<b>Central Ave</b>	WB Off Direct	1	1,500	910	0.61	**	F	1,030	0.69
	WB On Direct	1	1,500	990	0.66	**	F	910	0.61
<b>Mountain Ave</b>	EB Off Direct	1	1,500	800	0.53	**	F	930	0.62
	EB On Direct	1	1,500	1,040	0.69	Weaving Segment <sup>5</sup>		1,130	0.75
<b>Grove Ave</b>	WB Off Direct	1	1,500	910	0.61	Weaving Segment <sup>5</sup>		1,250	0.83
	WB On Direct	1	1,500	810	0.54	**	F	790	0.53
<b>Euclid Ave</b>	EB Off Direct	1	1,500	780	0.52	Weaving Segment <sup>5</sup>		970	0.65
	EB On Direct	1	1,500	920	0.61	Lane Add <sup>6</sup>		1,320	0.88
<b>2 - 104</b>	WB Off Direct	1	1,500	770	0.51	Lane Drop <sup>7</sup>		1,210	0.81
	WB On Direct	1	1,500	1,100	0.73	**	F	1,140	0.76
<b>WB Off Direct</b>	WB Off Direct	1	1,500	1,370	0.91	**	F	1,480	0.99
	WB On Direct	1	1,500	1,240	0.83	**	F	1,100	0.73
<b>WB Off Direct (7th St)</b>	EB Off Direct	1	1,500	1,030	0.69	**	F	1,570	1.05
	WB On Loop	1	1,500	470	0.31	**	F	530	0.35
<b>WB On Direct</b>	WB On Direct	1	1,500	750	0.50	**	F	630	0.42
	EB Off Direct	1	1,500	1,200	0.80	**	F	1,510	1.01
<b>WB Off Direct</b>	EB On Direct	1	1,500	1,040	0.69	**	F	860	0.57
	WB Off Direct	1	1,500	830	0.55	**	F	1,290	0.86
<b>WB On Direct</b>	WB On Direct	1	1,500	1,000	0.67	**	F	900	0.60

Table 2.5.5: Year 2045 Alternative 2 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
Vineyard Ave	EB Off Direct	1	1,500	930	0.62	**	F	460	0.31
	EB On Direct	1	1,500	1,060	0.71	Weaving Segment <sup>5</sup>		1,370	0.91
	WB Off Direct	1	1,500	1,280	0.85	Weaving Segment <sup>5</sup>		1,470	0.98
	WB On Loop	1	1,500	210	0.14	**	F	310	0.21
	WB On Direct	1	1,500	310	0.21	**	F	370	0.25
	EB Off Direct	2	3,000	1,720	0.57	Weaving Segment <sup>5</sup>		1,650	0.55
Archibald Ave	EB On Direct (Holt Blvd)	1	1,500	1,450	0.97	Lane Add <sup>6</sup>		2,080	1.39
	EB On Direct	1	1,500	690	0.46	**	F	1,060	0.71
	WB Off Direct	1	1,500	700	0.47	**	F	560	0.37
	WB Off Direct (Holt Blvd)	1	1,500	1,810	1.21	Lane Drop <sup>7</sup>		1,550	1.03
	WB On Direct	1	1,500	910	0.61	Weaving Segment <sup>5</sup>		1,710	1.14
	EB Off Direct <sup>8</sup>	2	3,000	2,120	0.71	**	F	1,580	0.53
Haven Ave	EB On Loop	1	1,500	560	0.37	**	F	670	0.45
	EB On Direct	1	1,500	1,810	1.21	Lane Add <sup>6</sup>		1,450	0.97
	WB Off Direct <sup>8</sup>	2	3,000	1,820	0.61	**	F	1,420	0.47
	WB On Loop	1	1,500	380	0.25	**	F	790	0.53
	WB On Direct	1	1,500	540	0.36	Lane Add <sup>6</sup>		1,230	0.82
	EB Off Direct <sup>8</sup>	2	3,000	1,060	0.35	**	F	1,000	0.33
Milliken Ave	EB On Loop	1	1,500	590	0.39	Weaving Segment <sup>5</sup>		950	0.63
	WB Off Loop	2	3,000	1,210	0.40	Weaving Segment <sup>5</sup>		1,090	0.36
	WB On Direct	1	1,500	750	0.50	**	F	1,230	0.82
	EB Off Direct (NB I-15)	2	3,000	1,560	0.52	Weaving Segment <sup>5</sup>		2,790	0.93
	EB Off Direct (SB I-15)	1	1,500	2,340	1.56	Lane Drop <sup>7</sup>		2,050	1.37
	EB On Direct (NB I-15)	1	1,500	2,590	1.73	Weaving Segment <sup>5</sup>		2,600	1.73
I-15	EB On Direct (SB I-15)	1	1,500	1,270	0.85	Weaving Segment <sup>5</sup>		1,120	0.75
	WB Off Direct (NB/SB I-15)	2	3,000	3,090	1.03	Weaving Segment <sup>5</sup>		2,880	0.96
	WB On Direct (SB I-15)	1	1,500	3,180	2.12	Lane Add <sup>6</sup>		2,470	1.65
	WB On Direct (NB I-15)	2	3,000	2,960	0.99	Weaving Segment <sup>5</sup>		2,340	0.78
	EB Off Direct (Etiwanda/Commerce)	2	3,000	1,340	0.45	Weaving Segment <sup>5</sup>		1,160	0.39
	EB On Direct (Commerce)	1	1,500	370	0.25	Lane Add <sup>6</sup>		1,150	0.77
Etiwanda Ave	WB Off Direct	1	1,500	790	0.53	**	F	680	0.45
	WB On Loop (NB Etiwanda Ave)	1	1,500	720	0.48	Weaving Segment <sup>5</sup>		1,200	0.80
	WB On Direct (SB Etiwanda Ave)	1	1,500	480	0.32	Weaving Segment <sup>5</sup>		790	0.53
	EB Off Direct <sup>8</sup>	2	3,000	970	0.32	**	F	1,290	0.43
	EB On Direct	1	1,500	750	0.50	**	F	1,010	0.67
	Cherry Ave								F

Table 2.5.5: Year 2045 Alternative 2 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
<b>Cherry Ave</b>	WB Off Direct	2	3,000	1,400	0.47	Weaving Segment <sup>5</sup>	1,350	0.45	Weaving Segment <sup>5</sup>
	WB On Loop	1	1,500	320	0.21	Lane Add <sup>6</sup>	330	0.22	Lane Add <sup>6</sup>
	WB On Direct	1	1,500	860	0.57	**	F	590	0.39
	EB Off Direct	1	1,500	350	0.23	**	F	650	0.43
	EB On Direct	1	1,500	590	0.39	Weaving Segment <sup>5</sup>	550	0.37	Weaving Segment <sup>5</sup>
	WB Off Direct	1	1,500	420	0.28	**	F	600	0.40
<b>Beech Ave</b>	WB On Direct	1	1,500	830	0.55	Weaving Segment <sup>5</sup>	690	0.46	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	550	0.37	Weaving Segment <sup>5</sup>	1,130	0.75	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	680	0.45	Lane Add <sup>6</sup>	620	0.41	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	630	0.42	Lane Drop <sup>7</sup>	810	0.54	Lane Drop <sup>7</sup>
	WB On Loop	1	1,500	520	0.35	**	F	390	0.26
	WB On Direct	1	1,500	770	0.51	**	F	430	0.29
<b>Citrus Ave</b>	WB Off Direct <sup>8</sup>	2	3,000	1,630	0.54	**	F	1,470	0.49
	EB Off Direct	1	1,500	1,110	0.74	**	F	1,280	0.85
	WB Off Direct	2	3,000	1,040	0.35	**	F	1,240	0.41
	WB On Direct	1	1,500	1,390	0.93	Lane Add <sup>6</sup>	1,650	1.10	Lane Add <sup>6</sup>
	EB Off Direct	1	1,500	420	0.28	**	F	680	0.45
	EB On Direct	1	1,500	610	0.41	**	F	470	0.31
<b>Sierra Ave</b>	WB Off Direct	1	1,500	470	0.31	**	F	660	0.44
	WB On Direct	1	1,500	730	0.49	**	F	540	0.36
	EB Off Direct	2	3,000	1,060	0.35	**	F	1,500	0.50
	EB On Direct	1	1,500	860	0.57	**	F	1,020	0.68
	WB Off Direct	1	1,500	870	0.58	Lane Drop <sup>7</sup>	1,000	0.67	Lane Drop <sup>7</sup>
	WB On Direct	1	1,500	1,540	1.03	**	F	1,220	0.81
<b>Cedar Ave</b>	EB Off Direct	2	3,000	910	0.30	**	F	980	0.33
	EB On Direct	1	1,500	940	0.63	**	F	1,100	0.73
	WB Off Direct	1	1,500	890	0.59	**	F	930	0.62
	WB On Direct	1	1,500	940	0.63	Lane Add <sup>6</sup>	1,000	0.67	Lane Add <sup>6</sup>
	EB Off Direct	1	1,500	560	0.37	**	F	540	0.36
	EB On Direct	1	1,500	920	0.61	**	F	830	0.55
<b>Riverside Ave</b>	WB Off Direct	1	1,500	810	0.54	35.2	E	750	0.50
	WB On Direct	1	1,500	840	0.56	**	F	640	0.43
	EB Off Direct	1	1,500	420	0.28	**	F	640	0.43
	EB On Direct	1	1,500	570	0.38	**	F	750	0.50
	WB Off Direct	1	1,500	530	0.35	Weaving Segment <sup>5</sup>	600	0.40	Weaving Segment <sup>5</sup>
	WB On Direct	1	1,500	530	0.35				

Table 2.5.5: Year 2045 Alternative 2 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
La Cadena Dr/9th st	WB On Direct	1	1,500	500	0.33	27.5	C	530	0.35
	EB Off Direct (9th St)	1	1,500	150	0.10	**	F	250	0.17
	EB On Direct (9th St)	1	1,500	440	0.29	Weaving Segment <sup>5</sup>		460	0.31
	WB Off Direct (9th St)	1	1,500	390	0.26	Weaving Segment <sup>5</sup>		440	0.29
	WB On Direct (La Cadena Dr)	1	1,500	270	0.18	Weaving Segment <sup>5</sup>		340	0.23
	EB Off Direct	1	1,500	710	0.47	Weaving Segment <sup>5</sup>		770	0.51
	EB On Direct	1	1,500	420	0.28	Weaving Segment <sup>5</sup>		430	0.29
	WB Off Direct (Sperry Dr)	1	1,500	870	0.58	Weaving Segment <sup>5</sup>		1,120	0.75
	WB On Direct	1	1,500	650	0.43	Weaving Segment <sup>5</sup>		810	0.54
	EB Off Direct (NB/SB I-215)	3	4,500	3,080	0.68	Weaving Segment <sup>5</sup>		3,260	0.72
I-215	EB On Direct (NB I-215)	1	1,500	3,040	2.03	Lane Add <sup>6</sup>		3,270	2.18
	EB On Direct (SB I-215)	1	1,500	2,040	1.36	Weaving Segment <sup>5</sup>		2,380	1.59
	WB Off Direct (NB/SB I-215)	2	3,000	5,420	1.81	Weaving Segment <sup>5</sup>		5,280	1.76
	WB On Loop (NB I-215)	1	1,500	910	0.61	22.9	C	1,460	0.97
	WB On Direct (SB I-215)	1	1,500	2,170	1.45	Weaving Segment <sup>5</sup>		2,600	1.73
	WB On Direct	1	1,500	260	0.17	17.8	B	890	0.59
	EB Off Direct	1	1,500	1,890	1.26	Weaving Segment <sup>5</sup>		1,270	0.85
	EB Off (Waterman Ave)	1	1,500	1,660	1.11	Lane Drop <sup>7</sup>		1,130	0.75
	EB On (Waterman Ave)	1	1,500	520	0.35	Weaving Segment <sup>5</sup>		1,120	0.75
	WB Off (Carnegie Dr)	2	3,000	1,110	0.37	Weaving Segment <sup>5</sup>		670	0.22
Waterman Ave/Carnegie Dr	WB On (Carnegie Dr)	1	1,500	490	0.33	Weaving Segment <sup>5</sup>		1,550	1.03
	EB Off Direct	2	3,000	1,090	0.36	Weaving Segment <sup>5</sup>		1,130	0.38
	EB On Direct	1	1,500	410	0.27	Weaving Segment <sup>5</sup>		1,130	0.75
	WB Off Direct	1	1,500	840	0.56	Weaving Segment <sup>5</sup>		760	0.51
	WB On Loop	1	1,500	370	0.25	**	F	720	0.48
	WB On Direct	1	1,500	550	0.37	Weaving Segment <sup>5</sup>		790	0.53
	EB Off Direct	1	1,500	1,340	0.89	Weaving Segment <sup>5</sup>		800	0.53
	EB On Direct	1	1,500	540	0.36	Weaving Segment <sup>5</sup>		1,400	0.93
	WB Off Direct	1	1,500	1,250	0.83	Weaving Segment <sup>5</sup>		870	0.58
	WB On Direct	1	1,500	980	0.65	Weaving Segment <sup>5</sup>		1,890	1.26
Mountain View Ave	EB Off Direct	1	1,500	1,060	0.71	Weaving Segment <sup>5</sup>		970	0.65
	EB On Direct	1	1,500	430	0.29	Lane Add <sup>6</sup>		1,250	0.83
	WB Off Direct	1	1,500	1,350	0.90	Weaving Segment <sup>5</sup>		690	0.46
	WB On Direct	1	1,500	710	0.47	Weaving Segment <sup>5</sup>		1,450	0.97
	EB Off Direct	1	1,500	810	0.54	21.7	C	1,000	0.67
California St	EB Off Direct	**							F
Alabama St	EB Off Direct	**							F

Table 2.5.5: Year 2045 Alternative 2 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
Alabama St	WB Off Direct	1	1,500	800	0.53	**	F	380	0.25
	WB On Direct	1	1,500	1,200	0.80	Weaving Segment <sup>5</sup>		1,400	0.93
	EB Off Direct (NB SR-210) <sup>8</sup>	2	3,000	1,130	0.38	12.2	B	2,400	0.80
	EB On Direct (SB SR-210)	1	1,500	2,390	1.59	Weaving Segment <sup>5</sup>		2,940	1.96
	WB Off Direct (NB SR-210)	2	3,000	3,360	1.12	Weaving Segment <sup>5</sup>		2,650	0.88
	WB On Direct (SB SR-210)	1	1,500	2,110	1.41	Lane Add <sup>6</sup>		1,390	0.93
SR-210	EB Off Direct (Tennessee St)	1	1,500	470	0.31	20.0	B	470	0.31
	EB On Direct (Tennessee St)	1	1,500	370	0.25	17.0	B	1,290	0.86
	WB Off Direct (Tennessee St)	1	1,500	470	0.31	**	F	430	0.29
	EB Off Direct (Eureka St)	1	1,500	1,360	0.91	Weaving Segment <sup>5</sup>		1,460	0.97
	EB On Direct (6th St)	1	1,500	260	0.17	19.8	B	700	0.47
	WB Off Direct (6th St)	1	1,500	500	0.33	**	F	420	0.28
Tennessee St	WB On Loop (NB Orange St)	1	1,500	920	0.61	Weaving Segment <sup>5</sup>		930	0.62
	WB On Direct (SB Orange St)	1	1,500	720	0.48	Weaving Segment <sup>5</sup>		520	0.35
	EB Off Direct	1	1,500	880	0.59	26.2	C	1,310	0.87
	EB On Direct	1	1,500	190	0.13	19.7	B	460	0.31
	WB Off Direct	1	1,500	370	0.25	**	F	320	0.21
	WB On Direct	1	1,500	1,600	1.07	**	F	930	0.62
University St/ Cypress Ave	EB Off Direct	1	1,500	790	0.53	23.6	C	840	0.56
	EB On Direct	1	1,500	600	0.40	16.2	B	1,210	0.81
	WB Off Direct	1	1,500	770	0.51	**	F	500	0.33
	WB On Direct	1	1,500	1,110	0.74	**	F	550	0.37
	EB Off Direct	1	1,500	70	0.05	19.6	B	380	0.25
	EB On Direct	1	1,500	140	0.09	19.0	B	190	0.13
Wabash Ave	WB Off Direct	1	1,500	120	0.08	**	F	130	0.09
	WB On Direct	1	1,500	250	0.17	**	F	280	0.19

Notes:

- Capacity and peak hour traffic volumes are shown in vehicles per hour (vph). On-ramp traffic volumes are assumed to be unmetered volumes. LOS - Level of Service; d/c - Demand Volume-to-Capacity
- Peak hour capacities for freeway ramps are 1,500 vph for each freeway ramp lane.
- LOS is F under either two conditions: (1) if the total flow of the merge/diverge area exceeds the capacity of the freeway section, denoted with an asterisk (\*) in the density column;

- (2) if the mainline demand volume to capacity is greater than 1.00, denoted with double asterisks (\*\*\*) in the density column.
- Density is shown in passenger cars/mile/lane [pc/mi/l]. The density LOS criteria for merge and diverge sections are per HCM 2000.

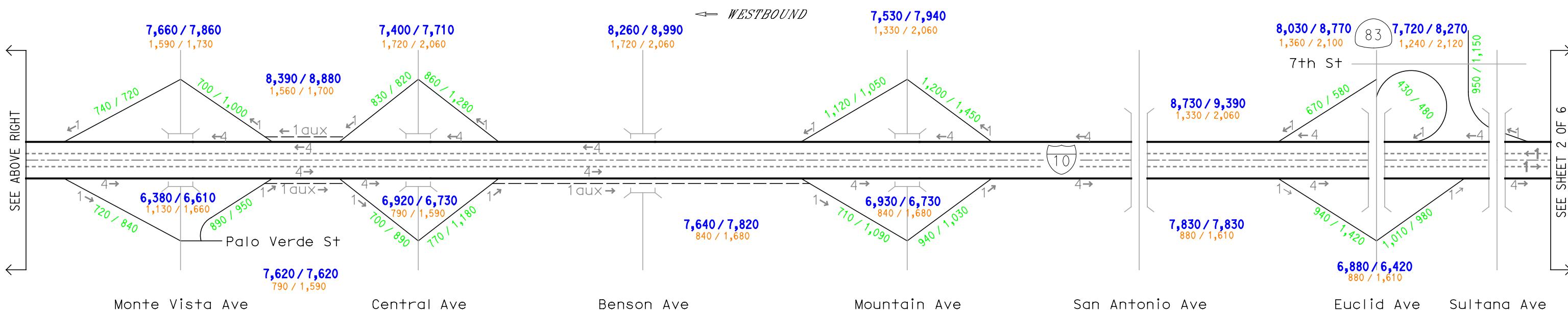
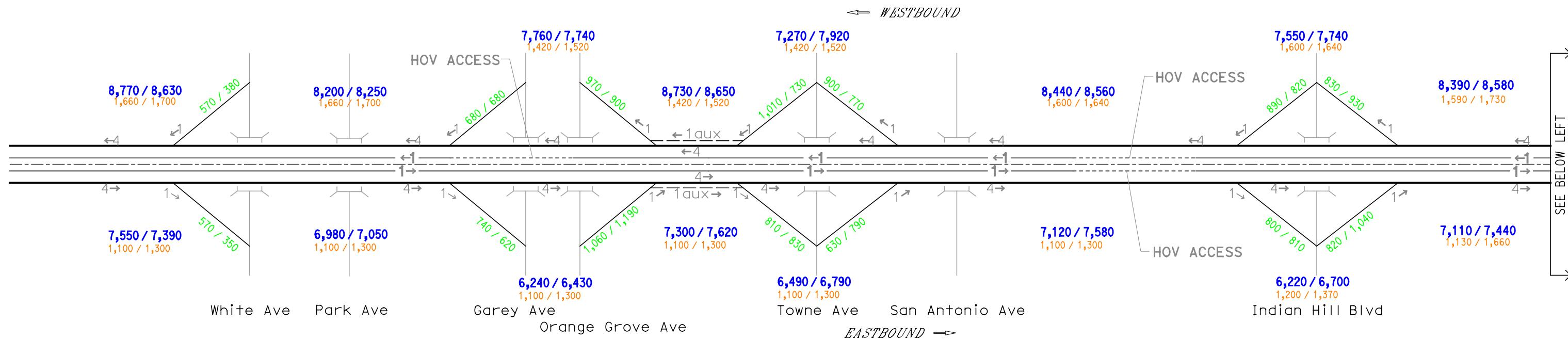
- Weaving Segment : Based on the lane configuration, ramp junction analysis is not applicable for this location. See [Table 2.5.3](#).

- Lane Add : Analysis for a single-lane addition is a basic freeway segment analysis for the segments downstream of the lane addition with an additional lane. See [Table 2.5.3](#).

- Lane Drop : Analysis for a single-lane drop is basic freeway segment analysis for the segments upstream and downstream of the lane drop. See [Table 2.5.3](#).

- Major Diverge : A major diverge exists when a two-lane off-ramp results in a lane drop. Density and LOS are calculated using the HCM 2000 Major Diverge Area analysis.

- Number of lanes on the ramp at the gore point (off-ramp) or 6-foot point (on-ramp).



#### LEGEND

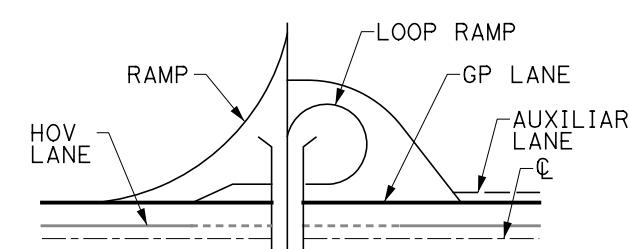
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AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

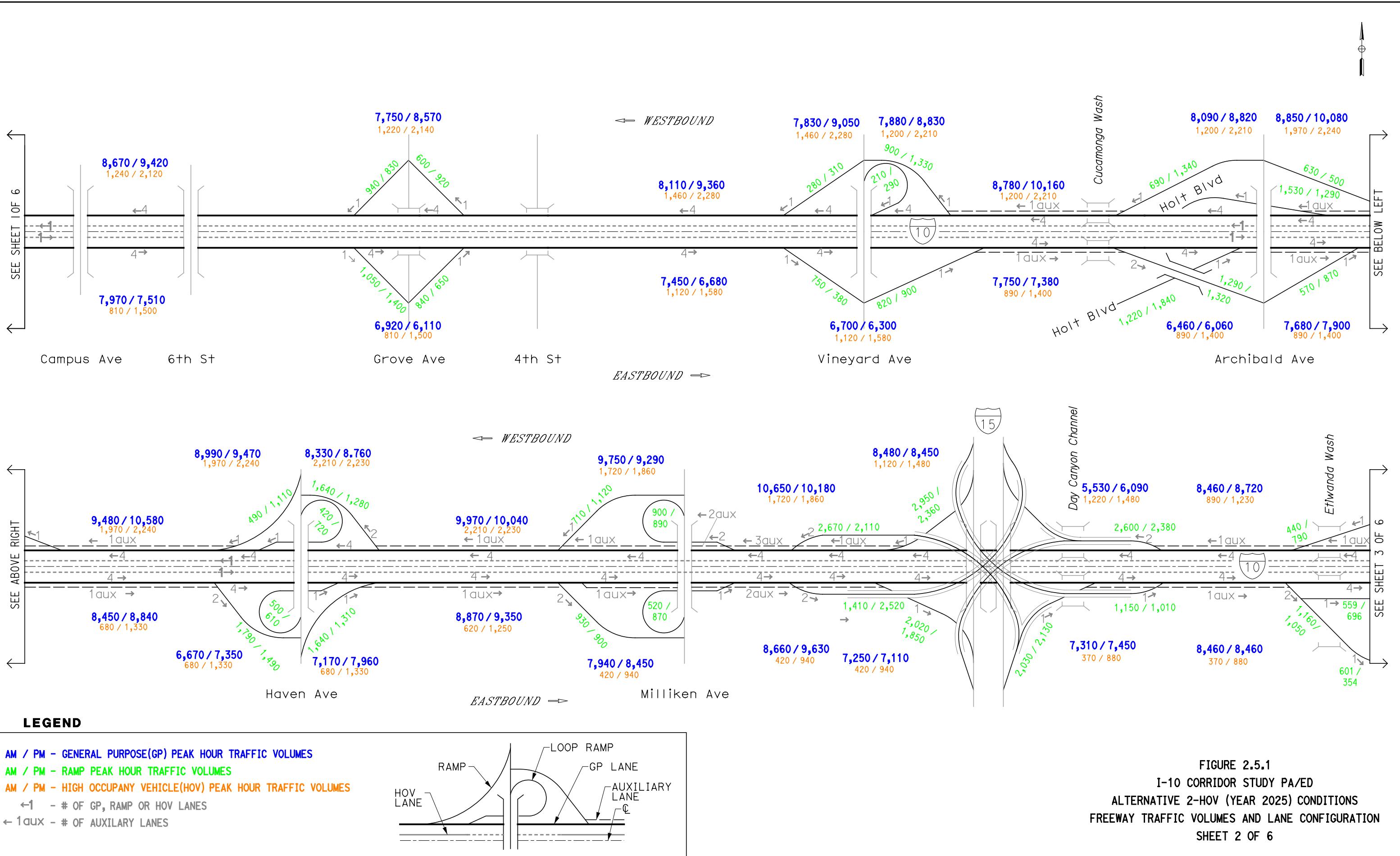
AM / PM - HIGH OCCUPANT VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES

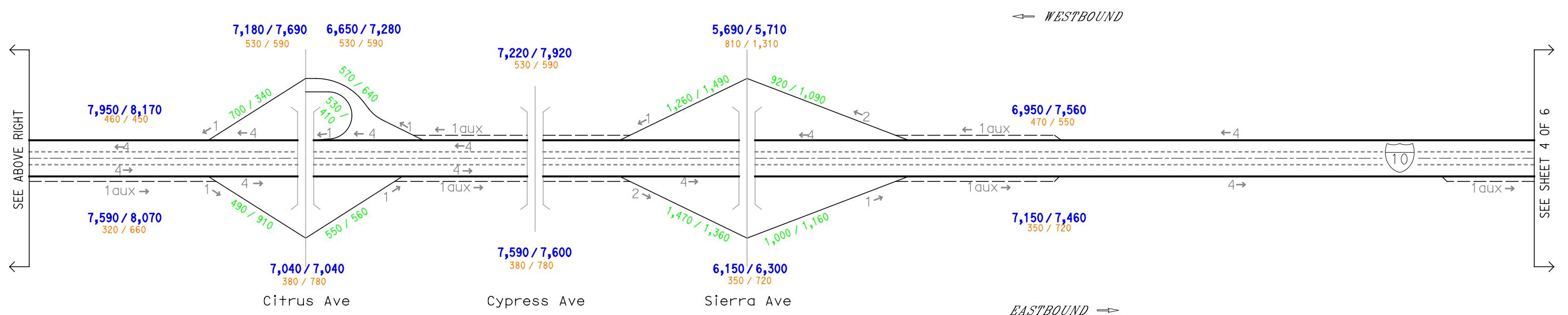
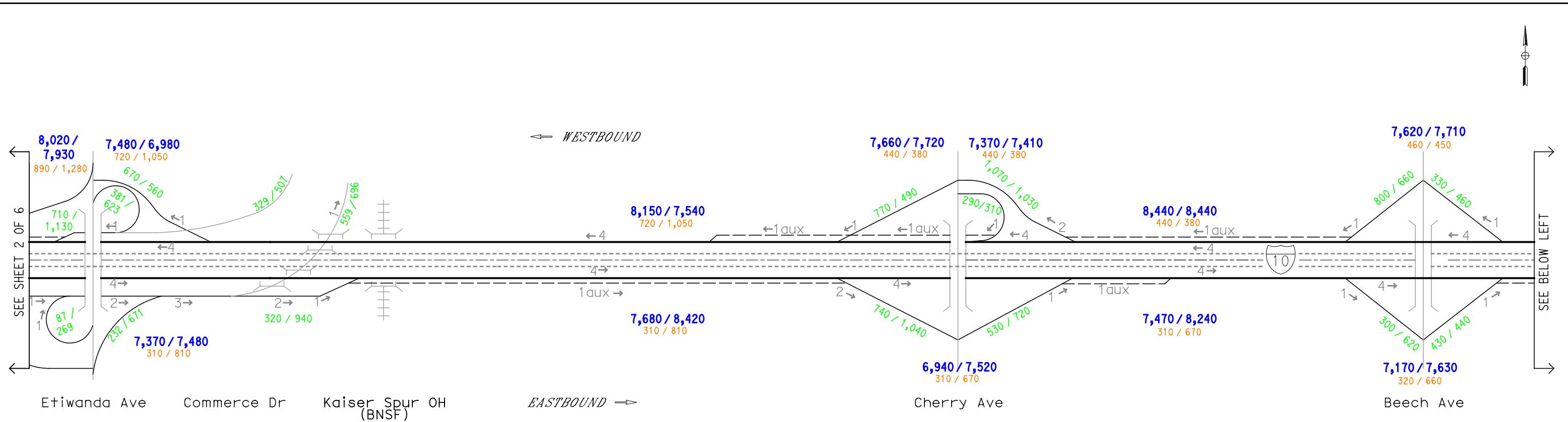
↔1 - # OF GP, RAMP OR HOV LANES

↔1aux - # OF AUXILIARY LANES



**FIGURE 2.5.1**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2-HOV (YEAR 2025) CONDITIONS  
FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
SHEET 1 OF 6





## **LEGEND**

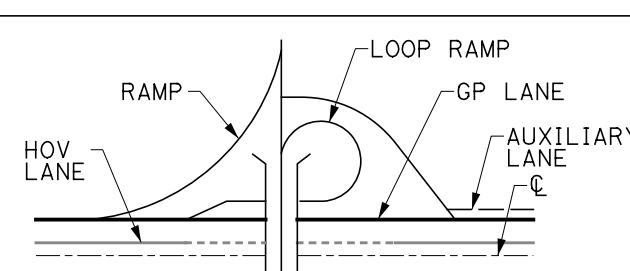
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## AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

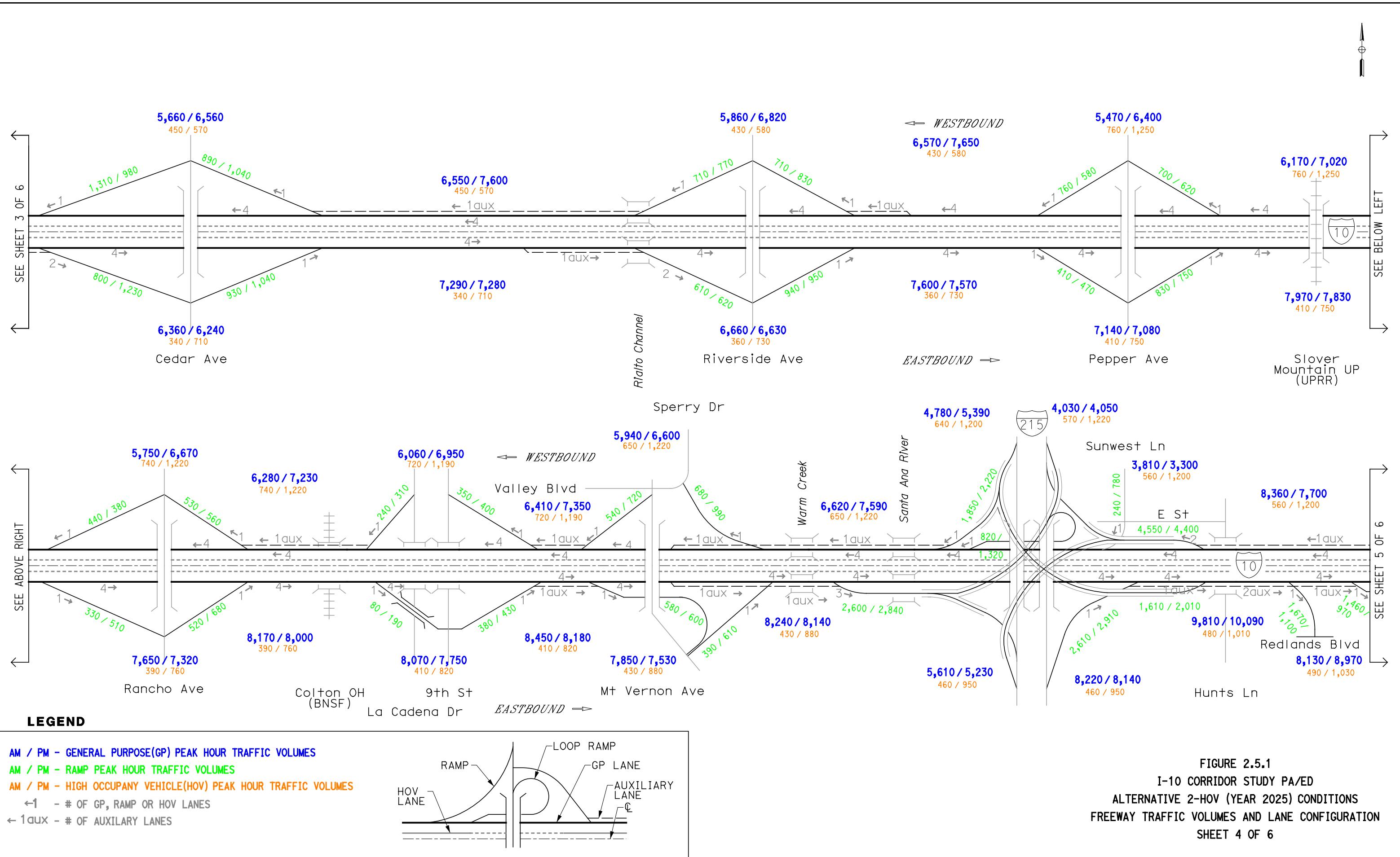
## AM / PM - HIGH OCCUPANT VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES

←1 - # OF GP, RAMP OR HOV LANES

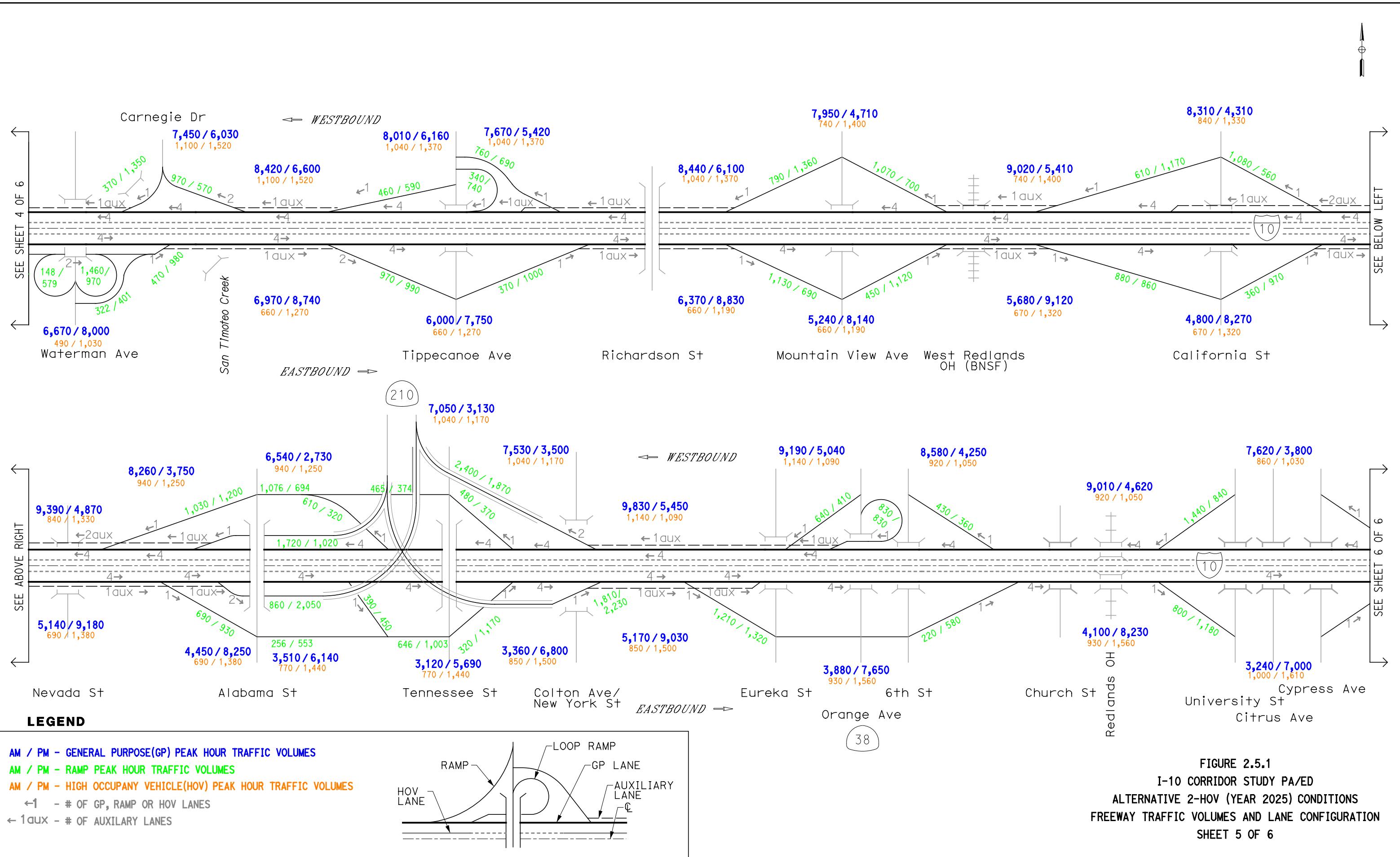
← 1AUX - # OF AUXILIARY LANES



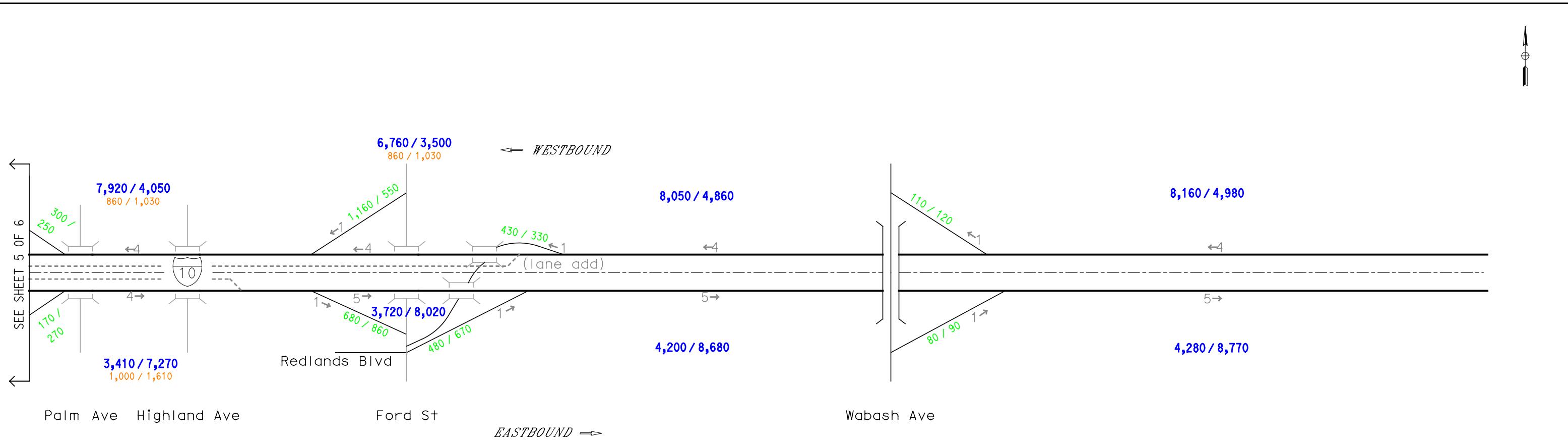
**FIGURE 2.5.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 2-HOV (YEAR 2025) CONDITIONS**  
**FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION**  
**SHEET 3 OF 6**



**FIGURE 2.5.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 2-HOV (YEAR 2025) CONDITIONS**  
**FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION**  
**SHEET 4 OF 6**



**FIGURE 2.5.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 2-HOV (YEAR 2025) CONDITIONS**  
**FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION**  
**SHEET 5 OF 6**



## **LEGEND**

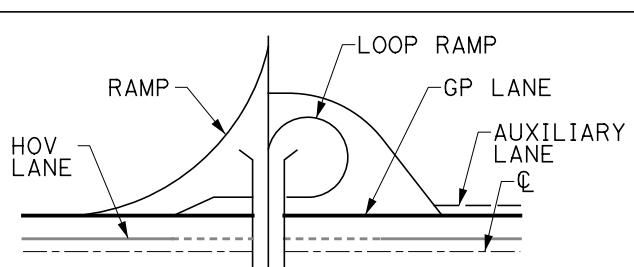
## AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES

## AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

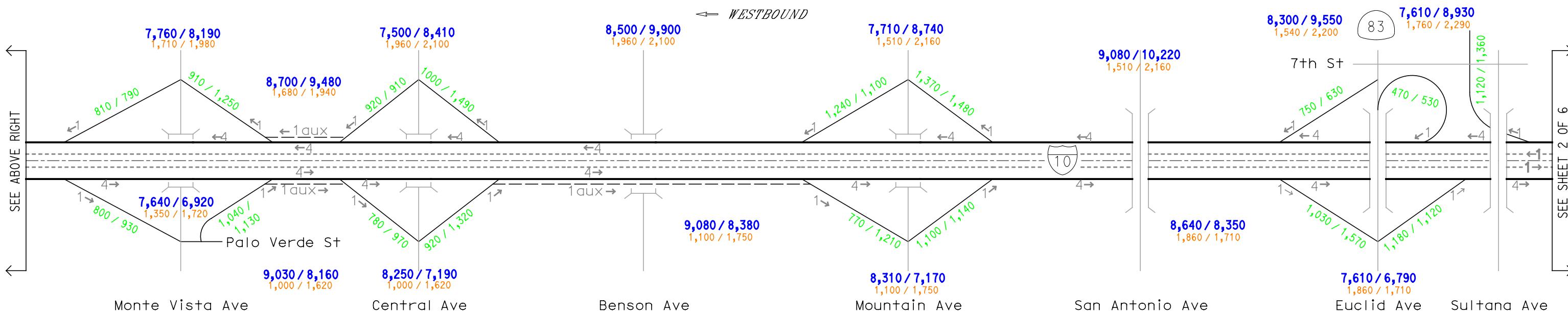
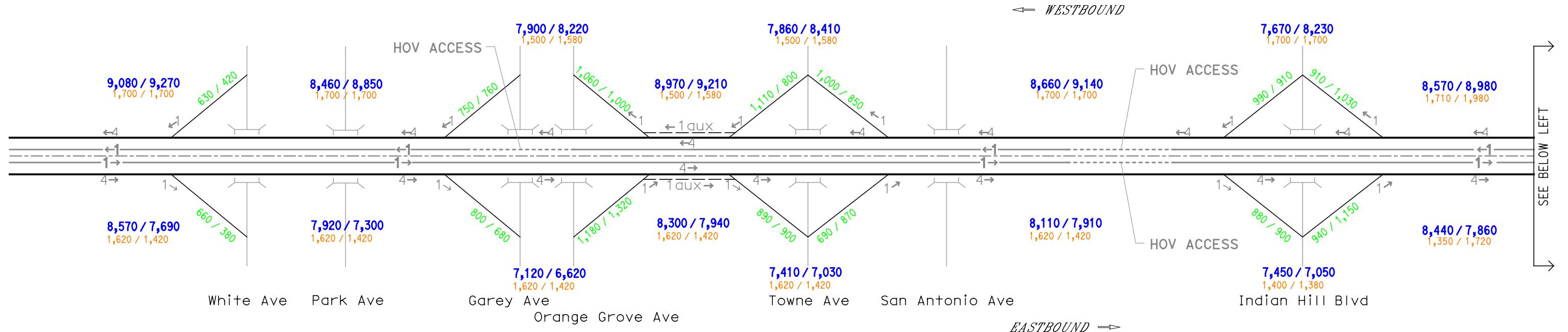
## AM / PM - HIGH OCCUPANCY VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES

←1 - # OF GP, RAMP OR HOV LANES

← 1aux - # OF AUXILIARY LANES



**FIGURE 2.5.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 2-HOV (YEAR 2025) CONDITIONS**  
**FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION**  
**SHEET 6 OF 6**



#### LEGEND

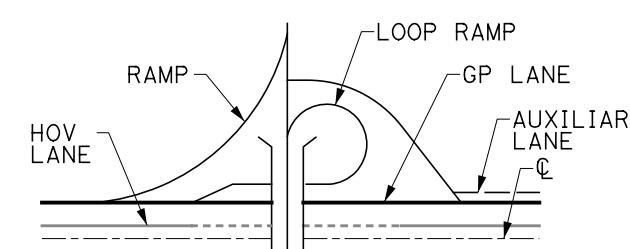
AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES

AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

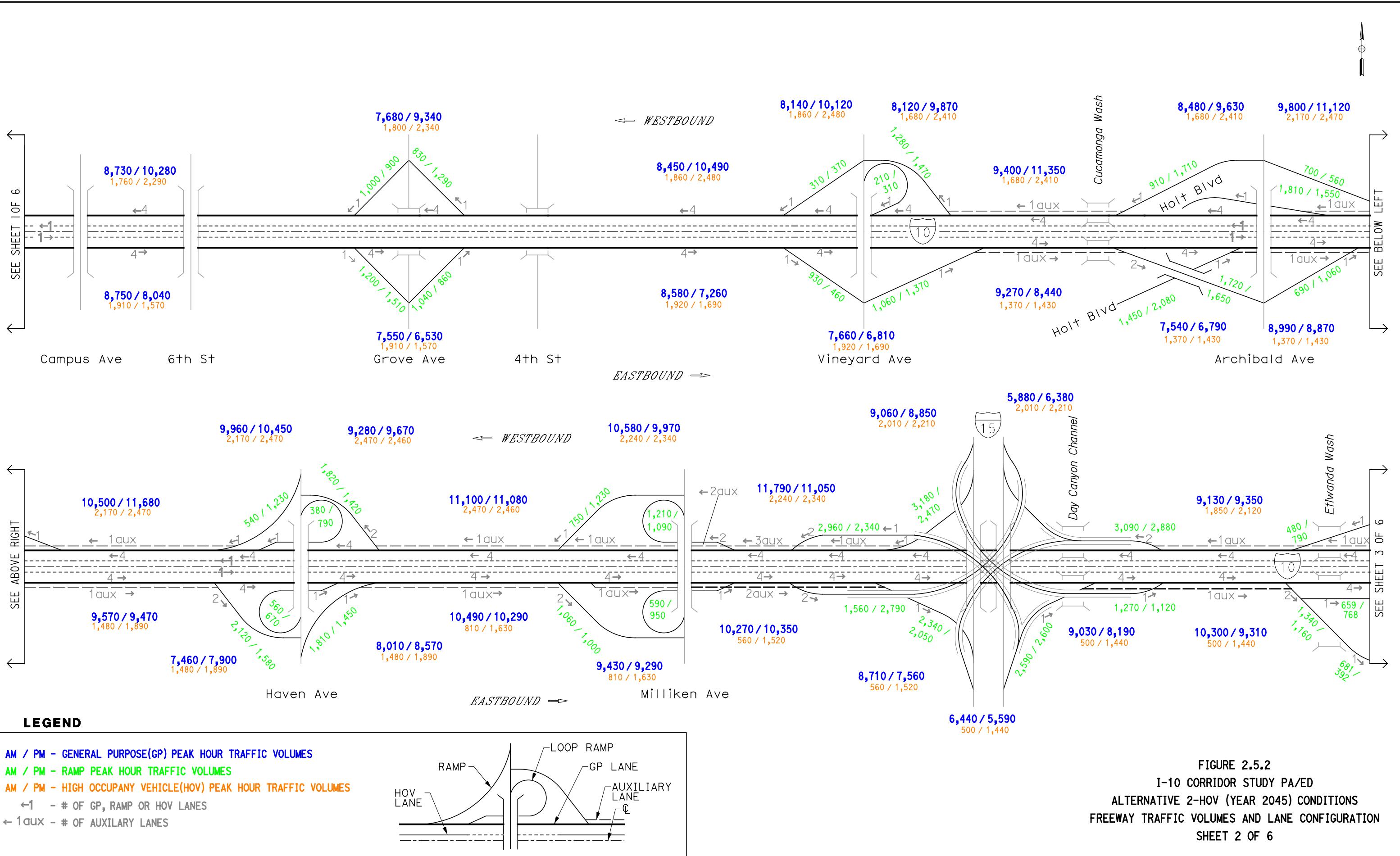
AM / PM - HIGH OCCUPANT VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES

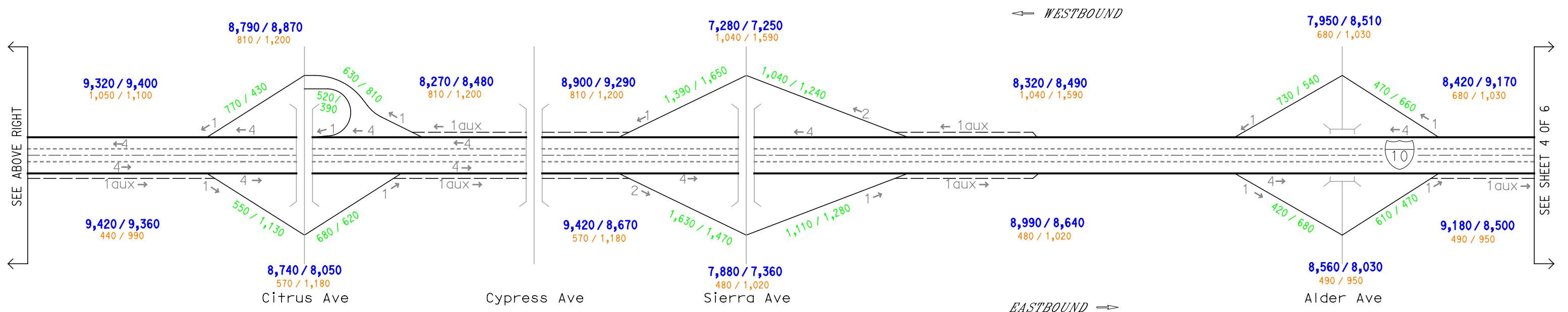
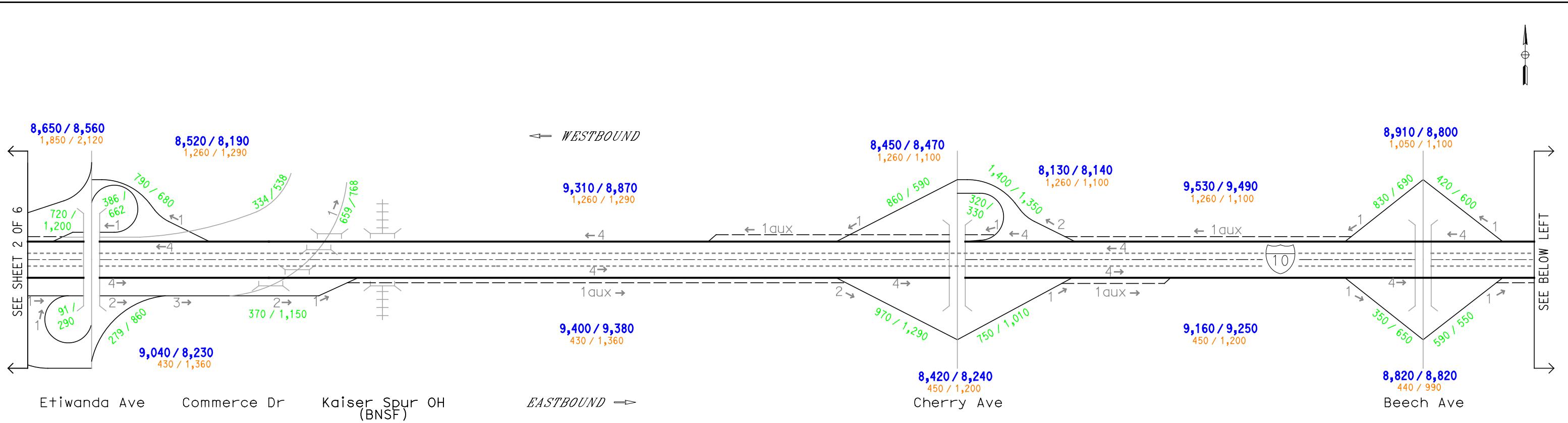
↔1 - # OF GP, RAMP OR HOV LANES

↔1aux - # OF AUXILIARY LANES



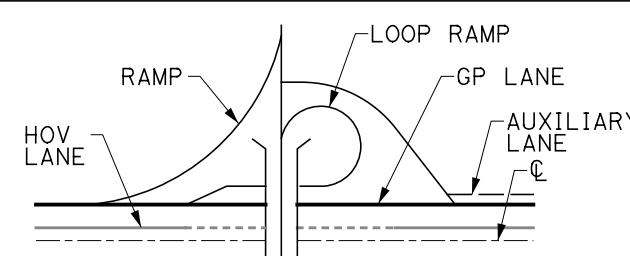
**FIGURE 2.5.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2-HOV (YEAR 2045) CONDITIONS  
FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION  
SHEET 1 OF 6



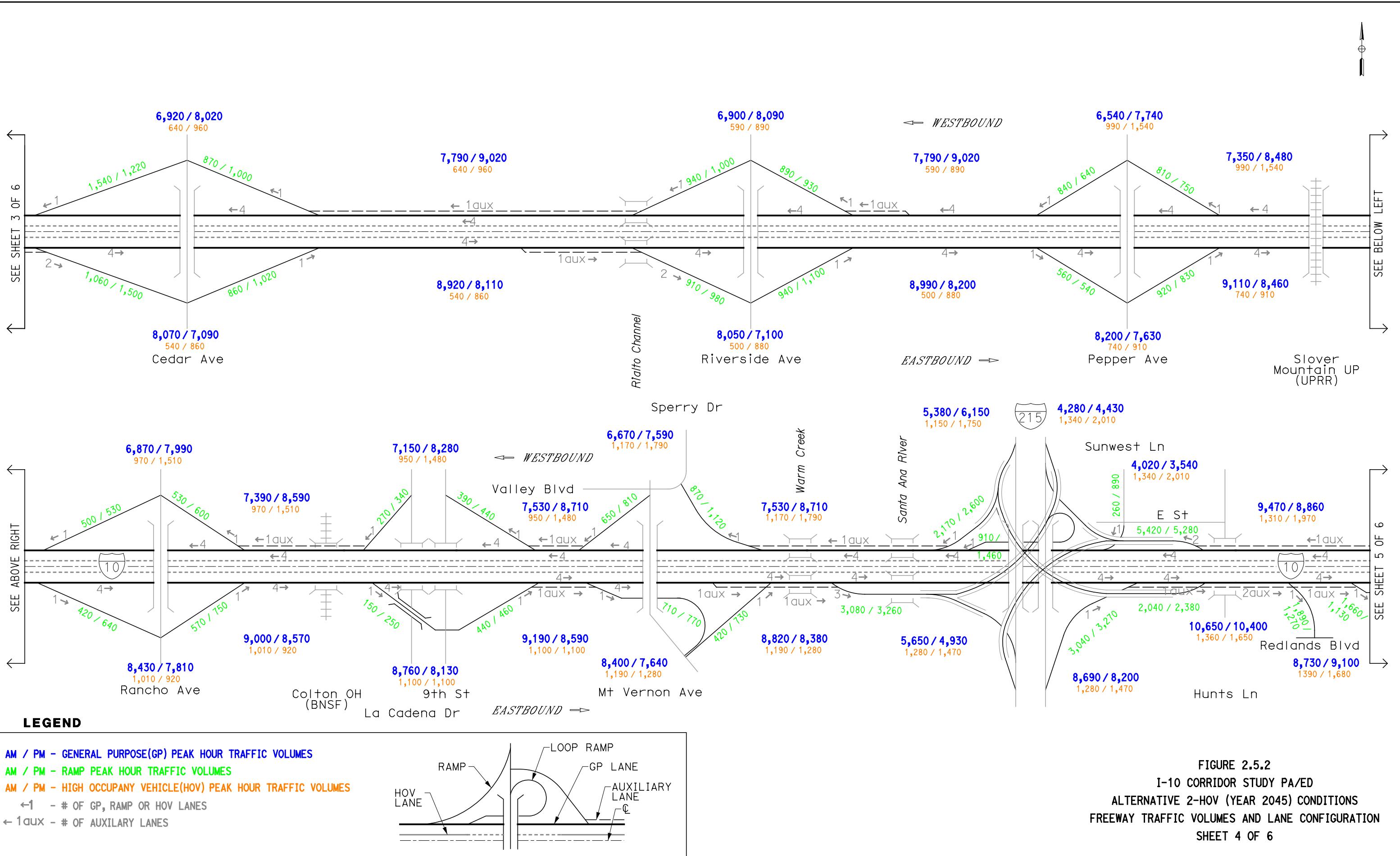


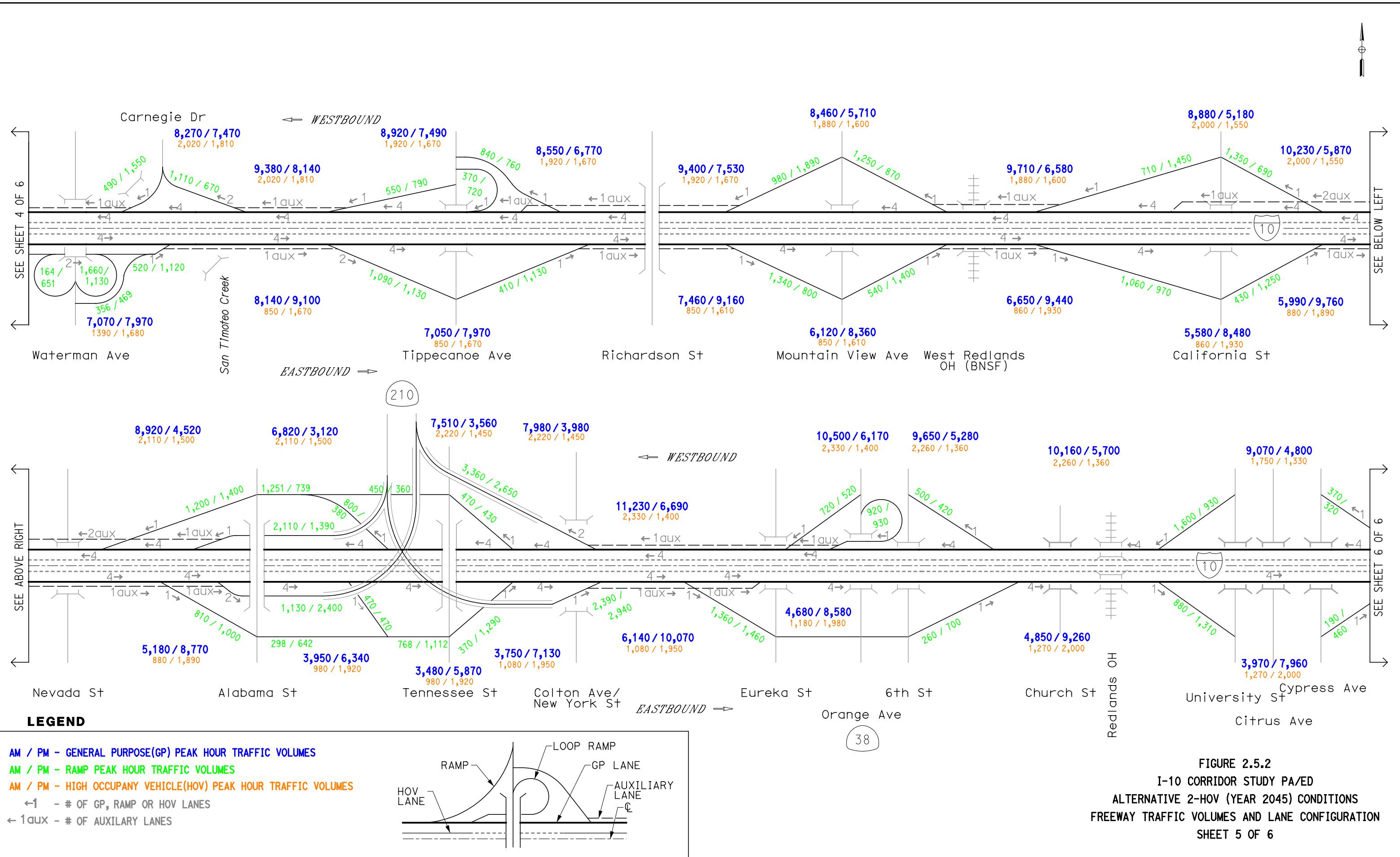
#### LEGEND

AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES  
 AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES  
 AM / PM - HIGH OCCUPANT VEHICLE(HOV) PEAK HOUR TRAFFIC VOLUMES  
 ←1 - # OF GP, RAMP OR HOV LANES  
 ←1aux - # OF AUXILIARY LANES

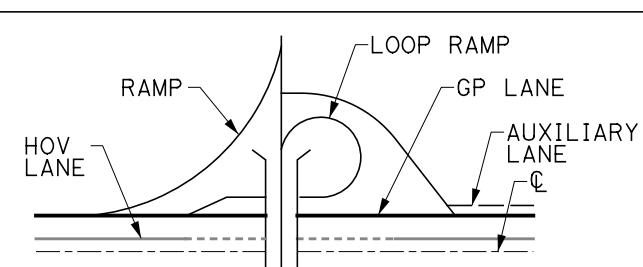
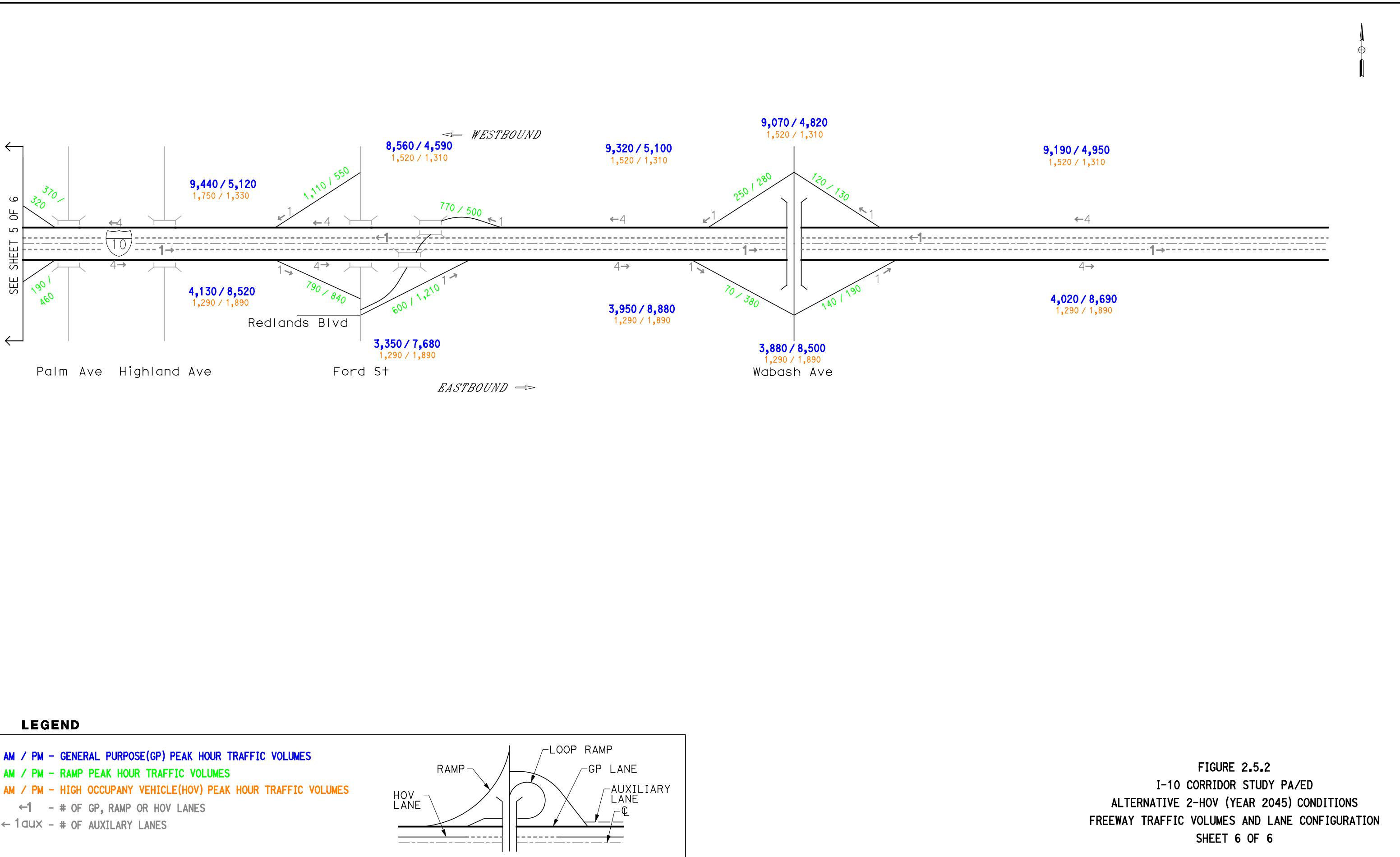


**FIGURE 2.5.2**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 2-HOV (YEAR 2045) CONDITIONS**  
**FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION**  
**SHEET 3 OF 6**





**FIGURE 2.5.2**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 2-HOV (YEAR 2045) CONDITIONS**  
**FREEWAY TRAFFIC VOLUMES AND LANE CONFIGURATION**  
**SHEET 5 OF 6**



## 2.6 Alternative 3: Two Express Lanes in Each Direction Conditions Analysis

This section of the report provides an analysis of the mainline freeway, for the GP, HOV, and Express Lanes as well as the freeway ramp junction locations for Alternative 3 (Express) conditions using projected Opening Year (2025) and Design Year (2045) traffic volumes. The HCS freeway LOS analysis worksheets for Alternative 3 (Express) conditions for Opening Year (2025) and Design Year (2045) are provided in [Appendix E-1](#) and [Appendix E-2](#), respectively.

As discussed in [Section 1.4.3](#), Alternative 3 would provide two Express Lanes in each direction of I-10 from the LA/SB County line to California Street (near SR-210) in the City of Redlands and one Express Lane in each direction from California Street to Ford Street in the City of Redlands, a total of 33 miles. In addition to the Express Lanes, Alternative 3 would also provide the following freeway improvements:

- Construct eastbound auxiliary lane between Mountain Avenue and Euclid Avenue
- Construct westbound auxiliary lane between Rancho Avenue and La Cadena Drive
- Extend westbound auxiliary lane between Pepper Avenue and Riverside Avenue
- Modify one-lane off-ramps to two-lane off-ramps at the following locations:
  - Monte Vista Avenue Westbound Off-Ramp
  - Mountain Avenue Westbound Off-Ramp
  - Euclid Avenue Eastbound Off-Ramp
  - Holt Boulevard Westbound Off-Ramp
  - Waterman Avenue/Carnegie Drive Westbound Off-Ramp

Alternative 3 assumes the completion of improvements along the project corridor included in Alternative 1 (No Build).

Year 2025 and 2045 Alternative 3 (Express) lane configurations and morning and evening peak hour traffic volumes for the I-10 mainline and all interchange ramps within the project limits are illustrated on [Figure 2.6.1](#) and [Figure 2.6.2](#). A detailed discussion of the methodology to develop future conditions freeway traffic volumes is presented in [Section 2.2.2](#) of this report.

[Section 2.6](#) is organized somewhat differently from [Section 2.4](#) and [Section 2.5](#). In the previous sections both GP and HOV analysis is presented in a single subsection devoted to mainline segment analysis. Because of the extent of analysis of the Express Lanes in this section, the analysis of the Express Lanes is presented in a separate subsection following subsections covering the GP lanes and ramp junctions in 2025 and 2045.

Alternative 3 ADT in 2025 is forecast to range from 336,000 in the western portion of the corridor to 223,000 in the eastern portion of the corridor and from 369,000 to 260,000 in 2045. Weekday daily VMT on I-10 within the study area is forecast to be 8.9 million vehicle miles in 2025 and 10.7 million vehicle miles in 2045 under Alternative 2. ADT and VMT data for Alternative 3 in 2025 and 2045 are presented in [Table 2.6.1](#).

Segment	Alternative 3 Condition I-10 Freeway Mainline Average Daily Traffic (ADT) and Vehicle Miles Travelled (VMT)			
	2025		2045	
	ADT	Daily VMT	ADT	Daily VMT
LA County Line to I-15	336,000	3,056,000	369,000	3,402,000
I-15 to I-215	255,000	3,340,000	297,000	4,144,000
I-215 to SR-210	265,000	1,353,000	300,000	1,649,000
SR-210 to Ford Street	223,000	1,188,000	260,000	1,541,000
<b>Total</b>	-	8,937,000	-	10,736,000

Source: SBTAM raw and post-processed data

### 2.6.1 Year 2025 General Purpose Lane Segment Analysis and Levels of Service

HCM 2000 basic freeway segment analysis was conducted for all I-10 segments except that, based on the segment and ramp lane configuration under year 2025 Alternative 3 (Express) conditions, the HCM 2000 weaving analysis method is applied to segments where an on-ramp is closely followed by an off-ramp and the two are joined by an auxiliary lane. As discussed in [Section 2.1.2](#) and noted in [Table 2.6.2](#), some weaving segments are categorized as a complex weaving segment. The analysis conducted for the complex weaving segments consists of two weaving analyses.

[Table 2.6.2](#) presents the LOS of each freeway segment with the proposed improvement for Alternative 3 (Express). For the year 2025 Alternative 3 (Express) condition the majority of the GP lane segments are expected to operate at LOS F during the morning or evening peak hours in both directions. In the eastbound direction, LOS F conditions are expected throughout the I-10 corridor within the project study limits during either the morning or evening peak hour. In the westbound direction, LOS F conditions are expected west of the Rancho Avenue interchange and east of the I-15 interchange. As shown in [Table 2.6.2](#), the GP lane segments are operating at LOS F due to the traffic demand volume exceeding capacity.

In the eastbound direction, the following GP lane segments are expected to operate at LOS F during the morning and/or evening peak hours in 2025:

- Between Dudley Street On-Ramp and White Avenue Off-Ramp
- Between White Avenue Off-Ramp and Garey Avenue Off-Ramp
- Between Orange Grove Avenue On-Ramp and Towne Avenue Off-Ramp
- Between Towne Avenue On-Ramp and Indian Hill Boulevard Off-Ramp
- Between Monte Vista Avenue On-Ramp and Central Avenue Off-Ramp
- Between Mountain Avenue Off-Ramp and Mountain Avenue On-Ramp
- Between Mountain Avenue On-Ramp and Euclid Avenue Off-Ramp
- Between Euclid Avenue On-Ramp and Grove Avenue Off-Ramp
- Between Vineyard Avenue On-Ramp and Archibald Avenue Off-Ramp
- Between Archibald Avenue On-Ramp and Haven Avenue Off-Ramp
- Between Haven Avenue Loop On-Ramp and Haven Avenue On-Ramp
- Between Haven Avenue Direct On-Ramp and Milliken Avenue Off-Ramp
- Between Milliken Avenue Loop On-Ramp and NB I-5 Off-Ramp

- Between NB/SB I-15 On-Ramp and Etiwanda Avenue Off-Ramp
- Between Cherry Avenue On-Ramp and Beech Avenue Off-Ramp
- Between Beech Avenue On-Ramp and Citrus Avenue Off-Ramp
- Between Riverside Avenue On-Ramp and Pepper Avenue Off-Ramp
- Between Pepper Avenue On-Ramp and Rancho Avenue Off-Ramp
- Between Rancho Avenue On-Ramp and 9<sup>th</sup> Street Off-Ramp
- Between 9<sup>th</sup> Street On-Ramp and Mt Vernon Avenue Off-Ramp
- Between SB I-215 On-Ramp and Redlands Boulevard Off-Ramp
- Between Redlands Boulevard Off-Ramp and Waterman Avenue Off-Ramp
- Between Waterman Avenue Off-Ramp and Waterman Avenue On-Ramp
- Between Waterman Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Mountain View Avenue Off-Ramp
- Between Mountain View Avenue Off-Ramp and Mountain View Avenue On-Ramp
- Between Mountain View Avenue On-Ramp and California Street Off-Ramp
- Between SB SR-210 On-Ramp and Eureka Street Off-Ramp
- Between 6<sup>th</sup> Street On-Ramp and University Street Off-Ramp
- Between Cypress Avenue On-Ramp and Ford Street Off-Ramp

Similarly, LOS F conditions are expected on the following westbound GP lane segments:

- Between Yucaipa Boulevard On-Ramp and Wabash Avenue Off-Ramp
- Between Wabash Avenue Off-Ramp and Ford Street Off-Ramp
- Between University Street On-Ramp and 6<sup>th</sup> Street Off-Ramp
- Between Orange Avenue Direct/Loop On-Ramp and NB SR-210 Off-Ramp
- Between SB SR-210/Alabama Street On-Ramp and California Street Off-Ramp
- Between California Street On-Ramp and Mountain View Avenue Off-Ramp
- Between Mountain View Avenue On-Ramp and Tippecanoe Avenue Off-Ramp
- Between Tippecanoe Avenue On-Ramp and Carnegie Drive/Waterman Avenue Off-Ramp
- Between Carnegie Drive/Waterman Avenue On-Ramp and NB/SB I-215 Off-Ramp
- Between SB I-215 On-Ramp and Sperry Drive Off-Ramp
- Between Mt. Vernon Avenue On-Ramp and 9<sup>th</sup> Street Off-Ramp
- Between La Cadena Drive On-Ramp and Rancho Avenue Off-Ramp
- Between Cherry Avenue On-Ramp and Etiwanda Avenue Off-Ramp
- Between NB I-15 On-Ramp and Milliken Avenue Off-Ramp
- Between Milliken Avenue On-Ramp and Haven Avenue Off-Ramp
- Between Haven Avenue Direct On-Ramp and Archibald Avenue Off-Ramp
- Between Archibald Avenue Off-Ramp and Holt Boulevard Off-Ramp
- Between Holt Boulevard Off-Ramp and Archibald Avenue On-Ramp
- Between Archibald Avenue On-Ramp and Vineyard Avenue Off-Ramp
- Between Vineyard Avenue Direct On-Ramp and Grove Avenue Off-Ramp
- Between Grove Avenue On-Ramp and 7<sup>th</sup> Street Off-Ramp
- Between Euclid Avenue Direct On-Ramp and Mountain Avenue Off-Ramp
- Between Mountain Avenue On-Ramp and Central Avenue Off-Ramp
- Between Central Avenue On-Ramp and Monte Vista Avenue Off-Ramp
- Between Indian Hill Boulevard On-Ramp and Towne Avenue Off-Ramp
- Between Towne Avenue On-Ramp and Orange Grove Avenue Off-Ramp

- Between Orange Grove Avenue Off-Ramp and Garey Avenue On-Ramp
- Between Garey Avenue On-Ramp and White Avenue On-Ramp
- Between White Avenue On-Ramp and Dudley Street Off-Ramp

## 2.6.2 Year 2025 Ramps and Ramp-Freeway Junction Analysis and Levels of Service

The density and LOS for each of the ramp junctions along I-10 within the study area are based on the forecasted year 2025 Alternative 3 (Express) traffic volumes. **Table 2.6.3** provides a summary of the findings from the analyses. The d/c ratio for each of the freeway ramps is also presented. It should be noted that when the GP lane segment is LOS F, the ramp junction also operates at LOS F, regardless of the flow rate entering the ramp influence area.

As discussed in **Section 2.1.3**, on- or off-ramps associated with lane additions and/or lane drops are not analyzed as a typical ramp junction (using the merge and diverge method). The operations of these special ramp conditions are based on the operation of the segment upstream and/or downstream of the ramp. Depending on the lane configuration, the basic freeway segment or the weave method is used to determine the operation of the segment. The special ramp conditions are indicated with “Lane Add”, “Lane Drop” or “Weaving Segment” in **Table 2.6.3**. The operations of the segments are summarized in **Table 2.6.2**. For major diverge locations, when a two-lane off-ramp results in a lane drop, the density and LOS are determined based on the HCM major diverge method described in **Section 2.1.3**.

Under the year 2025 Alternative 3 (Express) condition, the ramp junction peak hour LOS varies from B to E, except that the following ramp junction locations operate at LOS F:

- White Avenue EB Direct Off-Ramp
- White Avenue WB Direct On-Ramp
- Garey Avenue EB Direct Off-Ramp
- Garey Avenue WB Direct On-Ramp
- Towne Avenue EB Direct On-Ramp
- Towne Avenue WB Direct Off-Ramp
- Indian Hill Blvd EB Direct Off-Ramp
- Indian Hill Blvd WB Direct On-Ramp
- Central Avenue WB Direct Off-Ramp
- Mountain Avenue WB Direct Off-Ramp
- Mountain Avenue WB Direct On-Ramp
- Euclid Avenue EB Direct Off-Ramp
- Euclid Avenue EB Direct On-Ramp
- Euclid Avenue WB Direct Off-Ramp to 7<sup>th</sup> Street
- Euclid Avenue WB Loop On-Ramp
- Euclid Avenue WB Direct On-Ramp
- Grove Avenue EB Direct Off-Ramp
- Grove Avenue WB Direct Off-Ramp
- Grove Avenue WB Direct On-Ramp
- Vineyard Avenue WB Loop On-Ramp
- Vineyard Avenue WB Direct On-Ramp
- Archibald Avenue EB Direct On-Ramp
- Archibald Avenue WB Direct Off-Ramp

- Archibald Avenue WB Direct Off-Ramp (Holt Blvd)
- Haven Avenue EB Direct Off-Ramp
- Haven Avenue EB Direct On-Ramp
- Haven Avenue WB Direct Off-Ramp
- Haven Avenue WB Direct On-Ramp
- Milliken Avenue EB Direct Off-Ramp
- Milliken Avenue WB Direct On-Ramp
- Etiwanda Avenue WB Direct Off-Ramp
- Beech Avenue EB Direct Off-Ramp
- Riverside Avenue EB Direct On-Ramp
- Pepper Avenue EB Direct Off-Ramp
- Pepper Avenue EB Direct On-Ramp
- Rancho Avenue EB Direct Off-Ramp
- Rancho Avenue EB Direct On-Ramp
- La Cadena Drive/9<sup>th</sup> Street EB Direct Off-Ramp
- Tippecanoe Avenue WB Loop On-Ramp
- Tennessee Street WB Direct Off-Ramp
- Eureka Street/Orange Street/6<sup>th</sup> Street EB Direct On-Ramp
- Eureka Street/Orange Street/6<sup>th</sup> Street WB Direct Off-Ramp
- University Street/Cypress Avenue EB Direct Off-Ramp
- University Street/Cypress Avenue EB Direct On-Ramp
- University Street/Cypress Avenue WB Direct Off-Ramp
- University Street/Cypress Avenue WB Direct On-Ramp
- Ford Street WB Direct Off-Ramp
- Ford Street WB Direct On-Ramp
- Wabash Avenue WB Direct Off-Ramp

The majority of the ramp junction locations listed above are expected to operate at LOS F due to the LOS F condition forecast for the GP lane segments upstream of the ramp. As shown in **Table 2.6.2**, the traffic demand volumes for the majority of the GP lane segments are expected to exceed the capacity of the segments resulting in a LOS F condition.

### 2.6.3 Year 2045 General Purpose Lane Segment Analysis and Levels of Service

HCM 2000 basic freeway segment analysis was conducted for all I-10 segments except that, based on the segment and ramp lane configuration under year 2045 Alternative 3 (Express) conditions, the HCM 2000 weaving analysis method is applied to the same segments indicated in year 2025 Alternative 3 (Express) condition. As discussed in **Section 2.1.2** and noted in **Table 2.6.4**, some weaving segments are categorized as a complex weaving segment. The analysis conducted for the complex weaving segments consists of two weaving analyses.

**Table 2.6.4** presents the LOS of each freeway segment. Under year 2045 Alternative 3 (Express) conditions the majority of the GP lane segments are expected to operate at LOS F during the morning or the evening peak hours in both directions. As shown in the **Table 2.6.4**, the GP lane segments are generally operating at LOS F due to the traffic demand volume exceeding capacity.

In the eastbound direction, the following additional GP lane segments are expected to operate at LOS F during the morning and/or evening peak hours in comparison to the year 2025 Alternative 3 (Express) condition:

- Between Garey Avenue Off-Ramp and Orange Grove Avenue On-Ramp
- Between Central Avenue On-Ramp and Mountain Avenue Off-Ramp
- Between Grove Avenue On-Ramp and Vineyard Avenue Off-Ramp
- Between Holt Boulevard On-Ramp and Archibald Avenue On-Ramp
- Between Etiwanda Avenue On-Ramp and Cherry Avenue Off-Ramp
- Between Citrus Avenue On-Ramp and Sierra Avenue On-Ramp
- Between Sierra Avenue On-Ramp and Alder Avenue Off-Ramp
- Between Alder Avenue On-Ramp and Cedar Avenue Off-Ramp
- Between Cedar Avenue On-Ramp and Riverside Avenue Off-Ramp
- Between Mt. Vernon Avenue On-Ramp and NB/SB I-215 Off-Ramp
- Between Mountain View Avenue On-Ramp and California Street Off-Ramp
- Between California Street On-Ramp and Alabama Street Off-Ramp
- Between Alabama Street Off-Ramp and NB SR-210 Off-Ramp
- Between Ford Street On-Ramp and Wabash Avenue Off-Ramp
- Between Wabash Avenue On-Ramp and Yucaipa Boulevard Off-Ramp

In the westbound direction, the following additional GP lane segments are expected to operate at LOS F during the morning and/or evening peak hours in comparison to the year 2025 Alternative 3 (Express) condition:

- Between Ford Street On-Ramp and Cypress Avenue Off-Ramp
- Between Rancho Avenue On-Ramp and Pepper Avenue Off-Ramp
- Between Cedar Avenue On-Ramp and Alder Avenue Off-Ramp
- Between Alder Avenue On-Ramp and Sierra Avenue Off-Ramp
- Between Sierra Avenue On-Ramp and Citrus Avenue Off-Ramp
- Between Citrus Avenue Off-Ramp and Citrus Avenue Loop On-Ramp
- Between Citrus Avenue On-Ramp and Beech Avenue Off-Ramp
- Between Beech Avenue On-Ramp and Cherry Avenue Off-Ramp
- Between Cherry Avenue Loop On-Ramp and Cherry Avenue On-Ramp
- Between Etiwanda Avenue Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp
- Between Haven Avenue Loop On-Ramp and Haven Avenue On-Ramp
- Between Monte Vista Avenue On-Ramp and Indian Hill Boulevard Off-Ramp

#### **2.6.4 Year 2045 Ramps and Ramp-Freeway Junction Analysis and Levels of Service**

The density and LOS for each of the ramp junctions along I-10 within the study area are based on the forecasted year 2045 Alternative 3 (Express) traffic volumes. **Table 2.6.5** provides a summary of the findings from the ramp junction analyses. The d/c ratio for each of the freeway ramps is also presented. It should be noted that when the GP lane is LOS F, the ramp junction also operates at LOS F, regardless of the flow rate entering the ramp influence area.

As discussed in **Section 2.1.3**, on- or off-ramps associated with lane additions and/or lane drops are not analyzed as a typical ramp junction (using the merge and diverge method). The operations of these special ramp conditions are based on the operation of the segment upstream and/or downstream of the

ramp. Depending on the lane configuration, the basic freeway segment or the weave methods is used to determine the operation of the segment. The special ramp conditions are indicated with “Lane Add”, “Lane Drop” or “Weaving Segment” in **Table 2.6.5**. The operations of the segments are summarized in **Table 2.6.4**. For major diverge locations, when a two-lane off-ramp results in a lane drop, the density and LOS are determined based on the HCM major diverge method described in **Section 2.1.3**.

Under year 2045 Alternative 3 (Express) conditions, the ramp junction peak hour LOS varies from B to E, except that the following additional ramp junction locations operate at LOS F in comparison to the year 2025 Alternative 3 (Express) condition:

- Indian Hill Boulevard EB Direct Off-Ramp
- Indian Hill Boulevard WB Direct Off-Ramp
- Monte Vista Avenue WB Direct On-Ramp
- Grove Avenue EB Direct On-Ramp
- Vineyard Avenue EB Direct Off-Ramp
- Cherry Avenue EB Direct Off-Ramp
- Cherry Avenue WB Direct On-Ramp
- Beech Avenue WB Direct Off-Ramp
- Citrus Avenue WB Loop On-Ramp
- Citrus Avenue WB Direct On-Ramp
- Sierra Avenue EB Direct Off-Ramp
- Sierra Avenue EB Direct On-Ramp
- Sierra Avenue WB Direct Off-Ramp
- Alder Avenue WB Direct Off-Ramp
- Alder Avenue WB Direct On-Ramp
- Cedar Avenue EB Direct Off-Ramp
- Cedar Avenue EB Direct On-Ramp
- Cedar Avenue WB Direct On-Ramp
- Riverside Avenue EB Direct Off-Ramp
- Pepper Avenue WB Direct Off-Ramp
- Rancho Avenue WB Direct On-Ramp
- Alabama Street EB Direct Off-Ramp
- Alabama Street WB Direct Off-Ramp
- SR-210 EB Direct Off-Ramp (NB SR-210)
- Tennessee Street EB Direct On-Ramp
- Ford Street EB Direct Off-Ramp
- Ford Street EB Direct On-Ramp
- Wabash Avenue EB Direct Off-Ramp
- Wabash Avenue EB Direct On-Ramp
- Wabash Avenue WB Direct On-Ramp

The majority of the ramp junction locations listed above operate at LOS F due to the LOS F condition for the GP lane segments upstream of the ramp. As shown in **Table 2.6.4**, the majority of the GP lane segments are expected to operate at LOS F due to traffic demand volume exceeding capacity.

## 2.6.5 Express Lane Analysis and Levels of Service

This section summarizes the LOS expected for the transition areas, segments, and intermediate access locations associated with the Express Lanes in Alternative 3. Under Alternative 3, west of Haven Avenue to the LA/SB County line, a single new lane would be constructed and combined with the existing HOV lane to provide two Express Lanes in each direction; east of Haven Avenue to California Street (near SR-210), two new lanes would be constructed to provide two Express Lanes in each direction; east of California Street (near SR-210) to Ford Street, a single new lane would be constructed to provide a single Express Lane. Forecast Express Lane traffic volumes for years 2025 and 2045 are presented in [Figure 2.6.1](#) and [Figure 2.6.2](#), respectively.

The HCM 2000 Basic Freeway Segment methodology is applied to evaluate Express Lanes operations where dual Express Lanes in each direction are provided. Since no HCM 2000 method is available to determine LOS for single-lane Express Lanes, demand volume-to-capacity (d/c) ratios are calculated. The capacity used is 2,000 vphpl. The d/c ratios are used to identify single-lane Express Lane LOS using the conversion in [Table 2.1.2](#).

Transition areas would be provided where the Express Lanes begin and end. Transition areas near the beginning of the Express Lanes would allow for traffic in HOV and GP lanes to change lanes to access the GP and Express Lanes within the project limits of Alternative 3. Transition areas at the end of the Express Lanes would allow traffic in the Express and GP lanes to change lanes to access the GP and HOV lanes downstream of the end of the Express Facility. Transition areas may add new lanes and/or redesignate lanes from Express to HOV or GP. For analytical purposes, all lanes are treated as GP lanes, even though some are transition lanes linking HOV to Express Lanes (and vice versa). Transition areas for transitioning from Express Lanes to HOV lanes are approximately 1 mile long and 2 miles long for transitioning from HOV lanes to Express Lanes. HCM weaving analysis is limited to areas no longer than 2,500 feet; consequently, transition areas are analyzed as basic freeway segments.

Express Lanes would begin and end near the LA/SB County line and in the vicinity of the Ford Street interchange. Two transition areas (one in each direction) would be required for each location, for a total of 4 transition areas. Transition areas were analyzed using the HCM 2000 basic freeway mainline analysis. Transition area locations and schematic designs are shown in [Figure 2.6.3](#).

In addition to the beginning and end near the LA/SB County line and Ford Street, access to and from the Express Lanes would be provided in each direction at the following 10 locations.

1. Mountain Avenue interchange area
2. Between the Euclid Avenue and Grove Avenue interchanges
3. Haven Avenue interchange area
4. Between the Etiwanda Avenue and Cherry Avenue interchanges
5. Citrus Avenue interchange area
6. Cedar Avenue interchange area
7. Pepper Avenue interchange area
8. Tippecanoe Avenue interchange area
9. California Street interchange area
10. Orange Avenue/6<sup>th</sup> Street interchange area

Intermediate access area locations and schematic designs are shown in **Figure 2.6.3**. All intermediate access points, except at the California Street and Orange Avenue/6<sup>th</sup> Street interchange areas, would provide a “weave lane” to facilitate traffic movements between the Express Lanes and GP lanes. A “weave zone” is provided for the Intermediate access at the California Street interchange area in the westbound direction and Orange Avenue/6<sup>th</sup> Street interchange area in both directions. Intermediate access at California Street in the eastbound direction provides a modified “merge lane”. A “weave zone” combines ingress and egress created by short breaks in the buffer striping. A modified “merge lane” access separates the Express Lane ingress and egress utilizing a dedicated merge lane for ingress and a dedicated GP receiving lane for the egress. The peak hour ingress and egress volumes are forecasted using the methodology discussed in **Section 2.2** and are illustrated on **Figure 2.6.1** and **Figure 2.6.2**.

Intermediate accesses with a “weave zone” are analyzed using the HCM 2000 weaving analysis method. The LOS analysis for intermediate access areas with a “weave lane” utilizes the HCM 2000 weaving and ramp junction analysis methods. A ramp junction diverge analysis is performed for the “exit” from the Express Lanes to the “weave lane”. A weaving analysis is performed for the segment in which traffic moves between the “weave lane” and the GP lanes. A ramp junction merge analysis is performed for the “entrance” from the “weave lane” to the Express Lanes. The intermediate access at California Street in the eastbound direction is analyzed using the HCM 2000 basic segment analysis. A ramp junction diverge analysis is performed for the “exit” from the freeway mainline number one GP lane to the Express Lane merge lane. A ramp junction merge analysis is performed for the merge from the merge lane into the Express Lane.

It should be noted that the HCS software used for the analysis is limited to a weaving segment with 5 freeway mainline lanes. The volume input for weaving segments consisting of more than 5 freeway mainline lanes are adjusted to reflect a 5-lane weaving segment condition. The volume adjustment is based on the lane configuration at the weaving segment. There is one intermediate access location that consist of a weaving segment with more than 5 lanes. The adjustments to the volume is as follows:

#### Access 4: Between the Etiwanda Avenue and Cherry Avenue Interchanges

Access 4, in the eastbound direction, consists of two Express Lanes, one “weave lane”, four GP lanes and one auxiliary lane, a total of eight lanes. The weaving involves the “weave lane”, 4 GP lanes and the auxiliary lane. In order to reflect a 5-lane weaving segment at this location, the auxiliary lane is excluded from the analysis. It is assumed that the weaving between the “weave lane” and GP lanes would not conflict with the auxiliary lane traffic. The traffic volume is adjusted by assuming that the volume in the auxiliary lane is the off-ramp volume to Cherry Avenue; since the auxiliary lane is excluded from the analysis, this volume is omitted from the analysis.

#### Year 2025 Express Lanes Conditions

This section summarizes the LOS expected in the transition areas, segments and intermediate access locations for Year 2025 traffic conditions.

#### *Transition Areas*

**Table 2.6.6** summarizes the LOS in each of the transition areas anticipated for Year 2025. In the eastbound direction, the transition area near the LA/SB County line area is expected to operate at LOS C and D during the morning and evening peak hours, respectively. The transition area in the vicinity of the Ford Street interchange is expected to operate at LOS B and F in the eastbound direction during the morning and evening peak hours, respectively. In the westbound direction, the two transition areas are expected to operate at LOS D or better during the peak hours. The LOS F anticipated at the Ford Street

eastbound transition area during the evening peak hour is a result of the traffic demand volume exceeding the capacity of the lanes in the transition area.

#### *Segments*

**Table 2.6.7** summarizes the LOS for each of the Express Lane segments for Year 2025. In the eastbound direction, the Express Lane segments are anticipated to operate at LOS D or better with d/c ratios ranging from 0.22 to 0.84 during the peak hours. In the westbound direction, the Express Lane segments are expected to operate at LOS D or better with d/c ratios ranging from 0.28 to 0.85. As noted above, the LOS for single-lane Express Lanes is based on the d/c ratios.

#### *Intermediate Access*

**Table 2.6.8** summarizes the LOS for each of the intermediate access areas for Year 2025. As discussed above, three types of analysis were conducted for intermediate access with a “weave lane”: merge, weaving and diverge analysis. For intermediate access with a “weave zone”, only a weaving analysis was conducted. For intermediate access with a modified “merge lane”, three types of analysis were conducted: basic segment, merge and diverge analysis. Intermediate Access Locations 1 to 8 have a “weave lane” while Intermediate Access Locations 9 in the westbound direction and 10 in both directions have a “weave zone”. Intermediate Access 9 in the eastbound direction has a modified “merge lane”. For intermediate access locations with a “weave lane”, the diverge analysis is conducted for the Express Lanes at the divergence to the weave lane; a weaving analysis is conducted between the “weave lane” and the GP lanes; and a merge analysis is conducted for the Express Lanes at the merge of the Express Lanes with the traffic incoming from the “weave lane”. For the intermediate access location with a modified “merge lane”, the diverge analysis is conducted for the GP lanes at the divergence to the merge lane; a basic segment analysis is conducted for the GP lane segment downstream from the Express lane egress; and a merge analysis is conducted for the merge from the merge lane into the Express Lane.

As shown in **Table 2.6.8**, the merge and diverge areas into and out of the Express Lanes into the “weave lane” at Intermediate Access locations 1 to 8 are anticipated to operate at LOS D or better. At these same locations, weaving between the “weave lane” and the GP lanes is anticipated to operate at LOS F in a majority of locations due to the over-capacity condition anticipated in the GP lanes. The poor operations in the weaving area between the “weave lane” and the GP lanes are not anticipated to disrupt operations in the Express Lanes. For those transition areas with “weave lanes” that are anticipated to operate at LOS F in year 2045, additional analysis was completed to assess the potential of the weave lane traffic to back into and disrupt operations of the Express Lanes. The results of that analysis are reported below in the Section “Year 2045 Express Lanes Conditions”. This additional analysis was not conducted for year 2025 because year 2045 represents a worst case condition.

At Intermediate Access Locations 9 and 10, which have no “weave lane”, LOS F conditions are anticipated westbound during the morning peak hour for Intermediate Access Location 9 and westbound during the morning peak hour and eastbound during the evening peak hour for Intermediate Access Location 10, as shown in **Table 2.6.8**. These LOS F conditions result from the over-capacity conditions in the GP lanes.

At Intermediate Access Location 9, LOS C and D conditions are anticipated eastbound in the access area during the morning and evening peak hour, respectively. The layout of the access area (see **Figure 2.6.3**) separates the Express Lane ingress and egress with a dedicated merge lane for the ingress. The egress is provided with a GP receiving lane due to the reduction in the number of eastbound Express lanes from 2

lanes to 1 lane. There is only one eastbound Express Lane downstream of Intermediate Access Location 9. Since eastbound traffic exiting the Express Lanes has a GP receiving lane, traffic exiting the Express Lanes in the number two Express Lane is not anticipated to affect through traffic in the number one Express Lane.

As shown in **Table 2.6.8**, the ingress operation is analyzed with two ramp junction analyses: one diverge and one merge. The exit from the freeway mainline number one GP lane to the Express Lane merge lane is analyzed as a diverge. The merge from the merge lane into the Express Lane is analyzed as a merge. Under 2025 conditions, the diverge from the GP lanes onto the merge lane is expected to operate at LOS C and E during the morning and evening peak hours, respectively. The merge from the merge lane onto the Express Lane is expected to operate at LOS B and C during the morning and evening peak hours, respectively.

Due to a limitation of the HCM merge analysis method to a minimum of 2 lanes on the freeway, an adjustment was necessary because of the single Express Lane. The volume for the single through Express Lane was increased by 2,400 passenger cars per hour. The 2,400 passenger cars per hour value is the maximum flow per lane identified in HCM 2000 Exhibit 25-7 Capacity Values for Merge Areas. This provides a worst case and yields a conservative analysis since the Express Lane is a managed lane which is assumed not to reach capacity.

At Intermediate Access Location 9, LOS F conditions are anticipated westbound in the access area during the morning peak hour. The layout of the access area (see **Figure 2.6.3**) includes the number one Express Lane continuing through the access area and the number two Express Lane as the lane from which and to which vehicles will exit and enter the Express Lanes. The number two Express Lane through the access is expected to operate as a “weave lane”. Since the number two Express Lane is added immediately upstream of the intermediate access area, through Express Lane traffic will be signed to remain in the number one Express Lane and largely be unaffected by vehicles entering and exiting the Express Lanes. The access area will be striped to prohibit lane changes between the number one and number two Express Lanes within the intermediate access area. The weaving between the number two Express Lane and the GP lanes is anticipated to operate at LOS F due to the over-capacity condition anticipated in the GP lanes. The poor operations in the weaving area between the number two Express Lane and the GP lanes are not anticipated to disrupt operations in the number one Express Lane. Since the Express Lane ingress volume (330) greatly exceeds the egress volume (120) as shown in Figure 2.6.1, spaces created in the number one GP lane by vehicles moving into the number two Express Lane are anticipated to create sufficient spaces in the number one GP lane to accept the volume exiting the Express Lanes. Consequently, any queuing occurring in the number two Express Lane is not expected to back into the number one Express Lane and disrupt the operations of through traffic in the #1 Express Lane.

At Intermediate Access Location 10, LOS F conditions are anticipated eastbound during the evening peak hour. The layout of the access area (see **Figure 2.6.3**) includes the single Express Lane continuing through the access area with access provided across a skip-stripe. The LOS F conditions anticipated in the GP lanes are anticipated to impair the ability of motorists both exiting and entering the Express Lanes to do so at high speed. As motorists exiting the Express Lanes slow and/or stop to merge into the GP lanes, trailing traffic in the Express Lanes will be slowed. Consequently, speed reductions in the Express Lane are anticipated within the intermediate access area.

At Intermediate Access Location 10, LOS F conditions are anticipated westbound during the morning peak hour. The layout of the access area (see [Figure 2.6.3](#)) includes the single Express Lane continuing through the access area with access provided across a skip-stripe. The LOS F conditions anticipated in the GP lanes are anticipated to impair the ability of motorists both exiting and entering the Express Lanes to do so at high speed. Consequently, speed reductions in the Express Lane are anticipated within the intermediate access area. Since the volume of traffic exiting the Express Lanes is forecast to be light (30 vehicles as shown on [Figure 2.6.1](#)), very few vehicles are anticipated to require a full stop in the Express Lane while waiting to exit the lane.

#### Year 2045 Express Lanes Conditions

This section summarizes the LOS expected in the transition areas, segments and intermediate access locations for Year 2045 traffic conditions.

#### *Transition Areas*

[Table 2.6.9](#) summarizes the LOS in each of the transition areas anticipated for Year 2045. In the eastbound direction, the transition area near the LA/SB County line area is expected to operate at LOS D during the morning and evening peak hours. The transition area in the vicinity of the Ford Street interchange is expected to operate at LOS C and F in the eastbound direction during the morning and evening peak hours, respectively. In the westbound direction, the transition area in the vicinity of the Ford Street interchange is expected to operate at LOS F and C during the morning and evening peak hours, respectively. The transition area near the LA/SB County line is expected to operate at LOS D and F in the westbound direction during the morning and evening peak hours, respectively. The LOS F conditions anticipated in the transition areas result from the traffic demand volume exceeding the capacity of the lanes in the transition areas.

#### *Segments*

[Table 2.6.10](#) summarizes the LOS for each of the Express Lane segments for Year 2045. In the eastbound direction, the Express Lane segments are anticipated to operate at LOS D or better with d/c ratios ranging from 0.26 to 0.85 during the peak hours. In the westbound direction, the Express Lane segments are expected to operate at LOS D or better with d/c ratios ranging from 0.37 to 0.86. As noted above, the LOS for single-lane Express Lanes is based on the d/c ratios.

#### *Intermediate Access*

[Table 2.6.11](#) summarizes the LOS for each of the intermediate access for Year 2045. As discussed above, three types of analysis were conducted for intermediate access with a “weave lane”: merge, weaving and diverge analysis. For intermediate access with a “weave zone”, only a weaving analysis was conducted. Intermediate Access Locations 1 to 8 have a “weave lane” while Intermediate Access Locations 9 and 10 have a “weave zone”. For intermediate access locations with a “weave lane”, the diverge analysis is conducted for the Express Lanes at the divergence to the weave lane; a weaving analysis is conducted between the “weave lane” and the GP lanes; and a merge analysis is conducted for the Express Lanes at the merge of the Express Lanes with the traffic incoming from the “weave lane”. For the intermediate access location with a modified “merge lane”, the diverge analysis is conducted for the GP lanes at the divergence to the merge lane; a basic segment analysis is conducted for the GP lane segment downstream from the Express lane egress; and a merge analysis is conducted for the merge from the merge lane into the Express Lane.

As shown in [Table 2.6.11](#), the merge and diverge areas into and out of the Express Lanes into the “weave lane” at Intermediate Access locations 1 to 8 are anticipated to operate at LOS D or better. At

these same locations, weaving between the “weave lane” and the GP lanes is anticipated to operate at LOS F in a majority of locations due to the over-capacity condition anticipated in the GP lanes. The poor operations in the weaving area between the “weave lane” and the GP lanes are not anticipated to disrupt operations in the Express Lanes. For those transition areas with “weave lanes” that are anticipated to operate at LOS F in year 2045, additional analysis was completed to assess the potential of the weave lane traffic to back into and disrupt operations of the Express Lanes. The process used to determine the potential of weave lane traffic to back into the Express Lanes consists of the 3 steps presented below and summarized in **Table 2.6.12**.

1. **Table 2.6.11** shows that the LOS anticipated in the transition areas with “weave lanes”. The LOS in all of the weaving areas is C or F. For weaving areas that are expected to operate at LOS C, good traffic flow is anticipated and no queuing is anticipated in the “weave lane”. The remainder of the steps is devoted to addressing the potential for queuing under LOS F conditions in the “weave lane”.
2. Any intermediate access area where the Express Lane ingress volume exceeds the egress volume is assumed to have no queuing problem. As vehicles move out of the number one GP lane into the “weave lane”, they create space for vehicles to move out of the “weave lane” into the number one GP lane. Where the number of vehicles moving out the GP lane into the “weave lane” (ingress volume) exceeds the number moving into the number one GP (egress volume), the potential to form queues in the “weave lane” is low; therefore the likelihood is low that queuing in the weaving lane would disrupt operations of the Express Lanes. The remainder of the steps is devoted to addressing the potential for queuing where the egress volume exceeds the ingress volume and LOS F conditions are anticipated.
3. At an intermediate access area where egress exceeds ingress and LOS is F for the weaving between the “weave lane” and GP lanes:
  - a. The amount by which the egress volume exceeds the ingress volume is calculated. The space vacated by a vehicle entering the “weave lane” from the number one GP lane will be available for a vehicle exiting the “weave lane” into the number one GP lane. Only the volume by which the egress volume exceeds the ingress volume is liable to form queues in the “weave lane”. The remainder of the steps is devoted to addressing the potential for queuing resulting from the volume by which the egress volume exceeds the ingress volume under LOS F conditions for the weaving between the “weave lane” and GP lanes.
  - b. The d/c ratio value in each intermediate access area where the egress volume exceeds the ingress volume under LOS F conditions, for the weaving between the “weave lane” and GP lanes, is identified.
  - c. Operational flow, corresponding to the d/c value identified in the previous step, is determined using the Metropolitan Transportation Commission (MTC) speed deterioration curve and the I-10 mainline speed-flow curve. The MTC speed deterioration curve is used in Caltrans D-4 to relate d/c values to speed. Operational flows are determined by identifying the speeds associated with a d/c value on the MTC speed deterioration curve and then identifying the operational flow associated with that speed on a the I-10 mainline speed-flow curve developed from existing PEMS speed and

operational flow data along I-10 within the project limits. The MTC curve is used because, for flows less than capacity, the MTC curve represents the best fit to the speed deterioration curve developed from PeMS data. There are no empirical data available from PeMS for flows greater than capacity. To provide a continuous speed-flow curve, the curve based on PeMS data is extended to the origin (0,0) with a straight line. The MTC speed deterioration curve and the I-10 mainline speed-flow curve are provided in **Appendix A-2**.

- d. If the operational flow identified in the previous step is sufficient for the number one GP lane to receive the volume by which the egress volume exceeds the ingress volume, then the “weave lane” is determined not to have a queue that would overflow the “weave lane” and back into the Express Lanes. The operational flow in the number one GP lane is assumed to be sufficient to receive the volume by which the egress volume exceeds the ingress volume if the number one GP lane flow exceeds twice the volume by which the egress volume exceeds the ingress volume. Under heavily congested LOS F conditions, it is assumed that the number one GP lane would accept a vehicle exiting the “weave lane” between every vehicle in the number one GP lane. Under these conditions the number one GP lane would be able to accept all of the volume by which the egress volume exceeds the ingress volume if that volume is less than half of the flow identified in the previous step.

**Table 2.6.12** shows that none of the “weave lanes” is anticipated to queue into the Express Lanes and disrupt Express Lane operations.

At Intermediate Access Locations 9 and 10, which have no “weave lane”, LOS F conditions are anticipated westbound during the morning peak hour for Intermediate Access Location 9 and eastbound during the morning peak hour and westbound during the evening peak hour for Intermediate Access Location 10, as shown in **Table 2.6.11**. These LOS F conditions result from the over-capacity conditions in the GP lanes.

At Intermediate Access Location 9, LOS C and F conditions are anticipated eastbound in the access area during the morning and evening peak hour, respectively. The layout of the access area (see **Figure 2.6.3**) separates the Express Lane ingress and egress with a dedicated merge lane for the ingress. The egress is provided with a dedicated GP receiving lane due to the reduction in the number of eastbound Express lanes from 2 lanes to 1 lane. There is only one eastbound Express Lane downstream of Intermediate Access Location 9.

As shown in **Table 2.6.11**, a LOS F condition in the GP lanes is anticipated eastbound in the access area during the evening peak hours in year 2045 due to over-capacity condition anticipated in the GP lanes. Since eastbound traffic exiting the Express Lanes has a dedicated GP receiving lane, traffic exiting the Express Lanes in the number two Express Lane is not anticipated to affect through traffic in the number one Express Lane. However, because of the LOS F condition in the GP lanes in the intermediate area, traffic is anticipated to back up in the number two Express Lane as it “exits” the Express Lanes and becomes the number one GP lane. In response, some traffic exiting the Express Lanes may try to use the number one Express Lane as far downstream as possible before merging right; such maneuvers may require substantial slowing or stopping in the number one Express Lane because of the backup from the

LOS F condition in the GP lanes downstream of and within the intermediate access; this downstream “last second” lane changing behavior can be addressed by striping to prohibit lane changes between the number one and number two Express Lane upstream of Intermediate Access 9 for a distance similar to anticipated queuing in the number two Express Lane.

Also shown in **Table 2.6.11**, the ingress operation is analyzed with two ramp junction analyses: one diverge and one merge. The exit from the freeway mainline number one GP lane to the Express Lane merge lane is analyzed as a diverge. The merge from the merge lane into the Express Lane is analyzed as a merge. Under 2045 conditions, the diverge from the GP lanes onto the merge lane is expected to operate at LOS C and F during the morning and evening peak hours, respectively. The LOS F condition is expected for the evening peak hours due to the over-capacity condition anticipated for the GP lanes. The merge from the merge lane onto the Express Lane is expected to operate at LOS B and C during the morning and evening peak hours, respectively.

Due to a limitation of the HCM merge analysis method to a minimum of 2 lanes on the freeway, an adjustment was necessary because of the single Express Lane. The volume for the single through Express Lane was increased by 2,400 passenger cars per hour. The 2,400 passenger cars per hour value is the maximum flow per lane identified in HCM 2000 Exhibit 25-7 Capacity Values for Merge Areas. This provides a worst case and yields a conservative analysis since the Express Lane is a managed lane which is assumed not to reach capacity.

At Intermediate Access Location 9, LOS F conditions are anticipated westbound in the access area during the morning peak hour. The layout of the access area (see **Figure 2.6.3**) includes the number one Express Lane continuing through the access area and the number two Express Lane as the lane from which and to which vehicles will exit and enter the Express Lanes. The number two Express Lane through the access is expected to operate as a “weave lane”. Since the number two Express Lane is added immediately upstream of the intermediate access area, through Express Lane traffic will be signed to remain in the number one Express Lane and largely be unaffected by vehicles entering and exiting the Express Lanes. The access area will be striped to prohibit lane changes between the number one and number two Express Lanes within the intermediate access area. The weaving between the number two Express Lane and the GP lanes is anticipated to operate at LOS F due to the over-capacity condition anticipated in the GP lanes. The poor operations in the weaving area between the number two Express Lane and the GP lanes are not anticipated to disrupt operations in the number one Express Lane.. Since the Express Lane ingress volume (1,170) greatly exceeds the egress volume (10) as shown in Figure 2.6.2, spaces created in the number one GP lane by vehicles moving into the number two Express Lane are anticipated to create sufficient spaces in the number one GP lane to accept the volume exiting the Express Lanes. Consequently, any queuing occurring in the number two Express Lane is not expected to back into the number one Express Lane and disrupt the operations of through traffic in the #1 Express Lane.

At Intermediate Access Location 10, LOS F conditions are anticipated eastbound during the evening peak hour. The layout of the access area (see **Figure 2.6.3**) includes the single Express Lane continuing through the access area with access provided across a skip-stripe. The LOS F conditions anticipated in the GP lanes are anticipated to impair the ability of motorists both exiting and entering the Express Lanes to do so at high speed. As motorists exiting the Express Lanes slow and/or stop to merge into the GP lanes, trailing traffic in the Express Lanes will be slowed. Consequently, speed reductions in the Express Lane are anticipated within the intermediate access area.

At Intermediate Access Location 10, LOS F conditions are anticipated westbound during the morning peak hour. The layout of the access area (see **Figure 2.6.3**) includes the single Express Lane continuing through the access area with access provided across a skip-stripe. The LOS F conditions anticipated in the GP lanes are anticipated to impair the ability of motorists both exiting and entering the Express Lanes to do so at high speed. Consequently, speed reductions in the Express Lane are anticipated within the intermediate access area. Since the volume of traffic exiting the Express Lanes is forecast to be light (10 vehicles as shown on **Figure 2.6.2**), very few vehicles are anticipated to require a full stop in the Express Lane while waiting to exit the lane.

## 2.6.6 Average Peak Hour Speed, Vehicle Hours of Delay and Cost of Delay

Based on SBTAM forecast data for Alternative 3 and depending upon time of day and direction of travel, average speeds on I-10 during peak hours for a trip between the LA County line and the Ford Street interchange (a distance of approximately 33 miles) are anticipated to range from 38 to 54 mph in the GP lanes in 2025 and 25 to 42 mph in 2045. Average travel speeds in the Express Lanes during peak hours are anticipated to range from 62 to 65 mph in 2025 and from 58 to 62 mph in 2045. **Table 2.6.13** provides a summary of the average travel speeds anticipated along the I-10 corridor under Alternative 3 in 2025 and 2045.

**Table 2.6.14** shows that approximately 20,000 vehicle hours of delay are anticipated on I-10 within the study area on a typical weekday in 2025 under Alternative 3 and approximately 24,000 vehicle hours of delay in 2045. On an annual basis approximately 4.9 million vehicle hours of delay are anticipated in year 2025 and 6.0 million vehicle hours in 2045. The annual cost of those hours of delay in 2025 is estimated at \$77 million and \$95 million in 2045.

Table 2.6.13 Alternative 3 Condition I-10 Freeway Mainline Average Peak Hour Speeds between the LA/SB County Line and Ford Street				
Direction and Lane Type	2025		2045	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Eastbound GP Lanes	54	38	42	25
Westbound GP Lanes	44	46	31	31
Eastbound Express Lane	65	63	62	61
Westbound Express Lane	63	62	58	60

Source: SBTAM post-processed data

Table 2.6.14 Alternative 3 Condition I-10 Freeway Mainline Vehicle Hours of Delay and Cost of Delay		
	2025	2045
Daily Vehicle Hours of Delay on Weekdays <sup>1</sup>	19,766	24,165
Annual Vehicle Hours of Delay on Weekdays <sup>2</sup>	4,941,483	6,041,366
Annual Costs of Delay <sup>3</sup>	\$77,000,000	\$95,000,000

1. Source: SBTAM.

2. Based on 250 weekdays per year.

3. Cost based on weekday hours of delay times cost of hourly delay from Caltrans “Life-Cycle Benefit-Cost Analysis Economic Parameters 2012” (available at [http://www.dot.ca.gov/hq/tpp/offices/eab/benefit\\_cost/LCBA-economic\\_parameters.html](http://www.dot.ca.gov/hq/tpp/offices/eab/benefit_cost/LCBA-economic_parameters.html)) assuming 9% trucks, which is the corridor average.

Table 2.6.2: Year 2025 Alternative 3 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type	Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour					
		HOV/Express	GP	Aux	HOV/Express			GP & AUX			HOV/Express		
					Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>
<b>EASTBOUND</b>													
Between Dudley St On-Ramp and White Ave Off-Ramp	1 0 4 0 1,600 0 7,400 0 1,200 0.75 D	8,100	1.09	*	F	1,600	1.00 E	7,980	1.08	*	F		
Between White Ave Off-Ramp and Garey Ave Off-Ramp	1 0 4 0 1,600 0 7,400 0 1,200 0.75 D	7,500	1.01	*	F	1,600	1.00 E	7,630	1.03	*	F		
Between Garey Ave Off-Ramp and Orange Grove Ave On-Ramp	1 0 4 0 1,600 0 7,400 0 1,200 0.75 D	6,770	0.91	27.4	D	1,600	1.00 E	7,010	0.95	28.7	D		
Between Orange Grove Ave On-Ramp and Towne Ave Off-Ramp	1 0 4 1 1,600 0 7,400 0 1,200 0.75 D	7,850	1.06	*	F	1,600	1.00 E	8,210	1.11	*	F		
Between Towne Ave On-Ramp and Indian Hill Blvd Off-Ramp	0 0 5 0 0 0 9,250 0 -- --	8,880	0.96	28.7	D	--	--	9,780	1.06	*	F		
Between Indian Hill Blvd On-Ramp and Monte Vista Ave Off-Ramp	0 0 6 0 0 0 11,100 0 -- --	8,970	0.81	24.2	C	--	--	10,180	0.92	27.1	D		
Between Monte Vista Ave On-Ramp and Central Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0 2,400 0.60 C	6,830	0.92	28.0	C	2,810	0.70 C	7,670	1.04	*	F		
Between Central Ave On-Ramp and Mountain Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0 2,400 0.60 C	6,990	0.83	22.5	C	2,810	0.70 C	8,080	0.96	25.5	C		
Between Mountain Ave Off-Ramp and Mountain Ave On-Ramp <sup>7</sup>	2 1 4 0 4,000 0 7,400 0 2,060 0.52 B	6,580	0.89	23.0	C	2,100	0.53 B	7,700	1.04	*	F		
Between Mountain Ave On-Ramp and Euclid Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0 2,600 0.65 C	7,010	0.95	22.6	C	2,840	0.71 C	8,020	1.08	*	F		
Between Euclid Ave On-Ramp and Grove Ave Off-Ramp	2 1 4 0 4,000 0 7,400 0 2,220 0.56 C	7,460	1.01	*	F	2,090	0.52 B	8,350	1.13	*	F		
Between Grove Ave On-Ramp and Vineyard Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0 2,320 0.58 C	7,140	0.96	29.4	D	2,710	0.68 C	6,370	0.94	28.5	D		
Between Vineyard Ave On-Ramp and Archibald Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0 2,320 0.58 C	7,250	0.98	26.4	C	2,710	0.68 C	7,540	1.02	*	F		
Between Holt Blvd On-Ramp and Archibald Ave On-Ramp	2 0 4 1 4,000 0 7,400 1,000 2,320 0.58 C	7,300	0.87	22.8	C	2,710	0.68 C	8,210	0.98	26.0	C		
Between Archibald Ave On-Ramp and Haven Ave Off-Ramp	2 0 4 1 4,000 0 7,400 1,000 2,320 0.58 C	7,870	0.94	24.7	C	2,710	0.68 C	9,060	1.08	*	F		
Between Haven Ave Loop On-Ramp and Haven Ave On-Ramp <sup>7</sup>	2 0 4 1 4,000 0 7,400 1,000 2,200 0.55 C	6,960	0.83	21.7	C	2,330	0.58 C	8,810	1.05	*	F		
Between Haven Ave Direct On-Ramp and Milliken Ave Off-Ramp	2 0 4 1 4,000 0 7,400 1,000 2,200 0.55 C	8,600	1.02	*	F	2,330	0.58 C	10,130	1.21	*	F		
Between Milliken Ave Loop On-Ramp and NB I-15 Off-Ramp	2 0 4 2 4,000 0 7,400 1,000 2,200 0.55 C	8,150	0.97	24.8	C	2,330	0.58 C	10,010	1.19	*	F		
Between NB I-15 Off-Ramp and SB I-15 Off-Ramp <sup>7</sup>	2 0 4 1 4,000 0 7,400 1,000 2,200 0.55 C	6,720	0.80	20.9	C	2,330	0.58 C	7,450	0.89	23.3	C		
Between SB I-15 Off-Ramp and NB I-15 On-Ramp <sup>7</sup>	2 0 4 0 4,000 0 7,400 0 2,200 0.55 C	4,630	0.63	19.0	C	2,330	0.58 C	5,570	0.75	22.9	C		
Between NB/SB I-15 On-Ramp and Etiwanda Ave Off-Ramp	2 0 4 1 4,000 0 7,400 1,000 2,200 0.55 C	6,670	0.79	22.6	C	2,330	0.58 C	7,650	0.91	25.1	C		
Between Cherry Ave On-Ramp and Beech Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0 2,360 0.59 C	6,540	0.88	26.9	D	2,480	0.62 C	7,980	1.08	*	F		
Between Beech Ave On-Ramp and Citrus Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0 2,360 0.59 C	6,670	0.90	22.6	C	2,480	0.62 C	7,750	1.05	*	F		
Between Citrus Ave On-Ramp and Sierra Ave On-Ramp	2 0 4 1 4,000 0 7,400 1,000 2,240 0.56 C	6,920	0.82	21.9	C	2,310	0.58 C	7,540	0.90	24.0	C		
Between Sierra Ave On-Ramp and Cedar Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0 2,240 0.56 C	6,340	0.86	25.9	C	2,310	0.58 C	7,280	0.98	29.6	D		
Between Cedar Ave On-Ramp and Riverside Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0 2,000 0.50 B	6,670	0.90	27.5	D	1,980	0.50 B	7,350	0.99	30.0	D		
Between Riverside Ave On-Ramp and Pepper Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0 2,000 0.50 B	7,050	0.95	28.4	D	1,980	0.50 B	7,570	1.02	*	F		

Table 2.6.2: Year 2025 Alternative 3 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type	Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour				
		HOV/Express		AUX	HOV/Express		AUX	HOV/Express		AUX		
		HOV	Express	Weave	GP	EX	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	
Between Pepper Ave On-Ramp and Rancho Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0 1,920 0.48 B	7,610 1.03 *	F	2,200 0.55 C	7,660 1.04 *	F	2,200 0.55 C	7,890 1.07 *	F	2,200 0.55 C	7,890 1.07 *	F
Between Rancho Ave On-Ramp and 9th St Off-Ramp	2 0 4 0 4,000 0 7,400 0 1,920 0.48 B	7,770 1.05 *	F	2,200 0.55 C	8,150 1.10 *	F	2,200 0.55 C	8,150 1.10 *	F	2,200 0.55 C	8,130 0.97	38.1 E
Between 9th St On-Ramp and Mt. Vernon Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0 1,920 0.48 B	7,930 0.94 35.2 E	F	2,200 0.55 C	8,080 0.96 25.1 C	C	2,200 0.55 C	8,080 0.96 25.1 C	C	2,200 0.55 C	8,080 0.96 25.1 C	C
Between Mt. Vernon Ave On-Ramp and NB/SB I-215 Off-Ramp	2 0 4 1 4,000 0 7,400 1,000 1,920 0.48 B	7,920 0.94 24.5 C	F	2,200 0.55 C	8,230 1.05 *	F	2,200 0.55 C	8,910 1.18 *	F	2,200 0.55 C	8,910 1.18 *	F
Between NB I-215 On-Ramp and SB I-215 On-Ramp <sup>7</sup>	2 0 4 2 4,000 0 7,400 1,000 1,920 0.48 B	9,170 1.09 *	F	2,200 0.55 C	8,910 1.18 *	F	2,200 0.55 C	8,910 1.18 *	F	2,200 0.55 C	8,910 1.18 *	F
Between SB I-215 On-Ramp and Redlands Blvd Off-Ramp	2 0 4 1 4,000 0 7,400 1,000 1,920 0.48 B	7,510 0.89 23.9 C	F	2,200 0.55 C	8,830 1.05 *	F	2,200 0.55 C	8,830 1.05 *	F	2,200 0.55 C	8,830 1.05 *	F
Between Redlands Blvd Off-Ramp and Waterman Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0 1,920 0.48 B	6,080 0.82 24.7 C	F	2,200 0.55 C	7,890 1.07 *	F	2,200 0.55 C	7,890 1.07 *	F	2,200 0.55 C	7,890 1.07 *	F
Between Waterman Ave Off-Ramp and Waterman On-Ramp <sup>7</sup>	2 0 4 1 4,000 0 7,400 0 1,920 0.48 B	6,560 0.89 22.4 C	F	2,200 0.55 C	8,880 1.20 *	F	2,200 0.55 C	8,880 1.20 *	F	2,200 0.55 C	8,880 1.20 *	F
Between Waterman Ave On-Ramp and Tippecanoe Ave Off-Ramp	2 0 4 1 4,000 0 7,400 1,000 1,100 0.28 A	6,790 0.81 21.5 C	F	2,320 0.58 C	8,690 1.03 *	F	2,320 0.58 C	8,690 1.03 *	F	2,320 0.58 C	8,690 1.03 *	F
Between Tippecanoe Ave On-Ramp and Mountain View Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0 1,100 0.28 A	5,620 0.76 22.8 C	F	2,320 0.58 C	7,490 1.01 *	F	2,320 0.58 C	7,490 1.01 *	F	2,320 0.58 C	7,490 1.01 *	F
Between Mountain View Ave Off-Ramp and Mountain View Ave On-Ramp <sup>7</sup>	2 0 4 1 4,000 0 7,400 1,000 1,100 0.28 A	6,080 0.72 19.3 C	F	2,320 0.58 C	9,100 1.08 *	F	2,320 0.58 C	9,100 1.08 *	F	2,320 0.58 C	9,100 1.08 *	F
Between California St Off-Ramp and California St On-Ramp <sup>7</sup>	1 0 5 0 2,000 0 9,250 0 210 0.11 A	6,040 0.65 19.1 C	F	1,470 0.74 C	9,020 0.98 28.8 D	C	1,470 0.74 C	9,020 0.98 28.8 D	C	1,470 0.74 C	9,020 0.98 28.8 D	C
Between California St On-Ramp and Alabama St Off-Ramp	1 0 5 1 2,000 0 9,250 1,000 430 0.22 A	6,160 0.60 16.3 B	F	1,680 0.84 D	9,640 0.94 24.9 C	C	1,680 0.84 D	9,640 0.94 24.9 C	C	1,680 0.84 D	9,640 0.94 24.9 C	C
Between Mountain View Ave On-Ramp and California St Off-Ramp	1 0 5 0 2,000 0 9,250 0 430 0.22 A	5,440 0.59 17.2 B	F	1,680 0.84 D	8,680 0.94 27.4 D	C	1,680 0.84 D	8,680 0.94 27.4 D	C	1,680 0.84 D	8,680 0.94 27.4 D	C
Between Alabama St Off-Ramp and NB SR-210 Off-Ramp	1 0 4 0 2,000 0 7,400 0 430 0.22 A	4,360 0.59 17.7 B	F	1,680 0.84 D	6,450 0.87 26.4 D	C	1,680 0.84 D	6,450 0.87 26.4 D	C	1,680 0.84 D	6,450 0.87 26.4 D	C
Between NB SR-210 Off-Ramp and Tennessee St Off-Ramp	1 0 4 1 2,000 0 7,400 1,000 430 0.22 A	6,020 0.72 26.4 C	F	1,680 0.84 D	9,340 1.11 *	F	1,680 0.84 D	9,340 1.11 *	F	1,680 0.84 D	9,340 1.11 *	F
Between SB SR-210 On-Ramp and Eureka St Off-Ramp	1 0 4 0 2,000 0 7,400 0 440 0.22 A	4,960 0.67 20.1 C	F	1,500 0.75 D	8,740 1.18 *	F	1,500 0.75 D	8,740 1.18 *	F	1,500 0.75 D	8,740 1.18 *	F
Between 6th St On-Ramp and University St Off-Ramp	1 0 5 0 0 0 9,250 0 -- --	4,770 0.52 15.7 B	F	-- --	9,280 1.01 *	F	-- --	9,280 1.01 *	F	-- --	9,280 1.01 *	F
Between Cypress Ave On-Ramp and Ford St Off-Ramp	0 0 5 0 0 0 9,250 0 -- --	4,640 0.50 15.3 B	F	-- --	9,110 0.98 30.9 D	F	-- --	9,110 0.98 30.9 D	F	-- --	9,110 0.98 30.9 D	F
Between Ford St On-Ramp and Wabash Ave On-Ramp	0 0 5 0 0 0 9,250 0 -- --	4,720 0.51 15.5 B	F	-- --	9,180 0.99 31.2 D	F	-- --	9,180 0.99 31.2 D	F	-- --	9,180 0.99 31.2 D	F
<b>WESTBOUND</b>												
Between Yucaipa Blvd On-Ramp and Wabash Ave Off-Ramp	0 0 4 0 0 0 7,400 0 -- --	8,420 1.14 *	F	-- --	5,150 0.70 22.0 C	C	-- --	5,150 0.70 22.0 C	C	-- --	5,150 0.70 22.0 C	C
Between Wabash Ave Off-Ramp and Ford St Off-Ramp	0 0 4 0 0 0 7,400 0 -- --	8,320 1.12 *	F	-- --	5,050 0.68 21.6 C	C	-- --	5,050 0.68 21.6 C	C	-- --	5,050 0.68 21.6 C	C
Between Ford St On-Ramp and Cypress Ave Off-Ramp	1 0 4 0 2,000 0 7,400 0 1,560 0.78 D	8,570 1.16 *	F	580 0.29 A	4,720 0.64 20.1 C	C	580 0.29 A	4,720 0.64 20.1 C	C	580 0.29 A	4,720 0.64 20.1 C	C
Between University St On-Ramp and 6th St Off-Ramp	1 0 4 1 2,000 0 7,400 1,000 1,700 0.85 D	8,900 1.06 *	F	590 0.30 A	5,730 0.68 19.7 B	C	590 0.30 A	5,730 0.68 19.7 B	C	590 0.30 A	5,730 0.68 19.7 B	C
Between Orange Ave Direct/Loop On-Ramp and NB SR-210 Off-Ramp	1 0 4 1 2,000 0 7,400 1,000 1,700 0.85 D	9,560 1.14 *	F	590 0.30 A	6,190 0.74 23.1 C	C	590 0.30 A	6,190 0.74 23.1 C	C	590 0.30 A	6,190 0.74 23.1 C	C
Between SB SR-210 On-Ramp and Alabama St On-Ramp	1 0 4 1 2,000 0 7,400 1,000 1,700 0.85 D	8,310 0.99 25.9 C	F	590 0.30 A	4,870 0.58 15.4 B	C	590 0.30 A	4,870 0.58 15.4 B	C	590 0.30 A	4,870 0.58 15.4 B	C
Between Alabama St On-Ramp and California St Off-Ramp	1 0 4 2 2,000 0 7,400 1,000 1,700 0.85 D	9,280 1.10 *	F	590 0.30 A	6,110 0.73 18.2 B	C	590 0.30 A	6,110 0.73 18.2 B	C	590 0.30 A	6,110 0.73 18.2 B	C

Table 2.6.2: Year 2025 Alternative 3 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type	Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour																		
		HOV/Express		Aux	HOV/Express		Aux	HOV/Express		Aux	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>				
		HOV/Express	Weave	GP	HOV/Express	Weave	GP	HOV/Express	Weave	GP	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>				
Between California St On-Ramp and Mountain View Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0	1,910	0.48	B	8,700	1.18	*	F	1,100	0.28	A	6,430	0.87	25.7	C	7,260	0.98	29.5	D	7,640	1.03	*	F			
Between Mountain View Ave On-Ramp and Tippecanoe Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0	1,910	0.48	B	8,460	1.14	*	F	1,100	0.28	A	6,430	0.87	25.7	C	7,380	1.06	*	F	7,430	1.14	*	F			
Between Tippecanoe Ave On-Ramp and Carnegie Dr/Waterman Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0	2,200	0.55	C	8,240	1.11	*	F	1,400	0.35	B	6,430	0.87	25.7	C	7,260	0.98	29.5	D	7,380	1.06	*	F			
Between Carnegie Dr/Waterman Ave On-Ramp and NB/SB I-215 Off-Ramp	2 0 4 1 4,000 0 7,400 0	2,200	0.55	C	7,620	1.03	*	F	1,400	0.35	B	6,430	0.87	25.7	C	7,380	1.06	*	F	7,380	1.13	*	F			
Between SB I-215 On-Ramp and Sperry Dr Off-Ramp	2 0 4 1 4,000 0 7,400 0	2,200	0.55	C	5,340	0.72	22.9	C	1,400	0.35	B	7,870	1.06	*	F	7,380	1.06	*	F	7,380	1.13	*	F			
Between Mt. Vernon Ave On-Ramp and 9th St Off-Ramp	2 0 4 1 4,000 0 7,400 0	2,200	0.55	C	5,380	0.73	21.5	C	1,400	0.35	B	7,870	1.06	*	F	7,380	1.06	*	F	7,380	1.13	*	F			
Between La Cadena Dr On-Ramp and Rancho Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0	2,200	0.55	C	5,260	0.71	19.0	B	1,400	0.35	B	7,590	1.03	*	F	7,380	1.03	*	F	7,380	1.13	*	F			
Between Rancho Ave On-Ramp and Pepper Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0	2,200	0.55	C	5,150	0.70	21.0	C	1,400	0.35	B	7,340	0.99	30.0	D	7,380	1.06	*	F	7,380	1.13	*	F			
Between Pepper Ave On-Ramp and Riverside Ave Off-Ramp	2 0 4 1 4,000 0 7,400 1,000	1,960	0.49	B	5,480	0.65	17.5	B	2,200	0.55	C	6,460	0.77	20.5	C	6,260	0.57	C	6,650	0.90	26.2	C	6,350	0.76	20.1	C
Between Riverside Ave On-Ramp and Cedar Ave Off-Ramp	2 0 4 1 4,000 0 7,400 1,000	1,960	0.49	B	5,580	0.66	17.8	B	2,200	0.55	C	6,350	0.76	20.1	C	6,260	0.57	C	6,650	0.90	26.2	C	6,350	0.76	20.1	C
Between Cedar Ave Off-Ramp and Cedar Ave On-Ramp <sup>7</sup>	2 1 4 0 4,000 0 7,400 0	1,750	0.44	B	4,920	0.66	16.2	B	1,920	0.48	B	5,380	0.75	18.4	B	5,770	0.78	20.8	C	6,260	0.57	C	6,650	0.90	26.2	C
Between Cedar Ave On-Ramp and Sierra Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0	2,180	0.55	C	5,830	0.79	23.8	C	2,260	0.57	C	6,270	0.85	25.6	C	6,600	0.89	27.3	D	6,230	0.58	C	6,720	0.91	26.8	D
Between Sierra Ave On-Ramp and Citrus Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0	2,180	0.55	C	6,160	0.83	23.3	C	2,260	0.57	C	6,650	0.90	26.2	C	6,600	0.89	27.3	D	6,230	0.58	C	6,930	0.94	24.5	C
Between Citrus Ave Off-Ramp and Citrus Ave Loop On-Ramp <sup>7</sup>	2 1 4 0 4,000 0 7,400 0	2,000	0.50	B	5,770	0.78	19.1	B	2,000	0.50	B	6,260	0.85	20.8	C	6,600	0.89	27.3	D	6,230	0.58	C	6,720	0.91	26.8	D
Between Citrus Ave On-Ramp and Beech Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0	2,400	0.60	C	6,600	0.89	27.3	D	2,320	0.58	C	6,720	0.91	26.8	D	6,600	0.96	26.6	C	6,320	0.58	C	6,930	0.94	24.5	C
Between Beech Ave On-Ramp and Cherry Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0	2,400	0.60	C	7,120	0.96	26.6	C	2,320	0.58	C	6,720	0.91	26.8	D	6,600	0.96	26.6	C	6,320	0.58	C	6,930	0.94	24.5	C
Between Cherry Ave Loop On-Ramp and Cherry Ave On-Ramp <sup>7</sup>	2 0 4 1 4,000 0 7,400 0	2,400	0.60	C	6,490	0.88	20.0	C	2,320	0.58	C	6,430	0.87	20.4	C	6,490	0.88	20.3	D	6,720	0.91	26.8	D			
Between Cherry Ave On-Ramp and Etwanda Ave Off-Ramp	2 1 4 0 4,000 0 7,400 0	2,200	0.55	C	7,510	1.01	*	F	2,150	0.54	B	7,040	0.95	25.2	C	7,380	1.06	*	F	7,380	1.13	*	F			
Between Etwanda Ave Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp	2 0 4 1 4,000 0 7,400 1,000	3,010	0.75	D	6,840	0.81	22.8	C	3,170	0.79	D	6,780	0.81	22.6	C	6,840	0.81	22.6	C	6,380	0.80	23.1	C			
Between SB I-15 On-Ramp and NB I-15 On-Ramp <sup>7</sup>	2 0 4 3 4,000 0 7,400 1,850	3,010	0.75	D	7,240	0.86	28.8	D	3,170	0.79	D	7,390	0.88	30.3	D	7,380	1.06	*	F	7,380	1.13	*	F			
Between NB I-15 On-Ramp and Milliken Ave Off-Ramp	2 0 4 1 4,000 0 7,400 1,850	3,010	0.75	D	7,540	0.82	23.7	C	3,170	0.79	D	9,490	1.03	*	F	7,380	1.06	*	F	7,380	1.13	*	F			
Between Milliken Ave On-Ramp and Haven Ave Off-Ramp	2 0 4 1 4,000 0 7,400 1,000	3,280	0.82	D	10,210	1.10	*	F	3,170	0.79	D	9,740	1.05	*	F	7,380	1.06	*	F	7,380	1.13	*	F			
Between Haven Ave Loop On-Ramp and Haven Ave On-Ramp	2 0 4 1 4,000 0 7,400 0	3,280	0.82	D	8,700	0.94	28.1	D	3,380	0.85	D	9,040	0.98	29.4	D	7,380	1.06	*	F	7,380	1.13	*	F			
Between Haven Ave Direct On-Ramp and Archibald Ave Off-Ramp	2 0 4 1 4,000 0 7,400 1,000	3,280	0.82	D	9,190	1.09	*	F	3,380	0.85	D	10,150	1.21	*	F	7,380	1.06	*	F	7,380	1.13	*	F			
Between Archibald Ave Off-Ramp and Holt Blvd Off-Ramp	2 0 4 0 4,000 0 7,400 0	3,280	0.82	D	8,550	1.02	*	F	3,380	0.85	D	9,650	1.15	*	F	7,380	1.06	*	F	7,380	1.13	*	F			
Between Holt Blvd Off-Ramp and Archibald Ave On-Ramp	2 0 4 0 4,000 0 7,400 0	3,280	0.82	D	7,040	0.95	29.1	D	3,380	0.85	D	8,370	1.13	*	F	7,380	1.06	*	F	7,380	1.13	*	F			
Between Archibald Ave On-Ramp and Vineyard Ave Off-Ramp	2 0 4 1 4,000 0 7,400 0	3,280	0.82	D	7,760	1.05	*	F	3,380	0.85	D	9,760	1.32	*	F	7,380	1.06	*	F	7,380	1.13	*	F			
Between Vineyard Ave Direct On-Ramp and Grove Ave Off-Ramp	2 0 4 0 4,000 0 7,400 0	3,280	0.82	D	7,460	1.01	*	F	3,380	0.85	D	9,170	1.24	*	F	7,380	1.06	*	F	7,380	1.13	*	F			
Between Grove Ave On-Ramp and 7th St Off-Ramp	2 1 4 0 4,000 0 7,400 0	2,700	0.68	C	7,750	1.05	*	F	2,840	0.71	C	9,580	1.29	*	F	7,380	1.06	*	F	7,380	1.13	*	F			

Table 2.6.2: Year 2025 Alternative 3 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type						Capacity <sup>2,3</sup>						AM Peak Hour						PM Peak Hour										
	HOV/Express			Weave			HOV/Express			GP			Weave			HOV/Express			GP & AUX			HOV/Express			GP & AUX				
	HOV/Express	AUX	GP	HOV/Express	AUX	GP	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	D	8,900	1.21	*	F			
Between Euclid Ave Direct On-Ramp and Mountain Ave Off-Ramp	2	0	4	0	4,000	0	7,400	0	C	2,800	0.70	C	8,350	1.13	*	F	3,360	0.84	D	8,900	1.21	*	F						
Between Mountain Ave On-Ramp and Central Ave Off-Ramp	2	0	4	0	4,000	0	7,400	0	C	2,840	0.71	C	8,200	1.11	*	F	3,400	0.85	D	8,490	1.15	*	F						
Between Central Ave On-Ramp and Monte Vista Ave Off-Ramp	2	0	4	1	4,000	0	7,400	0	C	2,840	0.71	C	8,080	1.09	*	F	3,400	0.85	D	7,940	1.07	*	F						
Between Monte Vista Ave On-Ramp and Indian Hill Blvd Off-Ramp	0	0	6	0	0	0	11,100	0	-	-	-	10,720	0.97	29.2	D	--	--	--	--	--	--	--	10,900	0.98	29.7	D			
Between Indian Hill Blvd On-Ramp and Town Ave Off-Ramp	1	0	4	0	1,600	0	7,400	0	F	1,670	1.04	F	8,940	1.21	*	F	1,700	1.06	F	8,950	1.21	*	F						
Between Town Ave On-Ramp and Orange Grove Ave Off-Ramp	1	0	4	1	1,600	0	7,400	0	F	1,630	1.02	F	9,070	1.23	*	F	1,650	1.03	F	9,000	1.22	*	F						
Between Orange Grove Ave Off-Ramp and Garey Ave On-Ramp	1	0	4	0	1,600	0	7,400	0	F	1,630	1.02	F	8,080	1.09	*	F	1,650	1.03	F	8,090	1.09	*	F						
Between Garey Ave On-Ramp and White Ave On-Ramp	1	0	4	0	1,600	0	7,400	0	F	1,740	1.09	F	8,650	1.17	*	F	1,710	1.07	F	8,720	1.18	*	F						
Between White Ave On-Ramp and Dudley St Off-Ramp	1	0	4	0	1,600	0	7,400	0	F	1,740	1.09	F	9,220	1.25	*	F	1,710	1.07	F	9,100	1.23	*	F						

Notes:

1. The freeway segments were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis or weaving analysis method, depending on the lane configuration.

The weaving analysis method was applied to the segments highlighted in the table.

2. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).

3. Peak hour capacities for freeway lanes include:

- 1,850 vph for each General Purpose (GP) lane, 2,000 vph for each Express Lane and 1,600 vph for a single High Occupancy Vehicle (HOV) lane.

- 1,850 vph for an auxiliary (AUX) lane if the AUX length exceeds 1 mile.

- 1,000 vph for an auxiliary (AUX) lane if the AUX length is greater than 0.5 mile and less than 1 mile.

- 0 vph for an AUX lane if the AUX length is less than 0.5 mile.

4. Level of Service (LOS): GP lane LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*) in the density column).

5. Density is shown in passenger cars/mile/lane (pc/mln).

6. Based on the lane configuration, these segments are categorized as a complex weaving segment. In order to provide a more robust analysis for this complex weaving segment, the analysis is conducted as two weaving segments (for details on the methodology see [Section 2.1.2](#) of the report).7. Generally, freeway mainline segments within interchanges were not analyzed, since these are within the influence areas of the ramp junctions. As noted in [Section 2.1.3](#) under the heading "Special Ramp Conditions", mainline segments within interchanges are analyzed only when single-lane off-ramps are accompanied by a lane drop and the segment upstream of the lane drop is not a weaving section; or when single-lane on-ramps are accompanied by a lane add and the segment downstream of the lane add is not a weaving section.

Table 2.6.3: Year 2025 Alternative 3 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak				PM Peak			
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
<b>White Ave</b>	EB Off Direct	1	1,500	600	0.40	**	F	350	0.23	**	F
	WB On Direct	1	1,500	570	0.38	**	F	380	0.25	**	F
<b>Garey Ave</b>	EB Off Direct	1	1,500	730	0.49	**	F	620	0.41	**	F
	WB On Direct	1	1,500	680	0.45	**	F	680	0.45	**	F
<b>Orange Grove Ave</b>	EB On Direct	1	1,500	1,080	0.72	Weaving Segment <sup>5</sup>		1,200	0.80	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	990	0.66	Weaving Segment <sup>5</sup>		900	0.60	Weaving Segment <sup>5</sup>	
<b>Towne Ave</b>	EB Off Direct	1	1,500	800	0.53	Weaving Segment <sup>5</sup>		820	0.55	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	630	0.42	**	F	790	0.53	**	F
<b>Indian Hill Blvd</b>	WB Off Direct	1	1,500	900	0.60	Weaving Segment <sup>5</sup>		760	0.51	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	770	0.51	35.1	E	810	0.54	**	F
<b>Monte Vista</b>	EB On Direct	1	1,500	860	0.57	28.5	D	1,210	0.81	34.0	D
	WB Off Direct	1	1,500	1,000	0.67	31.9	D	1,070	0.71	31.0	D
<b>Central Ave</b>	WB On Direct	1	1,500	890	0.59	**	F	820	0.55	**	F
	EB Off Direct	1	1,500	670	0.45	30.4	D	840	0.56	33.5	D
<b>Mountain Ave</b>	EB On Direct	1	1,500	930	0.62	Weaving Segment <sup>5</sup>		1,140	0.76	Weaving Segment <sup>5</sup>	
	WB Off Direct	2	3,000	940	0.31	Weaving Segment <sup>5</sup>		1,150	0.38	Weaving Segment <sup>5</sup>	
<b>Grove Ave</b>	WB On Direct	1	1,500	740	0.49	28.3	D	710	0.47	28.5	D
	EB Off Direct	1	1,500	650	0.43	Weaving Segment <sup>5</sup>		850	0.57	Weaving Segment <sup>5</sup>	
<b>Euclid Ave</b>	EB On Direct	1	1,500	810	0.54	Lane Add <sup>6</sup>		1,260	0.84	Lane Add <sup>6</sup>	
	WB Off Direct	2	3,000	1,220	0.41	**	F	1,370	0.91	**	F
<b>WB On Direct</b>	WB Off Direct	1	1,500	970	0.65	Weaving Segment <sup>5</sup>		820	0.55	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	750	0.5	Lane Drop <sup>7</sup>		1,090	0.73	Lane Drop <sup>7</sup>	
<b>WB On Loop</b>	WB On Direct	1	1,500	930	0.63	**	F	1,060	0.71	Lane Add <sup>6</sup>	
	WB Off Direct	1	1,500	1,080	0.72	**	F	1,480	0.49	**	F
<b>WB On Direct</b>	WB Off Direct <sup>8</sup>	2	3,000	970	0.32	16.6	B	1,420	0.47	**	F
	EB On Direct	1	1,500	1,040	0.69	**	F	1,000	0.67	**	F
<b>WB Off Direct (7th St)</b>	WB On Direct	1	1,500	950	0.63	**	F	1,140	0.76	**	F
	WB On Loop	1	1,500	430	0.29	26.4	C	480	0.32	**	F
<b>WB On Direct</b>	WB Off Direct	1	1,500	670	0.45	**	F	590	0.39	**	F
	EB Off Direct	1	1,500	860	0.57	**	F	1,380	0.92	**	F
<b>Grove Ave</b>	EB On Direct	1	1,500	860	0.57	29.5	D	620	0.41	27.9	C
	WB Off Direct	1	1,500	610	0.41	**	F	900	0.6	**	F
<b>WB On Direct</b>	WB On Direct	1	1,500	860	0.57	**	F	770	0.51	**	F

Table 2.6.3: Year 2025 Alternative 3 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
Vineyard Ave	EB Off Direct	1	1,500	770	0.51	34.7	D	380	0.25
	EB On Direct	1	1,500	880	0.59	Weaving Segment <sup>5</sup>		940	0.63
	WB Off Direct	1	1,500	820	0.55	Weaving Segment <sup>5</sup>		1,190	0.79
	WB On Loop	1	1,500	230	0.15	26.0	C	300	0.2
	WB On Direct	1	1,500	280	0.19	26.7	C	300	0.2
	EB Off Direct	2	3,000	1,270	0.42	Weaving Segment <sup>5</sup>		1,220	0.41
	EB On Direct (Holt Blvd)	1	1,500	1,320	0.88	Lane Add <sup>6</sup>		1,890	1.26
	EB On Direct	1	1,500	570	0.38	25.2	C	850	0.57
Archibald Ave	WB Off Direct	1	1,500	630	0.42	**	F	500	0.33
	WB Off Direct (Holt Blvd) <sup>8</sup>	2	3,000	1,510	0.5	**	F	1,280	0.43
	WB On Direct	1	1,500	720	0.48	Weaving Segment <sup>5</sup>		1,390	0.93
	EB Off Direct <sup>8</sup>	2	3,000	1,530	0.51	18.1	B	1,230	0.41
	EB On Loop	1	1,500	500	0.33	Lane Add <sup>6</sup>		610	0.41
	EB On Direct	1	1,500	1,640	1.09	**	F	1,310	0.87
	WB Off Direct <sup>8</sup>	2	3,000	1,640	0.55	**	F	1,280	0.43
	WB On Loop	1	1,500	600	0.4	Lane Add <sup>6</sup>		790	0.53
Haven Ave	WB On Direct	1	1,500	490	0.33	**	F	1,110	0.74
	EB Off Direct <sup>8</sup>	2	3,000	940	0.31	**	F	940	0.31
	EB On Loop	1	1,500	490	0.33	Weaving Segment <sup>5</sup>		820	0.55
	WB Off Loop	2	3,000	930	0.31	Weaving Segment <sup>5</sup>		880	0.29
	WB On Direct	1	1,500	730	0.49	**	F	1,130	0.75
	EB Off Direct (NB I-15)	2	3,000	1,430	0.48	Weaving Segment <sup>5</sup>		2,560	0.85
	EB Off Direct (SB I-15)	1	1,500	2,090	1.39	Lane Drop <sup>7</sup>		1,880	1.25
	EB On Direct (NB I-15)	1	1,500	2,040	1.36	Weaving Segment <sup>5</sup>		2,080	1.39
Milliken Ave	EB On Direct (SB I-15)	1	1,500	1,150	0.77	Weaving Segment <sup>5</sup>		1,040	0.69
	WB Off Direct (NB/SB I-15)	2	3,000	2,720	0.91	Weaving Segment <sup>5</sup>		2,490	0.83
	WB On Direct (SB I-15)	1	1,500	3,010	2.01	Lane Add <sup>6</sup>		2,480	1.65
	WB On Direct (NB I-15)	2	3,000	2,670	0.89	Weaving Segment <sup>5</sup>		2,110	0.7
	EB Off Direct (Etiwanda/Commerce)	2	3,000	1,160	0.39	Weaving Segment <sup>5</sup>		1,050	0.35
	EB On Direct (Commerce)	1	1,500	320	0.21	Lane Add <sup>6</sup>		930	0.62
	WB Off Direct	1	1,500	660	0.44	**	F	480	0.32
	WB On Loop (NB Etiwanda Ave)	1	1,500	800	0.53	Weaving Segment <sup>5</sup>		1,240	0.83
Cherry Ave	WB On Direct (SB Etiwanda Ave)	1	1,500	400	0.27	Weaving Segment <sup>5</sup>		610	0.41
	EB Off Direct <sup>8</sup>	2	3,000	860	0.29	15.9	B	1,180	0.39
	EB On Direct	1	1,500	590	0.39	Weaving Segment <sup>5</sup>		740	0.49
	WB On Direct					Weaving Segment <sup>5</sup>			

Table 2.6.3: Year 2025 Alternative 3 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
<b>Cherry Ave</b>	WB Off Direct	2	3,000	950	0.32	Weaving Segment <sup>5</sup>	780	0.26	Weaving Segment <sup>5</sup>
	WB On Loop	1	1,500	320	0.21	Lane Add <sup>6</sup>	280	0.19	Lane Add <sup>6</sup>
	WB On Direct	1	1,500	820	0.55	22.5	C	440	0.29
	EB Off Direct	1	1,500	340	0.23	30.6	D	720	0.48
	EB On Direct	1	1,500	470	0.31	Weaving Segment <sup>5</sup>	490	0.33	Weaving Segment <sup>5</sup>
	WB Off Direct	1	1,500	340	0.23	30.9	D	460	0.31
<b>Beech Ave</b>	WB On Direct	1	1,500	860	0.57	Weaving Segment <sup>5</sup>	670	0.45	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	490	0.33	Weaving Segment <sup>5</sup>	940	0.63	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	620	0.41	Lane Add <sup>6</sup>	560	0.37	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	570	0.38	Lane Drop <sup>7</sup>	650	0.43	Lane Drop <sup>7</sup>
	WB On Loop	1	1,500	590	0.39	23.4	C	460	0.31
	WB On Direct	1	1,500	640	0.43	28.0	C	320	0.21
<b>Citrus Ave</b>	WB Off Direct <sup>8</sup>	2	3,000	1,590	0.53	16.2	B	1,420	0.47
	EB Off Direct	1	1,500	1,010	0.67	21.8	C	1,160	0.77
	WB Off Direct	2	3,000	920	0.31	0.5	A	1,110	0.37
	WB On Direct	1	1,500	1,260	0.84	Lane Add <sup>6</sup>	1,490	0.99	Lane Add <sup>6</sup>
	EB Off Direct <sup>8</sup>	2	3,000	930	0.31	14.8	B	1,360	0.45
	EB On Direct	1	1,500	1,020	0.68	28.0	C	1,100	0.73
<b>Sierra Ave</b>	WB Off Direct	1	1,500	870	0.58	Lane Drop <sup>7</sup>	1,050	0.7	Lane Drop <sup>7</sup>
	WB On Direct	1	1,500	1,340	0.89	25.1	C	1,030	0.69
	EB Off Direct	2	3,000	580	0.19	4.6	A	680	0.23
	EB On Direct	1	1,500	950	0.63	29.5	D	910	0.61
	WB Off Direct	1	1,500	670	0.45	18.9	B	810	0.54
	WB On Direct	1	1,500	770	0.51	Lane Add <sup>6</sup>	700	0.47	Lane Add <sup>6</sup>
<b>Cedar Ave</b>	EB Off Direct	1	1,500	400	0.27	31.1	D	460	0.31
	EB On Direct	1	1,500	880	0.59	**	F	770	0.51
	WB Off Direct	1	1,500	680	0.45	26.8	C	650	0.43
	WB On Direct	1	1,500	760	0.51	22.5	C	580	0.39
	EB Off Direct	1	1,500	370	0.25	**	F	520	0.35
	EB On Direct	1	1,500	540	0.36	**	F	750	0.5
<b>Riverside Ave</b>	WB Off Direct	1	1,500	610	0.41	Weaving Segment <sup>5</sup>	660	0.44	Weaving Segment <sup>5</sup>
	WB On Direct	1	1,500	500	0.33	21.0	C	410	0.27
	EB Off Direct (9th St)	1	1,500	70	0.05	**	F	190	0.13
	EB On Direct (9th St)	1	1,500	410	0.27	Weaving Segment <sup>5</sup>	450	0.3	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	880	0.59	**	F	770	0.51
	EB On Direct	1	1,500	680	0.45	26.8	C	650	0.43

Table 2.6.3: Year 2025 Alternative 3 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
La Cadena Dr/9th St	WB Off Direct (9th St)	1	1,500	360	0.24	Weaving Segment <sup>5</sup>	550	0.37	Weaving Segment <sup>5</sup>
	WB On Direct (La Cadena Dr)	1	1,500	240	0.16	Weaving Segment <sup>5</sup>	310	0.21	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	570	0.38	Weaving Segment <sup>5</sup>	610	0.41	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	390	0.26	Weaving Segment <sup>5</sup>	590	0.39	Weaving Segment <sup>5</sup>
	WB Off Direct (Sperry Dr)	1	1,500	520	0.35	Weaving Segment <sup>5</sup>	800	0.53	Weaving Segment <sup>5</sup>
	WB On Direct	1	1,500	560	0.37	Weaving Segment <sup>5</sup>	760	0.51	Weaving Segment <sup>5</sup>
Mt Vernon Ave	EB Off Direct (NB/SB I-215)	3	4,500	2,820	0.63	Weaving Segment <sup>5</sup>	3,090	0.69	Weaving Segment <sup>5</sup>
	EB On Direct (NB I-215)	1	1,500	2,810	1.87	Lane Add <sup>6</sup>	3,040	2.03	Lane Add <sup>6</sup>
	EB On Direct (SB I-215)	1	1,500	1,240	0.83	Weaving Segment <sup>5</sup>	1,830	1.22	Weaving Segment <sup>5</sup>
	WB Off Direct (NB/SB I-215)	2	3,000	4,920	1.64	Weaving Segment <sup>5</sup>	4,730	1.58	Weaving Segment <sup>5</sup>
	WB On Loop (NB I-215)	1	1,500	820	0.55	B	1,320	0.88	27.4
	WB On Direct (SB I-215)	1	1,500	1,590	1.06	Weaving Segment <sup>5</sup>	2,050	1.37	Weaving Segment <sup>5</sup>
I-215	WB On Direct	1	1,500	240	0.16	12.3	B	800	0.53
	EB Off Direct	1	1,500	1,660	1.11	Weaving Segment <sup>5</sup>	1,080	0.72	Weaving Segment <sup>5</sup>
	EB Off (Waterman Ave)	1	1,500	1,430	0.95	Lane Drop <sup>7</sup>	940	0.63	Lane Drop <sup>7</sup>
	WB On (Waterman Ave)	1	1,500	480	0.32	Weaving Segment <sup>5</sup>	990	0.66	Weaving Segment <sup>5</sup>
	WB Off (Carnegie Dr)	2	3,000	1,000	0.33	Weaving Segment <sup>5</sup>	590	0.2	Weaving Segment <sup>5</sup>
	WB On (Carnegie Dr)	1	1,500	380	0.25	Weaving Segment <sup>5</sup>	1,380	0.92	Weaving Segment <sup>5</sup>
Redlands Blvd	EB Off Direct	2	3,000	960	0.32	Weaving Segment <sup>5</sup>	1,030	0.34	Weaving Segment <sup>5</sup>
	EB On Direct	1	1,500	370	0.25	Lane Add <sup>6</sup>	960	0.64	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	760	0.51	Weaving Segment <sup>5</sup>	690	0.46	Weaving Segment <sup>5</sup>
	WB On Loop	1	1,500	400	0.27	**	F	800	0.53
	WB On Direct	1	1,500	430	0.29	Weaving Segment <sup>5</sup>	560	0.37	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	1,170	0.78	Lane Drop <sup>7</sup>	750	0.5	Lane Drop <sup>7</sup>
Sunwest Ln	EB On Direct	1	1,500	460	0.31	Lane Add <sup>6</sup>	1,160	0.77	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	1,070	0.71	Weaving Segment <sup>5</sup>	580	0.39	Weaving Segment <sup>5</sup>
	WB On Direct	1	1,500	830	0.55	Weaving Segment <sup>5</sup>	1,410	0.94	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	930	0.62	Lane Drop <sup>7</sup>	930	0.62	Lane Drop <sup>7</sup>
	EB On Direct	1	1,500	340	0.23	Lane Add <sup>6</sup>	830	0.55	Lane Add <sup>6</sup>
	WB Off Direct	1	1,500	1,020	0.68	Weaving Segment <sup>5</sup>	540	0.36	Weaving Segment <sup>5</sup>
Tippecano Ave	WB On Direct	1	1,500	650	0.43	Weaving Segment <sup>5</sup>	1,370	0.91	Weaving Segment <sup>5</sup>
	EB Off Direct	1	1,500	720	0.48	Lane Drop <sup>7</sup>	960	0.64	Lane Drop <sup>7</sup>
	EB On Direct	1	1,500	410	32.5	D	320	0.21	20.0
	WB Off Direct	1	1,500	970	0.65	Weaving Segment <sup>5</sup>	1,240	0.83	Weaving Segment <sup>5</sup>
	WB On Direct	1	1,500						
Mountain View Ave	EB Off Direct	1	1,500						
	WB On Direct	1	1,500						
	EB Off Direct	1	1,500						
	EB On Direct	1	1,500						
	WB Off Direct	1	1,500						
	WB On Direct	1	1,500						
California St	EB Off Direct	1	1,500						
	WB Off Direct	1	1,500						
	WB On Direct	1	1,500						
	EB Off Direct	1	1,500						
	EB On Direct	1	1,500						
	WB Off Direct	1	1,500						
Alabama St	WB Off Direct	1	1,500						
	WB On Direct	1	1,500						
	EB Off Direct	1	1,500						
	EB On Direct	1	1,500						
	WB Off Direct	1	1,500						
	WB On Direct	1	1,500						

**Table 2.6.3: Year 2025 Alternative 3 Condition I-10 Ramp Junction Peak Hour Level of Service**

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak		
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c
SR-210	EB Off Direct (NB SR-210) <sup>8</sup>	2	3,000	1,080	0.36	12.7	B	2,230	0.74
	EB On Direct (SB SR-210)	1	1,500	1,760	<b>1.17</b>	Weaving Segment <sup>5</sup>		2,220	<b>1.48</b>
	WB Off Direct (NB SR-210)	2	3,000	2,150	0.72	Weaving Segment <sup>5</sup>		1,870	0.62
	WB On Direct (SB SR-210)	1	1,500	1,990	<b>1.33</b>	Lane Add <sup>6</sup>		1,250	0.83
Tennessee St	EB Off Direct (Tennessee St)	1	1,500	420	0.28	21.3	C	490	0.33
	EB On Direct (Tennessee St)	1	1,500	320	0.21	18.1	B	1,160	0.77
	WB Off Direct (Tennessee St)	1	1,500	480	0.32	**	F	370	0.25
	EB On Direct (6th St)	1	1,500	200	0.13	19.5	B	580	0.39
Eureka St/Orange St/6th St	WB Off Direct (6th St)	1	1,500	420	0.28	**	F	380	0.25
	WB On Loop (NB Orange St)	1	1,500	890	0.59	Weaving Segment <sup>5</sup>		820	0.55
	WB On Direct (SB Orange St)	1	1,500	660	0.44	Weaving Segment <sup>5</sup>		460	0.31
	EB Off Direct	1	1,500	800	0.53	26.1	C	1,180	0.79
University St/Cypress Ave	EB On Direct	1	1,500	170	0.11	20.0	C	230	0.15
	WB Off Direct	1	1,500	290	0.19	**	F	260	0.17
	WB On Direct	1	1,500	1,440	0.96	**	F	840	0.56
	EB Off Direct	1	1,500	600	0.4	21.4	C	840	0.56
Ford St	EB On Direct	1	1,500	470	0.31	17.3	B	670	0.45
	WB Off Direct	1	1,500	530	0.35	**	F	360	0.24
	WB On Direct	1	1,500	1,190	0.79	**	F	610	0.41
	EB On Direct	1	1,500	80	0.05	17.4	B	70	0.05
Wabash Ave	WB Off Direct	1	1,500	100	0.07	**	F	100	0.07
	WB On Direct	1	1,500	100	0.07	**	F	100	0.07

Notes:

1. Capacity and peak hour traffic volumes are shown in vehicles per hour (vph). On-ramp traffic volumes are assumed to be unmetered volumes. LOS - Level of Service; d/c - Demand Volume-to-Capacity

2. Peak hour capacities for freeway ramps are 1,500 vph for each freeway ramp lane.

3. LOS is F under either two conditions: (1) if the total flow of the merge/diverge area exceeds the capacity of the freeway section, denoted with an asterisk (\*) in the density column;

(2) if the mainline demand volume to capacity is greater than 1.00, denoted with double asterisks (\*\*\*) in the density column.

4. Density is shown in passenger cars/mile/lane [pc/mi/in]. The density LOS criteria for merge and diverge sections are per HCM 2000.

5. *Weaving Segment* : Based on the lane configuration, ramp junction analysis is not applicable for this location. See [Table 2.6.1](#).

6. *Lane Add* : Analysis for a single-lane addition is a basic freeway segment analysis for the segment downstream of the lane addition with an additional lane. See [Table 2.6.1](#).

7. *Lane Drop* : Analysis for a single-lane drop is basic freeway segment analysis for the segments upstream and downstream of the lane drop. See [Table 2.6.1](#).

8. *Major Diverge* : A major diverge exists when a two-lane off-ramp results in a lane drop. Density and LOS are calculated using the HCM 2000 Major Diverge Area analysis.

9. Number of lanes on the ramp at the gore point (off-ramp) or 6-foot point (on-ramp).

Table 2.6.4: Year 2045 Alternative 3 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type	Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour									
		HOV/Express		Aux	HOV/Express		GP & AUX	HOV/Express		GP & AUX							
		HOV/Express	Weave	GP	Weave	GP	Aux	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>
<b>EASTBOUND</b>																	
Between Dudley St On-Ramp and White Ave Off-Ramp	1 0 4 0 1,600 0	7,400	0	1,700	1.06	F	8,860	1.20	*	F	1,660	1.04	F	8,530	1.15	*	F
Between White Ave Off-Ramp and Garey Ave Off-Ramp	1 0 4 0 1,600 0	7,400	0	1,700	1.06	F	8,230	1.11	*	F	1,660	1.04	F	8,140	1.10	*	F
Between Garey Ave Off-Ramp and Orange Grove Ave On-Ramp	1 0 4 0 1,600 0	7,400	0	1,700	1.06	F	7,450	1.01	*	F	1,660	1.04	F	7,460	1.01	*	F
Between Orange Grove Ave On-Ramp and Towne Ave Off-Ramp	1 0 4 1 1,600 0	7,400	0	1,700	1.06	F	8,650	1.17	*	F	1,660	1.04	F	8,780	1.19	*	F
Between Towne Ave On-Ramp and Indian Hill Blvd Off-Ramp	0 0 5 0 0 0	9,250	0	--	--	--	10,190	1.10	*	F	--	--	--	10,420	1.13	*	F
Between Indian Hill Blvd On-Ramp and Monte Vista Ave Off-Ramp	0 0 6 0 0 0	11,100	0	--	--	--	10,360	0.93	27.7	D	--	--	--	10,800	0.97	28.7	D
Between Monte Vista Ave On-Ramp and Central Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	2,600	0.65	C	8,090	1.09	*	F	3,020	0.76	D	8,160	1.10	*	F
Between Central Ave On-Ramp and Mountain Ave Off-Ramp	2 0 4 1 4,000 0	7,400	1,000	2,600	0.65	C	8,360	1.00	26.6	D	3,020	0.76	D	8,500	1.02	*	F
Between Mountain Ave Off-Ramp and Mountain Ave On-Ramp <sup>7</sup>	2 1 4 0 4,000 0	7,400	0	2,160	0.54	C	8,000	1.08	*	F	2,260	0.57	C	8,150	1.10	*	F
Between Mountain Ave On-Ramp and Euclid Ave Off-Ramp	2 0 4 0 4,000 0	7,400	0	3,060	0.77	D	8,230	1.11	*	F	3,040	0.76	D	8,570	1.16	*	F
Between Euclid Ave On-Ramp and Grove Ave Off-Ramp	2 1 4 0 4,000 0	7,400	0	2,600	0.65	C	8,820	1.19	*	F	2,310	0.58	C	8,910	1.20	*	F
Between Grove Ave On-Ramp and Vineyard Ave Off-Ramp	2 0 4 0 4,000 0	7,400	0	3,060	0.77	D	8,330	1.13	*	F	3,120	0.78	D	7,470	1.01	*	F
Between Vineyard Ave On-Ramp and Archibald Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	3,060	0.77	D	8,480	1.15	*	F	3,120	0.78	D	8,550	1.16	*	F
Between Holt Blvd On-Ramp and Archibald Ave On-Ramp	2 0 4 1 4,000 0	7,400	1,000	3,060	0.77	D	8,370	1.00	26.7	D	3,120	0.78	D	9,070	1.08	*	F
Between Archibald Ave On-Ramp and Haven Ave Off-Ramp	2 0 4 1 4,000 0	7,400	1,000	3,060	0.77	D	9,050	1.08	*	F	3,120	0.78	D	10,100	1.20	*	F
Between Haven Ave Loop On-Ramp and Haven Ave On-Ramp <sup>7</sup>	2 0 4 1 4,000 0	7,400	1,000	3,140	0.79	D	7,740	0.92	24.3	C	3,200	0.80	D	9,570	1.14	*	F
Between Haven Ave Direct On-Ramp and Milliken Ave Off-Ramp	2 0 4 1 4,000 0	7,400	1,000	3,140	0.79	D	9,550	1.14	*	F	3,200	0.80	D	11,020	1.31	*	F
Between Milliken Ave Loop On-Ramp and NB I-15 Off-Ramp	2 0 4 2 4,000 0	7,400	1,000	3,140	0.79	D	9,010	1.07	*	F	3,200	0.80	D	10,890	1.30	*	F
Between NB I-15 Off-Ramp and SB I-15 Off-Ramp <sup>7</sup>	2 0 4 1 4,000 0	7,400	1,000	3,140	0.79	D	7,400	0.88	23.2	C	3,200	0.80	D	8,100	0.96	25.2	C
Between SB I-15 Off-Ramp and NB I-15 On-Ramp <sup>7</sup>	2 0 4 0 4,000 0	7,400	0	3,140	0.79	D	5,010	0.68	20.6	C	3,200	0.80	D	6,040	0.82	24.6	C
Between NB/SB I-15 On-Ramp and Etiwanda Ave Off-Ramp	2 0 4 1 4,000 0	7,400	1,000	3,140	0.79	D	7,630	0.91	25.6	C	3,200	0.80	D	8,680	1.03	*	F
Between Cherry Ave On-Ramp and Etiwanda Ave Off-Ramp	2 0 4 1 4,000 0	7,400	1,000	3,410	0.85	D	8,900	1.06	*	F	3,200	0.80	D	9,800	1.17	*	F
Between Etiwanda Ave On-Ramp and Cherry Ave Off-Ramp	2 1 4 1 4,000 0	7,400	1,850	2,610	0.65	C	8,510	0.92	25.7	C	2,500	0.63	C	10,450	1.13	*	F
Between Cherry Ave On-Ramp and Beach Ave Off-Ramp	2 0 4 0 4,000 0	7,400	0	3,200	0.80	D	7,660	1.04	*	F	3,260	0.82	D	9,380	1.27	*	F
Between Beech Ave On-Ramp and Citrus Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	3,200	0.80	D	7,880	1.06	*	F	3,260	0.82	D	9,180	1.24	*	F
Between Citrus Ave On-Ramp and Sierra Ave On-Ramp	2 0 4 1 4,000 0	7,400	1,000	3,040	0.76	D	8,220	0.98	25.6	C	3,050	0.76	D	8,800	1.05	*	F
Between Sierra Ave On-Ramp and Alder Ave Off-Ramp	2 0 4 0 4,000 0	7,400	0	3,040	0.76	D	7,740	1.05	*	F	3,050	0.76	D	8,610	1.16	*	F
Between Alder Ave On-Ramp and Cedar Ave Off-Ramp	2 0 4 0 4,000 0	7,400	0	3,040	0.76	D	7,890	1.07	*	F	3,050	0.76	D	8,390	1.13	*	F
Between Cedar Ave On-Ramp and Riverside Ave Off-Ramp	2 0 4 0 4,000 0	7,400	0	2,720	0.68	C	7,880	1.06	*	F	2,630	0.66	C	8,200	1.11	*	F

Table 2.6.4: Year 2045 Alternative 3 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type						Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour									
	HOV/Express			HOV/Express			GP & AUX			HOV/Express			GP & AUX									
	HOV/Express	Weave	GP	HOV/Express	Weave	GP	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>	LOS <sup>4</sup>						
Between Riverside Ave On-Ramp and Pepper Ave Off-Ramp	2	0	4	0	4,000	0	7,400	0	2,720	0.68	C	7,920	1.07	*	F	2,630	0.66	C	8,150	1.10	*	F
Between Pepper Ave On-Ramp and Rancho Ave Off-Ramp	2	0	4	0	4,000	0	7,400	0	2,680	0.67	C	8,270	1.12	*	F	2,600	0.65	C	8,440	1.14	*	F
Between Rancho Ave On-Ramp and 9th St Off-Ramp	2	0	4	0	4,000	0	7,400	0	2,680	0.67	C	8,390	1.13	*	F	2,600	0.65	C	8,490	1.15	*	F
Between 9th St On-Ramp and Mt. Vernon Ave Off-Ramp	2	0	4	1	4,000	0	7,400	0	2,680	0.67	C	8,700	1.18	*	F	2,600	0.65	C	8,740	1.18	*	F
Between Mt. Vernon Ave On-Ramp and NB/SB I-215 Off-Ramp	2	0	4	1	4,000	0	7,400	1,000	2,680	0.67	C	8,290	0.99	38.4	E	2,600	0.65	C	8,350	1.02	*	F
Between NB I-215 On-Ramp and SB I-215 On-Ramp <sup>7</sup>	2	0	4	1	4,000	0	7,400	1,000	2,680	0.67	C	8,160	0.97	25.6	C	2,600	0.65	C	8,400	1.00	26.3	D
Between SB I-215 On-Ramp and Redlands Blvd Off-Ramp	2	0	4	2	4,000	0	7,400	1,000	2,680	0.67	C	10,150	1.21	*	F	2,600	0.65	C	11,010	1.31	*	F
Between Redlands Blvd Off-Ramp and Waterman Ave Off-Ramp	2	0	4	1	4,000	0	7,400	1,000	2,680	0.67	C	8,290	0.99	26.0	D	2,600	0.65	C	9,750	1.16	*	F
Between Waterman Ave Off-Ramp and Waterman On-Ramp <sup>7</sup>	2	0	4	0	4,000	0	7,400	0	2,680	0.67	C	6,640	0.90	26.6	D	2,600	0.65	C	8,370	1.17	*	F
Between Waterman Ave On-Ramp and Tippecanoe Ave Off-Ramp	2	0	4	1	4,000	0	7,400	0	2,680	0.67	C	7,160	0.97	24.1	C	2,600	0.65	C	9,830	1.33	*	F
Between Tippecanoe Ave On-Ramp and Mountain View Ave Off-Ramp	2	0	4	1	4,000	0	7,400	1,000	1,920	0.48	B	7,240	0.86	23.2	C	2,880	0.72	C	9,530	1.13	*	F
Between Mountain View Ave Off-Ramp and Mountain View Ave On-Ramp <sup>7</sup>	2	0	4	0	4,000	0	7,400	0	1,920	0.48	B	5,870	0.79	24.0	C	2,880	0.72	C	8,650	1.17	*	F
Between Mountain View Ave On-Ramp and California St Off-Ramp	2	0	4	1	4,000	0	7,400	1,000	1,920	0.48	B	6,380	0.76	20.4	C	2,880	0.72	C	10,010	1.19	*	F
Between California St Off-Ramp and California St On-Ramp <sup>7</sup>	1	0	5	0	2,000	0	9,250	0	460	0.23	A	6,740	0.73	21.5	C	960	0.48	B	10,830	1.17	*	F
Between California St On-Ramp and Alabama St Off-Ramp	1	0	5	1	2,000	0	9,250	1,000	520	0.26	A	7,090	0.69	18.8	C	1,690	0.85	D	11,210	1.09	*	F
Between Alabama St Off-Ramp and NB SR-210 Off-Ramp	1	0	5	0	2,000	0	9,250	0	520	0.26	A	6,220	0.67	19.8	C	1,690	0.85	D	10,090	1.09	*	F
Between NB SR-210 Off-Ramp and Tennessee St Off-Ramp	1	0	4	0	2,000	0	7,400	0	520	0.26	A	4,930	0.67	20.1	C	1,690	0.85	D	7,380	1.00	30.2	D
Between SB SR-210 On-Ramp and Eureka St Off-Ramp	1	0	4	1	2,000	0	7,400	1,000	520	0.26	A	7,130	0.85	32.1	D	1,690	0.85	D	10,730	1.28	*	F
Between 6th St On-Ramp and University St Off-Ramp	1	0	4	0	2,000	0	7,400	0	510	0.26	A	6,030	0.81	24.7	C	1,610	0.81	D	9,970	1.35	*	F
Between Cypress Ave On-Ramp and Ford St Off-Ramp	0	0	5	0	0	0	9,250	0	--	--	--	5,840	0.63	19.5	C	--	--	--	10,750	1.16	*	F
Between Ford St On-Ramp and Wabash Ave Off-Ramp	1	0	4	0	1,600	0	7,400	0	460	0.29	A	5,300	0.72	22.7	C	1,560	0.98	E	9,570	1.31	*	F
Between Wabash Ave On-Ramp and Yucaipa Blvd Off-Ramp	1	0	4	0	1,600	0	7,400	0	460	0.29	A	5,390	0.73	23.1	C	1,560	0.98	E	9,440	1.28	*	F
<b>WESTBOUND</b>																						
Between Yucaipa Blvd On-Ramp and Wabash Ave Off-Ramp	0	0	5	0	0	0	9,250	0	--	--	--	11,130	1.20	*	F	--	--	--	6,520	0.70	21.5	C
Between Wabash Ave On-Ramp and Ford St Off-Ramp	0	0	5	0	0	0	9,250	0	--	--	--	11,210	1.21	*	F	--	--	--	6,840	0.74	22.6	C
Between Ford St On-Ramp and Cypress Ave Off-Ramp	1	0	4	0	2,000	0	7,400	0	1,700	0.85	D	9,820	1.33	*	F	740	0.37	B	6,270	0.85	25.9	C
Between University St On-Ramp and 6th St Off-Ramp	1	0	4	0	2,000	0	7,400	0	1,700	0.85	D	11,000	1.49	*	F	740	0.37	B	6,870	0.93	27.5	D
Between Orange Ave Direct/Loop On-Ramp and NB SR-210 Off-Ramp	1	0	4	1	2,000	0	7,400	1,000	1,720	0.86	D	11,450	1.36	*	F	760	0.38	B	7,250	0.86	25.3	C
Between SB SR-210 On-Ramp and Wabash Ave Off-Ramp	1	0	4	1	2,000	0	7,400	1,000	1,720	0.86	D	9,890	1.18	*	F	760	0.38	B	7,740	0.92	29.5	D
Between SB SR-210 On-Ramp and Alabama St On-Ramp	1	0	4	1	2,000	0	7,400	1,000	1,720	0.86	D	9,890	1.18	*	F	760	0.67	B	5,620	0.67	17.8	B

Table 2.6.4: Year 2045 Alternative 3 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type	Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour					
		HOV/Express		Aux	HOV/Express		Aux	HOV/Express		Aux	HOV/Express		
		HOV/Express	Weave	GP	HOV/Express	Weave	GP	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	
Between Alabama St On-Ramp and California St Off-Ramp	1 0 4 2 2,000 0	7,400	1,000	1,720	0.86	D	11,160	1.33	*	F	760	0.38	B
Between California St On-Ramp and Mountain View Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	2,880	0.72	C	9,430	1.27	*	F	1,600	0.40	B
Between Mountain View Ave On-Ramp and Tippecanoe Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	2,880	0.72	C	9,210	1.24	*	F	1,600	0.40	B
Between Tippecanoe Ave On-Ramp and Carnegie Dr/Waterman Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	2,840	0.71	C	9,340	1.26	*	F	2,220	0.56	C
Between Carnegie Dr/Waterman Ave On-Ramp and NB/SB I-215 Off-Ramp	2 0 4 1 4,000 0	7,400	0	2,840	0.71	C	8,650	1.17	*	F	2,220	0.56	C
Between SB I-215 On-Ramp and Sperry Dr Off-Ramp	2 0 4 1 4,000 0	7,400	0	2,840	0.71	C	6,650	0.90	31.9	D	2,220	0.56	C
Between Mt. Vernon Ave On-Ramp and 9th St Off-Ramp	2 0 4 1 4,000 0	7,400	0	2,840	0.71	C	6,620	0.89	27.7	C	2,220	0.56	C
Between La Cadena Dr On-Ramp and Rancho Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	2,840	0.71	C	6,510	0.88	23.9	C	2,220	0.56	C
Between Rancho Ave On-Ramp and Pepper Ave Off-Ramp	2 0 4 0 4,000 0	7,400	0	2,840	0.71	C	6,470	0.87	26.6	D	2,220	0.56	C
Between Pepper Ave On-Ramp and Riverside Ave Off-Ramp	2 0 4 1 4,000 0	7,400	1,000	2,720	0.68	C	6,580	0.78	20.9	C	3,240	0.81	D
Between Riverside Ave On-Ramp and Cedar Ave Off-Ramp	2 0 4 1 4,000 0	7,400	1,000	2,720	0.68	C	6,720	0.80	21.3	C	3,240	0.81	D
Between Cedar Ave Off-Ramp and Cedar Ave On-Ramp <sup>7</sup>	2 1 4 0 4,000 0	7,400	0	2,430	0.61	C	6,130	0.83	20.9	C	2,840	0.71	C
Between Cedar Ave On-Ramp and Alder Ave Off-Ramp	2 0 4 0 4,000 0	7,400	0	3,000	0.75	D	7,120	0.96	28.8	D	3,220	0.81	D
Between Alder Ave On-Ramp and Sierra Ave Off-Ramp	2 0 4 0 4,000 0	7,400	0	3,000	0.75	D	7,430	1.00	30.5	D	3,220	0.81	D
Between Sierra Ave On-Ramp and Citrus Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	3,000	0.75	D	7,700	1.04	*	F	3,220	0.81	D
Between Citrus Ave Off-Ramp and Citrus Ave Loop On-Ramp	2 1 4 0 4,000 0	7,400	0	2,740	0.69	C	7,330	0.99	24.5	C	2,850	0.71	C
Between Citrus Ave On-Ramp and Beech Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	3,280	0.82	D	8,160	1.10	*	F	3,200	0.80	D
Between Beech Ave On-Ramp and Cherry Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	3,280	0.82	D	8,590	1.16	*	F	3,200	0.80	D
Between Cherry Ave Loop On-Ramp and Cherry Ave On-Ramp <sup>7</sup>	2 0 4 1 4,000 0	7,400	0	3,280	0.82	D	7,660	1.04	*	F	3,200	0.80	D
Between Cherry Ave On-Ramp and Etiwanda Ave Off-Ramp	2 1 4 0 4,000 0	7,400	0	2,900	0.73	C	8,940	1.21	*	F	2,820	0.71	C
Between Etiwanda Ave Direct/Loop On-Ramp and NB/SB I-15 Off-Ramp	2 0 4 1 4,000 0	7,400	1,000	3,390	0.85	D	8,400	1.00	28.5	D	3,400	0.85	D
Between Cherry Ave On-Ramp and Haven Ave Off-Ramp <sup>7</sup>	2 0 4 1 4,000 0	7,400	1,000	3,390	0.85	D	8,770	1.04	35.0	D	3,400	0.85	D
Between NB I-15 On-Ramp and Milliken Ave Off-Ramp	2 0 4 3 4,000 0	7,400	1,000	3,390	0.85	D	11,710	1.27	*	F	3,400	0.85	D
Between Milliken Ave On-Ramp and Haven Ave Off-Ramp	2 0 4 1 4,000 0	7,400	1,000	3,390	0.85	D	11,160	1.21	*	F	3,400	0.85	D
Between Haven Ave Loop On-Ramp and Archibald Ave Off-Ramp	2 0 4 1 4,000 0	7,400	1,000	3,400	0.85	D	10,210	1.22	*	F	3,400	0.85	D
Between Archibald Ave Off-Ramp and Holt Blvd Off-Ramp	2 0 4 0 4,000 0	7,400	0	3,400	0.85	D	9,510	1.13	*	F	3,400	0.85	D
Between Holt Blvd Off-Ramp and Archibald Ave On-Ramp	2 0 4 0 4,000 0	7,400	0	3,400	0.85	D	7,720	1.04	*	F	3,400	0.85	D
Between Archibald Ave On-Ramp and Vineyard Ave Off-Ramp	2 0 4 1 4,000 0	7,400	0	3,400	0.85	D	8,690	1.17	*	F	3,400	0.85	D

Table 2.6.4: Year 2045 Alternative 3 Condition I-10 Mainline Peak Hour Level of Service<sup>1</sup>

Freeway Segment <sup>1</sup>	Lane Type						Capacity <sup>2,3</sup>			AM Peak Hour			PM Peak Hour					
	HOV/Express		GP		AUX		HOV/Express		GP & AUX		HOV/Express		GP & AUX					
	Weave	AUX	GP	GP	Weave	GP	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	LOS <sup>4</sup>	Demand Volume <sup>2</sup>	d/c	Density <sup>5</sup>	LOS <sup>4</sup>		
Between Vineyard Ave Direct On-Ramp and Grove Ave Off-Ramp	2	0	4	0	4,000	0	7,400	0	3,400	0.85	D	7,940	1.07	*	F	3,400	0.85	
Between Grove Ave On-Ramp and 7th St Off-Ramp	2	1	4	0	4,000	0	7,400	0	2,920	0.73	C	8,520	1.15	*	F	2,806	0.70	
Between Euclid Ave Direct On-Ramp and Mountain Ave Off-Ramp	2	0	4	0	4,000	0	7,400	0	3,040	0.76	D	8,490	1.15	*	F	3,400	0.85	
Between Mountain Ave On-Ramp and Central Ave Off-Ramp	2	0	4	0	4,000	0	7,400	0	2,940	0.74	C	8,450	1.14	*	F	3,400	0.85	
Between Central Ave On-Ramp and Monte Vista Ave Off-Ramp	2	0	4	1	4,000	0	7,400	0	2,940	0.74	C	8,330	1.13	*	F	3,400	0.85	
Between Monte Vista Ave On-Ramp and Indian Hill Blvd Off-Ramp	0	0	6	0	0	0	11,100	0	--	--	--	11,040	0.99	29.6	D	--	--	
Between Indian Hill Blvd On-Ramp and Town Ave Off-Ramp	1	0	4	0	1,600	0	7,400	0	1,710	1.07	F	9,270	1.25	*	F	1,720	1.08	
Between Town Ave On-Ramp and Orange Grove Ave Off-Ramp	1	0	4	1	1,600	0	7,400	0	1,700	1.06	F	9,290	1.26	*	F	1,700	1.06	
Between Orange Grove Ave Off-Ramp and Garey Ave On-Ramp	1	0	4	0	1,600	0	7,400	0	1,700	1.06	F	8,210	1.11	*	F	1,700	1.06	
Between Garey Ave On-Ramp and White Ave On-Ramp	1	0	4	0	1,600	0	7,400	0	1,720	1.08	F	8,940	1.21	*	F	1,740	1.09	
Between White Ave On-Ramp and Dudley St Off-Ramp	1	1	0	4	0	1,600	0	7,400	0	1,720	1.08	F	9,570	1.29	*	F	1,740	1.09

Notes:

1. The freeway segments were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis or weaving analysis method, depending on the lane configuration.  
 The weaving analysis method was applied to the segments highlighted in the table.

2. Peak hour capacity and traffic volumes are shown in vehicles per hour (vph).

3. Peak hour capacities for freeway lanes include:

- 1,850 vph for each General Purpose (GP) lane, 2,000 vph for each Express Lane and 1,600 vph for a single High Occupancy Vehicle (HOV) lane.
- 1,850 vph for an auxiliary (AUX) lane if the AUX length exceeds 1 mile.
- 1,000 vph for an AUX lane if the AUX length is greater than 0.5 mile and less than 1 mile.
- 0 vph for an AUX lane if the AUX length is less than 0.5 mile.

4. Level of Service (LOS): GP lane LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk \*) in the density column).

HOV and Single Express Lanes LOS are based on demand volume-to-capacity (d/c) ratio.

5. Density is shown in passenger cars/mile/lane (pc/mi/h).

6. Based on the lane configuration, these segments are categorized as a complex weaving segment. In order to provide a more robust analysis for this complex weaving segment, the analysis is conducted as two weaving segments (for details on the methodology see [Section 2.1.2](#) of the report).

7. Generally, freeway mainline segments within interchanges were not analyzed, since these are within the influence areas of the ramp junctions. As noted in [Section 2.1.3](#) under the heading 'Special Ramp Conditions', mainline segments within interchanges are analyzed only when single-lane off-ramps are accompanied by a lane drop and the segment upstream of the lane drop is not a weaving section; or when single-lane on-ramps are accompanied by a lane add and the segment downstream of the lane add is not a weaving section.

Table 2.6.5: Year 2045 Alternative 3 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	AM Peak			PM Peak				
				Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
<b>White Ave</b>	EB Off Direct	1	1,500	640	0.43	**	F	380	0.25	**	F
	WB On Direct	1	1,500	630	0.42	**	F	420	0.28	**	F
<b>Garey Ave</b>	EB Off Direct	1	1,500	780	0.52	**	F	680	0.45	**	F
	WB On Direct	1	1,500	750	0.50	**	F	760	0.51	**	F
<b>Orange Grove Ave</b>	EB On Direct	1	1,500	1,210	0.81	Weaving Segment <sup>5</sup>		1,320	0.88	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	1,080	0.72	Weaving Segment <sup>5</sup>		1,020	0.68	Weaving Segment <sup>5</sup>	
<b>Towne Ave</b>	EB Off Direct	1	1,500	870	0.58	Weaving Segment <sup>5</sup>		900	0.60	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	700	0.47	**	F	890	0.59	**	F
<b>Indian Hill Blvd</b>	WB Off Direct	1	1,500	1,040	0.69	**	F	900	0.60	**	F
	WB On Direct	1	1,500	1,050	0.70	Weaving Segment <sup>5</sup>		790	0.53	Weaving Segment <sup>5</sup>	
<b>Monte Vista</b>	EB Off Direct	1	1,500	820	0.55	**	F	900	0.60	**	F
	WB Off Direct	1	1,500	990	0.66	**	F	1,280	0.85	**	F
<b>Central Ave</b>	EB Off Direct	1	1,500	1,050	0.70	32.4	D	1,210	0.81	**	F
	WB Off Direct	1	1,500	990	0.66	**	F	910	0.61	**	F
<b>Mountain Ave</b>	EB Off Direct	1	1,500	750	0.50	33.5	D	930	0.62	35.2	E
	WB Off Direct	1	1,500	1,090	0.73	Weaving Segment <sup>5</sup>		1,310	0.87	Weaving Segment <sup>5</sup>	
<b>Grove Ave</b>	EB Off Direct	2	3,000	1,040	0.35	Weaving Segment <sup>5</sup>		1,370	0.46	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	810	0.54	28.9	D	790	0.53	**	F
<b>Euclid Ave</b>	EB Off Direct	1	1,500	690	0.46	Weaving Segment <sup>5</sup>		940	0.63	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	950	0.63	Lane Add <sup>6</sup>		1,380	0.92	Lane Add <sup>6</sup>	
<b>WB On Direct</b>	EB Off Direct	1	1,500	1,040	0.69	**	F	1,480	0.99	**	F
	WB On Direct	1	1,500	920	0.61	Weaving Segment <sup>5</sup>		860	0.57	Weaving Segment <sup>5</sup>	
<b>WB Off Direct</b>	EB Off Direct	1	1,500	800	0.53	Lane Drop <sup>7</sup>		1,210	0.81	Lane Drop <sup>7</sup>	
	WB Off Direct	2	3,000	1,380	0.46	**	F	1,490	0.50	**	F
<b>WB On Direct</b>	EB Off Direct	1	1,500	1,240	0.83	**	F	1,120	0.75	**	F
	WB Off Direct <sup>8</sup>	2	3,000	1,060	0.35	**	F	1,570	0.52	**	F
<b>WB On Loop</b>	EB Off Direct	1	1,500	1,200	0.80	**	F	1,170	0.78	**	F
	WB On Direct	1	1,500	1,130	0.75	**	F	1,380	0.92	**	F
<b>WB On Direct</b>	EB Off Direct	1	1,500	470	0.31	25.2	C	530	0.35	**	F
	WB Off Direct	1	1,500	750	0.50	**	F	640	0.43	**	F
<b>WB On Direct</b>	EB Off Direct	1	1,500	1,120	0.75	**	F	1,470	0.98	**	F
	WB Off Direct	1	1,500	1,090	0.73	**	F	840	0.56	**	F
<b>WB On Direct</b>	EB Off Direct	1	1,500	920	0.61	**	F	1,340	0.89	**	F
	WB On Direct	1	1,500	1,030	0.69	**	F	910	0.61	**	F

Table 2.6.5: Year 2045 Alternative 3 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	AM Peak			PM Peak					
			Ramp Capacity <sup>1,2</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
Vineyard Ave	EB Off Direct	1	1,500	980	0.65	**	F	490	0.33	**	F
	EB On Direct	1	1,500	1,130	0.75	Weaving Segment <sup>5</sup>		1,570	<b>1.05</b>	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	1,290	0.86	Weaving Segment <sup>5</sup>		1,490	0.99	Weaving Segment <sup>5</sup>	
	WB On Loop	1	1,500	230	0.15	**	F	330	0.22	**	F
	WB On Direct	1	1,500	310	0.21	**	F	340	0.23	**	F
	EB Off Direct	2	3,000	1,690	0.56	Weaving Segment <sup>5</sup>		1,570	0.52	Weaving Segment <sup>5</sup>	
Archibald Ave	EB On Direct (Holt Blvd)	1	1,500	1,580	<b>1.05</b>	Lane Add <sup>6</sup>		2,100	<b>1.40</b>	Lane Add <sup>6</sup>	
	EB On Direct	1	1,500	680	0.45	**	F	1,030	0.69	**	F
	WB Off Direct	1	1,500	700	0.47	**	F	560	0.37	**	F
	WB Off Direct (Holt Blvd) <sup>8</sup>	2	3,000	1,790	0.60	**	F	1,540	0.51	**	F
	WB On Direct	1	1,500	970	0.65	Weaving Segment <sup>5</sup>		1,700	<b>1.13</b>	Weaving Segment <sup>5</sup>	
	EB Off Direct <sup>8</sup>	2	3,000	1,790	0.60	**	F	1,130	0.38	**	F
Haven Ave	EB On Loop	1	1,500	560	0.37	Lane Add <sup>6</sup>		670	0.45	Lane Add <sup>6</sup>	
	EB On Direct	1	1,500	1,810	<b>1.21</b>	**	F	1,450	0.97	**	F
	WB Off Direct <sup>8</sup>	2	3,000	1,860	0.62	**	F	1,420	0.47	**	F
	WB On Loop	1	1,500	380	0.25	Lane Add <sup>6</sup>		810	0.54	Lane Add <sup>6</sup>	
	WB On Direct	1	1,500	540	0.36	**	F	1,230	0.82	**	F
	EB Off Direct <sup>8</sup>	2	3,000	1,140	0.38	**	F	1,090	0.36	**	F
Milliken Ave	EB On Loop	1	1,500	600	0.40	Weaving Segment <sup>5</sup>		950	0.63	Weaving Segment <sup>5</sup>	
	WB Off Loop	2	3,000	1,290	0.43	Weaving Segment <sup>5</sup>		1,090	0.36	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	750	0.50	**	F	1,230	0.82	**	F
	EB Off Direct (NB I-15)	2	3,000	1,610	0.54	Weaving Segment <sup>5</sup>		2,790	0.93	Weaving Segment <sup>5</sup>	
	EB Off Direct (SB I-15)	1	1,500	2,390	<b>1.59</b>	Lane Drop <sup>7</sup>		2,060	<b>1.37</b>	Lane Drop <sup>7</sup>	
	EB On Direct (NB I-15)	1	1,500	2,620	<b>1.75</b>	Weaving Segment <sup>5</sup>		2,640	<b>1.76</b>	Weaving Segment <sup>5</sup>	
I-15	EB On Direct (SB I-15)	1	1,500	1,270	0.85	Weaving Segment <sup>5</sup>		1,120	0.75	Weaving Segment <sup>5</sup>	
	WB Off Direct (NB/SB I-15)	2	3,000	3,230	<b>1.08</b>	Weaving Segment <sup>5</sup>		2,900	0.97	Weaving Segment <sup>5</sup>	
	WB On Direct (SB I-15)	1	1,500	3,200	<b>2.13</b>	Lane Add <sup>6</sup>		2,550	<b>1.70</b>	Lane Add <sup>6</sup>	
	WB On Direct (NB I-15)	2	3,000	2,960	0.99	Weaving Segment <sup>5</sup>		2,340	0.78	Weaving Segment <sup>5</sup>	
	EB Off Direct (Etiwanda/Commerce)	2	3,000	1,290	0.43	Weaving Segment <sup>5</sup>		1,160	0.39	Weaving Segment <sup>5</sup>	
	EB On Direct (Commerce)	1	1,500	370	0.25	Lane Add <sup>6</sup>		1,110	0.74	Lane Add <sup>6</sup>	
Etiwanda Ave	WB Off Direct	1	1,500	770	0.51	**	F	580	0.39	**	F
	WB On Loop (NB Etiwanda Ave)	1	1,500	720	0.48	Weaving Segment <sup>5</sup>		1,270	0.85	Weaving Segment <sup>5</sup>	
	WB On Direct (SB Etiwanda Ave)	1	1,500	370	0.25	Weaving Segment <sup>5</sup>		610	0.41	Weaving Segment <sup>5</sup>	
	EB Off Direct <sup>8</sup>	2	3,000	1,060	0.35	18.5	B	1,390	0.46	**	F
	EB On Direct	1	1,500	800	0.53	Weaving Segment <sup>5</sup>		1,090	0.73	Weaving Segment <sup>5</sup>	
	Cherry Ave										

Table 2.6.5: Year 2045 Alternative 3 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	AM Peak			PM Peak					
			Ramp Capacity <sup>1,2</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
Cherry Ave	WB Off Direct	2	3,000	1,250	0.42	Weaving Segment <sup>5</sup>		1,020	0.34	Weaving Segment <sup>5</sup>	
	WB On Loop	1	1,500	320	0.21	Lane Add <sup>6</sup>		300	0.20	Lane Add <sup>6</sup>	
	WB On Direct	1	1,500	900	0.60	**	F	500	0.33	**	F
	EB Off Direct	1	1,500	410	0.27	**	F	730	0.49	**	F
	EB On Direct	1	1,500	630	0.42	Weaving Segment <sup>5</sup>		540	0.36	Weaving Segment <sup>5</sup>	
	WB Off Direct	1	1,500	420	0.28	**	F	600	0.40	**	F
Beech Ave	WB On Direct	1	1,500	840	0.56	Weaving Segment <sup>5</sup>		690	0.46	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	550	0.37	Weaving Segment <sup>5</sup>		1,220	0.81	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	720	0.48	Lane Add <sup>6</sup>		620	0.41	Lane Add <sup>6</sup>	
	WB Off Direct	1	1,500	630	0.42	Weaving Segment <sup>5</sup>		830	0.55	Weaving Segment <sup>5</sup>	
	WB On Loop	1	1,500	570	0.38	**	F	430	0.29	**	F
	WB On Direct	1	1,500	800	0.53	**	F	410	0.27	**	F
Citrus Ave	WB Off Direct <sup>8</sup>	2	3,000	1,630	0.54	18.7	B	1,470	0.49	**	F
	EB On Direct	1	1,500	1,150	0.77	**	F	1,280	0.85	**	F
	WB Off Direct <sup>8</sup>	2	3,000	1,120	0.37	**	F	1,290	0.43	**	F
	WB On Direct	1	1,500	1,390	0.93	Lane Add <sup>6</sup>		1,650	1.10	Lane Add <sup>6</sup>	
	EB Off Direct	1	1,500	470	0.31	Lane Drop <sup>7</sup>		710	0.47	Lane Drop <sup>7</sup>	
	EB On Direct	1	1,500	630	0.42	Lane Add <sup>6</sup>		490	0.33	Lane Add <sup>6</sup>	
Alder Ave	WB Off Direct	1	1,500	470	0.31	32.6	D	640	0.43	**	F
	WB On Direct	1	1,500	780	0.52	**	F	550	0.37	**	F
	EB Off Direct	2	3,000	1,170	0.39	**	F	1,660	0.55	**	F
	EB On Direct	1	1,500	840	0.56	**	F	1,040	0.69	**	F
	WB Off Direct	1	1,500	890	0.59	Lane Drop <sup>7</sup>		1,020	0.68	Lane Drop <sup>7</sup>	
	WB On Direct	1	1,500	1,570	1.05	30.4	D	1,220	0.81	**	F
Cedar Ave	EB Off Direct	2	3,000	940	0.31	**	F	1,180	0.39	**	F
	EB On Direct	1	1,500	980	0.65	**	F	1,130	0.75	**	F
	WB Off Direct	1	1,500	890	0.59	26.7	C	920	0.61	31.2	D
	WB On Direct	1	1,500	1,030	0.69	Lane Add <sup>6</sup>		1,160	0.77	Lane Add <sup>6</sup>	
	EB Off Direct	1	1,500	620	0.41	**	F	570	0.38	**	F
	EB On Direct	1	1,500	930	0.62	**	F	830	0.55	**	F
Pepper Ave	WB Off Direct	1	1,500	860	0.57	32.0	D	790	0.53	**	F
	WB On Direct	1	1,500	840	0.56	Lane Add <sup>6</sup>		640	0.43	Lane Add <sup>6</sup>	
	EB Off Direct	1	1,500	460	0.31	**	F	710	0.47	**	F
	EB On Direct	1	1,500	570	0.38	**	F	750	0.50	**	F
	EB Off Direct	1	1,500	980	0.65	**	F	1,130	0.75	**	F
	EB On Direct	1	1,500	1,030	0.69	Lane Add <sup>6</sup>		1,160	0.77	Lane Add <sup>6</sup>	

Table 2.6.5: Year 2045 Alternative 3 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	AM Peak				PM Peak					
		# of Ramp Lanes <sup>9</sup>	Ramp Capacity <sup>1,2</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
<b>Rancho Ave</b>	WB Off Direct	1	1,500	560	0.37	Weaving Segment <sup>5</sup>		720	0.48	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	530	0.35	25.5	C	540	0.36	**	F
	EB Off Direct (9th St)	1	1,500	160	0.11	**	F	230	0.15	**	F
	EB On Direct (9th St)	1	1,500	470	0.31	Weaving Segment <sup>5</sup>		480	0.32	Weaving Segment <sup>5</sup>	
	WB Off Direct (Sperry Dr)	1	1,500	390	0.26	Weaving Segment <sup>5</sup>		570	0.38	Weaving Segment <sup>5</sup>	
	WB On Direct (La Cadenas Dr)	1	1,500	270	0.18	Weaving Segment <sup>5</sup>		340	0.23	Weaving Segment <sup>5</sup>	
<b>Mt Vernon Ave</b>	EB Off Direct	1	1,500	770	0.51	Weaving Segment <sup>5</sup>		870	0.58	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	360	0.24	Weaving Segment <sup>5</sup>		680	0.45	Weaving Segment <sup>5</sup>	
	WB Off Direct (Sperry Dr)	1	1,500	660	0.44	Weaving Segment <sup>5</sup>		920	0.61	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	640	0.43	Weaving Segment <sup>5</sup>		810	0.54	Weaving Segment <sup>5</sup>	
	EB Off Direct (NB/SB I-215)	3	4,500	3,220	0.72	Weaving Segment <sup>5</sup>		3,530	0.78	Weaving Segment <sup>5</sup>	
	EB On Direct (NB I-215)	1	1,500	3,080	2.05	Lane Add <sup>6</sup>		3,380	2.25	Lane Add <sup>6</sup>	
<b>I-215</b>	EB On Direct (SB I-215)	1	1,500	2,000	1.33	Weaving Segment <sup>5</sup>		2,610	1.74	Weaving Segment <sup>5</sup>	
	WB Off Direct (NB/SB I-215)	2	3,000	5,460	1.82	Weaving Segment <sup>5</sup>		5,070	1.69	Weaving Segment <sup>5</sup>	
	WB On Loop (NB I-215)	1	1,500	910	0.61	20.8	C	1,460	0.97	30.8	D
	WB On Direct (SB I-215)	1	1,500	2,280	1.52	Weaving Segment <sup>5</sup>		2,760	1.84	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	270	0.18	14.1	B	900	0.60	22.7	C
	EB Off Direct	1	1,500	1,860	1.24	Weaving Segment <sup>5</sup>		1,260	0.84	Weaving Segment <sup>5</sup>	
<b>Sunwest Ln</b>	WB On Direct	1	1,500	1,650	1.10	Lane Drop <sup>7</sup>		1,080	0.72	Lane Drop <sup>7</sup>	
	EB Off (Waterman Ave)	1	1,500	520	0.35	Weaving Segment <sup>5</sup>		1,150	0.77	Weaving Segment <sup>5</sup>	
	WB Off (Carnegie Dr)	2	3,000	1,140	0.38	Weaving Segment <sup>5</sup>		680	0.23	Weaving Segment <sup>5</sup>	
	WB On (Carnegie Dr)	1	1,500	450	0.30	Weaving Segment <sup>5</sup>		1,560	1.04	Weaving Segment <sup>5</sup>	
	EB Off Direct	2	3,000	1,100	0.37	Weaving Segment <sup>5</sup>		1,150	0.38	Weaving Segment <sup>5</sup>	
	EB On Direct	1	1,500	410	0.27	Lane Add <sup>6</sup>		1,130	0.75	Lane Add <sup>6</sup>	
<b>Tippecano Ave</b>	WB Off Direct	1	1,500	860	0.57	Weaving Segment <sup>5</sup>		770	0.51	Weaving Segment <sup>5</sup>	
	WB On Loop	1	1,500	390	0.26	**	F	780	0.52	**	F
	WB On Direct	1	1,500	550	0.37	Weaving Segment <sup>5</sup>		740	0.49	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	1,370	0.91	Lane Drop <sup>7</sup>		880	0.59	Lane Drop <sup>7</sup>	
	EB On Direct	1	1,500	520	0.35	Lane Add <sup>6</sup>		1,360	0.91	Lane Add <sup>6</sup>	
	WB Off Direct	1	1,500	1,240	0.83	Weaving Segment <sup>5</sup>		720	0.48	Weaving Segment <sup>5</sup>	
<b>Mountain View Ave</b>	WB On Direct	1	1,500	1,020	0.68	Weaving Segment <sup>5</sup>		1,900	1.27	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	1,100	0.73	Lane Drop <sup>7</sup>		1,100	0.73	Lane Drop <sup>7</sup>	
	EB On Direct	1	1,500	410	0.27	Lane Add <sup>6</sup>		1,110	0.74	Lane Add <sup>6</sup>	
	WB Off Direct	1	1,500	1,290	0.86	Weaving Segment <sup>5</sup>		670	0.45	Weaving Segment <sup>5</sup>	
	WB On Direct	1	1,500	720	0.48	Weaving Segment <sup>5</sup>		1,600	1.07	Weaving Segment <sup>5</sup>	

Table 2.6.5: Year 2045 Alternative 3 Condition I-10 Ramp Junction Peak Hour Level of Service

Interchange	Ramp Type	# of Ramp Lanes <sup>9</sup>	AM Peak			PM Peak					
			Ramp Capacity <sup>1,2</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>	Demand Volume <sup>1</sup>	d/c	Density <sup>4</sup>	LOS <sup>3</sup>
Alabama St	EB Off Direct	1	1,500	870	0.58	Lane Drop <sup>7</sup>		1,120	0.75	Lane Drop <sup>7</sup>	
	WB Off Direct	1	1,500	810	0.54	**	F	430	0.29	22.7	C
	WB On Direct	1	1,500	1,270	0.85	Weaving Segment <sup>5</sup>		1,430	0.95	Weaving Segment <sup>5</sup>	
	EB Off Direct (NB SR-210) <sup>8</sup>	2	3,000	1,290	0.43	14.6	B	2,710	0.90	**	F
	EB On Direct (SB SR-210)	1	1,500	2,340	1.56	Weaving Segment <sup>5</sup>		2,670	1.78	Weaving Segment <sup>5</sup>	
	WB Off Direct (NB SR-210)	2	3,000	3,290	1.10	Weaving Segment <sup>5</sup>		2,820	0.94	Weaving Segment <sup>5</sup>	
SR-210	WB On Direct (SB SR-210)	1	1,500	2,270	1.51	Lane Add <sup>6</sup>		1,570	1.05	Lane Add <sup>6</sup>	
	EB Off Direct (Tennessee St)	1	1,500	520	0.35	24.2	C	560	0.37	34.2	D
	EB On Direct (Tennessee St)	1	1,500	380	0.25	20.1	C	1,240	0.83	**	F
	WB Off Direct (Tennessee St)	1	1,500	480	0.32	**	F	440	0.29	24.5	C
	EB Off Direct (Eureka St)	1	1,500	1,390	0.93	Weaving Segment <sup>5</sup>		1,490	0.99	Weaving Segment <sup>5</sup>	
	EB On Direct (6th St)	1	1,500	270	0.18	23.5	C	660	0.44	**	F
Tennessee St	WB Off Direct (6th St)	1	1,500	490	0.33	**	F	500	0.33	30.9	D
	WB On Loop (NB Orange St)	1	1,500	950	0.63	Weaving Segment <sup>5</sup>		900	0.60	Weaving Segment <sup>5</sup>	
	WB On Direct (SB Orange St)	1	1,500	760	0.51	Weaving Segment <sup>5</sup>		490	0.33	Weaving Segment <sup>5</sup>	
	EB Off Direct	1	1,500	880	0.59	30.9	D	1,310	0.87	**	F
	EB On Direct	1	1,500	190	0.13	23.8	C	480	0.32	**	F
	WB Off Direct	1	1,500	420	0.28	**	F	330	0.22	30.4	D
Eureka St/Orange St/6th St	WB On Direct	1	1,500	1,600	1.07	**	F	930	0.62	30.1	D
	EB Off Direct	1	1,500	670	0.45	24.7	C	900	0.60	**	F
	EB On Direct	1	1,500	590	0.39	40.0	E	1,370	0.91	**	F
	WB Off Direct	1	1,500	800	0.53	**	F	430	0.29	27.6	C
	WB On Direct	1	1,500	1,110	0.74	**	F	600	0.40	28.2	D
	EB Off Direct	1	1,500	60	0.04	25.2	C	400	0.27	**	F
Ford St	EB On Direct	1	1,500	150	0.10	24.0	C	170	0.11	**	F
	WB Off Direct	1	1,500	120	0.08	**	F	100	0.07	24.8	C
	WB On Direct	1	1,500	200	0.13	**	F	420	0.28	23.8	C

Notes:

- Capacity and peak hour traffic volumes are shown in vehicles per hour (vph). On-ramp traffic volumes are assumed to be unmetered volumes. LOS - Level of Service; d/c - Demand Volume-to-Capacity
- Peak hour capacities for freeway ramps are 1,500 vph for each freeway ramp lane.
- LOS is F under either two conditions: (1) if the total flow of the merge/diverge area exceeds the capacity of the freeway section, denoted with an asterisk (\*) in the density column;

- (2) if the mainline demand volume to capacity is greater than 1.00, denoted with double asterisks (\*\*\*) in the density column.
- Density is shown in passenger cars/mile/lane (pc/mi/lm). The density LOS criteria for merge and diverge sections are per HCM 2000.

- Weaving Segment : Based on the lane configuration, ramp junction analysis is not applicable for this location. See [Table 2.6.3](#).
- Lane Add : Analysis for a single-lane addition is a basic freeway segment analysis for the segment downstream of the lane addition with an additional lane. See [Table 2.6.3](#).
- Lane Drop : Analysis for a single-lane drop is basic freeway segment analysis for the segments upstream and downstream of the lane drop. See [Table 2.6.3](#).

- Major Diverge : A major diverge exists when a two-lane off-ramp results in a lane drop. Density and LOS are calculated using the HCM 2000 Major Diverge/Area analysis.
- Number of lanes on the ramp at the gore point at the gore point (off-ramp) or 6-foot point (on-ramp).

Table 2.6.6: Year 2025 Alternative 3 Condition Express Lane Transition Area Peak Hour Level of Service<sup>1</sup>

Transition Area Locations	# of Lanes	Capacity <sup>2</sup>	AM Peak Hour				PM Peak Hour			
			Demand Volume <sup>3</sup>	d/c	Density <sup>4</sup>	LOS <sup>5</sup>	Demand Volume <sup>3</sup>	d/c	Density <sup>4</sup>	LOS <sup>5</sup>
<b>EASTBOUND</b>										
Near LA/SB County Line	6	11,100	8,970	0.81	24.2	C	10,180	0.92	27.1	D
Vicinity of Ford St	5	9,250	4,770	0.52	15.7	B	9,280	<b>1.01</b>	*	F
<b>WESTBOUND</b>										
Vicinity of Ford St	5	9,250	7,790	0.84	26.1	D	4,690	0.51	15.7	B
Near LA/SB County Line	6	11,100	10,720	0.97	29.2	D	10,900	0.98	29.7	D

## Notes:

1. The transition areas were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis.
2. Peak hour capacity for each General Purpose (GP) freeway lane is 1,850 vehicles per hour (vph).
3. Peak hour traffic volumes are shown in vph.
4. Density is shown in passenger cars/mile/lane (pc/mi/ln).
5. Level of Service (LOS): Based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*) in the density column).

Table 2.6.7: Year 2025 Alternative 3 Condition Express Lane Segment Peak Hour Level of Service<sup>1</sup>

Express Lane Segment Locations <sup>2</sup>	# of Express Lanes	Express Lane Capacity <sup>3</sup>	AM Peak Hour				PM Peak Hour			
			Demand Volume <sup>4</sup>	d/c	Density <sup>5</sup>	LOS <sup>6</sup>	Demand Volume <sup>4</sup>	d/c	Density <sup>5</sup>	LOS <sup>6</sup>
<b>EASTBOUND</b>										
Between Beginning of Express Lanes and Access 1	2	4,000	2,400	0.60	20.6	C	2,810	0.70	24.1	C
Between Access 1 and Access 2	2	4,000	2,600	0.65	22.3	C	2,840	0.71	24.4	C
Between Access 2 and Access 3	2	4,000	2,320	0.58	19.9	C	2,710	0.68	23.2	C
Between Access 3 and Access 4	2	4,000	2,200	0.55	18.9	C	2,330	0.58	20.0	C
Between Access 4 and Access 5	2	4,000	2,360	0.59	19.6	C	2,480	0.62	20.6	C
Between Access 5 and Access 6	2	4,000	2,240	0.56	18.6	C	2,310	0.58	19.2	C
Between Access 6 and Access 7	2	4,000	2,000	0.50	16.6	B	1,980	0.50	16.5	B
Between Access 7 and Access 8	2	4,000	1,920	0.48	16.5	B	2,200	0.55	18.9	C
Between Access 8 and Access 9	2	4,000	1,100	0.28	9.1	A	2,320	0.58	19.3	C
Between Access 9 and Access 10	1	2,000	430	0.22	--	A	1,680	0.84	--	D
Between Access 10 and End of Express Lanes	1	2,000	440	0.22	--	A	1,500	0.75	--	C
<b>WESTBOUND</b>										
Between Beginning of Express Lanes and Access 10	1	2,000	1,560	0.78	--	C	580	0.29	--	A
Between Access 10 and Access 9	1	2,000	1,700	0.85	--	D	590	0.30	--	A
Between Access 9 and Access 8	2	4,000	1,910	0.48	15.9	B	1,100	0.28	9.1	A
Between Access 8 and Access 7	2	4,000	2,200	0.55	18.9	C	1,400	0.35	12.0	B
Between Access 7 and Access 6	2	4,000	1,960	0.49	16.8	B	2,200	0.55	18.9	C
Between Access 6 and Access 5	2	4,000	2,180	0.55	18.7	C	2,260	0.57	19.4	C
Between Access 5 and Access 4	2	4,000	2,400	0.60	20.0	C	2,320	0.58	19.3	C
Between Access 4 and Access 3	2	4,000	3,010	0.75	25.8	C	3,170	0.79	27.2	D
Between Access 3 and Access 2	2	4,000	3,280	0.82	28.2	D	3,380	0.85	29.2	D
Between Access 2 and Access 1	2	4,000	2,800	0.70	24.0	C	3,360	0.84	29.0	D
Between Access 1 and End of Express Lanes	2	4,000	2,840	0.71	24.4	C	3,400	0.85	29.4	D

## Notes:

- Two-lane Express lane segments were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis. Since no HCM 2000 method is available for one-lane Express lane segments, demand volume-to-capacity (d/c) ratios were calculated.
- Locations of the access areas are illustrated on [Figure 2.6.3](#).
- The capacity used for the Express lane is 2,000 vehicles per hour (vph).
- Peak hour traffic volumes are shown in vph.
- Density is shown in passenger cars/mile/lane (pc/mi/ln).
- Level of Service (LOS): Two-lane Express lane LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F. One-lane Express lane LOS is based on the d/c ratio using the conversion in [Table 2.1.2](#). One-lane Express lane segments are highlighted in the table and show "--" for density since a method to calculate density is not available.

**Table 2.6.8: Year 2025 Alternative 3 Condition Express Lane Intermediate Access Peak Hour Level of Service<sup>1</sup>**

Intermediate Access Locations <sup>2</sup>	Lane Type	Capacity <sup>3</sup>		AM Peak Hour				PM Peak Hour				Weaving <sup>5</sup>				Diverge <sup>5,6</sup>				Merge <sup>5,6</sup>														
		Express	Weave	GP	Aux	Express	Weave, GP & AUX		Demand d/c	Demand Volume <sup>4</sup>	d/c	Demand d/c	Demand Volume <sup>4</sup>	d/c	Weave, GP & AUX	AM	PM	AM	PM	LOS Density	LOS Density	AM	PM											
							Weave	GP	Aux	Express	Demand Volume <sup>4</sup>	Density	LOS	Density	LOS	Density	LOS	Density	AM	PM	AM	PM												
<b>Access 1</b>	EB	2	1	4	0	4,000	0	7,400	0	2,060	0.52	6,580	0.89	2,100	0.53	7,700	1.04	23.0	C	*	F	24.0	C	27.7	C	21.7	C	23.6	C					
	WB	2	1	4	0	4,000	0	7,400	0	2,310	0.58	7,610	1.03	2,710	0.68	8,170	1.10	*	F	*	F	27.6	C	32.7	D	23.7	C	28.2	D					
<b>Access 2</b>	EB	2	1	4	0	4,000	0	7,400	0	2,220	0.56	7,460	1.01	2,090	0.53	8,350	1.13	*	F	*	F	25.8	C	28.0	C	19.6	B	22.6	C					
	WB	2	1	4	0	4,000	0	7,400	0	2,700	0.68	8,290	1.12	2,840	0.71	9,580	1.29	*	F	*	F	32.0	D	32.9	D	23.6	C	28.0	C					
<b>Access 3</b>	EB	2	1	4	0	4,000	0	7,400	0	2,004	0.51	6,656	0.90	1,994	0.50	8,536	1.15	22.5	C	*	F	23.3	C	26.8	C	18.6	B	19.6	B					
	WB	2	1	4	0	4,000	0	7,400	0	2,580	0.65	8,800	1.19	2,710	0.68	8,920	1.21	*	F	*	F	29.5	D	31.0	D	27.2	C	28.1	D					
<b>Access 4</b>	EB	2	1	4	1	4,000	0	7,400	1.850	1,770	0.45	7,400	0.80	1,810	0.46	9,090	0.98	22.8	C	27.6	C	22.0	C	23.2	C	19.3	B	20.2	C					
	WB	2	1	4	0	4,000	0	7,400	0	2,200	0.55	7,510	1.01	2,150	0.54	7,040	0.95	*	F	25.2	C	23.8	C	23.1	C	24.5	C	24.5	C	25.7	C			
<b>Access 5</b>	EB	2	1	4	0	4,000	0	7,400	0	1,890	0.48	6,650	0.90	2,040	0.51	7,250	0.98	22.8	C	24.0	C	23.6	C	24.7	C	18.9	B	19.5	B					
	WB	2	1	4	0	4,000	0	7,400	0	2,000	0.50	5,770	0.78	2,000	0.50	6,260	0.85	19.1	B	20.8	C	21.8	C	22.6	C	19.7	B	19.1	B					
<b>Access 6</b>	EB	2	1	4	0	4,000	0	7,400	0	1,730	0.44	5,920	0.80	1,840	0.46	6,390	0.86	20.0	B	21.4	C	22.4	C	23.0	C	16.5	B	16.4	B					
	WB	2	1	4	0	4,000	0	7,400	0	1,750	0.44	4,920	0.66	1,920	0.48	5,580	0.75	16.2	B	18.4	B	19.8	B	22.0	C	17.9	B	18.6	B					
<b>Access 7</b>	EB	2	1	4	0	4,000	0	7,400	0	1,640	0.41	7,010	0.95	1,680	0.42	7,410	1.00	22.9	C	*	F	20.2	C	20.0	C	15.8	B	18.0	B					
	WB	2	1	4	0	4,000	0	7,400	0	1,890	0.48	4,780	0.65	1,205	0.31	6,885	0.93	15.3	B	24.6	C	22.0	C	14.8	B	16.3	B	17.8	B					
<b>Access 8</b>	EB	2	1	4	0	4,000	0	7,400	0	1,090	0.28	6,420	0.87	1,750	0.44	8,300	1.12	22.0	C	*	F	19.7	B	22.2	C	9.7	A	19.4	B					
	WB	2	1	4	0	4,000	0	7,400	0	1,610	0.41	8,000	1.08	850	0.22	6,330	0.92	*	F	23.6	C	19.6	B	12.2	B	18.4	B	11.9	B					
<b>Access 9</b>	EB	1	0	5	0	2,000	0	9,250	0	210	0.11	6,040	0.65	1,470	0.74	9,020	0.98	19.1 <sup>7</sup>	C	28.8 <sup>7</sup>	D <sup>7</sup>	23.7 <sup>8</sup>	C <sup>8</sup>	37.4 <sup>8</sup>	E <sup>8</sup>	16.1 <sup>9</sup>	B <sup>9</sup>	26.3 <sup>9</sup>	C <sup>9</sup>					
	WB	2	0	4	0	4,000	0	7,400	0	1,580	0.40	8,380	1.13	530	0.14	5,630	0.76	*	F	18.7	B	No Weave Lane so No Merge or Diverge Analysis												
<b>Access 10</b>	EB	1	0	4	0	2,000	0	7,400	0	200	0.10	5,000	0.68	1,380	0.69	8,280	1.12	16.8	B	*	F	17.2	B	No Weave Lane so No Merge or Diverge Analysis										
	WB	1	0	4	0	2,000	0	7,400	0	1,530	0.77	8,180	1.11	580	0.29	4,920	0.66	*	F	17.2	B													

Notes:

- The Express lane intermediate access (eastbound (EB) and westbound (WB)) areas were analyzed based on the Highway Capacity Manual (HCM) 2000 ramp junction analysis method and/or weaving analysis method, depending on the lane configuration.
- Locations of the access areas are illustrated on [Figure 2.6.3](#).
- Peak hour capacities for freeway lanes include:
  - 1,850 vehicles per hour (vph) for each General Purpose (GP) lane and 2,000 vph for each Express lane.
  - 1,850 vph for an auxiliary (AUX) or weave lane if the length exceeds 1 mile.
  - 1,000 vph for an AUX or weave lane if the length is greater than 0.5 mile and less than 1 mile.
  - 0 vph for an AUX or weave lane if the length is less than 0.5 mile.
- Peak hour traffic volumes are shown in vph.
- Level of Service (LOS): LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*)) in the density column. Density is shown in passenger cars/mile/lane (pc/ml/in).
- The merge and diverge analysis was conducted for the areas into and out of the Express lanes into the "weave lane".
- A basic segment analysis was conducted for EB Access 9 since the proposed design separates the ingress and egress and the distance between the two areas is greater than 2,500 ft.
- The diverge analysis for EB Access 9 was conducted for the exit from the freeway mainline number one GP lane to the Express Lane merge lane.
- The merge analysis for EB Access 9 was conducted for the merge into the Express lane.

Table 2.6.9: Year 2045 Alternative 3 Condition Express Lane Transition Area Peak Hour Level of Service<sup>1</sup>

Transition Area Locations	# of Lanes	Capacity <sup>2</sup>	AM Peak Hour				PM Peak Hour			
			Demand Volume <sup>3</sup>	d/c	Density <sup>4</sup>	LOS <sup>5</sup>	Demand Volume <sup>3</sup>	d/c	Density <sup>4</sup>	LOS <sup>5</sup>
<b>EASTBOUND</b>										
Near LA/SB County Line	6	11,100	10,350	0.93	27.7	D	10,800	0.97	28.7	D
Vicinity of Ford St	5	9,250	5,840	0.63	19.5	C	10,750	<b>1.16</b>	*	F
<b>WESTBOUND</b>										
Vicinity of Ford St	5	9,250	11,210	<b>1.21</b>	*	F	6,840	0.74	22.6	C
Near LA/SB County Line	6	11,100	11,040	0.99	29.6	D	12,160	<b>1.10</b>	*	F

## Notes:

1. The transition areas were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis.
2. Peak hour capacity for each General Purpose (GP) freeway lane is 1,850 vehicles per hour (vph).
3. Peak hour traffic volumes are shown in vph.
4. Density is shown in passenger cars/mile/lane (pc/mi/ln).
5. Level of Service (LOS): Based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*) in the density column).

Table 2.6.10: Year 2045 Alternative 3 Condition Express Lane Segment Peak Hour Level of Service<sup>1</sup>

Express Lane Segment Locations <sup>2</sup>	# of Express Lanes	Express Lane Capacity <sup>3</sup>	AM Peak Hour				PM Peak Hour			
			Demand Volume <sup>4</sup>	d/c	Density <sup>5</sup>	LOS <sup>6</sup>	Demand Volume <sup>4</sup>	d/c	Density <sup>5</sup>	LOS <sup>6</sup>
<b>EASTBOUND</b>										
Between Beginning of Express Lanes and Access 1	2	4,000	2,600	0.65	22.3	C	3,020	0.76	25.9	C
Between Access 1 and Access 2	2	4,000	3,060	0.77	26.3	D	3,040	0.76	26.1	D
Between Access 2 and Access 3	2	4,000	3,060	0.77	26.3	D	3,120	0.78	26.8	D
Between Access 3 and Access 4	2	4,000	3,140	0.79	27.0	D	3,200	0.80	27.5	D
Between Access 4 and Access 5	2	4,000	3,200	0.80	26.8	D	3,260	0.82	27.3	D
Between Access 5 and Access 6	2	4,000	3,040	0.76	25.4	C	3,050	0.76	25.4	C
Between Access 6 and Access 7	2	4,000	2,720	0.68	22.7	C	2,630	0.66	21.9	C
Between Access 7 and Access 8	2	4,000	2,680	0.67	23.0	C	2,600	0.65	22.3	C
Between Access 8 and Access 9	2	4,000	1,920	0.48	16.0	B	2,880	0.72	24.0	C
Between Access 9 and Access 10	1	2,000	520	0.26	--	A	1,690	0.85	--	D
Between Access 10 and End of Express Lanes	1	2,000	510	0.26	--	A	1,610	0.81	--	D
<b>WESTBOUND</b>										
Between Beginning of Express Lanes and Access 10	1	2,000	1,700	0.85	--	D	740	0.37	--	A
Between Access 10 and Access 9	1	2,000	1,720	0.86	--	D	760	0.38	--	A
Between Access 9 and Access 8	2	4,000	2,880	0.72	24.0	C	1,600	0.40	13.3	B
Between Access 8 and Access 7	2	4,000	2,840	0.71	24.4	C	2,220	0.56	19.1	C
Between Access 7 and Access 6	2	4,000	2,720	0.68	23.4	C	3,240	0.81	27.9	D
Between Access 6 and Access 5	2	4,000	3,000	0.75	25.8	C	3,220	0.81	27.7	D
Between Access 5 and Access 4	2	4,000	3,280	0.82	27.5	D	3,200	0.80	26.8	D
Between Access 4 and Access 3	2	4,000	3,390	0.85	29.3	D	3,400	0.85	29.4	D
Between Access 3 and Access 2	2	4,000	3,400	0.85	29.4	D	3,400	0.85	29.4	D
Between Access 2 and Access 1	2	4,000	3,040	0.76	26.1	D	3,400	0.85	29.4	D
Between Access 1 and End of Express Lanes	2	4,000	2,940	0.74	25.3	C	3,400	0.85	29.4	D

## Notes:

- Two-lane Express lane segments were analyzed based on the Highway Capacity Manual (HCM) 2000 basic freeway segment analysis. Since no HCM 2000 method is available for one-lane Express lane segments, demand volume-to-capacity (d/c) ratios were calculated.
- Locations of the access areas are illustrated on [Figure 2.6.3](#).
- The capacity used for the Express lane is 2,000 vehicles per hour (vph).
- Peak hour traffic volumes are shown in vph.
- Density is shown in passenger cars/mile/lane (pc/mi/ln).
- Level of Service (LOS): Two-lane Express lane LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F. One-lane Express lane LOS is based on the d/c ratio using the conversion in [Table 2.1.2](#). One-lane Express lane segments are highlighted in the table and show "--" for density since a method to calculate density is not available.

Table 2.6.11: Year 2045 Alternative 3 Condition Express Lane Intermediate Access Peak Hour Level of Service<sup>1</sup>

Intermediate Access Locations <sup>2</sup>	Lane Type				Capacity <sup>3</sup>				AM Peak Hour				PM Peak Hour				Weaving <sup>5</sup>				Diverge <sup>5,6</sup>				Merge <sup>5,6</sup>					
	Express		Weave		GP		Aux		Express		Weave, GP & AUX		Weave, GP & AUX		AM		PM		AM		PM		AM		PM					
	Direction	Express	Weave	Aux	Express	GP	Aux	Express	Demand Volume <sup>4</sup>	d/c	Demand Volume <sup>4</sup>	d/c	Demand Volume <sup>4</sup>	d/c	Demand Volume <sup>4</sup>	d/c	Demand Volume <sup>4</sup>	d/c	Demand Volume <sup>4</sup>	d/c	Demand Volume <sup>4</sup>	d/c	Demand Volume <sup>4</sup>	d/c	Demand Volume <sup>4</sup>	d/c				
<b>Access 1</b>	EB	2	1	4	0	4,000	0	7,400	0	2,160	0.54	8,000	<b>1.08</b>	2,260	0.57	8,150	<b>1.10</b>	*	F	*	F	25.8	C	29.6	D	25.3	C	25.2	C	
	WB	2	1	4	0	4,000	0	7,400	0	2,610	0.66	7,540	<b>1.02</b>	2,770	0.70	9,460	<b>1.28</b>	*	F	*	F	29.8	D	33.1	D	24.6	C	28.3	D	
<b>Access 2</b>	EB	2	1	4	0	4,000	0	7,400	0	2,600	0.65	8,820	<b>1.19</b>	2,310	0.58	8,910	<b>1.20</b>	*	F	*	F	30.0	D	29.8	D	25.5	C	25.9	C	
	WB	2	1	4	0	4,000	0	7,400	0	2,920	0.73	8,520	<b>1.15</b>	2,806	0.71	11,124	<b>1.50</b>	*	F	*	F	33.1	D	33.1	D	25.5	C	28.3	D	
<b>Access 3</b>	EB	2	1	4	0	4,000	0	7,400	0	2,660	0.67	7,660	<b>1.04</b>	2,350	0.59	9,750	<b>1.32</b>	*	F	*	F	30.0	D	30.5	D	26.2	C	26.5	C	
	WB	2	1	4	0	4,000	0	7,400	0	2,900	0.73	9,790	<b>1.32</b>	2,840	0.71	10,590	<b>1.44</b>	*	F	*	F	33.0	D	33.1	D	28.3	D	28.3	D	
<b>Access 4</b>	EB	2	1	4	1	4,000	0	7,400	1,850	2,610	0.66	8,510	0.92	2,500	0.63	10,450	<b>1.13</b>	25.7	C	*	F	30.5	D	31.1	D	26.2	C	26.6	C	
	WB	2	1	4	0	4,000	0	7,400	0	2,900	0.73	8,940	<b>1.21</b>	2,820	0.71	8,700	<b>1.18</b>	*	F	*	F	31.8	D	31.1	D	27.8	C	27.8	C	
<b>Access 5</b>	EB	2	1	4	0	4,000	0	7,400	0	2,720	0.68	7,810	<b>1.06</b>	2,640	0.66	8,590	<b>1.16</b>	*	F	*	F	31.2	D	31.8	D	25.5	C	25.5	C	
	WB	2	1	4	0	4,000	0	7,400	0	2,740	0.69	7,330	0.99	2,850	0.72	7,950	<b>1.07</b>	24.5	C	*	F	29.3	D	31.2	D	26.9	C	26.3	C	
<b>Access 6</b>	EB	2	1	4	0	4,000	0	7,400	0	2,490	0.63	7,270	0.98	2,410	0.61	7,370	1.00	24.2	C	24.7	C	29.6	D	29.7	D	22.4	C	21.7	C	
	WB	2	1	4	0	4,000	0	7,400	0	2,430	0.61	6,130	0.83	2,840	0.71	7,310	0.99	20.9	C	24.3	C	26.7	C	31.4	D	24.6	C	24.6	C	26.5
<b>Access 7</b>	EB	2	1	4	0	4,000	0	7,400	0	2,180	0.55	7,840	<b>1.06</b>	2,050	0.53	8,120	<b>1.10</b>	*	F	*	F	26.7	C	25.9	C	22.0	C	21.3	C	
	WB	2	1	4	0	4,000	0	7,400	0	2,450	0.62	6,010	0.81	1,950	0.49	8,340	<b>1.13</b>	20.1	C	*	F	27.8	C	22.2	C	22.4	C	22.4	C	26.2
<b>Access 8</b>	EB	2	1	4	0	4,000	0	7,400	0	1,860	0.47	6,880	0.93	2,010	0.51	9,270	<b>1.25</b>	23.1	C	*	F	26.5	C	25.8	C	16.4	B	23.9	C	
	WB	2	1	4	0	4,000	0	7,400	0	2,500	0.63	8,730	<b>1.18</b>	1,260	0.32	7,890	<b>1.07</b>	*	F	*	F	28.3	D	16.8	B	23.8	C	18.4	B	
<b>Access 9</b>	EB	1	0	5	0	2,000	0	9,250	0	460	0.23	6,740	0.73	960	0.48	10,830	<b>1.17</b>	21.5 <sup>7</sup>	C <sup>7</sup>	* <sup>7</sup>	F <sup>7</sup>	24.1 <sup>8</sup>	C <sup>8</sup>	* <sup>8</sup>	F <sup>8</sup>	16.9 <sup>9</sup>	B <sup>9</sup>	26.2 <sup>9</sup>	C <sup>9</sup>	
	WB	2	0	4	0	4,000	0	7,400	0	1,710	0.43	9,880	<b>1.34</b>	660	0.17	6,480	0.88	*	F	22.6	C	No Weave Lane so No Merge or Diverge Analysis								
<b>Access 10</b>	EB	1	0	4	0	2,000	0	7,400	0	6,030	0.81	1,340	0.67	9,590	<b>1.30</b>	20.9	C	*	F	22.1	C	No Weave Lane so No Merge or Diverge Analysis								
	WB	1	0	4	0	2,000	0	7,400	0	1,690	0.85	10,520	<b>1.42</b>	730	0.37	6,380	0.86	*	F	22.1	C									

Notes:

- The Express lane intermediate access (eastbound (EB) and westbound (WB)) areas were analyzed based on the Highway Capacity Manual (HCM) 2000 ramp junction analysis method and/or weaving analysis method, depending on the lane configuration.
- Locations of the access areas are illustrated on [Figure 2.6.3](#).
- Peak hour capacities for freeway lanes include:
  - 1,850 vehicles per hour (vph) for each General Purpose (GP) lane and 2,000 vph for each Express lane.
  - 1,850 vph for an auxiliary (AUX) or weave lane if the length exceeds 1 mile.
  - 1,000 vph for an AUX or weave lane if the length is greater than 0.5 mile and less than 1 mile.
  - 0 vph for an AUX or weave lane if the length is less than 0.5 mile.
- Peak hour traffic volumes are shown in vph.

- Level of Service (LOS): LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*)) in the density column. Density is shown in passenger cars/mile/lane (pc/mi/ln).
- The merge and diverge analysis was conducted for the areas into and out of the Express Lanes into the "Weave lane".
- A basic segment analysis was conducted for EB Access 9 since the proposed design separates the ingress and egress and the distance between the two areas is greater than 2,500 ft.
- The diverge analysis for EB Access 9 was conducted for the exit from the freeway mainline number one GP lane to the Express Lane merge lane.
- The merge analysis for EB Access 9 was conducted for the merge from the merge lane into the Express Lane.

1. The Express lane intermediate access (eastbound (EB) and westbound (WB)) areas were analyzed based on the Highway Capacity Manual (HCM) 2000 ramp junction analysis method and/or weaving analysis method, depending on the lane configuration.

2. Locations of the access areas are illustrated on [Figure 2.6.3](#).

3. Peak hour capacities for freeway lanes include:
 

- 1,850 vph for an auxiliary (AUX) or weave lane if the length exceeds 1 mile.
- 1,000 vph for an AUX or weave lane if the length is greater than 0.5 mile and less than 1 mile.
- 0 vph for an AUX or weave lane if the length is less than 0.5 mile.

4. Peak hour traffic volumes are shown in vph.

5. Level of Service (LOS): LOS is based on density except when traffic demand volume-to-capacity (d/c) ratio is greater than 1.00, which is LOS F (indicated with an asterisk (\*)) in the density column. Density is shown in passenger cars/mile/lane (pc/mi/ln).

6. The merge and diverge analysis was conducted for the areas into and out of the Express Lanes into the "Weave lane".

7. A basic segment analysis was conducted for EB Access 9 since the proposed design separates the ingress and egress and the distance between the two areas is greater than 2,500 ft.

8. The diverge analysis for EB Access 9 was conducted for the exit from the freeway mainline number one GP lane to the Express Lane merge lane.

9. The merge analysis for EB Access 9 was conducted for the merge from the merge lane into the Express Lane.

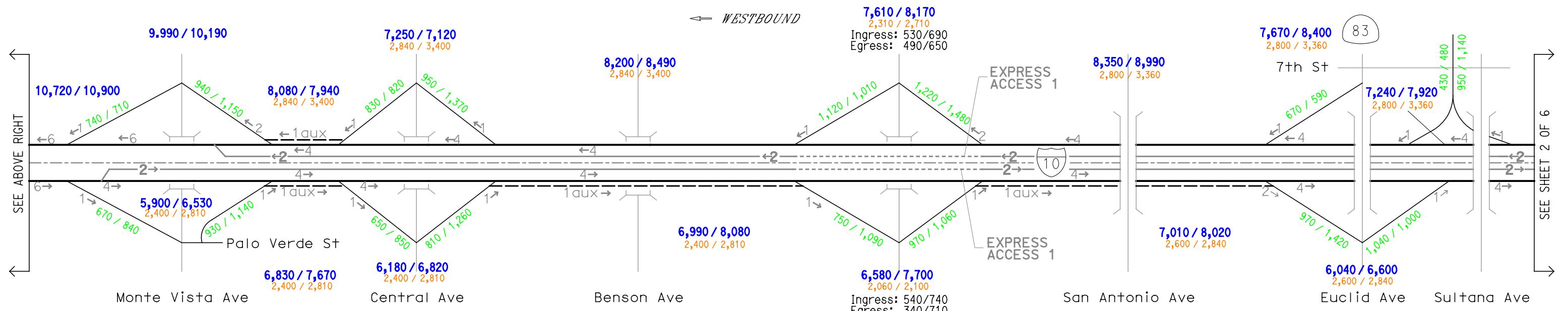
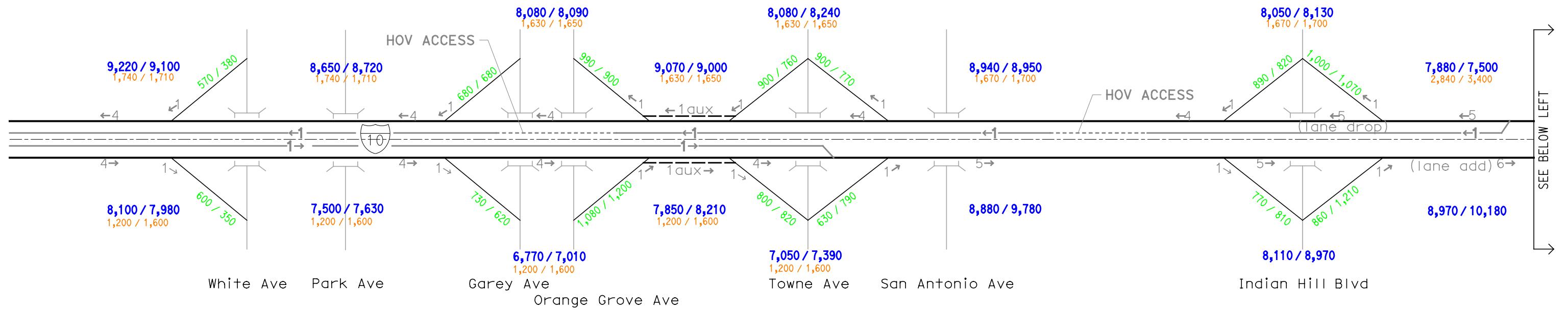
**Table 2.6.12: Year 2045 Alternative 3 Condition Weave Lane Queuing at Intermediate Access Locations 1 to 9<sup>1</sup>**

Table 2.6.12: Year 2045 Alternative 3 Condition Weave Lane Queuing at Intermediate Access Locations 1 to 9 <sup>1</sup>																								
Access Locations <sup>1</sup>		Ingress/Egress Volumes <sup>3</sup>		Weaving <sup>4</sup>		Step 1		Step 2		Step 3a		Step 3b		Step 3d		Finding								
						AM	PM	AM	PM	AM <sup>5</sup>	PM <sup>5</sup>	Flow Sufficient to Accept Egress per GP Lane <sup>6</sup>	Estimated Flow per GP Lane <sup>6</sup>	Ingress Equal to or Greater than Egress?	Will Weave Lane Queue Overflow?	LOS C or Better?	LOS C or Better?	Estimated Flow per GP Lane <sup>6</sup>	Amount Egress Exceeds Ingress	Flow Sufficient to Accept Egress per GP Lane <sup>6</sup>	Will Weave Lane Queue Overflow?			
Access 1	EB	440	900	760	*	F	1.09	*	F	1.11	No	Yes	No Weave Lane Queue Overflow Expected	No	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No				
		WB	430	630	*	F	1.02	*	F	1.28	No	No	100	1.02	1.826	Yes	No	No	Yes	No Weave Lane Queue Overflow Expected	No			
Access 2	EB	460	730	810	*	F	1.20	*	F	1.21	No	Yes	No Weave Lane Queue Overflow Expected	No	No	No	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No		
		WB	480	120	594	*	F	1.16	*	F	1.51	No	No	360	1.16	1.726	Yes	No	No	Yes	No Weave Lane Queue Overflow Expected	No		
Access 3	EB	400	480	770	*	F	1.04	*	F	1.32	No	Yes	No Weave Lane Queue Overflow Expected	No	No	No	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No		
		WB	490	500	560	*	F	1.33	*	F	1.45	No	Yes	No Weave Lane Queue Overflow Expected	No	No	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No		
Access 4	EB	530	590	700	760	25.7	C	0.92	*	F	1.13	Yes	No Weave Lane Queue Overflow Expected	No	No	Yes	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No		
		WB	380	490	380	580	*	F	1.21	*	F	1.18	No	Yes	No Weave Lane Queue Overflow Expected	No	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No		
Access 5	EB	480	320	620	410	*	F	1.06	*	F	1.17	No	No	160	1.06	1.849	Yes	No	No	21.0	1.17	1.711	Yes	No
		WB	260	540	370	350	24.5	C	1.00	*	F	1.08	Yes	No Weave Lane Queue Overflow Expected	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No		
Access 6	EB	550	230	640	220	24.2	C	0.99	24.7	C	1.00	Yes	No Weave Lane Queue Overflow Expected	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No			
		WB	290	570	400	380	20.9	C	0.83	24.3	C	0.99	Yes	No Weave Lane Queue Overflow Expected	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No		
Access 7	EB	540	500	540	510	*	F	1.06	*	F	1.10	No	No	40	1.06	1.849	Yes	No	No	30	1.10	1.831	Yes	No
		WB	390	270	270	1,290	20.1	C	0.82	*	F	1.13	Yes	No Weave Lane Queue Overflow Expected	No	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No	
Access 8	EB	820	60	590	870	23.1	C	0.93	*	F	1.26	Yes	No Weave Lane Queue Overflow Expected	No	No	Yes	No	Yes	No Weave Lane Queue Overflow Expected	No	No Weave Lane Queue Overflow Expected	No		
		WB	380	340	340	960	*	F	1.18	*	F	1.07	No	No	40	1.18	1.678	Yes	No	No	Yes	No Weave Lane Queue Overflow Expected	No	

**Notes:**

1. Intermediate Access Locations 9 (Eastbound only) and 10 do not have a weave lane. Schematics of each intermediate access area are shown on [Figure 2.6.3](#).
  2. Locations of the accesses are illustrated on [Figure 2.6.3](#).
  3. Ingress/egress volumes are from [Figure 2.6.2](#).
  4. Weaving area density, LOS, and d/c are from [Table 2.6.11](#).
  5. Steps 1 to 3d and findings are explained in the text.
  6. The method of determining flow values is explained in the text. The flow was calculated for every 0.05 increment of d/c from 1.05 to 1.35. Each d/c ratio was rounded up to the nearest 0.05 and the value for the rounded d/c used to determine flow. This slightly understates flows. The flows used are 1.795 vph for d/c < 1.00-1.05, 1.777 for 1.06-1.10, 1.705 for 1.11-1.15, 1.579 for 1.16-1.20, 1.507 for 1.21-1.25, 1.400 for 1.26-1.30, and 1.166 for 1.31-1.35. No d/c values in the table exceed 1.35.

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#### LEGEND

AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES  
(GP PEAK HOUR TRAFFIC VOLUMES INCLUDE INGRESS AND EGRESS VOLUMES AT INTERMEDIATE ACCESS LOCATIONS FOR THE EXPRESS LANES)

AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

AM/PM - HIGH OCCUPANCY VEHICLES(HOV) OR  
EXPRESS LANES PEAK HOUR TRAFFIC VOLUMES

↔ 1 - # OF GP, RAMP OR EXPRESS/HOV LANES

↔ 1aux - # OF AUXILIARY LANES

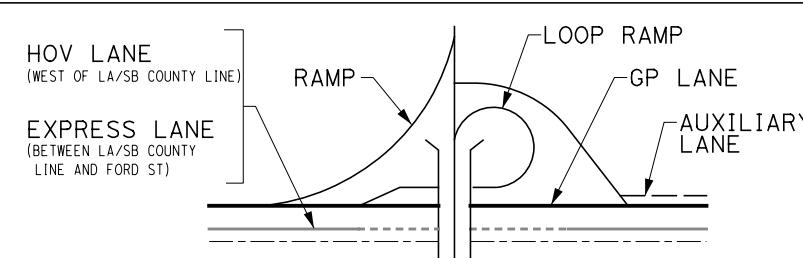
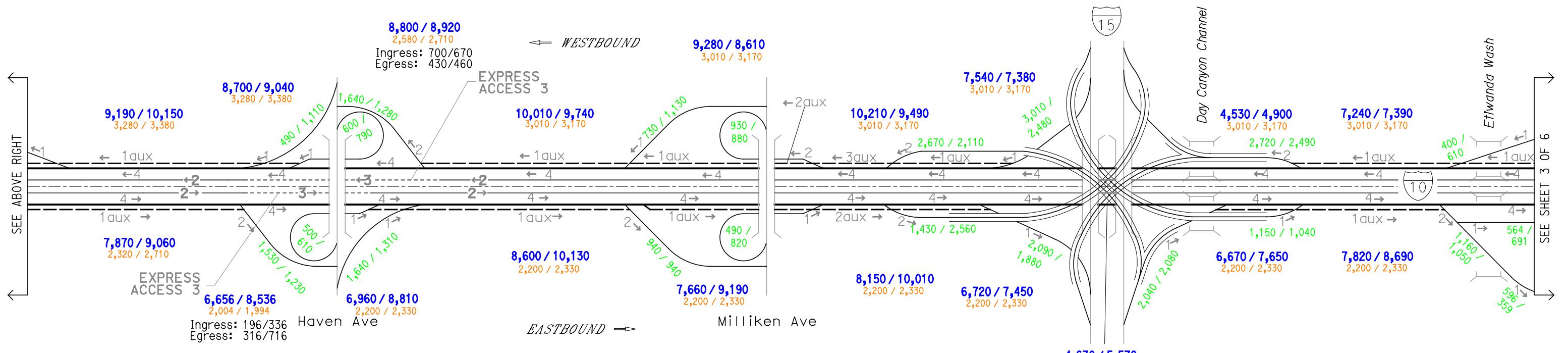
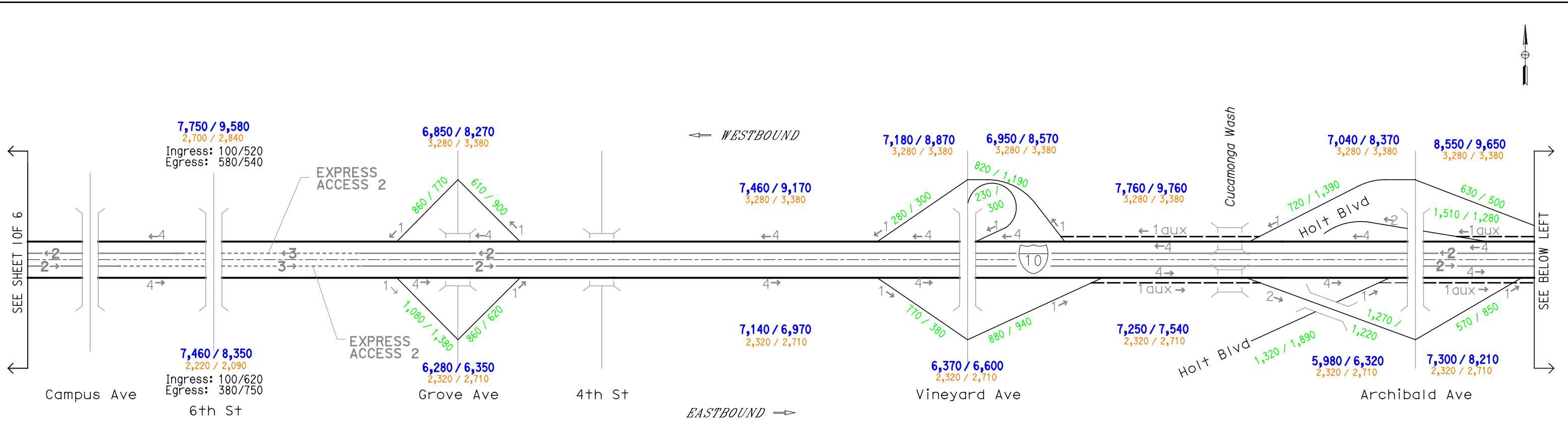


FIGURE 2.6.1  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2025)  
FREWAY TRAFFIC VOLUMES  
AND LANE CONFIGURATION

SHEET 1 OF 6



#### LEGEND

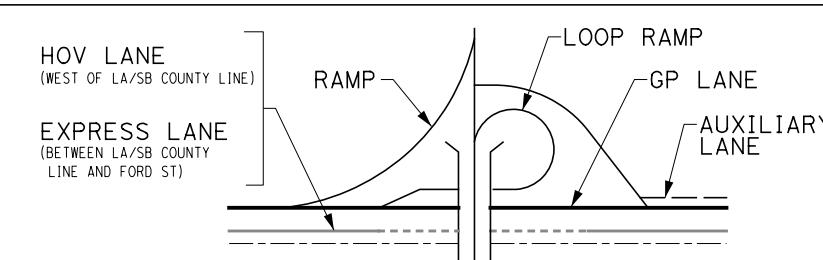
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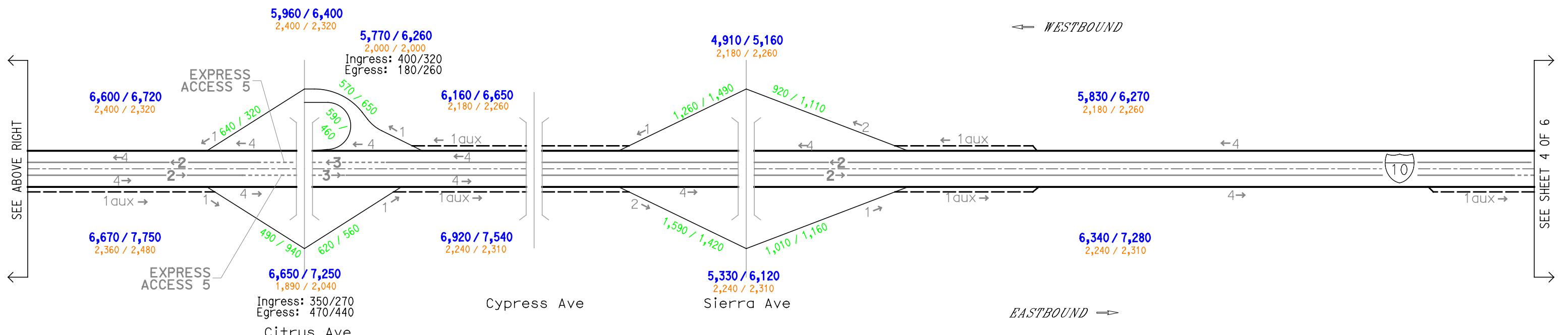
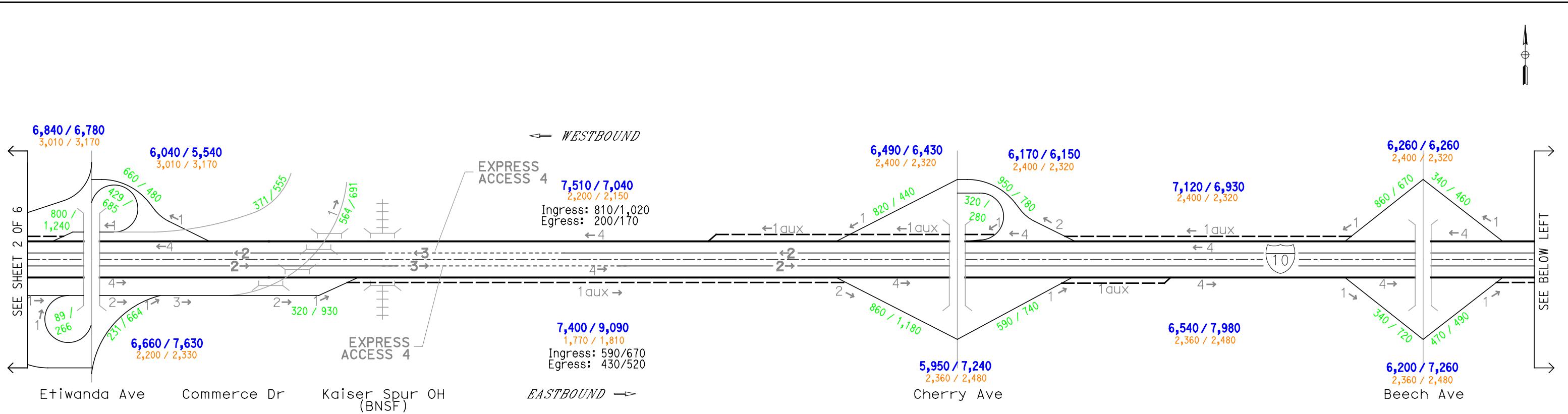
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**FIGURE 2.6.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 3 - EXPRESS (YEAR 2025)**  
**FREWAY TRAFFIC VOLUMES**  
**AND LANE CONFIGURATION**

SHEET 2 OF 6



#### LEGEND

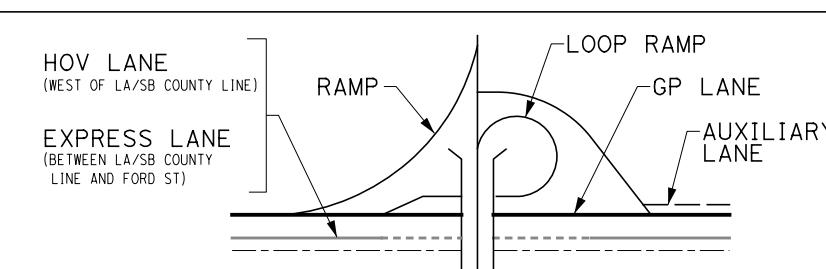
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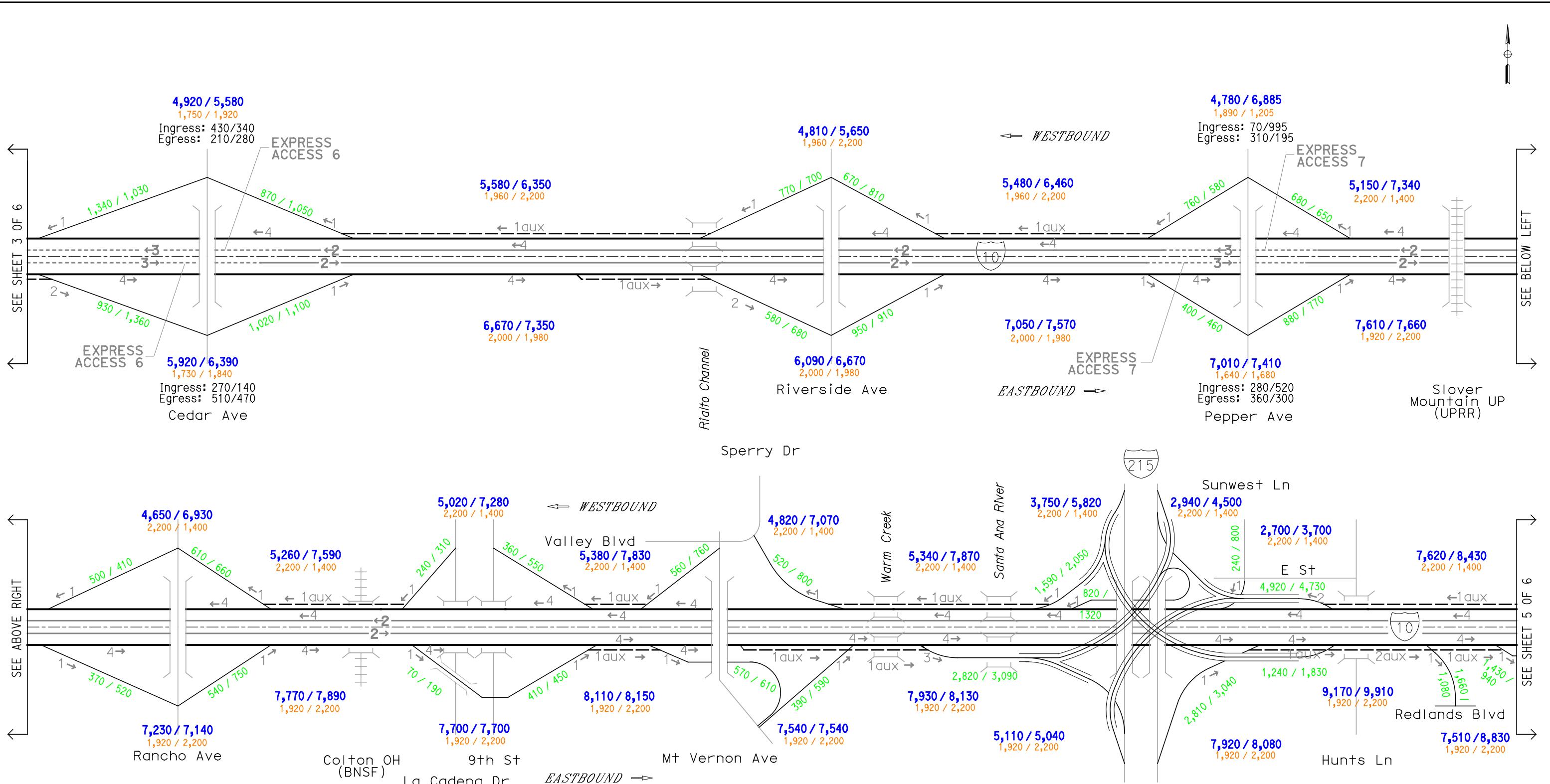
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← 1aux - # OF AUXILIARY LANES



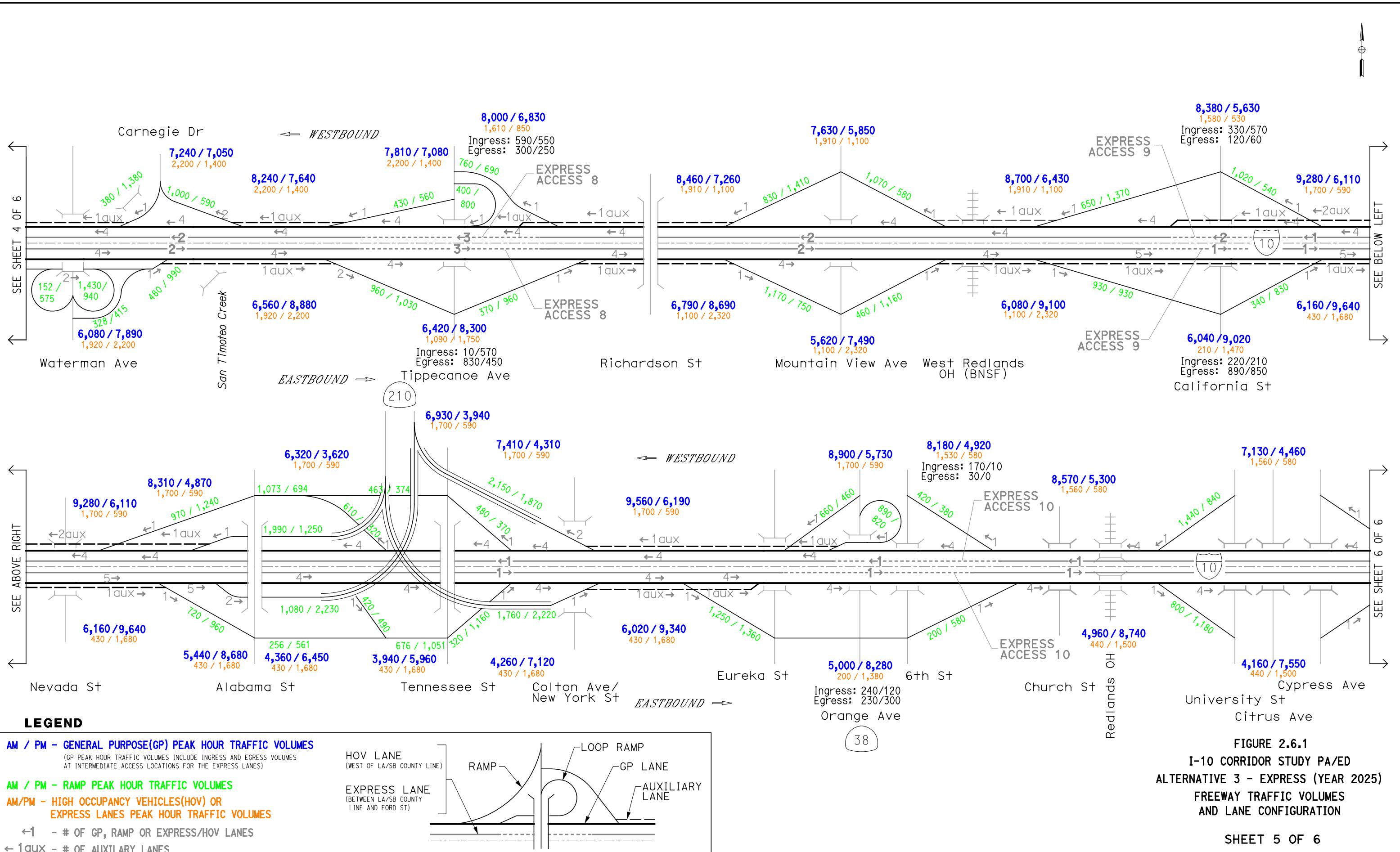
**FIGURE 2.6.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 3 - EXPRESS (YEAR 2025)**  
**FREWAY TRAFFIC VOLUMES**  
**AND LANE CONFIGURATION**

SHEET 3 OF 6



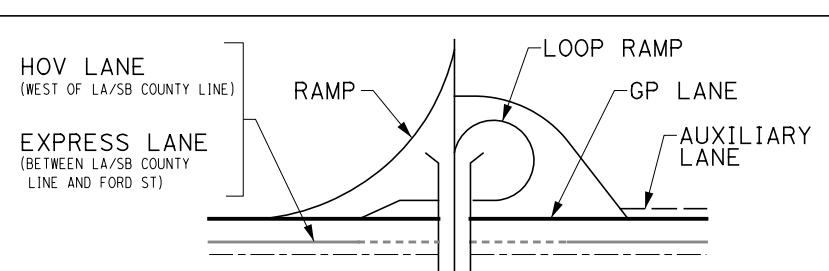
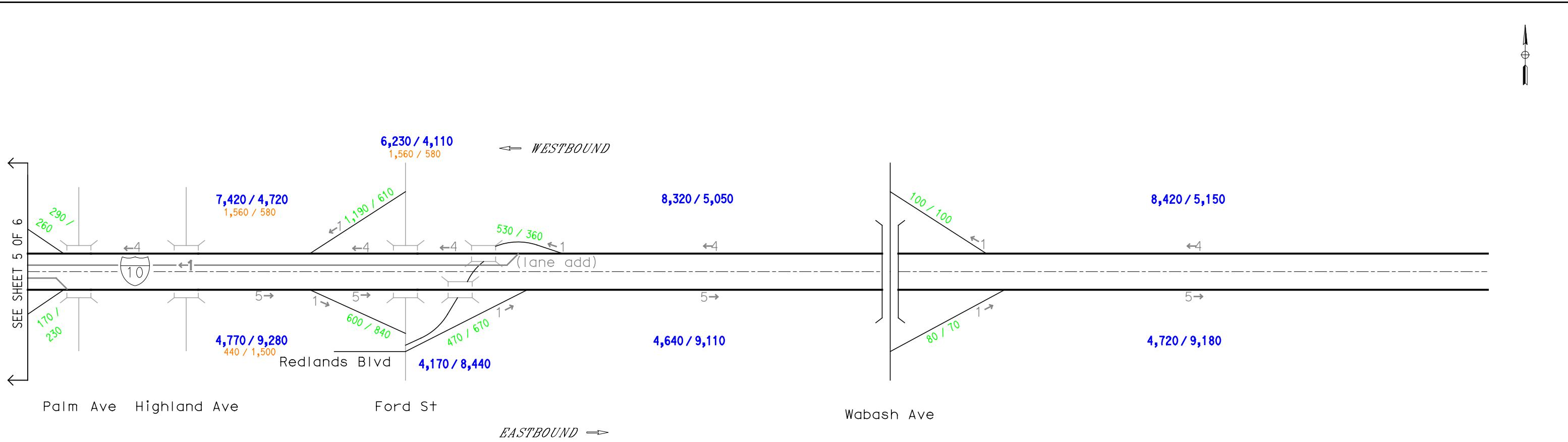
**FIGURE 2.6.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 3 - EXPRESS (YEAR 2025)**  
**FREWAY TRAFFIC VOLUMES**  
**AND LANE CONFIGURATION**

SHEET 4 OF 6



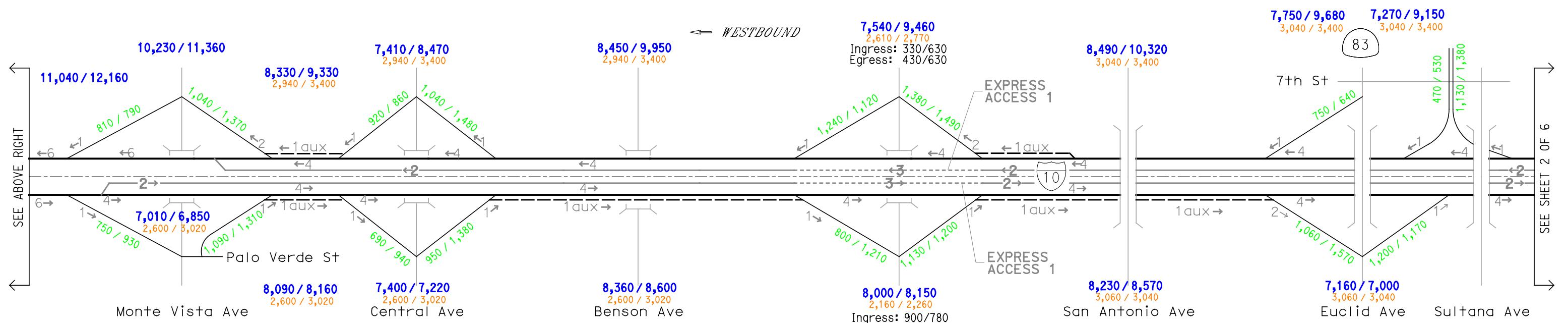
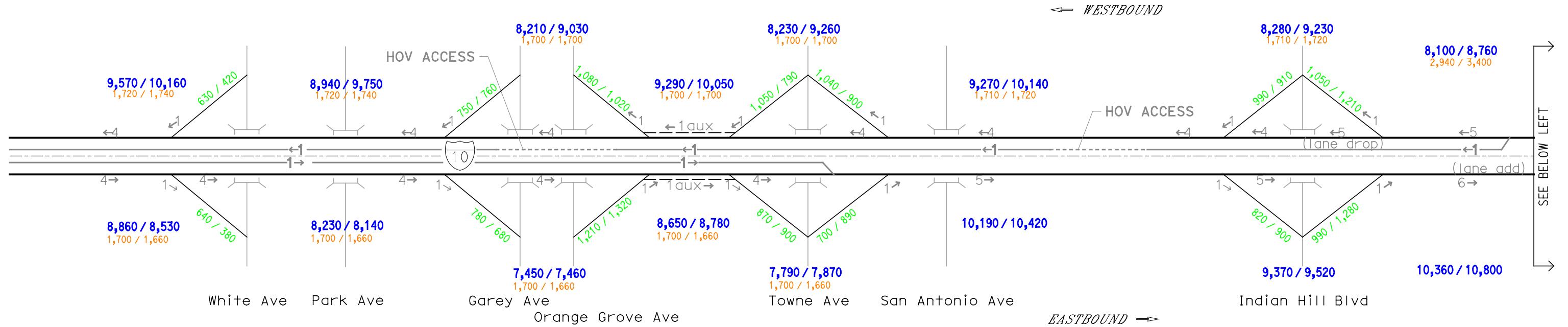
**FIGURE 2.6.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 3 - EXPRESS (YEAR 2025)**  
**FREEWAY TRAFFIC VOLUMES**  
**AND LANE CONFIGURATION**

SHEET 5 OF 6



**FIGURE 2.6.1**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 3 - EXPRESS (YEAR 2025)**  
**FREWAY TRAFFIC VOLUMES**  
**AND LANE CONFIGURATION**

SHEET 6 OF 6



#### LEGEND

AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES

(GP PEAK HOUR TRAFFIC VOLUMES INCLUDE INGRESS AND EGRESS VOLUMES AT INTERMEDIATE ACCESS LOCATIONS FOR THE EXPRESS LANES)

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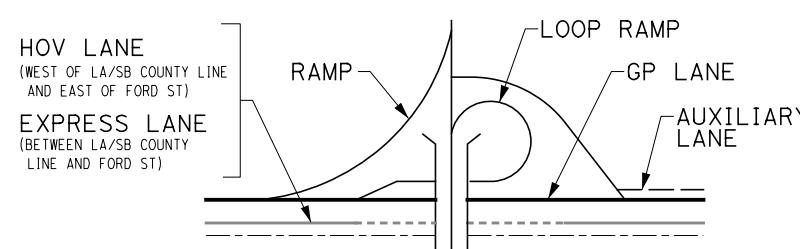
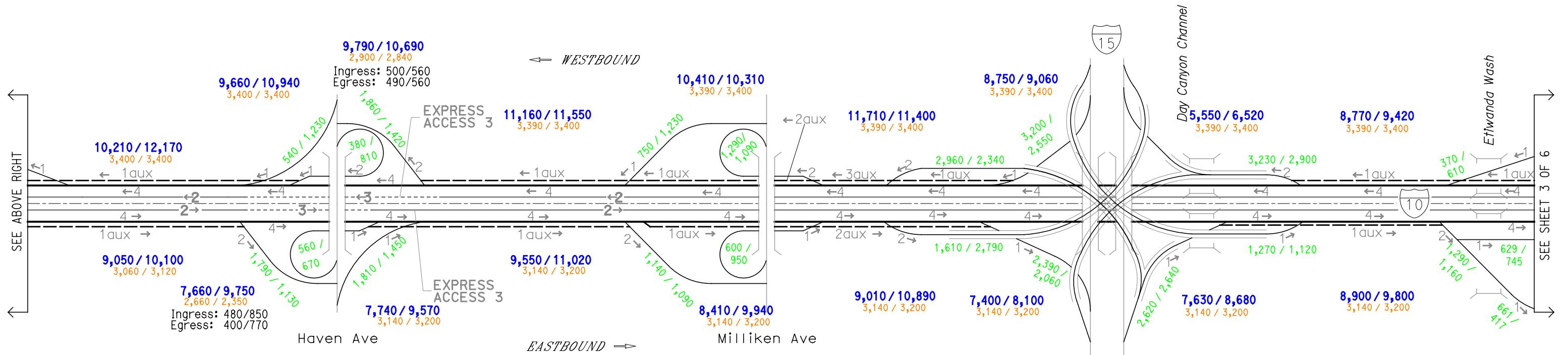
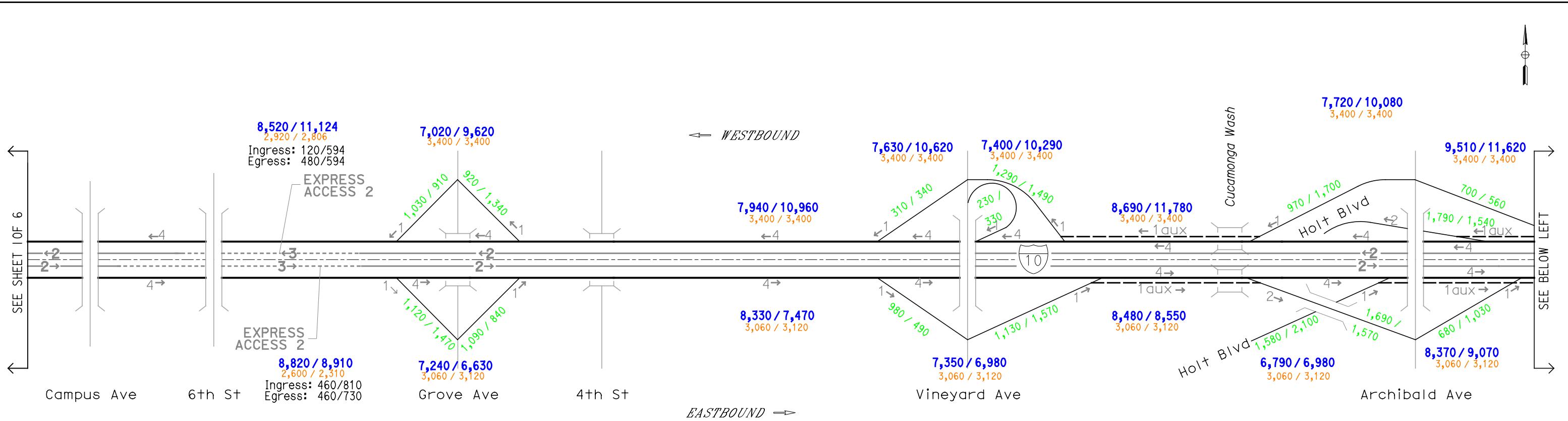


FIGURE 2.6.2  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2045)  
FREWAY TRAFFIC VOLUMES  
AND LANE CONFIGURATION

SHEET 1 OF 6



#### LEGEND

AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES

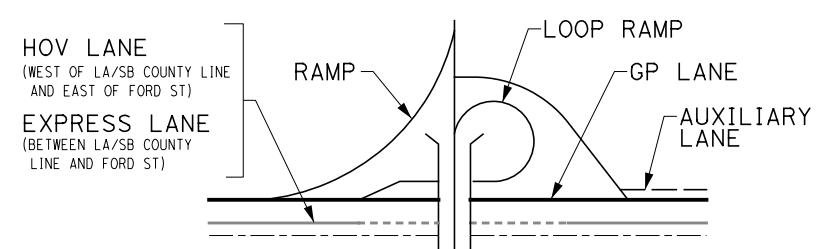
(GP PEAK HOUR TRAFFIC VOLUMES INCLUDE INGRESS AND EGRESS VOLUMES AT INTERMEDIATE ACCESS LOCATIONS FOR THE EXPRESS LANES)

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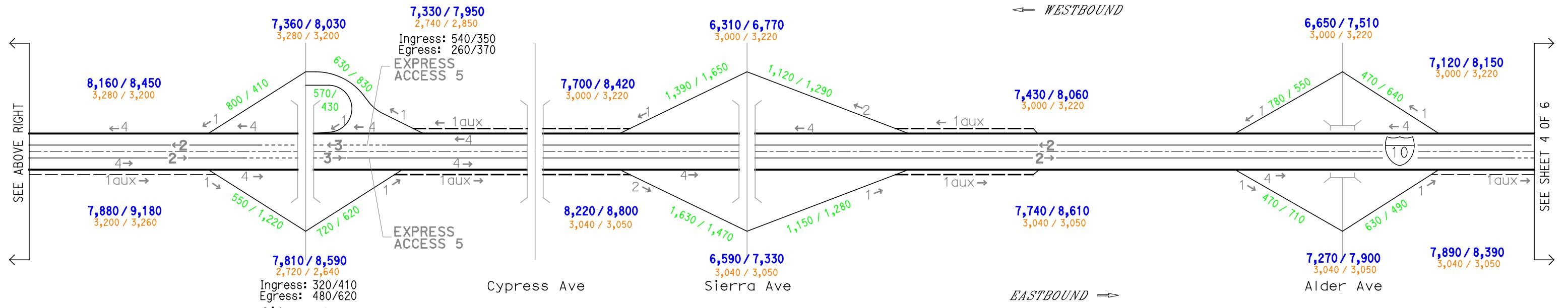
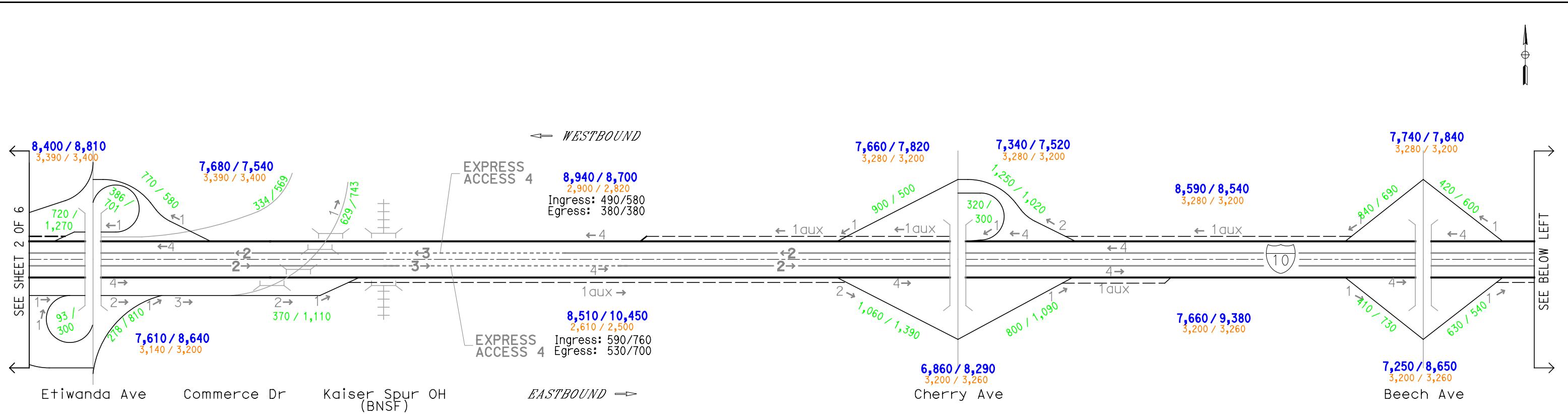
↔ 1 - # OF GP, RAMP OR EXPRESS/HOV LANES

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**FIGURE 2.6.2**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 3 - EXPRESS (YEAR 2045)**  
**FREWAY TRAFFIC VOLUMES AND LANE CONFIGURATION**

SHEET 2 OF 6



## **LEGEND**

AM / PM - GENERAL PURPOSE(GP) PEAK HOUR TRAFFIC VOLUMES

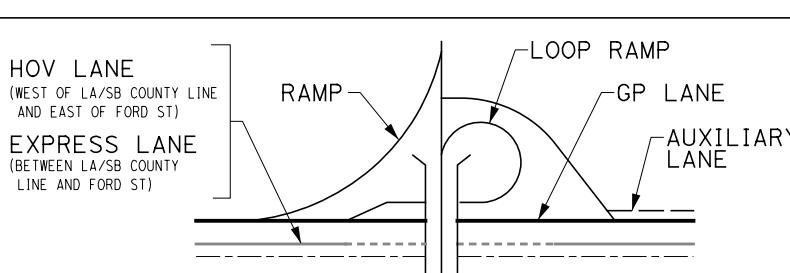
(GP PEAK HOUR TRAFFIC VOLUMES INCLUDE INGRESS AND EGRESS VOLUME AT INTERMEDIATE ACCESS LOCATIONS FOR THE EXPRESS LANES)

## AM / PM - RAMP PEAK HOUR TRAFFIC VOLUMES

AM/PM - HIGH OCCUPANCY VEHICLES(HOV) OR  
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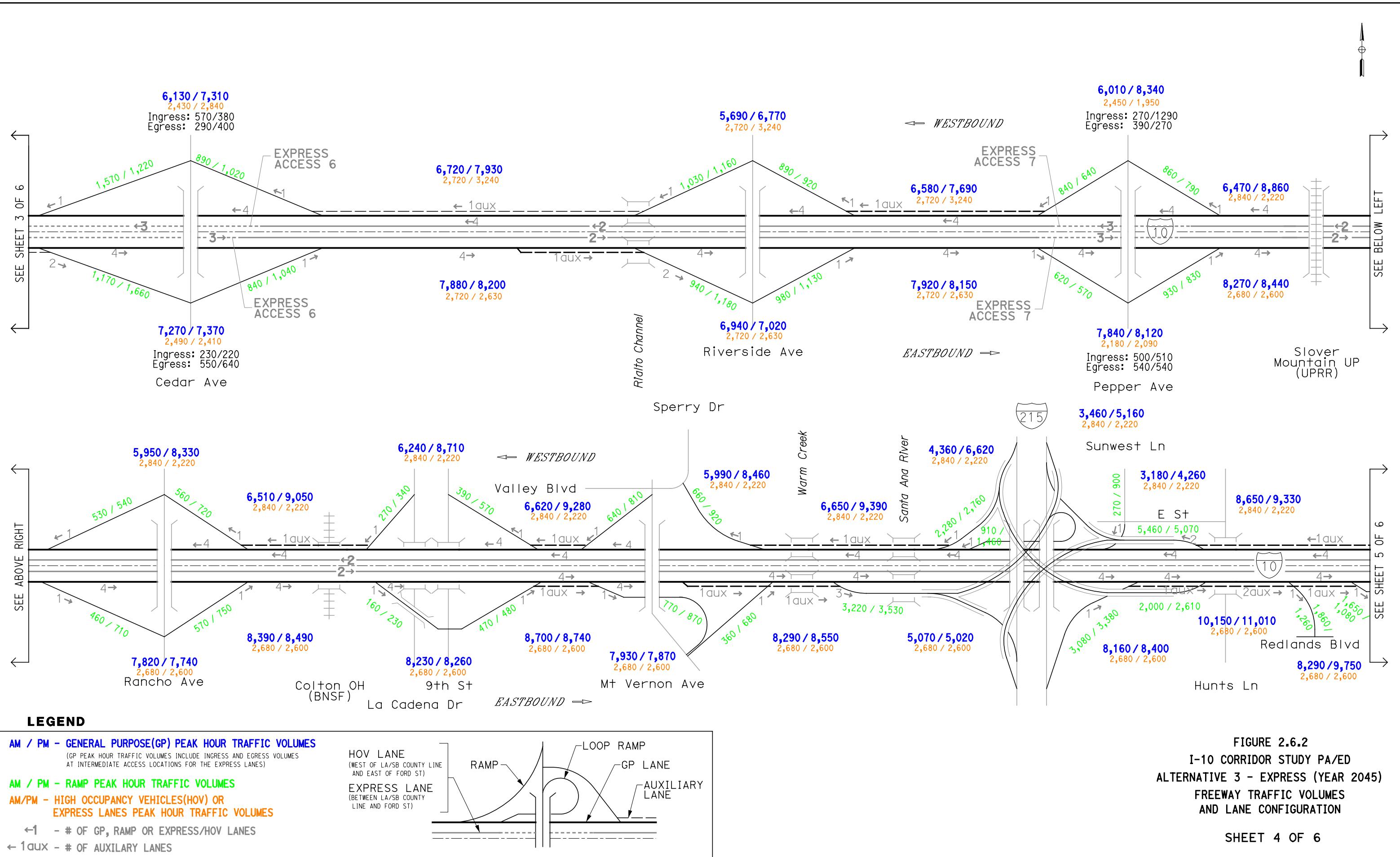
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← 1aux - # OF AUXILIARY LANES



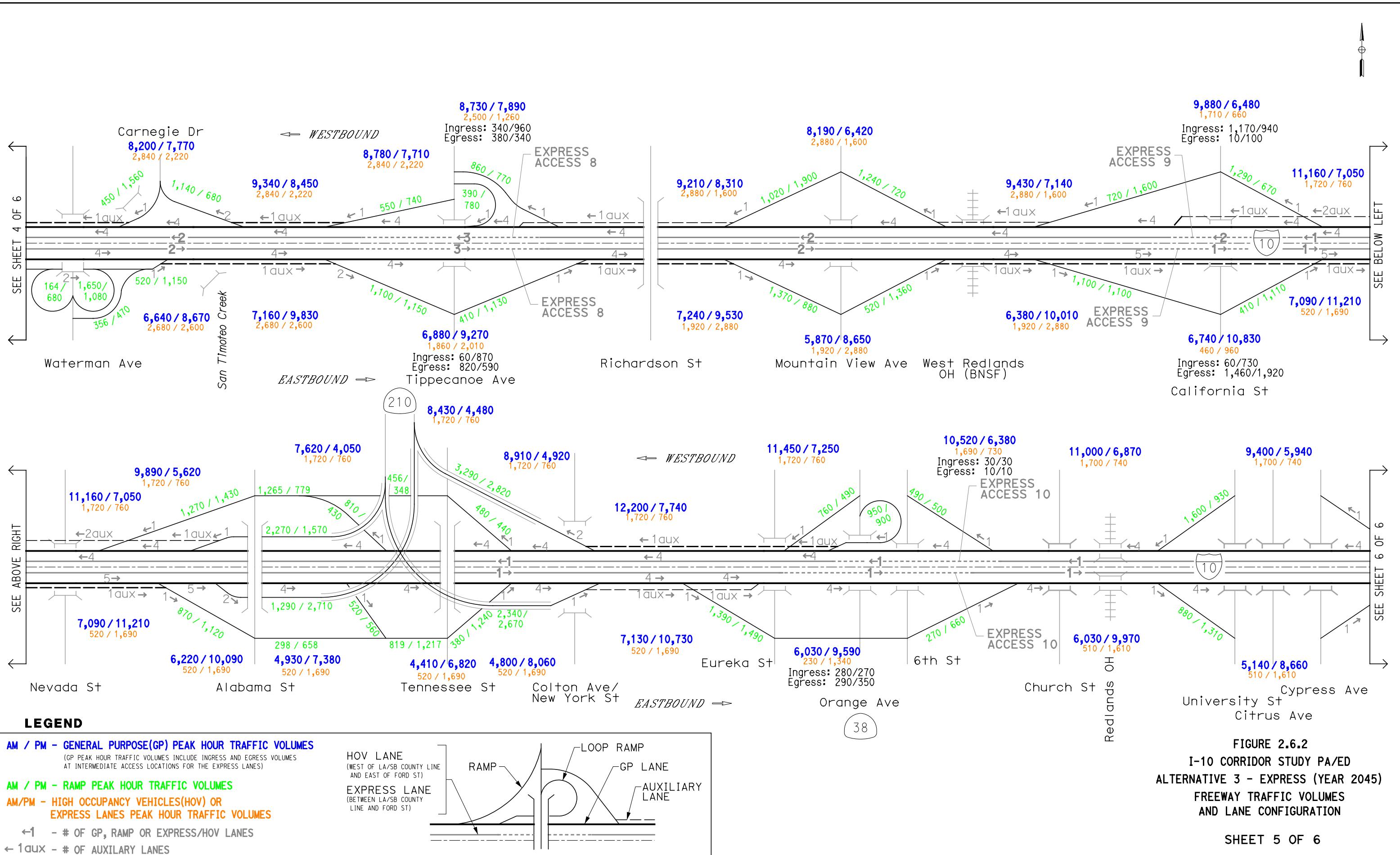
**FIGURE 2.6.2**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 3 - EXPRESS (YEAR 2045)**

SHEET 3 OF 6



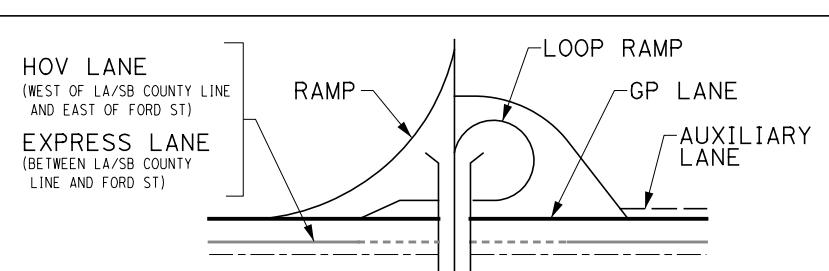
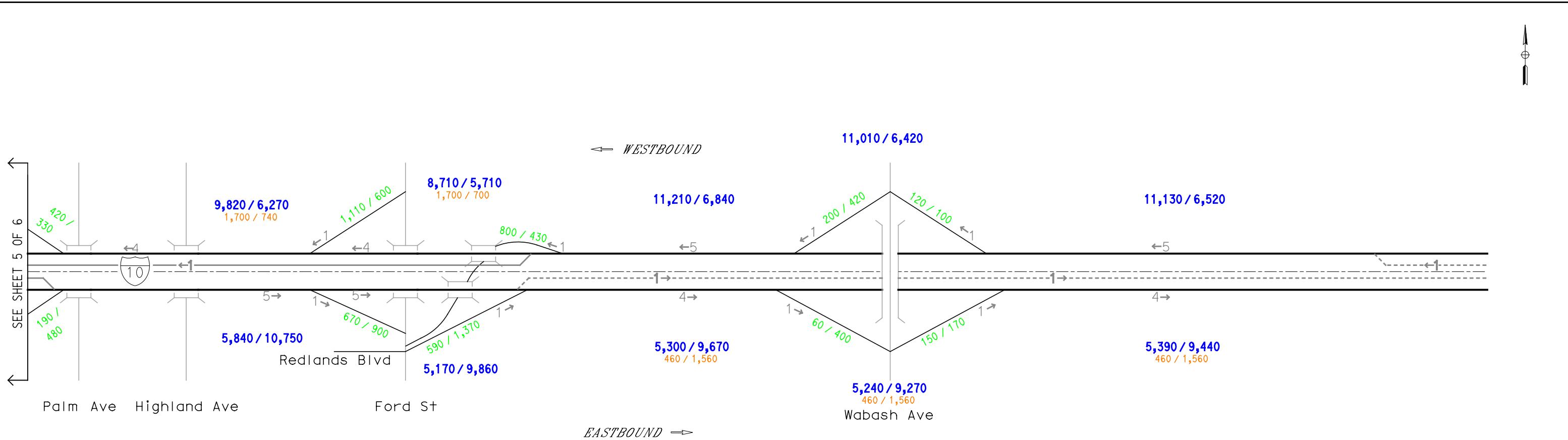
**FIGURE 2.6.2**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 3 - EXPRESS (YEAR 2045)**  
**FREEWAY TRAFFIC VOLUMES**  
**AND LANE CONFIGURATION**

SHEET 4 OF 6



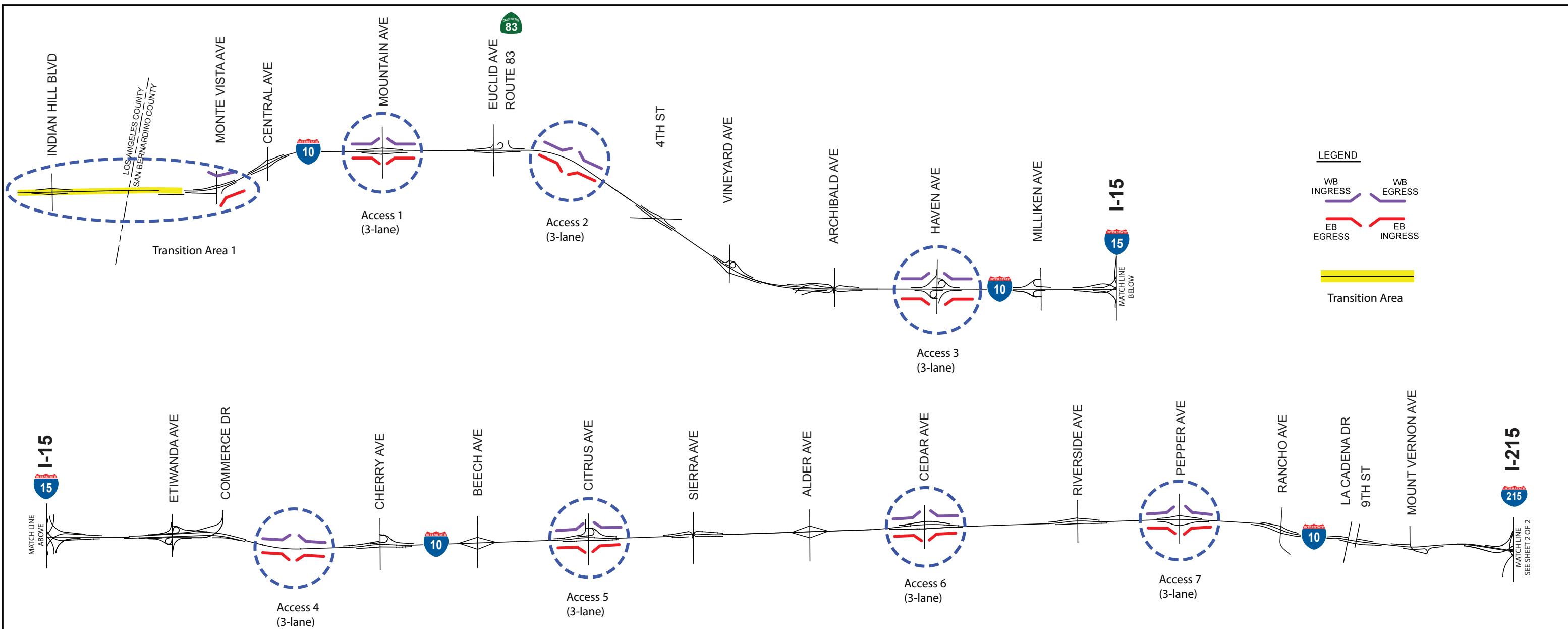
**FIGURE 2.6.2**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 3 - EXPRESS (YEAR 2045)**  
**FREEWAY TRAFFIC VOLUMES**  
**AND LANE CONFIGURATION**

SHEET 5 OF 6



**FIGURE 2.6.2**  
**I-10 CORRIDOR STUDY PA/ED**  
**ALTERNATIVE 3 - EXPRESS (YEAR 2045)**  
**FREWAY TRAFFIC VOLUMES**  
**AND LANE CONFIGURATION**

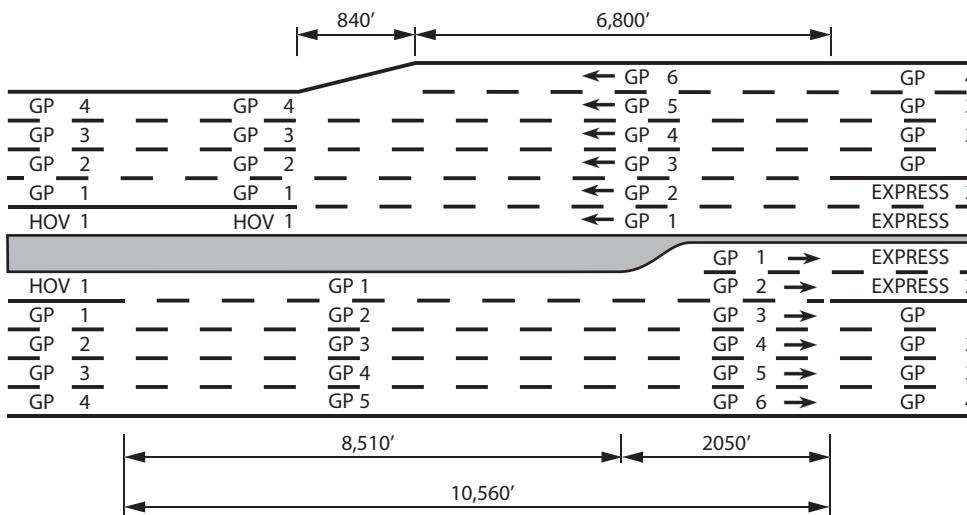
SHEET 6 OF 6



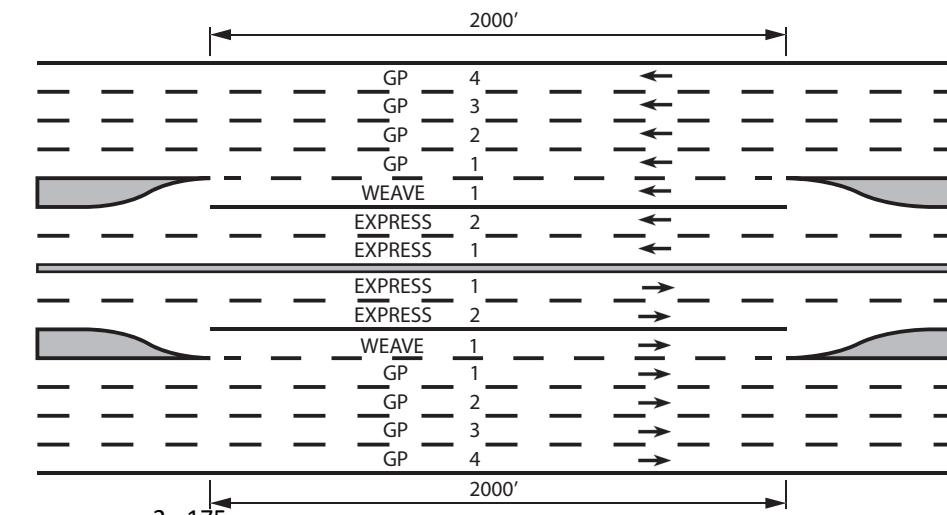
#### NOTES:

1. Some lanes labeled "GP" in this graphic are auxiliary lanes or transition lanes between HOV and Express Lanes. This graphic depicts how the lanes are analyzed in the traffic study.
2. Distance is based on Figure 2G-22 of the California MUTCD 2012 edition.
3. Distance is based on Figure 2G-3 of the California MUTCD 2012 edition.

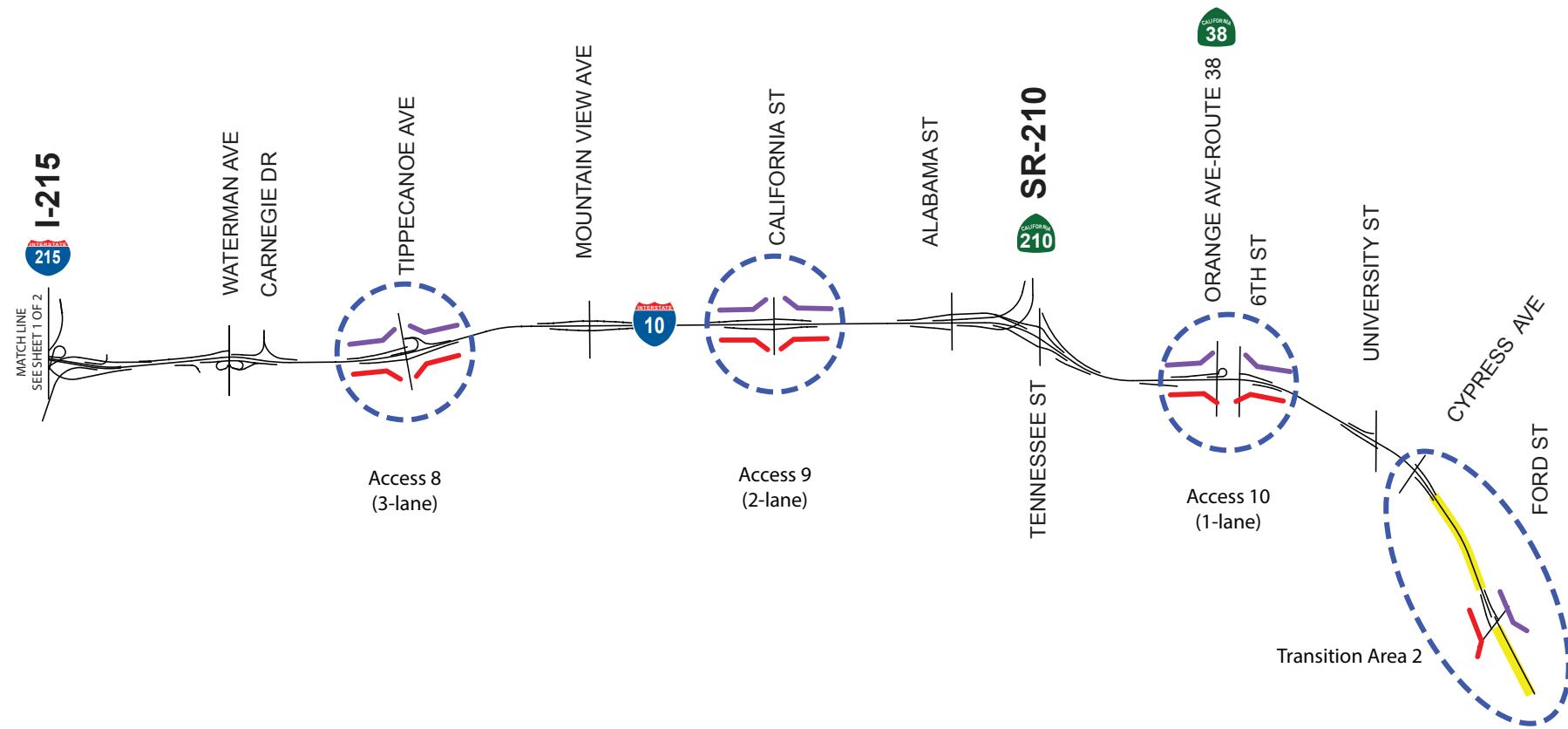
#### Transition Area 1



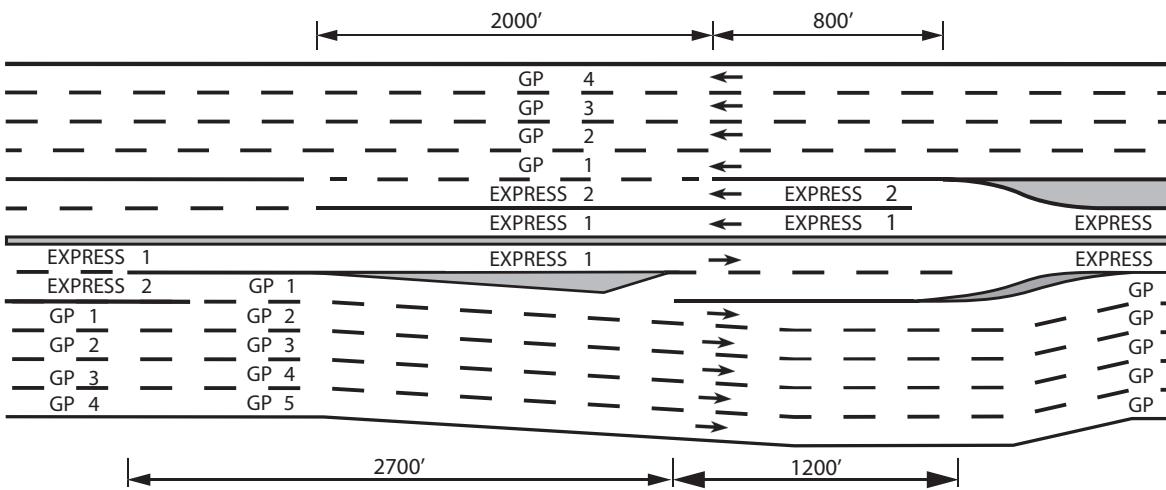
#### 3-Lane Intermediate Access (Access 1 to 8)



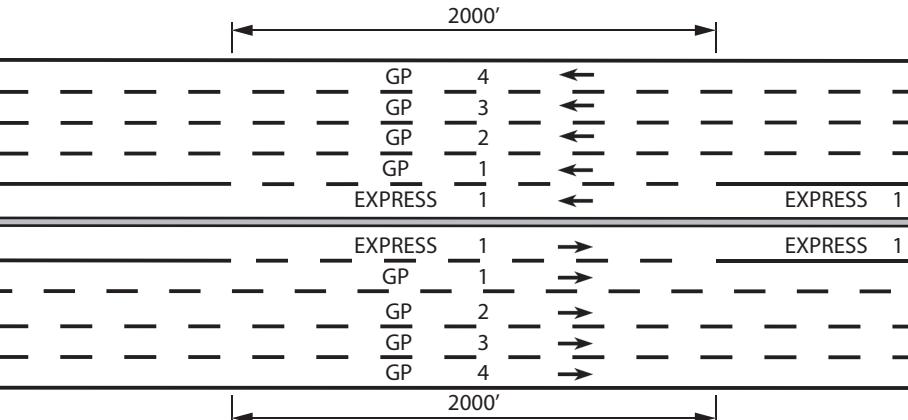
**FIGURE 2.6.3**  
I-10 Corridor Study PA/ED  
Express Lane Access Locations  
and Lane Configurations



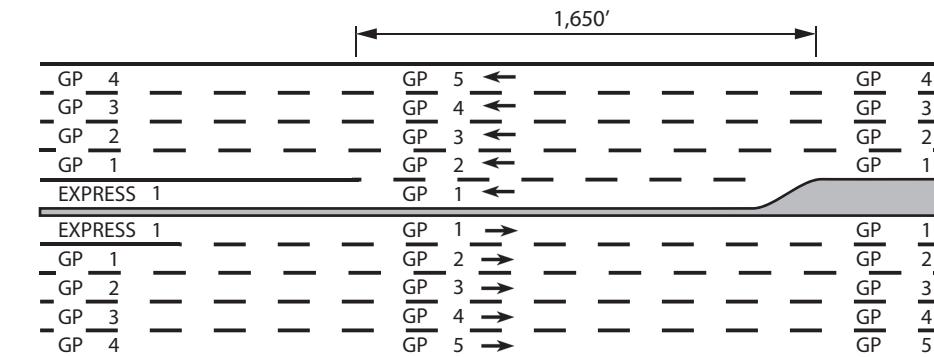
## **2-Lane Intermediate Access (Access 9)**



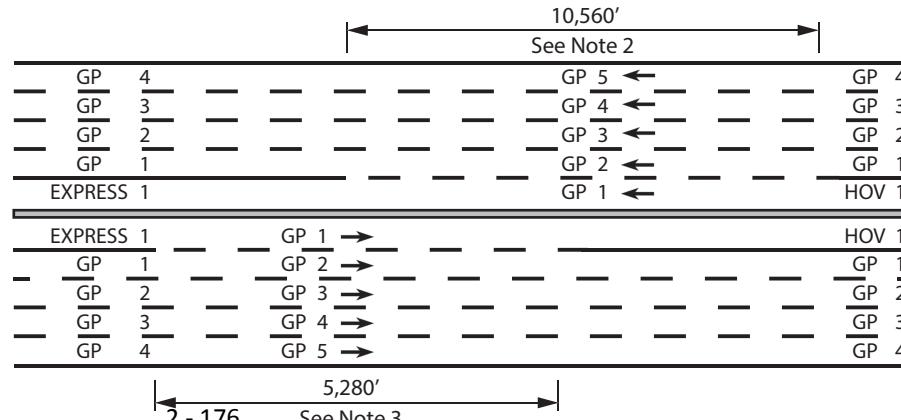
## **1-Lane Intermediate Access (Access 10)**



**Transition Area 2 (Year 2025)**



## **Transition Area 2 (Year 2045)**



## NOTES:

1. Some lanes labeled "GP" in this graphic are auxiliary lanes or transition lanes between HOV and Express Lanes. This graphic depicts how the lanes are analyzed in the traffic study.
  2. Distance is based on Figure 2G-22 of the California MUTCD 2012 edition.
  3. Distance is based on Figure 2G-3 of the California MUTCD 2012 edition.

## **FIGURE 2.6.3**

### I-10 Corridor Study PA/ED Express Lane Access Locations and Lane Configurations

### **3 ARTERIAL AND INTERCHANGE COMPONENT**

This section of the report addresses traffic operations at interchanges along the portion of the I-10 corridor under study. The interchange traffic operations analysis includes analysis of ramp/arterial intersections and specific arterial/arterial intersections in the general study area surrounding the interchanges that may be impacted by the freeway improvements. The analysis also includes queuing analysis at ramp meters and at study intersections, including intersections at the arterial terminus of freeway off ramps. The analysis of intersection operations was conducted for existing conditions, Opening Year (2025) conditions, and Design Year (2045) conditions. Alternative 1 (No Build), Alternative 2 (HOV) and Alternative 3 (Express) are evaluated for both Opening Year (2025) and Design Year (2045) traffic conditions.

The project does not require local interchange improvements to meet the project purpose and need and, therefore, does not include traffic operations analysis for all interchanges. However, due to potential project related traffic impacts at arterial intersections, it is necessary to identify the interchanges that require full detailed traffic operations analysis.

A preliminary analysis of the interchanges was performed to identify interchanges for which full detailed traffic operations analysis is needed. The preliminary analysis consisted, in part, of a comparison of traffic volumes forecast for Alternative 1 (No Build Alternative) and Alternative 3 (Express Lanes Alternative). Alternative 3 adds the most freeway capacity among the build alternatives and has the most extensive project limits. In comparison to Alternative 1 (No Build Alternative), Alternative 3 represents the “worst case” in determining the potential of the build alternatives for significant traffic impacts to the interchanges in the corridor.

There are 33 local interchanges within the limits of the I-10 Corridor Project. The 33 interchanges are listed below. Two of the interchanges (#1 and #2) are in Los Angeles County west of the Express Lane Limits and one (#33) is east of the Express Lanes limits.

1. Towne Avenue
2. Indian Hill Boulevard
3. Monte Vista Avenue
4. Central Avenue
5. Mountain Avenue
6. Euclid Avenue/7<sup>th</sup> Street
7. Grove Avenue/4<sup>th</sup> Street
8. Vineyard Avenue
9. Holt Boulevard/Archibald Avenue
10. Haven Avenue
11. Milliken Avenue
12. Etiwanda Avenue/Commerce Drive
13. Cherry Avenue
14. Beech Avenue (future)
15. Citrus Avenue
16. Sierra Avenue
17. Alder Avenue (future)
18. Cedar Avenue

19. Riverside Avenue
20. Pepper Avenue
21. Rancho Avenue
22. La Cadena Drive/9<sup>th</sup> Street
23. Mt. Vernon Avenue
24. Waterman Avenue/Redlands Boulevard/Hospitality Lane
25. Tippecanoe Avenue
26. Mountain View Avenue
27. California Street
28. Alabama Street
29. Tennessee Street
30. Eureka Street/Orange Avenue/6<sup>th</sup> Street
31. University Street/Cypress Avenue
32. Ford Street
33. Wabash Avenue

An impact criterion has been selected as the determinant of a significant impact. That criterion is an increase in an intersection's volume-to-capacity (v/c) ratio of 0.10 or more from the no-build condition to the build condition when the build condition provides an intersection level of service (LOS) F. (See "Proposed Traffic Operations Methodology for I-10 Corridor Project", May 2013.) The criterion is adapted from the deficiency standard presented in Policy 2.3.1 of the *San Bernardino County Congestion Management Plan 2007 Update* which uses 10 percent degradation as the threshold for determination of a deficiency.

The following discussion describes the preliminary analysis undertaken to determine the potential for project related traffic impacts at the arterial intersection to thereby identify interchanges that require full detailed traffic operations analysis. The preliminary analysis consists of the three steps described below.

**Step 1:** In Step 1, an interchange is identified for full detailed traffic operations analysis if Alternative 3 includes construction affecting an arterial at the interchange in any of the following ways:

- Replacement of an arterial overcrossing or undercrossing;
- Relocation of a ramp/arterial intersection; or
- Widening of an arterial at an interchange.

If Alternative 3 widens ramps at the arterial terminus but does not affect arterial legs of the arterial/ramp intersection, the interchange is not identified for full detailed traffic operations analysis under Step 1. Additional ramp lanes would tend to improve operations; by themselves, they do not represent potential for a significant traffic impact.

If an interchange includes construction that would require a Modified Access Report (MAR), then the MAR requirement for analysis of adjacent interchanges applies. Step 1 identified interchanges that are adjacent to interchanges requiring a MAR for full detailed traffic operations analysis to meet the MAR requirement.

Under Alternative 3, five interchanges include overcrossing or undercrossing replacement and substantial changes in arterial geometry or are an interchange adjacent to one requiring a MAR. These five interchanges will be subject to full detailed traffic operations analysis. Those interchanges are listed below:

- Monte Vista Avenue
- Mountain Avenue
- Euclid Avenue
- Vineyard Avenue
- Tennessee Street

The Euclid Avenue interchange would require a MAR under Alternative 3. The adjacent interchange to the west at Mountain Avenue is consequently identified for full detailed traffic operations analysis. The adjacent interchange to the east, at the time the I-10 project is opened to traffic, will be the Grove Avenue interchange. The Grove Avenue interchange does not currently exist and is currently in the PA&ED phase of project development as a separate project. The Grove Avenue interchange project assumed I-10 improvements. Environmental impacts of the Grove Avenue interchange project will be addressed by the Grove Avenue interchange project, so a full detailed traffic analysis of Grove Avenue interchange is not needed to identify potential environmental impacts to traffic. The traffic study for the Grove Avenue project will be used to meet the Euclid Avenue MAR requirement for traffic operations analysis of the Grove Avenue interchange.

**Step 2:** In Step 2, an interchange is removed from consideration for a full detailed traffic operations analysis if the interchange:

- (1) does not currently exist and is expected to be designed assuming that proposed I-10 improvements are implemented;
- (2) is scheduled in the RTP for improvements to be designed prior to opening of I-10 improvements and assuming that proposed I-10 improvements are implemented; or
- (3) was recently reconstructed and designed assuming I-10 HOV improvements.

Three proposed new interchanges at Grove Avenue, Beech Avenue, and Alder Avenue will not be subject to full detailed traffic operations analysis based on Step 2. One interchange to be reconstructed at Alabama Street will not be subject to full detailed traffic operations analysis based on Step 2. Two recently reconstructed interchanges at Riverside Avenue and Tippecanoe Avenue will not be subject to full detailed traffic operations based on Step 2.

The Grove Avenue interchange project is in the RTP for completion in 2018. The new Grove Avenue interchange will eliminate the I-10/4<sup>th</sup> Street interchange. The PA&ED phase of this project has recently begun and therefore it is assumed that the design of the Grove Avenue interchange would accommodate traffic served by an improved I-10 corridor. If determined necessary because of construction staging requirements, the I-10 Corridor Project may replace the Grove Avenue undercrossing. The I-10 Corridor Project would not include local street improvements; and therefore the Grove Avenue interchange was not included in Step 1.

The Beech Avenue interchange project is in the RTP for completion in 2023. Since the I-10 improvements are currently anticipated to be open to traffic in 2025, it is assumed that the design of the Beech Avenue interchange would accommodate traffic served by an improved I-10 corridor.

The Alder Avenue interchange project is in the RTP for completion in 2030. Since the I-10 improvements are currently anticipated to be open to traffic prior to 2030, it is assumed that the design of the Alder Avenue interchange would accommodate traffic served by an improved I-10 corridor.

The Alabama Street interchange reconstruction project is in the RTP for completion by 2020. Since the I-10 improvements are currently anticipated to be open to traffic in 2025, it is assumed that the design of the Alabama Street interchange would accommodate traffic served by an improved I-10 corridor.

The Riverside Avenue interchange was reconstructed and all roadway improvements were opened to traffic in 2012. The overcrossing bridge was widened to carry nine lanes of traffic including three northbound through lanes, two southbound through lanes, and a dual side-by-side left turn lanes for freeway-bound traffic in both directions. An eastbound auxiliary lane was added to I-10 to accommodate a dual lane off-ramp and a westbound deceleration lane was added on the approach to the westbound off-ramp. The project assumed that HOV lanes would be added to the freeway by 2025.

The Tippecanoe Avenue interchange is currently being reconstructed. The reconstruction includes relocation of the westbound I-10 off-ramp to terminate on Tippecanoe Avenue opposite Harriman Place with a single lane exiting the freeway and four lanes at the Tippecanoe terminus. A two-lane loop ramp will be provided for northbound Tippecanoe traffic to enter I-10 westbound. The existing on-ramp to westbound I-10 will serve only southbound Tippecanoe Avenue and will be widened from two lanes to three lanes upstream of the ramp meter. The existing off-ramp from eastbound I-10 will be widened from a single lane freeway exit to a two-lane exit widening from the existing two lanes to four lanes at the Tippecanoe Avenue terminus. The project includes widening Tippecanoe Avenue north of the I-10 undercrossing bridge to Harriman Place to provide additional northbound turning lanes at the intersection of Tippecanoe Avenue with Harriman Place/westbound I-10 ramps. The lane designations on Tippecanoe Avenue beneath the undercrossing bridge will be changed from two through lanes and one left turn lane in each direction to two northbound through lanes, two southbound through lanes, and two southbound left turn lanes into the eastbound I-10 on-ramp. The project was advanced assuming that HOV lanes would be added to the freeway.

- Step 3:** The remaining 22 interchanges are evaluated in Step 3. Traffic service on arterials is primarily determined by traffic control at signalized and stop-controlled intersections. Significant traffic impacts of the proposed project on arterial roadways will be identified by evaluation of intersections along arterials in the vicinity of interchanges. The criterion by which a significant intersection impact is determined is a LOS F under the build condition with an increase of 0.10 or more in the intersection's v/c ratio, comparing the No Build Alternative to a build alternative.

**Table 3.1.1** shows the maximum increase in volume entering an intersection in the vicinity of each interchange. The increase is determined by a comparison of 2035 SBTAM AM and PM peak hour traffic volumes forecast for Alternative 1 (No Build Alternative) and Alternative 3. Year 2035 volumes are used because interchange volumes will not be post-processed to year 2045 unless an interchange is selected for full detailed traffic operations analysis. The year 2035 volumes are raw SBTAM output volumes. Because the change of an intersection's entering volume does not perfectly correspond to the change in V/C ratio, a conservative factor of 0.08 is used to ensure that intersections with the potential for a significant traffic impact (at the 0.10 level) are identified.

Those intersections with an increase of 50 peak hour vehicles or more should be considered for potential impacts according to the *San Bernardino Congestion Management Plan* (Appendix C pages C-2 and C-3). **Table 3.1.1** identifies those interchanges with an intersection in their vicinity forecast to have such a volume increase. All of the intersections with 50 or more peak hour vehicles have been considered for potential impacts. Those with less than a 0.08 increase in entering volume as described above are found not to have the potential for significant impacts; the others are found to have the potential and their interchanges are included with full detailed traffic operations analysis.

Therefore, a Step 3 finding of the need to conduct a full detailed traffic operations analysis at an interchange is based on the interchange having an:

1. intersection with more than 50 additional peak hour vehicles (No Build compared to Alternative 3); and
2. intersection with a peak hour volume increase factor of 0.08 (8%) or more (No Build compared to Alternative 3).

Based on these two criteria the 5 additional interchanges listed below and in Table 1 are included with full detailed traffic operations analysis. The reasons for each inclusion are summarized in the table. Under Step 3 the interchanges included for full detailed traffic operations analysis are:

- Etiwanda Avenue/Commerce Drive`
- Pepper Avenue
- La Cadena Drive/9<sup>th</sup> Street
- Ford Street
- Wabash Avenue

A total of 10 interchanges are included with full detailed traffic operations analysis: 5 interchanges are recommended based on Step 1 and 5 interchanges are recommended based on Step 3 criterion. These interchanges are as follows:

- Monte Vista Avenue/Palo Verde Street
- Mountain Avenue
- Euclid Avenue/2<sup>nd</sup> Avenue
- Vineyard Avenue
- Etiwanda Avenue/Commerce Drive
- Pepper Avenue
- La Cadena Drive/9<sup>th</sup> Street
- Tennessee Street
- Ford Street
- Wabash Avenue

**Table 3.1.1 Recommendation for a Full Detailed Traffic Operations Analysis**

Interchange	Vehicle Increase	Percent Increase	Recommendation	Reason for Recommendation
Towne Avenue	47	2.0%	No	Neither criterion met.
Indian Hill Boulevard	112	5.2%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
Monte Vista Avenue			Yes	Undercrossing is to be replaced by project.
Central Avenue	21	0.8%	No	Neither criterion met.
Mountain Avenue			Yes	Modified Access Report required at adjacent Euclid Avenue interchange.
Euclid Avenue/7th Street			Yes	Overcrossing is to be replaced by project and interchange is being reconfigured.
Grove Avenue/4th Street			No	Currently in PA&ED phase; Future interchange assumed to accommodate I-10 as improved.
Vineyard Avenue			Yes	Overcrossing is to be replaced by project and interchange is being reconfigured.
Holt Boulevard/Archibald Avenue	-2	-0.1%	No	Neither criterion met.
Haven Avenue	221	5.3%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
Milliken Avenue	52	1.8%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
Etiwanda Avenue/Commerce Drive	340	10.5%	Yes	Both criteria are met.
Cherry Avenue	48	1.8%	No	Neither criterion met.
Beech Avenue (future)			No	Future interchange assumed to accommodate I-10 as improved.
Citrus Avenue	94	3.4%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
Sierra Avenue	109	3.8%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
Alder Avenue (future)			No	Future interchange assumed to accommodate I-10 as improved.
Cedar Avenue	67	2.3%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
Riverside Avenue			No	Interchange reconstructed in 2012 and designed assuming I-10 HOV

**Table 3.1.1 Recommendation for a Full Detailed Traffic Operations Analysis**

Interchange	Vehicle Increase	Percent Increase	Recommendation	Reason for Recommendation
				improvement.
Pepper Avenue	298	16.4%	Yes	Both criteria are met.
Rancho Avenue	137	5.6%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
La Cadena Drive/9th Street	93	9.4%	Yes	Both criteria are met.
Mt Vernon Avenue	122	5.7%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
Waterman Avenue/Redlands Boulevard/Hospitality Lane	94	3.0%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
Tippecanoe Avenue			No	Interchange currently being reconstructed and designed assuming I-10 HOV improvement.
Mountain View Avenue	292	7.7	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
California Street	189	6.3%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
Alabama Street			No	Interchange reconstruction by 2020 assumed to accommodate I-10 as improved.
Tennessee Street			Yes	Overcrossing is to be replaced by project and interchange is being reconfigured.
Eureka Street/Orange Avenue/6th Street	32	5.0%	No	Neither criterion met.
University Street/Citrus Avenue/Cypress Avenue	65	6.6%	No	Percent increase is less than 8%, hence no significant traffic impacts anticipated.
Ford Street	297	25.1%	Yes	Both criteria are met.
Wabash Avenue	168	15.3%	Yes	Both criteria are met.

Notes:

Vehicle increase threshold criterion is 50 peak hour vehicles; the value shown is the highest value for intersections in the vicinity of the interchange.

Percent increase threshold criterion is 8 percent (0.08); the value shown is the highest value for intersections in the vicinity of the interchange.

Recommendation is a Yes/No value indicating whether full detailed traffic operations analysis is recommended. Shaded rows indicate an interchange for which full detailed traffic operations analysis is recommended.

For each interchange, several intersections were analyzed. These are collectively referred to as the "study intersections". There are a total of 39 study intersections. For organizational purpose each study intersection is assigned a unique number. The numbering of the intersections is a three or four digit number such as 351 or 1112. The thousands, hundreds, and tens digits identify the interchange based on its post mile. For example, the post mile for the Euclid Avenue interchange is about 3.5. Therefore, the hundreds and tens digit of the intersections for the Euclid Avenue is 35. The ones digit represents an intersection. For example, for the Euclid Avenue interchange there are six intersections numbered from 351 to 356. Similarly, for the Etiwanda Avenue interchange with a post mile of 11.1, there are eight intersections numbered from 1111 to 1118. In addition to the peak hour traffic volume figures, **Figure 3.3.1** identifies the interchange areas and intersections included in the existing conditions analysis. For each intersection, **Figure 3.3.1** illustrates the existing geometry and intersection control type.

### 3.1 Intersection Analysis Methodology

The following is an overview of the methodologies used in evaluating operations at arterial intersections and arterial/ramp intersections. The methodologies include those utilized to determine intersection levels of service and vehicle queuing, storage evaluation at freeway off-ramp terminals with arterials, and on-ramp metering and vehicle queue storage.

The evaluation of operations at arterial intersections and arterial/ramp intersections are based on the methodologies described in the Highway Capacity Manual (HCM) 2000. As mentioned in **Section 2.0** of this report, HCM 2010 is not used due to unreliable results discovered through conducting intersection analysis. The problems yielding unreliable results are as follows:

- Approach lane configuration with an exclusive lane plus a shared lane (e.g., one exclusive left turn lane and one shared left and through lane) is not currently supported by the HCM 2010 methodology. Therefore, the HCM method does not provide delay and LOS for the intersection.
- A "T" intersection having a side street approach of a single shared left-right turn lane or a single left turn lane and a single right turn lane yields a zero delay for the approach. The HCM method provides a delay and LOS for the intersection but becomes unreliable since the minor approach yields a zero delay. In order for the approach to calculate a delay, the approach must be coded with a thru movement having a zero volume. Adding a through movement at these approaches may result in confusion because analysis geometry will not match the design geometry.
- Only right turns served during a green signal phase should be represented in the right turn volume input to the analysis. The right-turn-on-red volume is a manual input. Continuous right turn volumes cannot be included in the traffic volumes. This segregation and elimination of volumes for the right turns results in inconsistency with the Traffic Volumes Report and reduces the reliability of the HCM analysis using Synchro for signal coordination due to the inconsistent volumes from one intersection to the next.

Due to the problems noted above, application of the HCM 2000 procedures has been approved by Caltrans (see **Appendix A-1**).

### 3.1.1 Intersection Level of Service Analysis Methodology

The following measures of effectiveness were used to evaluate intersection operations under existing, Alternative 1 (No Build), Alternative 2 (HOV) and Alternative 3 (Express) conditions in years 2025 and 2045, as appropriate:

- Intersection LOS
- Intersection V/C ratios
- Average intersection delay and queuing

The 2000 Highway Capacity Manual (HCM) defines Level of Service (LOS) as a qualitative measure that describes operational conditions within a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. The criteria used to evaluate LOS conditions vary based on the type of roadway and whether the traffic flow is considered interrupted or uninterrupted. The intersection LOS was determined using the Synchro version 7.0 software using procedures contained in the HCM. All analyses were completed using appropriate signal system cycle lengths best suited for coordination of interchange traffic signals with adjacent arterial signals.

The LOS for interrupted flow (controlled intersections) is defined in terms of control delay, which is a measure of driver discomfort, frustration, fuel consumption and increased travel time. The LOS is evaluated based on average control delay per vehicle for signalized and unsignalized intersections using HCM methodologies. Control delay is the portion of total delay attributed to the intersection controller (signal, stop or yield). The LOS criteria are provided in **Table 3.1.2**.

Key analysis parameter assumptions are as follows:

- Existing and Future Peak Hour Factor (PHF): Existing PHF is based on existing traffic counts at each intersection.
- Base Saturation Flow Rate: 1,900 vphpl
- Arterial Roadway Truck Percent (%): Existing condition truck percentages for each arterial roadway from existing peak hour classification counts conducted at interchange and arterial intersections. For locations where classification counts are not available, existing condition arterial roadway truck percentages presented in the Traffic Volumes report are utilized. Future truck percentages for each arterial roadway are calculated using the model as presented in the Traffic Volumes Report.

Table 3.1.2 Intersection Level of Service Criteria		
Level of Service	Average Control Delay Per Vehicle (seconds)	
	Type of Intersection Control	
	Signalized	Unsignalized/ STOP Controlled
A (minimal delay)	< 10	< 10
B (short delay)	> 10 and < 20	> 10 and < 15
C (average delay)	> 20 and < 35	> 15 and < 25
D (long delay)	> 35 and < 55	> 25 and < 35
E (very long delay)	> 55 and < 80	> 35 and < 50
F (extreme delay/jammed)	> 80	> 50

*Source: Highway Capacity Manual (2000: Exhibits 16-2 and 17-2*

- **Ramp Truck Percent (%)**: Existing truck percentages for each ramp are based on existing peak hour classification counts conducted at interchange intersections. For locations where classification counts are not available, existing ramp truck percentages are calculated using the model as presented in the Traffic Volumes Report. Future truck percentages for each ramp are calculated using the model as presented in the Traffic Volumes Report.
- **Cycle Lengths**: Cycle lengths are optimized with consideration given to cycle lengths used up to 130 seconds, but shorter cycle lengths will be preferred with long cycle lengths used only for the most congested condition.
- **Signal Coordination**: Signal coordination is considered as necessary.
- **Signal Timing Inputs**:
 

Minimum Split:	Minimum split phase time is 10 seconds for turning lanes and for through lanes at intersections without crosswalks. Minimum split phase time with pedestrians in consideration is calculated using a walk speed of 3.5 feet per second and the length of the crosswalk.
Lost Time:	Lost time, which HCM 2000 (page 10-12) defines as yellow clearance, all red clearance and start-up lost time.
Yellow Clearance:	Yellow clearance duration is determined by speed as shown in <b>Table 3.1.3</b> (extracted from Table 4D-102 (CA) in the California MUTCD (2012 edition)).
All Red Clearance:	All red clearance is 0.5 seconds.
Start-up Lost Time:	Start-up lost time is 2 seconds.

#### Significant Impact Criteria

A criterion of an increase of 0.10 or more in the overall v/c ratios is used to identify potential significant traffic impacts of the project to the study intersections. This criterion is applied to intersections that are operating at LOS F during the peak hours. This assessment compares the Opening Year (2025) and Design Year (2045) overall v/c ratios for study intersections under Alternative 1 (No Build) with Alternative 2 (HOV) and Alternative 3 (Express) traffic. Mitigations are developed for locations that meet or exceed the significant impact threshold.

Table 3.1.3 Minimum Yellow Change Interval Timing	
Posted Speed (mph)	Minimum Yellow Interval (seconds)
25 or less	3.0
30	3.2
35	3.6
40	3.9
45	4.3
50	4.7
55	5.0
60	5.4
65	5.8

Source: Table 4D-102 (CA) California MUTCD (2012 edition)

### 3.1.2 Queuing at Arterial Roadways and Freeway Off-Ramps Analysis Methodology

The 95<sup>th</sup> percentile queue lengths were investigated to determine the adequacy of storage to accommodate expected queues of vehicles. Queues were evaluated on the arterial roadways and freeway off-ramps for Existing (Year 2012), Alternative 1 (No Build), Alternative 2 (HOV), and Alternative 3 (Express) conditions. The queuing analysis was conducted using Synchro. The 95<sup>th</sup> percentile queue length reported by Synchro is the average within a lane group. For example, if an intersection approach has dual left-turn lanes, Synchro calculates the total queue for left turning vehicles and then divides by 2, the number of lanes. It should be noted that if the resulting 95<sup>th</sup> percentile queue is between 0 and 25 feet, the queue is rounded to 25 feet. The 95<sup>th</sup> percentile queue is then compared to the available storage in the lane group. In the case where multiple lanes exist in the lane group the 95<sup>th</sup> percentile queue is compared to the average storage length in the lane group.

For off-ramp locations where the 95<sup>th</sup> percentile queue exceeds the available storage length, resulting in vehicle spill backs and storage blockage between lane groups, the maximum total queue of the off-ramp is calculated and compared to the length of the ramp. The maximum total queue is calculated only for year 2045 because 2045 traffic volumes are generally greater than those of 2025 and, therefore, its queues are generally longer and represent a worst case condition. The maximum total queue of the off-ramp is calculated by adding the queues from the blocked movements to the longest queue reported. The blocked queue is calculated by determining the portion of the queue that is able to utilize the blocked lanes prior to the lanes being blocked based on the ratio of the pocket length to the longest queue reported.

For example, the maximum total queue for the I-10 eastbound off-ramp to Mountain Avenue under existing conditions is calculated as follows:

Eastbound Left Turn Lane: 300 feet of storage length with a 95<sup>th</sup> percentile queue of 212 feet  
Eastbound Left/Through Lane: 980 feet of storage length with a 95<sup>th</sup> percentile queue of 212 feet  
Eastbound Right Turn Lane: 300 feet of storage length with a 95<sup>th</sup> percentile queue of 466 feet

Based on the 95<sup>th</sup> percentile queue, the eastbound right turn queue exceeds the 300 feet of storage resulting in a storage blockage for the left turn lane and the shared left/through lane. The calculation assumes that a portion of the vehicles using the left turn lane and shared left/through lane is able to enter these two lanes prior to the right turn vehicles blocking entry to those two lanes. The portion of the queue in each of the two lanes that is able to enter the two lanes prior to being blocked is calculated by taking the ratio of the pocket length to the longest queue, 300/466. The portion of the queues in the two lanes that is able to enter the lanes without being blocked is then subtracted from the total queue for the two blocked movements to determine the amount of queue that will be blocked due to the right turn queue exceeding the available storage length. As shown below, the amount of blocked queue is added to the longest queue of 466 feet resulting in maximum total queue of 617 feet.

$$\text{Maximum Total Queue} = 466 \text{ feet} + \{(212 \text{ feet} + 212 \text{ feet}) - [(212 * (300/466)) + 212 * (300/466)]\} = 617 \text{ feet}$$

The existing condition turn pocket storage lengths and distances between arterial intersections were measured. Under no build traffic conditions, information from committed projects within the study area was used to determine turn pocket storage lengths as well as any other geometric changes that would impact operations and queue lengths. Under the project build conditions, lane geometrics, storage lengths and intersection distances are based on and measured from the engineered drawings.

### **3.1.3 Freeway On-Ramp Metering Vehicle Storage Evaluation Analysis Methodology**

Ramp metering analysis was conducted to determine the potential of queues at ramp meters to back across upstream arterial intersections and disrupt arterial roadway operations. Using the methodology provided in the *Caltrans Ramp Meter Design Manual (January 2000)* augmented by a conservative assumption that platoons arrive at the meter instantaneously, proposed ramp storage capacity was compared to the highest 2045 peak hour storage demand for each on-ramp. Platoons are assumed to be constituted by an upstream traffic signal (such as the signal at the ramp entrance) discharging a single platoon into the on-ramp once each cycle. The vehicles to be stored on the ramp are related to the on-ramp volume, the cycle length at the principal intersection feeding the on-ramp, and the discharge rate/cycle length of the ramp meter. Caltrans typically uses ramp metering discharge rates in the range of 240 vehicles per hour per ramp lane on the low end to as much as 900 vehicles per hour per ramp lane on the high end, and adjusts the rate between these values based on varying traffic conditions on the freeway and the on-ramp.

Ramp meter queuing analysis was conducted only for year 2045 because 2045 traffic volumes are generally greater than 2025 volumes and, therefore, its meter queues are generally longer and represent a worst case condition. Ramp meter queuing analysis is conducted for on-ramps within the project limits at study interchanges under build alternatives. Since the western project limit of Alternative 2 is Haven Avenue, no ramp meter analysis was completed for on-ramps west of Haven Avenue under Alternative 2. Under Alternative 3 ramp meter queuing analysis was conducted for all on-ramps at study interchanges, except for the Wabash Avenue interchange, which is east of the proposed Alternative 3 lane additions.

Ramp metering analysis was limited to the build alternatives. Peak hour ramp meter queuing analysis was not conducted for Alternative 1 (No Build) because the purpose of the ramp queuing analysis is to determine if the ramps that may be reconstructed as part of a build alternative are anticipated to provide sufficient storage on the ramp.

## 3.2 Intersection Traffic Volumes

This section presents the methodology used to develop existing and future traffic volumes for the I-10 Corridor Project arterial intersections. Traffic volumes were developed for the following alternatives:

- Existing Traffic Conditions – Year 2012
- Opening Year 2025 Alternative 1 – No Build
- Opening Year 2025 Alternative 2 – HOV Lanes
- Opening Year 2025 Alternative 3 – Express Lanes
- Design Year 2045 Alternative 1 – No Build
- Design Year 2045 Alternative 2 – HOV Lanes
- Design Year 2045 Alternative 3 – Express Lanes

Arterial intersection traffic volumes are based on existing and projected volumes from the “*I-10 Corridor Study – PA/ED HOV and Express Lanes Traffic Volumes Report*” prepared by Iteris in January 2014 (Traffic Volumes Report). A summary of the methodology is provided below and in **Section 2.2** of this report. **Appendix A-2** includes the “*I-10 Corridor Study – PA/ED HOV and Express Lanes Traffic Volumes Report*” prepared by Iteris in January 2014.

### 3.2.1 Existing (Year 2012) Intersection Traffic Volumes

To establish existing traffic conditions, AM and PM peak hour turning movement counts were collected at all study intersections. A complete discussion relative to the collection of existing traffic volumes can be found in **Section 2.2** and the Traffic Volumes Report (**Appendix A-2**). The existing conditions intersection traffic volumes are presented in **Figure 3.2.1**.

As part of the data gathering effort, a vehicle classification count was conducted at several of the study area intersections. At locations without vehicle classification data the traffic analysis was supplemented with heavy vehicle percentage data from the base year SBTAM. Using the combined information, heavy vehicle percentages were computed for each arterial at the analyzed intersections. For an arterial/arterial intersection an individual heavy vehicle percentage was developed for each arterial. In the case where an arterial’s opposing approaches offered vastly different characteristics, separate heavy vehicle percentages were used.

For an arterial/ramp intersection, existing heavy vehicle percentages for each ramp are based on existing peak hour classification counts conducted at interchange intersections. For locations where classification counts are not available, existing heavy vehicle percentages are calculated using SBTAM as presented in the Traffic Volumes Report.

Arterial heavy vehicle percentages used in the existing conditions analysis can be found in Appendix E of the Traffic Volumes Report.

### 3.2.2 Future Years Intersection Traffic Volumes

The future year 2025 and 2045 traffic volumes for the project area intersections were developed using projections from SBTAM. A complete discussion relative to SBTAM and the methodologies for

producing the project intersection peak hour forecasts can be found in **Section 2.2** and the Traffic Volumes Report (**Appendix A-2**).

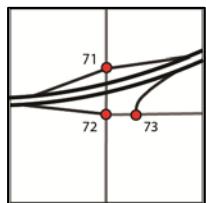
Similar to existing conditions, individual arterial and off-ramp heavy vehicle percentages were used for the traffic analysis. As with intersections without vehicle classification counts in the existing conditions analysis, heavy vehicle percentage forecasts were utilized from the Traffic Volumes Report developed using SBTAM. For an arterial/arterial intersection an individual heavy vehicle percentage was developed for each arterial. In the case where an arterial's opposing approaches offered vastly different characteristics, separate heavy vehicle percentages were used. Likewise for each off-ramp, separate heavy vehicle percentages were developed using the SBTAM as presented in the Traffic Volumes Report. Arterial heavy vehicle percentages used in the forecast year conditions analysis can be found in Appendix E of the Traffic Volumes Report.

### 3.3 Existing (Year 2012) Conditions Analysis

Level-of-service (LOS) analyses, volume-to-capacity (v/c) calculations and queue analysis were conducted for the arterial/ramp intersections and other key arterial intersections within each interchange area for Existing (Year 2012) traffic conditions. The analyses are based on year 2012 peak hour volumes and year 2012 intersection traffic control and lane configuration. A detailed discussion of the methodology to develop Existing (Year 2012) peak hour traffic volumes is presented in [Section 3.2](#).

The results of these analyses are presented in the following sections by interchange. Summary tables of LOS, v/c, average delay and the queuing analysis are included in each interchange section. The analysis worksheets for each intersection can be found in [Appendix F-1](#).

#### 3.3.1 Monte Vista Avenue Interchange Analysis



The study intersections in the traffic analysis for the I-10/Monte Vista Avenue interchange area include:

- #71 - I-10 Westbound Ramps & Monte Vista Avenue
- #72 - I-10 Eastbound Off-Ramp/Palo Verde Street & Monte Vista Avenue
- #73 - Palo Verde Street & I-10 Eastbound On-Ramp

All three study intersections are currently signalized. The existing intersection peak hour volumes and lane geometry are shown in [Figure 3.3.1](#) and [Figure 3.3.2](#), respectively.

The existing condition LOS analysis indicates that the intersection of I-10 Eastbound Off-Ramp/Palo Verde Street & Monte Vista Avenue operates at LOS D during the PM peak hour. All other Monte Vista Avenue interchange area study intersections currently operate at LOS C or better during the peak hours. A summary of LOS, v/c and average vehicle delay for AM and PM peak hours is provided in [Table 3.3.1](#).

Table 3.3.1: Monte Vista Avenue Interchange Existing (2012) Intersection Levels of Service – AM/PM Peak Hours									
Intersection Number	Location		Traffic Control	Existing (2012) Level of Service					
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour		
				v/c	Avg. Delay (sec)	LOS	v/c	Avg. Delay (sec)	
71	I-10 WB Ramps	Monte Vista Ave	Sig	0.83	25.3	C	0.77	22.3	
72	I-10 EB Off-Ramp/Palo Verde St	Monte Vista Ave	Sig	0.83	31.7	C	1.00	45.8	
73	Palo Verde St	I-10 EB On-Ramp	Sig	0.36	10.7	B	0.37	13.0	

The queuing analysis for the arterial intersection approaches and available storage for each movement are presented in [Table 3.3.2](#). In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements exceed the available storage under existing conditions:

- Northbound left turn at I-10 WB Ramp & Monte Vista Ave (PM Peak Hour)
- Southbound left turn at I-10 EB Off-Ramp/Palo Verde St & Monte Vista Ave (AM and PM Peak Hours)

Table 3.3.2: Monte Vista Avenue Interchange Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
71	I-10 WB Ramp & Monte Vista Ave	Sig	NBL	100	38	Yes	244	<u>No</u>
			NBT	340	127	Yes	135	Yes
			SBT	810	301	Yes	317	Yes
			SBR	810	50	Yes	66	Yes
72	I-10 EB Off-Ramp/Palo Verde St & Monte Vista Ave	Sig	NBT	700	252	Yes	236	Yes
			NBR	140	97	Yes	82	Yes
			SBL	100	218	<u>No</u>	408	<u>No</u>
			SBT	340	106	Yes	207	Yes
			WBL	225	77	Yes	141	Yes
			WBR	225	175	Yes	0	Yes
73	Palo Verde St & I-10 EB On-Ramp	Sig	EBL	150	27	Yes	30	Yes
			EBT	225	0	Yes	0	Yes
			WBTR	930	110	Yes	140	Yes

Peak hour vehicle queues for freeway off-ramps at the Monte Vista Avenue interchange are summarized in **Table 3.3.3**. As shown in the table, the 95<sup>th</sup> percentile queue for the westbound right turn movement at the westbound off-ramp to Monte Vista Avenue exceeds the available storage during the evening peak hour under existing conditions. The 95<sup>th</sup> percentile queue for this movement is 151 feet per lane during the evening peak hour with an average available storage length of 123 feet per lane.

Table 3.3.3: Monte Vista Avenue Interchange Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
71	I-10 WB Ramp & Monte Vista Ave	Traffic Signal	WBL	875	302	Yes	348	Yes
			WBR	123 <sup>1</sup>	115	Yes	151	<u>No</u>
72	I-10 EB Off-Ramp/Palo Verde St & Monte Vista Ave	Traffic Signal	EBL	690	276	Yes	529	Yes
			EBTR	1,550	264	Yes	317	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 85' and 2<sup>nd</sup> storage lane is 160'. The average available storage is 123 feet per lane.

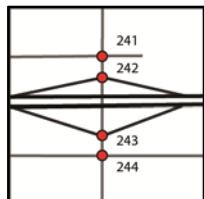
Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

The 95<sup>th</sup> percentile queue for the westbound left turn movement at the westbound off-ramp to Monte Vista Avenue is 302 feet during the morning peak hour and 348 feet for the evening peak hour. The available storage length for this movement accommodates the 95<sup>th</sup> percentile queue for both peak hours. However, the queues for both the morning and evening peak hours are longer than the 160 feet

right turn lane resulting in storage blockage for the westbound right turn movement. Under this condition, the estimated longest queue is approximately 511 feet. The length of the ramp from the stop bar to the gore point is approximately 875 feet, leaving approximately 364 feet from the back of the queue to the gore point.

### 3.3.2 Mountain Avenue Interchange Analysis

The study intersections in the traffic analysis for the I-10/Mountain Avenue Interchange area include:



- #241 - 7<sup>th</sup> Street/Shopping Center & Mountain Avenue
- #242 - I-10 Westbound Ramps & Mountain Avenue
- #243 - I-10 Eastbound Ramps & Mountain Avenue
- #244 - 6<sup>th</sup> Street & Mountain Avenue

All four study intersections are currently signalized. The existing intersection peak hour volumes and lane geometry are shown in [Figure 3.3.1](#) and [Figure 3.3.2](#), respectively. The existing condition LOS analysis indicates all Mountain Avenue interchange area study intersections currently operate at LOS C or better during the peak hours. A summary of LOS, v/c and average vehicle delay for AM and PM peak hours is provided in [Table 3.3.4](#).

**Table 3.3.4: Mountain Avenue Interchange**  
**Existing (2012) Intersection Levels of Service – AM/PM Peak Hours**

Intersection Number	Location		Traffic Control	Existing (Year 2012) Level of Service					
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour		
				v/c	Avg. Delay (sec)	LOS	v/c	Avg. Delay (sec)	
241	7 <sup>th</sup> St/Shopping Center	Mountain Ave	Sig	0.56	16.5	B	0.79	26.4	
242	I-10 WB Ramp	Mountain Ave	Sig	0.70	20.0	C	0.79	25.3	
243	I-10 EB Ramp	Mountain Ave	Sig	0.57	16.2	B	0.78	29.1	
244	6th St	Mountain Ave	Sig	0.65	18.7	B	0.71	21.7	

The queuing analysis for the arterial intersection approaches and available storage for each movement are presented in [Table 3.3.5](#). In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements exceed the available storage under existing conditions:

- Eastbound left turn at 7<sup>th</sup> Street/Shopping Center & Mountain Ave (PM Peak Hour)
- Northbound through at I-10 WB Ramp & Mountain Ave (PM Peak Hour)
- Southbound through at I-10 EB Ramp & Mountain Ave (PM Peak Hour)

Peak hour vehicle queues for freeway off-ramps at the Mountain Avenue interchange are summarized in [Table 3.3.6](#). As shown in the table, the 95<sup>th</sup> percentile queue for the eastbound right turn movement at the eastbound off-ramp to Mountain Avenue exceeds the available storage during the evening peak hour under existing conditions. The 95<sup>th</sup> percentile queue for this movement is 466 feet during the evening peak hour with an available storage length of 300 feet. Since the storage length does not accommodate the 95<sup>th</sup> percentile queue, the eastbound right turn vehicles currently stack on the ramp body resulting in a storage blockage for the eastbound left turn vehicles. Under this condition, the

estimated longest queue is approximately 617 feet. The length of the ramp from the stop bar to the gore point is approximately 930 feet, leaving approximately 313 feet from the back of the queue to the gore point.

Table 3.3.5: Mountain Avenue Interchange Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
241	7 <sup>th</sup> St/Shopping Center & Mountain Ave	Sig	NBL	230	74	Yes	227	Yes
			NBT	290	272	Yes	190	Yes
			NBR	290	25	Yes	25	Yes
			SBL	200	25	Yes	25	Yes
			SBTR	670	230	Yes	380	Yes
			EBL	150	82	Yes	227	<u>No</u>
			EBT	660	47	Yes	100	Yes
			EBR	660	84	Yes	66	Yes
			WBL	100	65	Yes	83	Yes
			WBLTR	100	65	Yes	85	Yes
242	I-10 WB Ramp & Mountain Ave	Sig	NBL	240	186	Yes	185	Yes
			NBT	240	173	Yes	291	<u>No</u>
			SBT	290	83	Yes	71	Yes
			SBR	290	84	Yes	25	Yes
243	I-10 EB Ramp & Mountain Ave	Sig	NBT	305 <sup>1</sup>	113	Yes	177	Yes
			NBR	510	37	Yes	61	Yes
			SBL	240	178	Yes	234	Yes
			SBT	240	191	Yes	313	<u>No</u>
244	6th St & Mountain Ave	Sig	NBL	100	25	Yes	34	Yes
			NBTR	590	468	Yes	424	Yes
			SBL	200	39	Yes	75	Yes
			SBT	510	91	Yes	205	Yes
			SBR	510	25	Yes	25	Yes
			EBL	100	68	Yes	96	Yes
			EBTR	213	70	Yes	108	Yes
			WBL	200	142	Yes	139	Yes
			WBTR	575	55	Yes	66	Yes

<sup>1</sup> 2 through lanes with storage lengths of 100' and 2 through lanes with storage lengths of 510' each lane. The average available storage is 305 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

**Table 3.3.6: Mountain Avenue Interchange**  
**Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

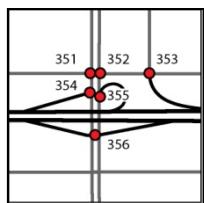
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
242	I-10 WB Ramp & Mountain Ave	Traffic Signal	WBL	375	187	Yes	294	Yes
			WBLT	980	188	Yes	303	Yes
			WBR	305 <sup>1</sup>	138	Yes	222	Yes
243	I-10 EB Ramp & Mountain Ave	Traffic Signal	EBL	300	158	Yes	212	Yes
			EBLT	930	158	Yes	212	Yes
			EBR	300	186	Yes	466	No

<sup>1</sup> 1<sup>st</sup> storage lane is 235' and 2<sup>nd</sup> storage lane is 375'. The average available storage is 305 feet per lanes.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

### 3.3.3 Euclid Avenue Interchange Analysis

The study intersections in the traffic analysis for the I-10/Euclid Avenue interchange area include:



- #351 - 7<sup>th</sup> Street & Southbound Euclid Avenue
- #352 - 7<sup>th</sup> Street & Northbound Euclid Avenue
- #353 - 7<sup>th</sup> Street & I-10 Westbound Off-Ramp/2<sup>nd</sup> Avenue
- #354 - I-10 Westbound On-Ramp & Southbound Euclid Avenue
- #355 - I-10 Westbound On-Ramp & Northbound Euclid Avenue
- #356 - I-10 Eastbound Ramps & Euclid Avenue

Except for the westbound on-ramps (uncontrolled) and westbound off-ramp (all-way stop controlled), all study intersections are currently signalized. The existing intersection peak hour volumes and lane geometry are shown in [Figure 3.3.1](#) and [Figure 3.3.2](#), respectively.

The existing condition LOS analysis indicates that the intersection of the I-10 Eastbound Ramps & Euclid Avenue operates at LOS D during both AM and PM peak hours. All other Euclid Avenue interchange study intersections currently operate at LOS C or better during the peak hours. A summary of LOS, v/c and average vehicle delay for AM and PM peak hours is provided in [Table 3.3.7](#).

The queuing analysis for the arterial intersection approaches and available storage for each movement are presented in [Table 3.3.8](#). In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements exceed the available storage under existing conditions:

- Westbound left turn at 7<sup>th</sup> St & Southbound Euclid Ave (AM and PM Peak Hours)
- Westbound through at 7<sup>th</sup> St & Southbound Euclid Ave (AM and PM Peak Hours)
- Northbound right turn at I-10 EB Ramp & Euclid Ave (AM and PM Peak Hours)
- Southbound left turn at I-10 EB Ramp & Euclid Ave (AM and PM Peak Hours)

Queuing analysis for the I-10 WB on-ramp from SB Euclid and NB Euclid were not conducted since there are no conflicting movements at these locations.

Table 3.3.7: Euclid Avenue Interchange Existing (2012) Intersection Levels of Service – AM/PM Peak Hours									
Intersection Number	Location		Traffic Control	Existing (Year 2012) Level of Service					
	East/West Street	North/South Street		AM Peak Hour		PM Peak Hour			
				v/c	Avg. Delay (sec)	LOS	v/c	Avg. Delay (sec)	
351	7 <sup>th</sup> St	SB Euclid Ave	Sig	0.74	18.1	B	0.73	20.6	
352	7 <sup>th</sup> St	NB Euclid Ave	Sig	0.52	10.3	B	0.66	13.8	
353	7 <sup>th</sup> St	I-10 WB Off-Ramp/ 2nd Ave	AWS	0.43	13.7	B	0.57	20.9	
354	I-10 WB On-Ramp	SB Euclid Ave	UC <sup>1</sup>	0.43	--	--	0.37	--	
355	I-10 WB On-Ramp	NB Euclid Ave	UC <sup>1</sup>	0.27	--	--	0.31	--	
356	I-10 EB Ramp	Euclid Ave	Sig	0.97	45.3	D	1.00	52.0	

<sup>1</sup>For uncontrolled movements the v/c was calculated based on a saturation flow rate of 1,500 vehicles per hour. Average delay and LOS are not calculated for these intersections, denoted with double dashes (--).

Table 3.3.8: Euclid Avenue Interchange Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
351	7 <sup>th</sup> St & SB Euclid Ave	Sig	SBLTR	605	423	Yes	404	Yes
			EBTR	284	129	Yes	84	Yes
			WBL	60	78	No	70	No
			WBT	60	72	No	80	No
352	7 <sup>th</sup> St & NB Euclid Ave	Sig	NBLTR	605	25	Yes	257	Yes
			EBL	60	0	Yes	25	Yes
			EBT	60	25	Yes	52	Yes
			WBTR	660	209	Yes	284	Yes
353	7 <sup>th</sup> St & I-10 WB Off-Ramp/2nd Ave	AWS <sup>1</sup>	EBLT	648	--	--	--	--
			WBTR	279	--	--	--	--
356	I-10 EB Ramp & Euclid Ave	Sig	NBT	602	355	Yes	405	Yes
			NBR	100	236	No	259	No
			SBL	300	602	No	642	No
			SBT	605	33	Yes	52	Yes

<sup>1</sup>-- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

Peak hour vehicle queues for freeway off-ramps at the Euclid Avenue interchange are summarized in **Table 3.3.9**. As shown in the table, the 95<sup>th</sup> percentile queue for the eastbound right turn movement at the eastbound off-ramp to Euclid Avenue exceeds the available storage during the morning and evening peak hours under existing conditions. The 95<sup>th</sup> percentile queue for this movement is 323 feet during the morning peak hour and 538 feet during the evening peak hour with an available storage length of 225 feet.

The 95<sup>th</sup> percentile queue for the eastbound left turn movement at the eastbound off-ramp to Euclid Avenue is 291 feet during the morning peak hour and 432 feet for the evening peak hour. The available storage length for this movement accommodates the 95<sup>th</sup> percentile queue for both peak hours. However, the queue for both the morning and evening peak hours are longer than the 225 feet right turn lane resulting in storage blockage for the eastbound right turn movement. Under this condition, the estimated longest queue is approximately 323 feet and 832 feet during the morning and evening peak hours, respectively. The length of the ramp from the stop bar to the gore point is approximately 900 feet, leaving approximately 577 feet and 68 feet from the back of the queue to the gore point during the morning and evening peak hours, respectively.

Table 3.3.9: Euclid Avenue Interchange Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
353	7 <sup>th</sup> St & I-10 WB Off-Ramp/2nd Ave	AWS <sup>1</sup>	NBL	350	--	--	--	--
			NBLTR	980	--	--	--	--
356	I-10 EB Ramp & Euclid Ave	Sig	EBL	628 <sup>2</sup>	291	Yes	432	Yes
			EBR	225	323	No	538	No

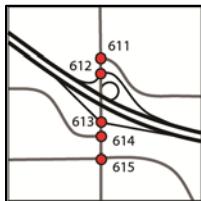
<sup>1</sup>-- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

<sup>2</sup> 1<sup>st</sup> storage lane is 355' and 2<sup>nd</sup> lane extends 900' to the beginning of the painted gore'. The average available storage is 628 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

### 3.3.4 Vineyard Avenue Interchange Analysis

The study intersections in the traffic analysis for the I-10/Vineyard Avenue interchange area include:



- #611 - Inland Empire Boulevard & Vineyard Avenue
- #612 - I-10 Westbound Ramps & Vineyard Avenue
- #613 - I-10 Eastbound Ramps & Vineyard Avenue
- #614 - G Street & Vineyard Avenue
- #615 - D Street & Vineyard Avenue

All five study intersections are currently signalized. The existing intersection peak hour volumes and lane geometry are shown in [Figure 3.3.1](#) and [Figure 3.3.2](#), respectively.

The existing condition LOS analysis indicates that all Vineyard Avenue interchange study intersections currently operate at LOS B or better during the peak hours. A summary of LOS, v/c and average vehicle delay for AM and PM peak hours is provided in [Table 3.3.10](#)

The queuing analysis for the arterial intersection approaches and available storage for each movement are presented in [Table 3.3.11](#). In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements exceed the available storage under existing conditions:

- Southbound through at I-10 WB Ramp & Vineyard Ave (PM Peak Hour)
- Southbound left turn at I-10 EB Ramp & Vineyard Ave (AM Peak Hour)

- Eastbound left turn lane at D St & Vineyard Ave (AM and PM Peak Hours)

Table 3.3.10: Vineyard Avenue Interchange Existing (2012) Intersection Levels of Service – AM/PM Peak Hours									
Intersection Number	Location			Traffic Control	Existing (Year 2012) Level of Service				
	East/West Street	North/South Street			AM Peak Hour		PM Peak Hour		
					v/c	Avg. Delay (sec)	LOS	v/c	
611	Inland Empire Blvd	Vineyard Ave	Sig	0.52	8.3	A	0.55	9.2	A
612	I-10 WB Ramp	Vineyard Ave	Sig	0.59	10.0	A	0.64	11.9	B
613	I-10 EB Ramp	Vineyard Ave	Sig	0.71	16.6	B	0.65	12.1	B
614	G St	Vineyard Ave	Sig	0.44	9.8	A	0.43	8.9	A
615	D St	Vineyard Ave	Sig	0.40	15.0	B	0.55	18.3	B

Table 3.3.11: Vineyard Avenue Interchange Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
611	Inland Empire Blvd & Vineyard Ave	Sig	NBL	140	25	Yes	25	Yes
			NBTR	250	74	Yes	134	Yes
			SBL	150	33	Yes	25	Yes
			SBTR	915	243	Yes	179	Yes
			EBLTR	74	60	Yes	50	Yes
			WBL	165	48	Yes	73	Yes
			WBLT	5,500 <sup>1</sup>	48	Yes	73	Yes
			WBR	5,500 <sup>1</sup>	31	Yes	36	Yes
612	I-10 WB Ramp & Vineyard Ave	Sig	NBT	525	95	Yes	80	Yes
			NBR	345	0	Yes	0	Yes
			SBT	250	247	Yes	254	No
			SBR	240	25	Yes	25	Yes
613	I-10 EB Ramp & Vineyard Ave	Sig	NBTR	265	158	Yes	80	Yes
			SBL	280	326	No	222	Yes
			SBT	525	62	Yes	88	Yes

Table 3.3.11 continued: Vineyard Avenue Interchange Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
614	G St & Vineyard Ave	Sig	NBL	150	25	Yes	64	Yes
			NBT	515	25	Yes	74	Yes
			SBT	265	127	Yes	69	Yes
			SBR	100	25	Yes	0	Yes
			E BLR	170	117	Yes	100	Yes
			EBR	100	25	Yes	28	Yes
615	D St & Vineyard Ave	Sig	NBL	125	28	Yes	40	Yes
			NBTR	1,180 <sup>1</sup>	72	Yes	154	Yes
			SBL	150	80	Yes	139	Yes
			SBTR	430 <sup>2</sup>	0	Yes	25	Yes
			EBL	125	148	No	158	No
			EBTR	635	42	Yes	30	Yes
			WBL	125	30	Yes	25	Yes
			WBT	1,230 <sup>1</sup>	25	Yes	45	Yes
			WBR	1,230 <sup>1</sup>	33	Yes	44	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

<sup>2</sup> 2 through lanes with storage lengths of 515' and 1 lane with storage length of 260'. The average storage length is 430 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

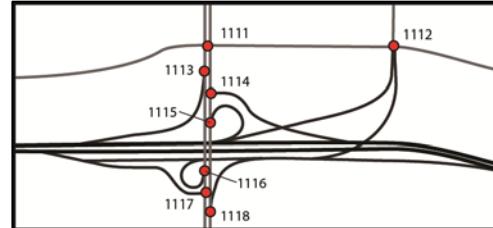
Peak hour vehicle queues for freeway off-ramps at the Vineyard Avenue interchange are summarized in **Table 3.3.12**. As shown in the table, none of the queues exceed the available storage during the peak hours under existing conditions.

Table 3.3.12: Vineyard Avenue Interchange Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
612	I-10 WB Ramp & Vineyard Ave	Sig	WBL	175	126	Yes	151	Yes
			WBR	1,475	178	Yes	264	Yes
613	I-10 EB Ramp & Vineyard Ave	Sig	EBL	370	177	Yes	124	Yes
			EBLTR	1,050	93	Yes	101	Yes
			EBR	380	53	Yes	47	Yes

### 3.3.5 Etiwanda Avenue/Commerce Drive Interchange Analysis

The study intersections in the traffic analysis for the I-10/Etiwanda Avenue/Commerce Drive interchange area include:

- #1111 - Valley Boulevard/Ontario Mills Parkway & Etiwanda Avenue
- #1112 - Valley Boulevard & Commerce Drive
- #1113 - I-10 Westbound On-Ramp & Southbound Etiwanda Avenue
- #1114 - I-10 Westbound Off-Ramp & Etiwanda Avenue
- #1115 - I-10 Westbound On-Ramp & Northbound Etiwanda Avenue
- #1116 - I-10 Eastbound On-Ramp & Southbound Etiwanda Avenue
- #1117 - I-10 Eastbound Off-Ramp & Etiwanda Avenue
- #1118 - I-10 Eastbound On-Ramp & Northbound Etiwanda Avenue



Except for the four uncontrolled on-ramp intersections with Etiwanda Avenue, all study intersections are currently signalized. The existing intersection peak hour volumes and lane geometry are shown in [Figure 3.3.1](#) and [Figure 3.3.2](#), respectively.

The existing condition LOS analysis indicates that all Etiwanda Avenue/Commerce Drive interchange study intersections currently operate at LOS C or better during the peak hours. A summary of LOS, v/c and average vehicle delay for AM and PM peak hours is provided in [Table 3.3.13](#).

**Table 3.3.13: Etiwanda Avenue/Commerce Drive Interchange Existing (2012) Intersection Levels of Service – AM/PM Peak Hours**

Intersection Number	Location		Traffic Control	Existing (Year 2012) Level of Service					
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour		
				v/c	Avg. Delay (sec)	LOS	v/c	Avg. Delay (sec)	
1111	Valley Blvd/Ontario Mills Pkwy	Etiwanda Ave	Sig	0.38	16.5	B	0.47	20.3	
1112	Valley Blvd	Commerce Dr	Sig	0.36	31.6	C	0.44	32.5	
1113	I-10 WB On-Ramp	SB Etiwanda Ave	UC <sup>1</sup>	0.12	--	--	0.19	--	
1114	I-10 WB Off-Ramp	Etiwanda Ave	Sig	0.55	17.8	B	0.42	12.9	
1115	I-10 WB On-Ramp	NB Etiwanda Ave	UC <sup>1</sup>	0.23	--	--	0.38	--	
1116	I-10 EB On-Ramp	SB Etiwanda Ave	UC <sup>1</sup>	0.06	--	--	0.19	--	
1117	I-10 EB Off-Ramp	Etiwanda Ave	Sig	0.77	24.5	C	0.44	13.3	
1118	I-10 EB On-Ramp	NB Etiwanda Ave	UC <sup>1</sup>	0.14	--	--	0.41	--	

<sup>1</sup>For uncontrolled movements the v/c was calculated based on a saturation flow rate of 1,500 vehicles per hour. Average delay and LOS are not calculated for these intersections, denoted with double dashes (--).

The queuing analysis for the arterial intersection approaches and available storage for each movement are presented in [Table 3.3.14](#). In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues exceed the available storage during the peak hours under existing conditions. Queuing analysis was not conducted for uncontrolled intersections that do not consist of conflicting movements.

Table 3.3.14: Etiwanda Avenue/Commerce Drive Interchange Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
1111	Valley Blvd/Ontario Mills Pkwy & Etiwanda Ave	Sig	NBL	300	94	Yes	53	Yes
			NBTR	670	43	Yes	95	Yes
			SBL	250	35	Yes	35	Yes
			SBTR	1,070 <sup>1</sup>	107	Yes	142	Yes
			EBL	200	25	Yes	83	Yes
			EBT	775	25	Yes	37	Yes
			EBR	775	30	Yes	72	Yes
			WBL	250	29	Yes	29	Yes
			WBT	1,450 <sup>1</sup>	25	Yes	38	Yes
			WBR	1,450 <sup>1</sup>	25	Yes	41	Yes
1112	Valley Blvd & Commerce Dr	Sig	EBR	850	25	Yes	25	Yes
			WBL	270	115	Yes	165	Yes
			WBT	770	58	Yes	80	Yes
			WBR	770	25	Yes	25	Yes
1114	I-10 WB Off-Ramp & Etiwanda Ave	Sig	NBT	850	66	Yes	48	Yes
			SBT	730	42	Yes	56	Yes
1117	I-10 EB Off-Ramp & Etiwanda Ave	Sig	NBT	315	153	Yes	172	Yes
			SBT	850	202	Yes	88	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

Table 3.3.15: Etiwanda Avenue/Commerce Drive Interchange Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
1112	Valley Blvd & Commerce Dr/I-10 EB Off-Ramp	Sig	NBL	550 <sup>1</sup>	25	Yes	25	Yes
			NBT	900	123	Yes	162	Yes
			NBR	900	79	Yes	96	Yes
1114	I-10 WB Off-Ramp & Etiwanda Ave	Sig	WBL	650	299	Yes	204	Yes
			WBR	1,200 <sup>2</sup>	30	Yes	32	Yes
1117	I-10 EB Off-Ramp & Etiwanda Ave	Sig	EBL	1,000 <sup>3</sup>	50	Yes	57	Yes
			EBR	470	333	Yes	161	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 200' and 2<sup>nd</sup> storage lane is 900'. The average storage length is 550 feet per lane.

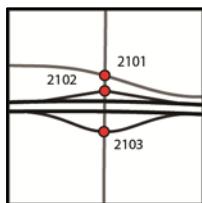
<sup>2</sup> 1<sup>st</sup> storage lane is 400' and 2<sup>nd</sup> lane extends 2,000' to the beginning of the painted gore'. The average storage length is 1,200 feet per lane.

<sup>3</sup> 1<sup>st</sup> storage lane is 470' and 2<sup>nd</sup> lane extends 1,530' to the beginning of the painted gore'. The average storage length is 1,000 feet per lane.

Note: The 95<sup>th</sup> percentile queues are compared to a lane group's average lane length.

Peak hour vehicle queues for freeway off-ramps at the Etiwanda Avenue/Commerce Drive interchange are summarized in **Table 3.3.15**. As shown in the table, none of the queues exceed the available storage during the morning and evening peak hours under existing conditions.

### 3.3.6 Pepper Avenue Interchange Analysis



The study intersections in the traffic analysis for the I-10/Pepper Avenue interchange area include:

- #2101 - Valley Boulevard & Pepper Avenue
- #2102 - I-10 Westbound Ramps & Pepper Avenue
- #2103 - I-10 Eastbound Ramps & Pepper Avenue

All three study intersections are currently signalized. The existing intersection peak hour volumes and lane geometry are shown in **Figure 3.3.1** and **Figure 3.3.2**, respectively.

The existing condition LOS analysis indicates that the intersection of the I-10 Eastbound Ramps & Pepper Avenue operates at LOS D during both AM and PM peak hours. All other Pepper Avenue interchange study intersections currently operate at LOS C or better during the peak hours. A summary of LOS, v/c and average vehicle delay for AM and PM peak hours is provided in **Table 3.3.16**.

Table 3.3.16: Pepper Avenue Interchange Existing (2012) Intersection Levels of Service – AM/PM Peak Hours										
Intersection Number	Location		Traffic Control	Existing (Year 2012) Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			
				v/c	Avg. Delay (sec)	LOS	v/c	Avg. Delay (sec)	LOS	
2101	Valley Blvd	Pepper Ave	Sig	0.64	30.9	C	0.62	31.3	C	
2102	I-10 WB Ramp	Pepper Ave	Sig	0.65	24.3	C	0.52	14.9	B	
2103	I-10 EB Ramp	Pepper Ave	Sig	0.98	53.1	D	0.89	49.6	D	

The queuing analysis for the arterial intersection approaches and available storage for each movement are presented in **Table 3.3.17**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements exceed the available storage under existing conditions:

- Northbound left turn at Valley Blvd & Pepper Ave (AM and PM Peak Hours)
- Southbound left turn at I-10 Eastbound Ramp & Pepper Ave (AM and PM Peak Hours)

Peak hour vehicle queues for freeway off-ramps at the Pepper Avenue interchange are summarized in **Table 3.3.18**. As shown in the table, none of the queues exceed the available storage during the morning and evening peak hours under existing conditions.

Table 3.3.17: Pepper Avenue Interchange								
Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour	PM Peak Hour		
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2101	Valley Blvd & Pepper Ave	Sig	NBL	90	133	No	268	No
			NBT	215 <sup>1</sup>	171	Yes	187	Yes
			NBR	340	25	Yes	25	Yes
			SBL	230	34	Yes	32	Yes
			SBT	575	386	Yes	321	Yes
			SBR	340	81	Yes	30	Yes
			EBL	240	53	Yes	90	Yes
			EBT	300	82	Yes	111	Yes
			EBR	320	75	Yes	62	Yes
			WBL	220	160	Yes	71	Yes
			WBTR	1,330 <sup>2</sup>	74	Yes	94	Yes
2102	I-10 WB Ramp & Pepper Ave	Sig	NBL	120	25	Yes	0	Yes
			NBT	410	51	Yes	96	Yes
			SBT	340	290	Yes	60	Yes
			SBR	340	81	Yes	30	Yes
2103	I-10 EB Ramp & Pepper Ave	Sig	NBT	1,700 <sup>2</sup>	121	Yes	168	Yes
			NBR	200	25	Yes	53	Yes
			SBL	160	277	No	623	No
			SBT	410	25	Yes	25	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 90' and 2 through lanes with storage lengths of 340' each lane. The average available storage is 215 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

Table 3.3.18: Pepper Avenue Interchange								
Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour	PM Peak Hour		
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2102	I-10 WB Ramp & Pepper Ave	Sig	WBLTR	1,140	100	Yes	90	Yes
			WBR	200	86	Yes	83	Yes
2103	I-10 EB Ramp & Pepper Ave	Sig	EBLT	1,175	450	Yes	507	Yes
			EBR	770	33	Yes	25	Yes

### 3.3.7 La Cadena Drive/9<sup>th</sup> Street Interchange Analysis



The study intersections in the traffic analysis for the I-10/La Cadena Drive/9<sup>th</sup> Street interchange area include:

- #2261 - I-10 Westbound On-Ramp & La Cadena Drive
- #2262 - I-10 Westbound Off-Ramp & 9<sup>th</sup> Street
- #2263 - I-10 Eastbound Ramps & 9<sup>th</sup> Street

All three study intersections are currently unsignalized with stop control on the minor street approach. The existing intersection peak hour volumes and lane geometry are shown in [Figure 3.3.1](#) and [Figure 3.3.2](#), respectively. The existing condition LOS analysis indicates that all La Cadena Drive/9<sup>th</sup> Street interchange study intersections currently operate at LOS B or better during the peak hours. A summary of LOS, v/c and average vehicle delay for AM and PM peak hours is provided in [Table 3.3.19](#).

Table 3.3.19: La Cadena Drive/9 <sup>th</sup> Street Interchange Existing (2012) Intersection Levels of Service – AM/PM Peak Hours									
Intersection Number	Location		Traffic Control	Existing (Year 2012) Level of Service					
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour		
				v/c	Avg. Delay (sec)	LOS	v/c	Avg. Delay (sec)	
2261	I-10 WB On-Ramp	La Cadena Dr	UC <sup>1</sup>	0.09	4.0	A	0.17	5.3	
2262	I-10 WB Off-Ramp	9 <sup>th</sup> St	SC <sup>2</sup>	0.49	12.9	B	0.46	12.9	
2263	I-10 EB Ramp	9 <sup>th</sup> St	AWS	0.38	11.3	B	0.44	11.9	

<sup>1</sup> The v/c ratio, average delay and LOS for this intersection are for northbound left turn movement only which conflicts with the free southbound through movement.

<sup>2</sup> For two-way stop control intersection, the average delay and LOS are for the worst stop-controlled approach; the v/c ratio is for the worst stop-controlled movement/approach.

The queuing analysis for the arterial intersection approaches and available storage for each movement are presented in [Table 3.3.20](#). In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues exceed the available storage.

Table 3.3.20: La Cadena Drive/9 <sup>th</sup> Street Interchange Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2261	I-10 WB On-Ramp & La Cadena Dr	UC	NBLT	1,500 <sup>2</sup>	25	Yes	25	Yes
2263	I-10 EB Ramp & 9 <sup>th</sup> St	AWS <sup>1</sup>	SBL	400	--	--	--	--

<sup>1</sup> -- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

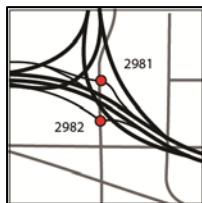
<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

Peak hour vehicle queues for freeway off-ramps at the La Cadena Drive/9<sup>th</sup> Street interchange are summarized in [Table 3.3.21](#). As shown in the table, none of the queues exceed the available storage during the morning and evening peak hours under existing conditions.

Table 3.3.21: La Cadena Drive/9 <sup>th</sup> Street Interchange Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2262	I-10 WB Off-Ramp & 9 <sup>th</sup> St	SC	WBLR	900	69	Yes	61	Yes
2263	I-10 EB Ramp & 9 <sup>th</sup> St	AWS <sup>1</sup>	EBLTR	830	--	--	--	--

<sup>1</sup>-- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

### 3.3.8 Tennessee Street Interchange Analysis



The study intersections in the traffic analysis for the I-10/Tennessee Street interchange area include:

- #2981 - I-10 Westbound Ramps & Tennessee Street
- #2982 - I-10 Eastbound Ramps & Tennessee Street

Both study intersections are currently signalized. The existing intersection peak hour volumes and lane geometry are shown in [Figure 3.3.1](#) and [Figure 3.3.2](#), respectively.

The existing condition LOS analysis indicates that the intersection of the I-10 Eastbound Ramps & Tennessee Street operates at LOS D during the PM peak hour. The remaining study intersection of I-10 Westbound Ramps & Tennessee Street operates at LOS C or better during the peak hours. A summary of LOS, v/c and average vehicle delay for AM and PM peak hours is provided in [Table 3.3.22](#).

Table 3.3.22: Tennessee Street Interchange Existing (2012) Intersection Levels of Service – AM/PM Peak Hours								
Intersection Number	Location			Traffic Control	Existing (Year 2012) Level of Service			
	East/West Street		North/South Street		AM Peak Hour		PM Peak Hour	
			v/c		Avg. Delay (sec)	LOS	v/c	
2981	I-10 WB Ramp	Tennessee St	Sig	Sig	0.74	20.5	C	0.57
2982	I-10 EB Ramp	Tennessee St	Sig	Sig	0.52	14.7	B	0.90
								16.9
							D	37.2

The queuing analysis for the arterial intersection approaches and available storage for each movement are presented in [Table 3.3.23](#). In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements exceed the available storage under existing conditions:

- Northbound left turn at I-10 WB Ramp & Tennessee St (AM Peak Hour)
- Southbound left turn at I-10 EB Ramp & Tennessee St (PM Peak Hour)

Peak hour vehicle queues for freeway off-ramps at the Tennessee Street interchange are summarized in [Table 3.3.24](#). As shown in the table, none of the queues exceed the available storage during the morning and evening peak hours under existing conditions.

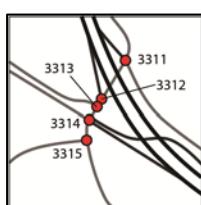
Table 3.3.23: Tennessee Street Interchange Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2981	I-10 WB Ramp & Tennessee St	Sig	NBL	150	236	No	107	Yes
			NBT	490	25	Yes	62	Yes
			SBTR	1,350 <sup>1</sup>	121	Yes	223	Yes
2982	I-10 EB Ramp & Tennessee St	Sig	NBTR	522	144	Yes	388	Yes
			SBL	150	37	Yes	263	No
			SBT	490	48	Yes	25	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

Table 3.3.24: Tennessee Street Interchange Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2981	I-10 WB Ramp & Tennessee St	Sig	WBLT	1,140	178	Yes	142	Yes
			WBTR	690	35	Yes	60	Yes
2982	I-10 EB Ramp & Tennessee St	Sig	EBLT	470	93	Yes	387	Yes
			EBTR	470	93	Yes	387	Yes

### 3.3.9 Ford Street Interchange Analysis

The study intersections in the traffic analysis for the I-10/Ford Street interchange area include:



- #3311 – I-10 Westbound On-Ramp/Reservoir Road & Ford Street
- #3312 – I-10 Eastbound Off-Ramp & Ford Street
- #3313 – Ford Street & Parkford Drive
- #3314 – I-10 Eastbound On-Ramp/I-10 Westbound Off-Ramp/Redlands Boulevard & Ford Street
- #3315 – Ford Street & Oak Street

The intersection of the I-10 Eastbound On-Ramp/I-10 Westbound Off-Ramp/Redlands Boulevard & Ford Street (#3314) is currently signalized. All other study intersections are currently unsignalized with stop control on the minor street approach. The existing intersection peak hour volumes and lane geometry are shown in [Figure 3.3.1](#) and [Figure 3.3.2](#), respectively.

The existing condition LOS analysis indicates that the stop controlled westbound approach to the I-10 Westbound On-Ramp/Reservoir Road & Ford Street intersection operates at LOS F and E during the AM and PM peak hours, respectively. The eastbound stop controlled approaches to Ford Street from the I-10 Eastbound Off-Ramp and from Parkford Drive both operate at LOS D during the PM peak hour. All other Ford Street interchange study intersections currently operate at LOS C or better during the peak hours. A summary of LOS, v/c and average vehicle delay for AM and PM peak hours is provided in **Table 3.3.25**.

Table 3.3.25: Ford Street Interchange Existing (2012) Intersection Levels of Service – AM/PM Peak Hours									
Intersection Number	Location		Traffic Control	Existing (Year 2012) Level of Service					
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour		
				v/c	Avg. Delay (sec)	LOS	v/c	Avg. Delay (sec)	
3311	Reservoir Rd/I-10 WB On-Ramp	Ford St	SC <sup>1</sup>	1.25	253.2	F	0.60	45.6	
3312	I-10 EB Off-Ramp	Ford St	SC <sup>1</sup>	0.50	13.9	B	0.86	29.5	
3313	Parkford Dr	Ford St	SC <sup>1</sup>	0.40	21.9	C	0.65	31.8	
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp	Ford St	Sig	0.51	18.0	B	0.56	19.7	
3315	Oak St	Ford St	SC <sup>1</sup>	0.27	19.1	C	0.10	12.4	

<sup>1</sup>For two-way stop control intersection, the average delay and LOS are for the worst stop-controlled approach; the v/c ratio is for the worst stop-controlled movement/approach.

The queuing analysis for the arterial intersection approaches and available storage for each movement are presented in **Table 3.3.26**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements exceed the available storage under existing conditions:

- Northbound through/right turn at Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St (AM Peak Hours)
- Southbound left turn at Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St (AM and PM Peak Hours)

Peak hour vehicle queues for freeway off-ramps at the Ford Street interchange are summarized in **Table 3.3.27**. As shown in the table, none of the queues exceed the available storage during the morning and evening peak hour under existing conditions.

Table 3.3.26: Ford Street Interchange								
Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3311	Reservoir Rd/I-10 WB On-Ramp & Ford St	SC	NBL	85	59	Yes	25	Yes
			NBR	50	0	Yes	0	Yes
			SBL	45	25	Yes	25	Yes
			SBTR	1,215 <sup>2</sup>	0	Yes	0	Yes
			WBLTR	2,160 <sup>2</sup>	210	Yes	84	Yes
3313	Parkford Dr & Ford St	SC	NBL	30	25	Yes	25	Yes
			EBLR	820	47	Yes	110	Yes
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St	Sig	NBL	85	64	Yes	41	Yes
			NBTR	85	126	No	62	Yes
			SBL	40	82	No	83	No
			SBTR	105	75	Yes	94	Yes
			EBL	115	90	Yes	91	Yes
			EBTR	3,100 <sup>2</sup>	75	Yes	150	Yes
3315	Oak St & Ford St	SC	NBL	60	0	Yes	0	Yes
			NEL	325 <sup>1</sup>	27	Yes	25	Yes
			NER	80 <sup>1</sup>	--	--	--	--

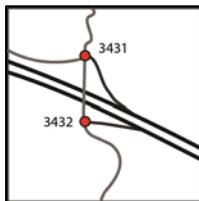
<sup>1</sup> For the northeast approach calculated queues are based on the HCM shared lane capacity analysis. The northeast approach consists of 2 lanes: 325 feet and 80 feet. The 95<sup>th</sup> percentile queue length is the total length for both movements.

<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

Table 3.3.27: Ford Street Interchange								
Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3312	I-10 EB Off-Ramp & Ford St	SC	EBL	1,025	71	Yes	265	Yes
			EBR	30 <sup>1</sup>	-	-	-	-
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St	Sig	WBL	120	60	Yes	35	Yes
			WBTR	1,675	78	Yes	58	Yes

<sup>1</sup> For the eastbound approach calculated queues are based on the HCM shared lane capacity analysis. The eastbound approach consists of 2 lanes: 1,025 feet and 30 feet. The 95<sup>th</sup> percentile queue length is the total queue length for both movements.

### 3.3.11 Wabash Avenue Interchange Analysis



The study intersections in the traffic analysis for the I-10/Wabash Avenue interchange area include:

- #3431 - I-10 Westbound Off-Ramp/Reservoir Road & Wabash Avenue
- #3432 - I-10 Eastbound On-Ramp & Wabash Avenue

Both study intersections are currently unsignalized with stop control on the minor street approach. The existing intersection peak hour volumes and lane geometry are shown in [Figure 3.3.1](#) and [Figure 3.3.2](#), respectively.

The existing condition LOS analysis indicates that both Wabash Avenue interchange study intersections currently operate at LOS B or better during the peak hours. A summary of LOS, v/c and average vehicle delay for AM and PM peak hours is provided in [Table 3.3.28](#).

Table 3.3.28: Wabash Avenue Interchange Existing (2012) Intersection Levels of Service – AM/PM Peak Hours									
Intersection Number	Location		Traffic Control	Existing (Year 2012) Level of Service					
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour		
				v/c	Avg. Delay (sec)	LOS	v/c	Avg. Delay (sec)	
3431	I-10 WB Off-Ramp/Reservoir Rd	Wabash Ave	SC <sup>1</sup>	0.12	12.7	B	0.08	10.7	
3432	I-10 EB On-Ramp	Wabash Ave	UC <sup>2</sup>	0.02	1.4	A	0.01	1.2	

<sup>1</sup> For two-way stop control intersection, the average delay and LOS are for the worst stop-controlled approach; the v/c ratio is for the worst stop-controlled movement/approach.

<sup>2</sup> The v/c ratio, average delay and LOS for this intersection is for southbound left turn movement only which conflicts with the free northbound through movement.

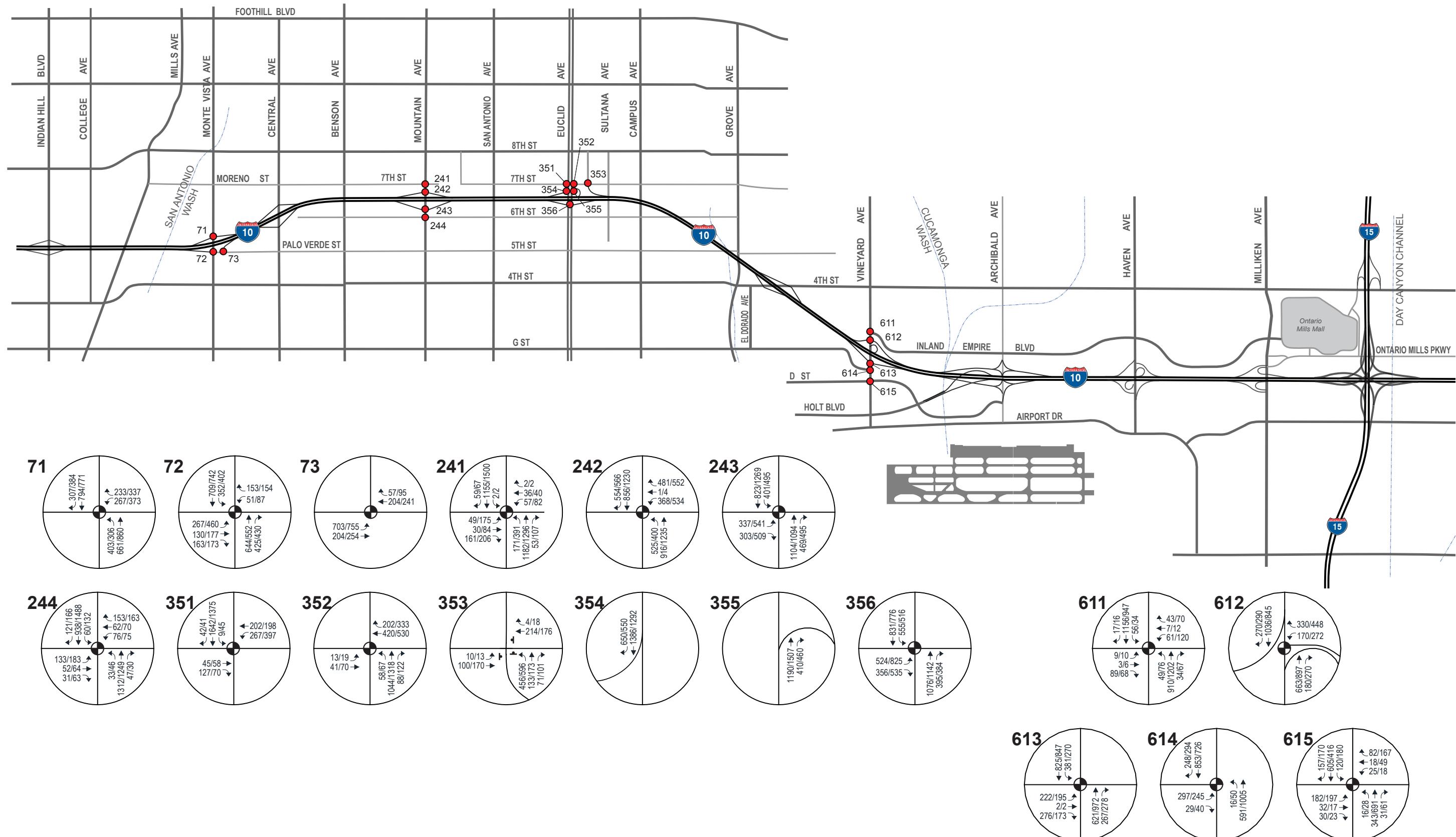
The queuing analysis for the arterial intersection approaches and available storage for each movement are presented in [Table 3.3.29](#). In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues exceed the available storage.

Table 3.3.29: Wabash Avenue Interchange Existing (2012) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	East/West Street & North/South Street				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3431	I-10 WB Off-Ramp/Reservoir Rd & Wabash Ave	SC	NBLT	590	25	Yes	25	Yes
			EBLTR	2,077 <sup>1</sup>	25	Yes	25	Yes
3432	I-10 EB On-Ramp & Wabash Ave	UC	SBLT	590	25	Yes	25	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

Peak hour vehicle queues for freeway off-ramps at the Wabash Avenue interchange are summarized in **Table 3.3.30**. As shown in the table, none of the queues exceed the available storage during the evening peak hour under existing conditions.

Table 3.3.30: Wabash Avenue Interchange Existing (2012) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection Number	Location	Traffic Control	Movement	Available Storage (ft)	Existing (Year 2012) Conditions			
					AM Peak Hour		PM Peak Hour	
	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)				
3431	I-10 WB Off-Ramp/Reservoir Rd & Wabash Ave	Stop Control	WBLTR	1,050	25	Yes	25	Yes



#### LEGEND

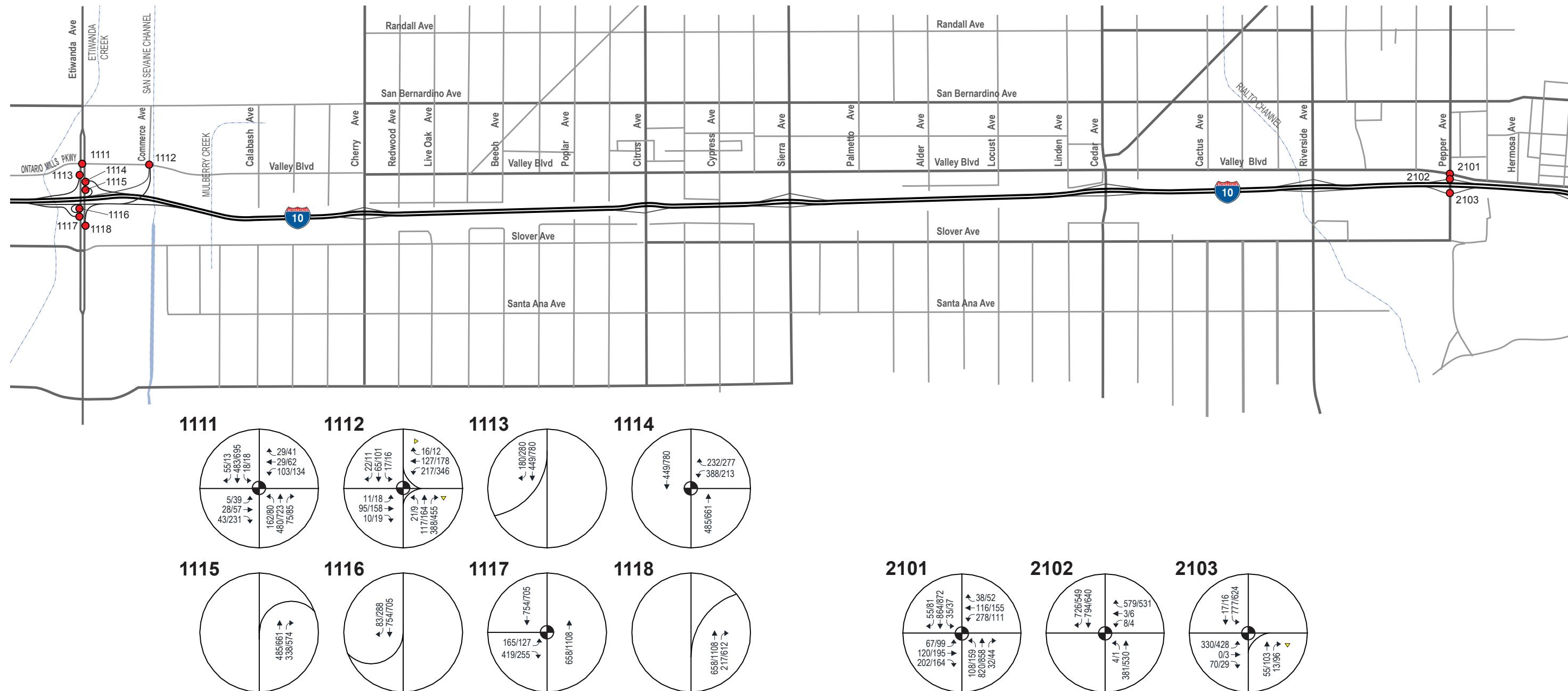
- Traffic Signal
- Stop Sign
- ▼ Yield Sign
- ↑ Turning Movement
- Through Movement
- XX/XX AM/PM Peak Hour Volumes
- 1234 ● Intersection Number



FIGURE 3.3.1

I-10 CORRIDOR STUDY PA/ED  
EXISTING (YEAR 2012) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

SHEET 1 OF 3



#### LEGEND

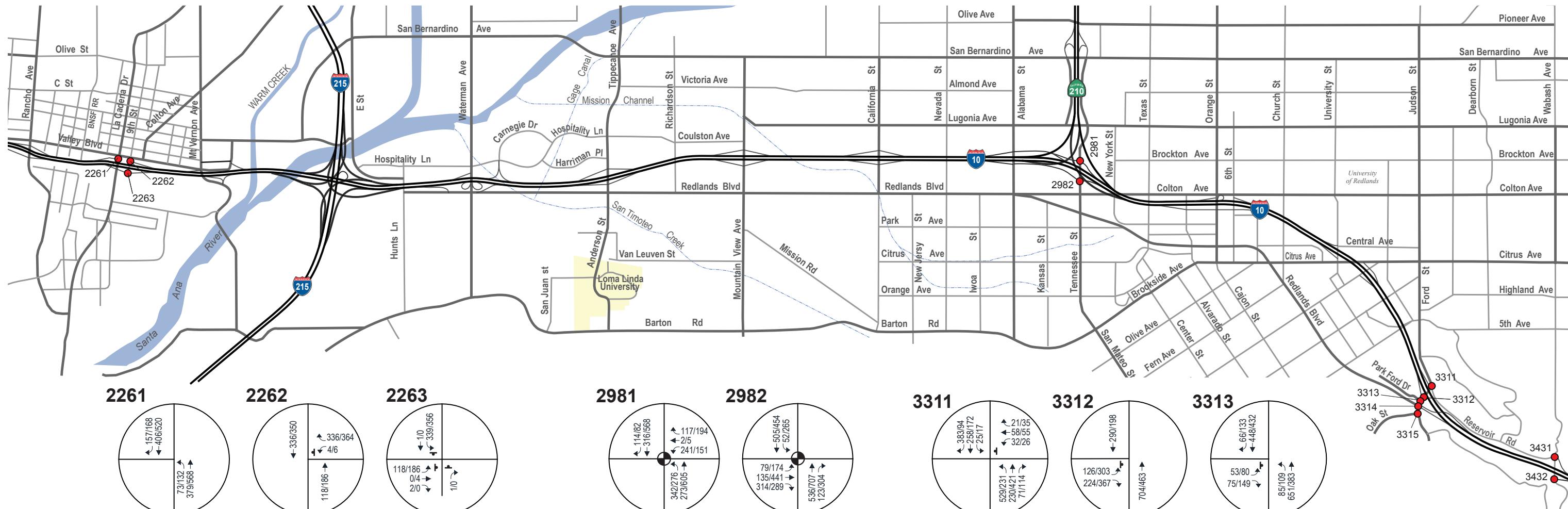
- Traffic Signal      ↗ Turning Movement
- Stop Sign      → Through Movement
- ▼ Yield Sign      1234 ● Intersection Number
- XX/XX AM/PM Peak Hour Volumes



FIGURE 3.3.1

I-10 CORRIDOR STUDY PA/ED  
EXISTING (YEAR 2012) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

SHEET 2 OF 3



#### LEGEND

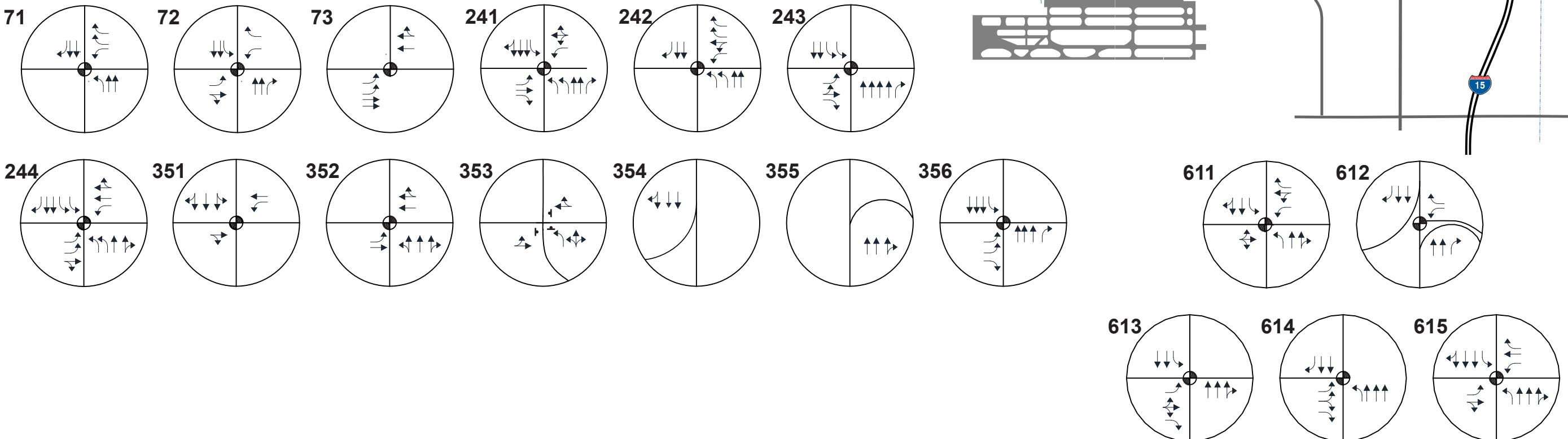
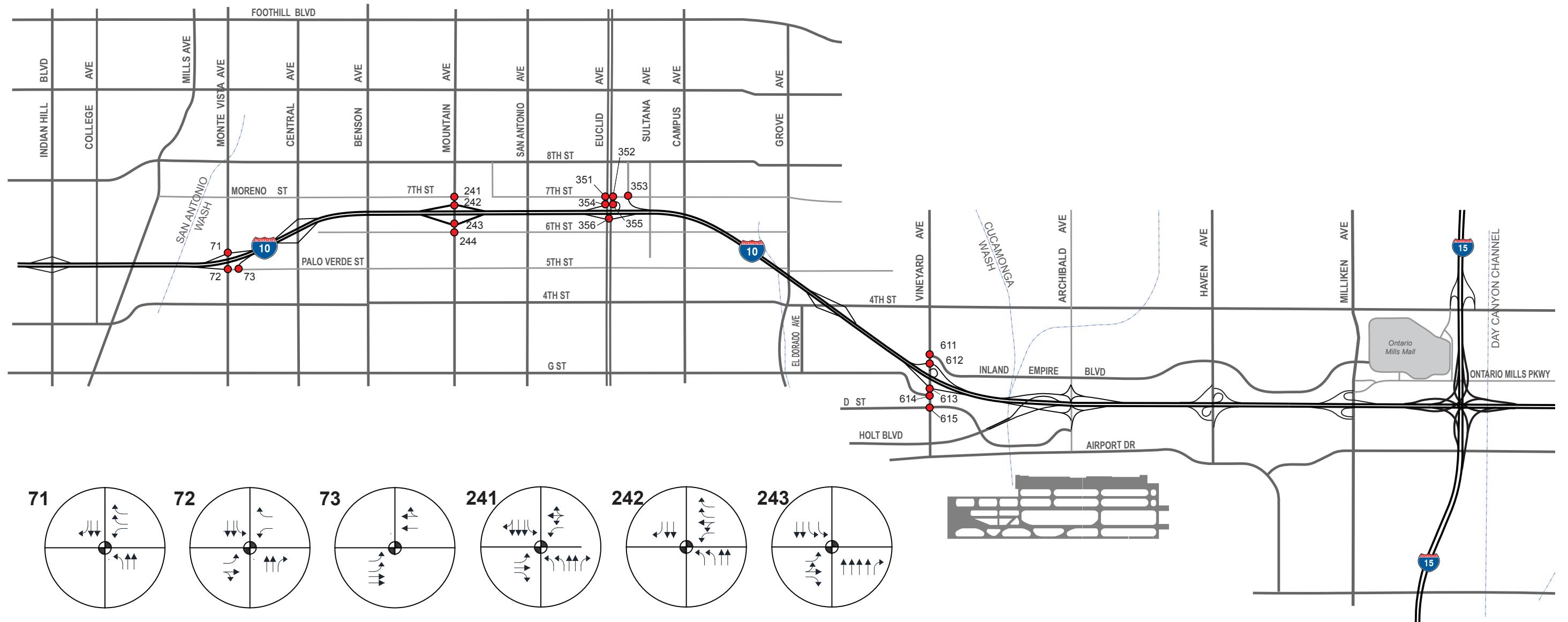
- |                  |                    |                               |
|------------------|--------------------|-------------------------------|
| ● Traffic Signal | ↗ Turning Movement | 1234 ● Intersection Number    |
| ■ Stop Sign      | → Through Movement | XX/XX AM/PM Peak Hour Volumes |
| ▼ Yield Sign     |                    |                               |



FIGURE 3.3.1

I-10 CORRIDOR STUDY PA/ED  
EXISTING (YEAR 2012) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

SHEET 3 OF 3



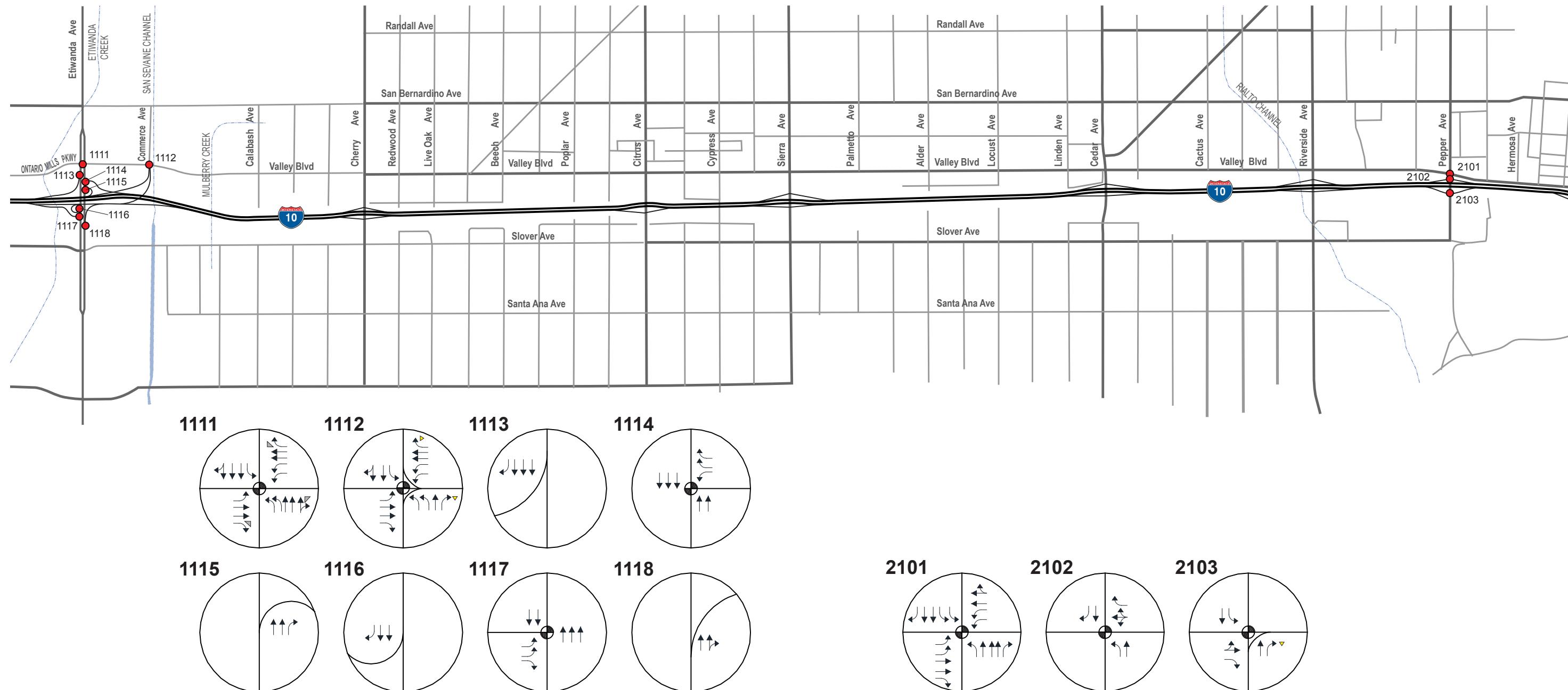
#### LEGEND

- |  |                |  |                    |  |                     |
|--|----------------|--|--------------------|--|---------------------|
|  | Traffic Signal |  | Free-Right Turn    |  | Through Lanes       |
|  | Stop Sign      |  | Defacto Right Turn |  | Intersection Number |
|  | Yield Sign     |  | Turning Lanes      |  |                     |

**FIGURE 3.3.2**  
I-10 CORRIDOR STUDY PA/ED  
EXISTING (YEAR 2012) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION

SHEET 1 OF 3



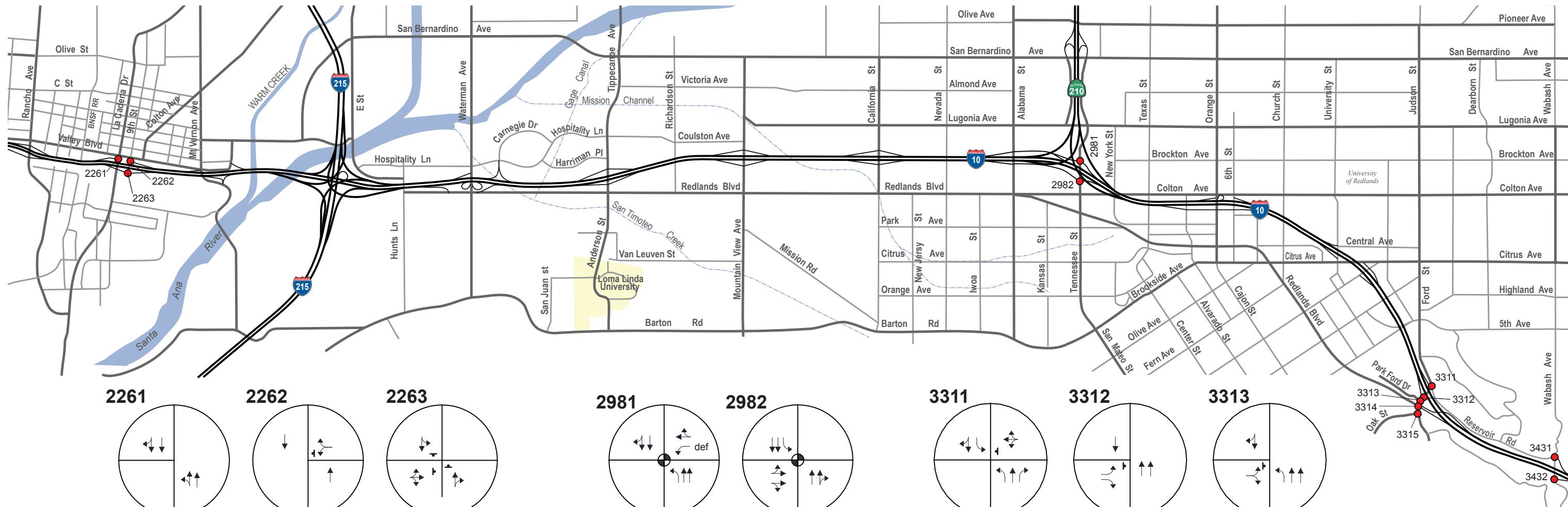


#### LEGEND

- |                  |                          |                            |
|------------------|--------------------------|----------------------------|
| ● Traffic Signal | ↗ Free-Right Turn        | → Through Lanes            |
| ■ Stop Sign      | def → Defacto Right Turn | 1234 ● Intersection Number |
| ▼ Yield Sign     | ↑ Turning Lanes          |                            |



**FIGURE 3.3.2**  
I-10 CORRIDOR STUDY PA/ED  
EXISTING (YEAR 2012) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION



#### LEGEND

- Traffic Signal
- ▼ Yield Sign
- Stop Sign
- Through Lanes
- ↗ Turning Lanes
- ↙ Free-Right Turn
- ↖ Defacto Right Turn
- 1234 ● Intersection Number



**FIGURE 3.3.2**  
I-10 CORRIDOR STUDY PA/ED  
EXISTING (YEAR 2012) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 3 OF 3

### 3.4 Alternative 1: No Build Conditions Analysis

Level-of-service (LOS) analyses, demand volume-to-capacity (d/c) calculations and queue analysis were conducted for the arterial/ramp intersections and other key arterial intersections within each interchange area for both Opening Year (2025) and Design Year (2045) traffic conditions. The results of these analyses are presented in the following sections by interchange. Summary tables of LOS, d/c, average delay and the queuing analysis are included in each interchange section. For future conditions, the v/c ratio is the d/c ratio, where the demand volume is used. The analysis worksheets for Alternative 1 (No Build) conditions for Opening Year (2025) and Design Year (2045) are provided in [Appendix G-1](#) and [Appendix G-2](#), respectively.

Alternative 1, the No Build alternative includes the following interchange and arterial improvements along I-10 within the project study area planned by SANBAG, Caltrans and local agencies that are under construction or included in the Final 2012 RTP Project List:

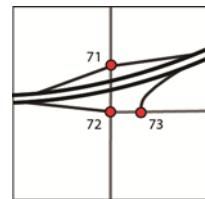
- Mountain Avenue Widening Project (Brooks Street to Sixth Street) - RTP# 4120147
- Vineyard Avenue Widening Project (4<sup>th</sup> Street to I-10) - RTP# 4A01222
- Etiwanda Avenue Widening Project - RTP# SBD031228
- I-10/Pepper Avenue Bridge Replacement Project
- Widen Pepper Avenue from Slover Avenue to Valley Boulevard from 2 to 4 Lanes - RTP# 4A07200
- La Cadena Drive/9<sup>th</sup> Street Eastbound Ramp Entrance Widening Project - RTP# 4M04023
- Ford Street Widening Project (5<sup>th</sup> Avenue to I-10) - RTP# 4A01243
- Ford Street Signalization Improvement Project - RTP# 2004323
- I-10/Wabash Avenue Interchange Project – RTP# 4M01032
- Wabash Avenue Widening Project (5<sup>th</sup> Avenue to I-10) - RTP# 200035

A detailed discussion of all planned interchange improvements is presented below by interchange. Project descriptions contained in the RTP are limited and most of the projects have limited or no design work completed. Consequently, the precise improvements to be implemented under each project, particularly with respect to intersection turn lane improvements, are not currently known. Based on forecast turning volumes a reasonable set of improvements has been assumed.

The intersections analyzed for Alternative 1 (No Build) conditions are the same intersections analyzed under Existing (2012) conditions. Alternative 1 – No Build (Year 2025) intersection peak hour volumes and lane geometry are shown in [Figure 3.4.1](#) and [Figure 3.4.2](#), respectively. Alternative 1 – No Build (Year 2045) intersection peak hour volumes and lane geometry are shown in [Figure 3.4.3](#) and [Figure 3.4.4](#), respectively. A detailed discussion of the methodology to develop future conditions freeway traffic volumes is presented in [Section 2.2.1](#) of this report.

#### 3.4.1 Monte Vista Avenue Interchange Analysis

Under Year 2025, the study intersections at the Monte Vista Avenue interchange are expected to operate at LOS D or better except for the I-10 eastbound off-ramp to Monte Vista Avenue, which is expected to operate at LOS E during the evening peak hour. For Year 2045, both the I-10 westbound off-ramp and the eastbound off-ramp to Monte Vista Avenue are expected to operate at LOS E during the evening peak hour. The intersection



of Palo Verde Street and I-10 eastbound on-ramp is expected to operate at LOS B during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 1 (No Build) conditions at the Monte Vista Avenue interchange study intersections is provided in **Table 3.4.1**.

Table 3.4.1: Monte Vista Avenue Interchange Alternative 1 (No Build) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
71	I-10 WB Ramps	Monte Vista Ave	Sig	0.90	28.6	C	1.02	38.2	D	0.99	39.6	D	1.19	57.7	E
72	I-10 EB Off-Ramp/Palo Verde St	Monte Vista Ave	Sig	0.93	36.1	D	1.18	57.4	E	1.01	46.1	D	1.29	74.6	E
73	Palo Verde St	I-10 EB On-Ramp	Sig	0.38	9.8	A	0.41	11.6	B	0.43	10.3	B	0.46	13.1	B

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 1 (No Build) conditions are presented in **Table 3.4.2**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements are expected to exceed the available storage under year 2025 Alternative 1 (No Build) conditions:

- Northbound left turn at I-10 WB Ramp & Monte Vista Ave (PM Peak Hour)
- Northbound right turn at I-10 EB Off-Ramp & Palo Verde St (AM and PM Peak Hours)
- Southbound left turn at I-10 EB Off-Ramp & Palo Verde St (AM and PM Peak Hours)

As shown in **Table 3.4.2**, no additional movements are expected to exceed the available storage under year 2045 Alternative 1 (No Build) conditions.

Peak hour vehicle queues for freeway off-ramps at the Monte Vista Avenue interchange for years 2025 and 2045 under Alternative 1 (No Build) conditions are summarized in **Table 3.4.3**. As shown in the table, the 95<sup>th</sup> percentile queue for the westbound right turn movement at the westbound off-ramp to Monte Vista Avenue is expected to exceed the average available storage length of 122 feet per lane during the peak hours under both years for Alternative 1 (No Build) conditions. The expected 95<sup>th</sup> percentile queue for this movement is 136 feet per lane during the morning peak hour and 165 feet per lane during the evening peak hour for year 2025. Under year 2045, the 95<sup>th</sup> percentile queue is expected to increase to 203 feet per lane during the morning peak hour and 235 feet per lane during the evening peak hour.

The 95<sup>th</sup> percentile queue for the westbound left turn movement at the westbound off-ramp to Monte Vista Avenue is 509 feet during the morning peak hour and 772 feet for the evening peak hour in year 2045. The available storage length for this movement accommodates the 95<sup>th</sup> percentile queue for both peak hours. However, the queues for both the morning and evening peak hours are longer than the 160 foot right turn lane resulting in storage blockage for the westbound right turn movement. Under this condition, the estimated longest queue is approximately 787 feet during the morning peak hour and

1,145 feet during the evening peak hour. The length of the ramp from the stop bar to the gore point is approximately 875 feet, leaving approximately 88 feet during the morning peak hour from the back of the queue to the gore point. For the evening peak hour, the longest queue is expected to spill back onto the freeway mainline.

Table 3.4.2: Monte Vista Avenue Interchange Alternative 1 (No Build) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
71	I-10 WB Ramps & Monte Vista Ave	Sig	NBL	100	81	Yes	332	No	365	No	335	No
			NBT	340	157	Yes	183	Yes	227	Yes	225	Yes
			SBT	810	355	Yes	388	Yes	484	Yes	494	Yes
			SBR	810	56	Yes	66	Yes	63	Yes	71	Yes
72	I-10 EB Off-Ramp/Palo Verde St & Monte Vista Ave	Sig	NBT	700	330	Yes	314	Yes	424	Yes	463	Yes
			NBR	140	196	No	194	No	434	No	375	No
			SBL	100	264	No	297	No	258	No	329	No
			SBT	340	132	Yes	207	Yes	150	Yes	225	Yes
			WBL	225	79	Yes	151	Yes	112	Yes	200	Yes
			WBR	225	168	Yes	163	Yes	163	Yes	150	Yes
73	Palo Verde St & I-10 EB On-Ramp	Sig	EBL	150	25	Yes	26	Yes	26	Yes	34	Yes
			EBT	225	0	Yes	0	Yes	0	Yes	0	Yes
			WBTR	930	110	Yes	128	Yes	125	Yes	151	Yes

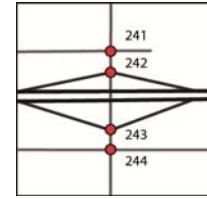
Table 3.4.3: Monte Vista Avenue Interchange Alternative 1 (No Build) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
71	I-10 WB Ramps & Monte Vista Ave	Sig	WBL	875	366	Yes	561	Yes	509	Yes	772	Yes
			WBR	122 <sup>1</sup>	136	No	165	No	203	No	235	No
72	I-10 EB Off-Ramp/Palo Verde St & Monte Vista Ave	Sig	EBL	690	335	Yes	526	Yes	380	Yes	643	Yes
			EBTR	1,550	337	Yes	312	Yes	458	Yes	391	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 85' and 2<sup>nd</sup> storage lane is 160'. The average available storage length is 122 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

### 3.4.2 Mountain Avenue Interchange Analysis

Alternative 1 (No Build) conditions analysis assumes the Mountain Avenue Widening Project to be constructed by year 2018. Based on the Mountain Avenue Widening Project, the following improvement has been included as part of the analysis for years 2025 and 2045:



#### Mountain Avenue Widening Project (Brooks Street to Sixth Street) - RTP# 4120147

- Add a 2<sup>nd</sup> exclusive through lane on the northbound approach at the intersection of Mountain Avenue and 6<sup>th</sup> Street (Intersection #244)

Differences between existing and Alternative 1 (No Build) intersection lane configurations at the Mountain Avenue interchange are highlighted in **Figure 3.4.2** for year 2025 and **Figure 3.4.4** for year 2045.

Under Alternative 1 (No Build) for years 2025 and 2045, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 1 (No Build) conditions at the Mountain Avenue interchange study intersections is provided in **Table 3.4.4**.

Table 3.4.4: Mountain Avenue Interchange Alternative 1 (No Build) Intersection Levels of Service – AM/PM Peak Hours																
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
241	7 <sup>th</sup> St/ Shopping Center	Mountain Ave	Sig	0.67	17.2	B	0.96	35.1	D	0.84	19.6	B	1.01	40.3	D	
242	I-10 WB Ramp	Mountain Ave	Sig	0.85	32.2	C	0.99	35.2	D	0.98	40.9	D	1.11	52.0	D	
243	I-10 EB Ramp	Mountain Ave	Sig	0.59	16.7	B	0.85	32.8	C	0.68	25.7	C	0.87	34.6	C	
244	6th St	Mountain Ave	Sig	0.48	16.7	B	0.74	22.8	C	0.57	18.5	B	0.77	23.3	C	

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 1 (No Build) conditions are presented in **Table 3.4.5**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements are expected to exceed the available storage under year 2025 Alternative 1 (No Build) conditions:

- Northbound left turn at 7<sup>th</sup> Street/Shopping Center & Mountain Ave (PM Peak Hour)
- Northbound through at 7<sup>th</sup> Street/Shopping Center & Mountain Ave (PM Peak Hour)
- Eastbound left turn at 7<sup>th</sup> Street/Shopping Center & Mountain Ave (PM Peak Hour)
- Westbound left turn at 7<sup>th</sup> Street/Shopping Center & Mountain Ave (PM Peak Hour)
- Westbound shared left/through/right at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Northbound left turn at I-10 WB Ramp & Mountain Ave (PM Peak Hour)
- Northbound through at I-10 WB Ramp & Mountain Ave (AM Peak Hour)
- Southbound through at I-10 WB Ramp & Mountain Ave (PM Peak Hour)

- Southbound right turn at I-10 WB Ramp & Mountain Ave (AM Peak Hour)
- Southbound through at I-10 EB Ramp & Mountain Ave (PM Peak Hour)
- Eastbound left turn at 6<sup>th</sup> St & Mountain Ave (PM Peak Hour)

Table 3.4.5: Mountain Avenue Interchange  
Alternative 1 (No Build) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
241	7 <sup>th</sup> St/ Shopping Center & Mountain Ave	Sig	NBL	230	102	Yes	246	No	92	Yes	222	Yes
			NBT	290	222	Yes	692	No	445	No	969	No
			NBR	290	25	Yes	25	Yes	25	Yes	25	Yes
			SBL	200	25	Yes	25	Yes	25	Yes	25	Yes
			SBTR	670	275	Yes	504	Yes	319	Yes	752	No
			EBL	150	93	Yes	311	No	121	Yes	302	No
			EBT	660	48	Yes	116	Yes	54	Yes	106	Yes
			EBR	660	98	Yes	77	Yes	112	Yes	77	Yes
			WBL	100	67	Yes	102	No	73	Yes	102	No
			WBLTR	100	67	Yes	102	No	73	Yes	102	No
242	I-10 WB Ramp & Mountain Ave	Sig	NBL	240	239	Yes	273	No	295	No	295	No
			NBT	240	286	No	198	Yes	180	Yes	284	No
			SBT	290	165	Yes	704	No	549	No	892	No
			SBR	290	417	No	60	Yes	512	No	77	Yes
243	I-10 EB Ramp & Mountain Ave	Sig	NBT	305 <sup>1</sup>	121	Yes	216	Yes	169	Yes	263	Yes
			NBR	510	29	Yes	25	Yes	25	Yes	25	Yes
			SBL	240	155	Yes	229	Yes	185	Yes	238	Yes
			SBT	240	149	Yes	510	No	196	Yes	434	No
244	6th St & Mountain Ave	Sig	NBL	100	25	Yes	41	Yes	28	Yes	46	Yes
			NBTR	590	280	Yes	316	Yes	330	Yes	346	Yes
			SBL	200	40	Yes	73	Yes	44	Yes	67	Yes
			SBT	510	102	Yes	333	Yes	313	Yes	501	Yes
			SBR	510	25	Yes	25	Yes	25	Yes	25	Yes
			EBL	100	70	Yes	119	No	83	Yes	115	No
			EBTR	213	76	Yes	142	Yes	86	Yes	141	Yes
			WBL	200	118	Yes	163	Yes	128	Yes	170	Yes
			WBTR	575	57	Yes	71	Yes	72	Yes	73	Yes
			NBL	100	25	Yes	41	Yes	28	Yes	46	Yes
			NBTR	590	280	Yes	316	Yes	330	Yes	346	Yes

<sup>1</sup> 2 through lanes with storage lengths of 100' each lane and 2 through lanes with storage lengths of 510' each lane. The average available storage is 305 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

As shown in **Table 3.4.5**, the following additional movement is expected to exceed the available storage under year 2045 Alternative 1 (No Build) conditions:

- Southbound shared through/right at 7<sup>th</sup> Street/Shopping Center & Mountain Ave (PM Peak Hour)

Peak hour vehicle queues for freeway off-ramps at the Mountain Avenue interchange for years 2025 and 2045 under Alternative 1 (No Build) conditions are summarized in **Table 3.4.6**. As shown in the table, the expected 95<sup>th</sup> percentile queue for the westbound right turn movement at the westbound off-ramp to Mountain Avenue exceeds the average available storage length of 305 feet per lane. The expected queue is 323 feet per lane during the morning peak hour and 528 feet per lane during the evening peak hour for year 2025. Under year 2045, the 95<sup>th</sup> percentile queue increases to 430 feet per lane during the morning peak hour and 615 feet per lane during the evening peak hour. For the eastbound right turn movement at the eastbound off-ramp to Mountain Avenue, the expected 95<sup>th</sup> percentile queue exceeds the available storage length of 300 feet during the evening peak hour for both years 2025 and 2045. The expected queue is 542 feet for year 2025 and 540 feet for year 2045.

In year 2045 the projected queue for the right turn lane on the westbound off-ramp is expected to exceed the available storage resulting in a storage blockage for the westbound left turn vehicles. Under this condition, the estimated longest queue is approximately 1,110 feet during the morning peak hour and 1,719 during the evening peak hour. The length of the ramp from the stop bar to the gore point is approximately 980 feet. In comparing the estimated longest queue and the length of the ramp, vehicles are expected to queue onto the freeway mainline.

Similarly, the year 2045 queue for the right turn lane on the eastbound off-ramp is expected to exceed the available storage resulting in a storage blocked for the eastbound left turn vehicles. Under this condition, the estimated longest queue is approximately 891 feet during the morning peak hour. The length of the ramp from the stop bar to the gore point is approximately 930 feet, leaving approximately 39 feet from the back of the queue to the gore point.

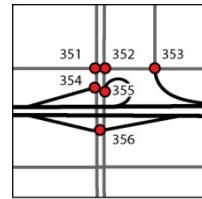
Table 3.4.6: Mountain Avenue Interchange Alternative 1 (No Build) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
242	I-10 WB Ramp & Mountain Ave	Sig	WBL	375	193	Yes	360	Yes	221	Yes	348	Yes
			WBLT	980	195	Yes	369	Yes	223	Yes	355	Yes
			WBR	305 <sup>1</sup>	323	No	528	No	430	No	615	No
243	I-10 EB Ramp & Mountain Ave	Sig	EBL	300	165	Yes	289	Yes	202	Yes	395	No
			EBLT	930	166	Yes	291	Yes	203	Yes	395	Yes
			EBR	300	194	Yes	542	No	245	Yes	540	No

<sup>1</sup> 1<sup>st</sup> storage lane is 235' and 2<sup>nd</sup> storage lane is 375'. The average available storage is 305 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

### 3.4.3 Euclid Avenue Interchange Analysis

Under Alternative 1 (No Build) for years 2025 and 2045, the study intersections are expected to operate at LOS C or better during the morning and evening peak hours except for two intersections: the I-10 EB Ramp/Euclid Avenue and 7<sup>th</sup> Street/I-10 WB Off-Ramp/2<sup>nd</sup> Avenue intersections. In year 2025, the I-10 EB Ramp and Euclid Avenue intersection is expected to operate at LOS D and F during the morning and evening peak hours, respectively. For the intersection of 7<sup>th</sup> Street and I-10 WB Off-Ramp/2<sup>nd</sup> Avenue, LOS C and F are expected during the morning and evening peak hours, respectively. In year 2045, both intersections are expected to further deteriorate. The intersection of I-10 EB Ramp and Euclid Avenue is anticipated to operate at LOS F during the morning and evening peak hours and the intersection of 7<sup>th</sup> Street and I-10 WB Off-Ramp/2<sup>nd</sup> Avenue is anticipated to operate at LOS E and F during the morning and evening peak hours, respectively. For the uncontrolled intersections, the d/c ratio ranges from 0.29 to 0.50. A summary of LOS, d/c and average vehicle delay for Alternative 1 (No Build) conditions at the Euclid Avenue interchange study intersections is provided in **Table 3.4.7**.



**Table 3.4.7: Euclid Avenue Interchange**  
**Alternative 1 (No Build) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
351	7 <sup>th</sup> St	SB Euclid Ave	Sig	0.79	22.8	C	0.78	21.8	C	0.95	32.8	C	0.9	29.6	C	
352	7 <sup>th</sup> St	NB Euclid Ave	Sig	0.60	12.9	B	0.83	17.8	B	0.69	13.6	B	0.95	20.4	C	
353	7 <sup>th</sup> St	I-10 WB Off-Ramp/2nd Ave	AWS	0.55	21.1	C	<b>0.70</b>	<b>50.1</b>	F	0.63	35.2	E	<b>0.78</b>	<b>98.1</b>	F	
354	I-10 WB On-Ramp	SB Euclid Ave	UC <sup>1</sup>	0.45	--	--	0.39	--	--	0.50	--	--	0.43	--	--	
355	I-10 WB Loop On-Ramp	NB Euclid Ave	UC <sup>1</sup>	0.29	--	--	0.32	--	--	0.31	--	--	0.35	--	--	
356	I-10 EB Ramps	Euclid Ave	Sig	1.00	53.6	D	<b>1.14</b>	<b>92.1</b>	F	<b>1.23</b>	<b>92.5</b>	F	<b>1.39</b>	<b>156.7</b>	F	

<sup>1</sup> For uncontrolled movements the d/c was calculated based on a saturation flow rate of 1,500 vehicles per hour. Average delay and LOS are not calculated for these intersections, denoted with double dashes (--).

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 1 (No Build) conditions are presented in **Table 3.4.8**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements are expected to exceed the available storage under year 2025 Alternative 1 (No Build) conditions and the same movements are expected to exceed the available storage in year 2045:

- Southbound shared left/through/right at 7<sup>th</sup> Street & SB Euclid Ave (AM Peak Hour)
- Westbound left turn at 7<sup>th</sup> St & SB Euclid Ave (AM Peak Hour)
- Westbound through at 7<sup>th</sup> St & SB Euclid Ave (AM and PM Peak Hours)
- Eastbound through at 7<sup>th</sup> St & NB Euclid Ave (PM Peak Hour)

- Northbound through at I-10 EB Ramp & Euclid Ave (PM Peak Hour)
- Northbound right turn at I-10 EB Ramp & Euclid Ave (AM and PM Peak Hours)
- Southbound left turn at I-10 EB Ramp & Euclid Ave (AM and PM Peak Hours)

Queuing analysis for the I-10 WB on-ramp from SB Euclid and NB Euclid were not conducted since there are no conflicting movements at these locations.

**Table 3.4.8: Euclid Avenue Interchange**  
**Alternative 1 (No Build) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
351	7 <sup>th</sup> St & SB Euclid Ave	Sig	SBLTR	605	616	<u>No</u>	488	Yes	873	<u>No</u>	748	<u>No</u>
			EBTR	284	186	Yes	117	Yes	245	Yes	123	Yes
			WBL	60	117	<u>No</u>	26	Yes	402	<u>No</u>	25	Yes
			WBT	60	89	<u>No</u>	88	<u>No</u>	73	<u>No</u>	78	<u>No</u>
352	7 <sup>th</sup> St & NB Euclid Ave	Sig	NBLTR	605	121	Yes	97	Yes	0	Yes	87	Yes
			EBL	60	25	Yes	50	Yes	25	Yes	53	Yes
			EBT	60	25	Yes	80	<u>No</u>	25	Yes	71	<u>No</u>
			WBTR	660	304	Yes	528	Yes	410	Yes	642	Yes
353	7 <sup>th</sup> St & I-10 WB Off Ramp /2 <sup>nd</sup> St	AWS <sup>1</sup>	EBLT	648	--	--	--	--	--	--	--	--
			WBTR	279	--	--	--	--	--	--	--	--
356	I-10 EB Ramps & Euclid Ave	Sig	NBT	602	551	Yes	690	<u>No</u>	693	<u>No</u>	880	<u>No</u>
			NBR	100	298	<u>No</u>	323	<u>No</u>	344	<u>No</u>	324	<u>No</u>
			SBL	300	865	<u>No</u>	873	<u>No</u>	990	<u>No</u>	1,051	<u>No</u>
			SBT	605	38	Yes	78	Yes	43	Yes	66	Yes

<sup>1</sup>-- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

Peak hour vehicle queues for freeway off-ramps at the Euclid Avenue interchange for years 2025 and 2045 under Alternative 1 (No Build) conditions are summarized in **Table 3.4.9**. As shown in the table, the expected 95<sup>th</sup> percentile queue for the eastbound left and right turn movements at the eastbound off-ramp to Euclid Avenue exceeds the available storage length. The eastbound left turn movement exceeds the average available storage length of 628 feet during the evening peak hour in year 2045. The 95<sup>th</sup> percentile queue expected for this movement is 725 feet during the evening peak hour. For the eastbound right turn movement, the expected 95<sup>th</sup> percentile queue exceeds the available storage of 225 feet during the morning and evening peak hours in both years 2025 and 2045. In year 2025, the expected 95<sup>th</sup> percentile queue is 409 feet during the morning peak hour and 667 feet during the evening peak hour. For year 2045, the expected 95<sup>th</sup> percentile queue is 661 feet during the morning peak hour and 883 feet during the evening peak hour.

Table 3.4.9: Euclid Avenue Interchange Alternative 1 (No Build) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
353	7 <sup>th</sup> St & I-10 WB Off-Ramp/ 2nd Ave	AWS <sup>2</sup>	NBL	350	--	--	--	--	--	--	--	
			NBLTR	980	--	--	--	--	--	--	--	
356	I-10 EB Ramps & Euclid Ave	Sig	EBL	628 <sup>1</sup>	393	Yes	611	Yes	415	Yes	725	
			EBR	225	409	No	667	No	661	No	883	

<sup>1</sup> 1<sup>st</sup> storage lane is 355' and 2<sup>nd</sup> lane extends 900' to the beginning of the painted gore'. The average available storage is 628 feet per lane.

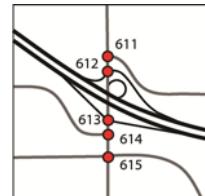
Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

<sup>2</sup>-- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

In year 2045 the projected queue for the right turn lane on the eastbound off-ramp is expected to exceed the available storage resulting in a storage blocked for the eastbound left turn vehicles. Under this condition, the estimated longest queue is approximately 1,045 feet during the morning peak hour and 1,750 during the evening peak hour. The length of the ramp from the stop bar to the gore point is approximately 900 feet. In comparing the estimated longest queue and the length of the ramp, vehicles are expected to queue onto the freeway mainline during the morning and evening peak hours.

### 3.4.4 Vineyard Avenue Interchange Analysis

Alternative 1 (No Build) conditions analysis assumes the Vineyard Avenue Widening Project to be constructed by year 2030. Based on the Vineyard Avenue Widening Project, the following improvements have been included as part of the analysis for year 2045:



#### Vineyard Avenue Widening Project (4<sup>th</sup> Street to I-10) – RTP# 4A01222

- Add a 2<sup>nd</sup> exclusive through lane on the northbound approach at the intersection of Vineyard Avenue and Inland Empire Boulevard (Intersection #611)
- Add a 2<sup>nd</sup> exclusive through lane on the southbound approach at the intersection of Vineyard Avenue and Inland Empire Boulevard (Intersection #611)
- Convert the existing exclusive right turn lane to a shared through/right lane on the northbound approach at the intersection of Vineyard Avenue and I-10 WB Ramps (Intersection #612)
- Add a 3<sup>rd</sup> exclusive through lane on the southbound approach at the intersection of Vineyard Avenue and I-10 WB Ramps (Intersection #612)

Differences between existing and Alternative 1 (No Build) intersection lane configurations at the Vineyard Avenue interchange are highlighted in **Figure 3.4.4** for year 2045.

Under Alternative 1 (No Build) for years 2025 and 2045, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours except for the I-10 EB Ramp and Vineyard Avenue intersection. In year 2045, the I-10 EB Ramp and Vineyard Avenue intersection is expected to operate at LOS E during the morning peak hour. A summary of LOS, d/c and average vehicle delay for Alternative 1 (No Build) conditions at the Vineyard Avenue interchange study intersections is provided in **Table 3.4.10**.

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 1 (No Build) conditions are presented in **Table 3.4.11**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements are expected to exceed the available storage under year 2025 Alternative 1 (No Build) conditions:

- Northbound shared through/right at Inland Empire Blvd & Vineyard Ave (PM Peak Hour)
- Eastbound shared left/through/right at Inland Empire Blvd & Vineyard Ave (PM Peak Hour)
- Northbound through at I-10 WB Ramps & Vineyard Ave (PM Peak Hour)
- Southbound through at I-10 WB Ramps & Vineyard Ave (AM and PM Peak Hours)
- Southbound left turn at I-10 EB Ramps & Vineyard Ave (AM and PM Peak Hours)
- Southbound through at G St & Vineyard Ave (AM Peak Hour)
- Southbound left turn at D St & Vineyard Ave (PM Peak Hour)
- Eastbound left turn at D St & Vineyard Ave (AM and PM Peak Hours)

As shown in **Table 3.4.11**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 1 (No Build) conditions:

- Northbound shared through/right at I-10 EB & Vineyard Ave (AM and PM Peak Hours)
- Eastbound left/right turn at G St & Vineyard Ave (AM Peak Hour)

Table 3.4.10: Vineyard Avenue Interchange Alternative 1 (No Build) Intersection Levels of Service – AM/PM Peak Hours																
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
611	Inland Empire Blvd	Vineyard Ave	Sig	0.63	8.9	A	0.82	12.0	B	0.57	8.2	A	0.67	10.8	B	
612	I-10 WB Ramps	Vineyard Ave	Sig	0.83	14.5	B	1.05	36.8	D	0.87	20.8	C	1.10	44.3	D	
613	I-10 EB Ramps	Vineyard Ave	Sig	0.95	29.7	C	0.89	18.7	B	1.12	61.9	E	1.09	41.5	D	
614	G St	Vineyard Ave	Sig	0.65	12.2	B	0.54	9.8	A	0.81	18.2	B	0.66	12.2	B	
615	D St	Vineyard Ave	Sig	0.63	16.1	B	0.71	23.7	C	0.74	20.0	C	0.90	31.5	C	

Table 3.4.11: Vineyard Avenue Interchange  
Alternative 1 (No Build) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
611	Inland Empire Blvd & Vineyard Ave	Sig	NBL	140	25	Yes	25	Yes	25	Yes	25	Yes
			NBTR	250	133	Yes	264	No	131	Yes	178	Yes
			SBL	150	115	Yes	80	Yes	114	Yes	65	Yes
			SBTR	915	357	Yes	300	Yes	249	Yes	269	Yes
			EBLTR	74	72	Yes	78	No	83	No	71	Yes
			WBL	165	48	Yes	101	Yes	60	Yes	146	Yes
			WBLT	5,500 <sup>1</sup>	48	Yes	102	Yes	60	Yes	149	Yes
			WBR	5,500 <sup>1</sup>	36	Yes	47	Yes	39	Yes	49	Yes
612	I-10 WB Ramps & Vineyard Ave	Sig	NBT	525	63	Yes	666	No	124	Yes	331	Yes
			NBR	345	0	Yes	0	Yes	--	--	--	--
			SBT	250	441	No	525	No	495	No	456	No
			SBR	240	25	Yes	31	Yes	51	Yes	228	Yes
613	I-10 EB Ramps & Vineyard Ave	Sig	NBTR	265	260	Yes	124	Yes	539	No	759	No
			SBL	525	509	No	353	No	786	No	548	No
			SBT	525	102	Yes	134	Yes	122	Yes	162	Yes
614	G St & Vineyard Ave	Sig	NBL	150	25	Yes	77	Yes	25	Yes	73	Yes
			NBT	515	82	Yes	114	Yes	90	Yes	166	Yes
			SBT	265	277	No	155	Yes	436	No	407	No
			SBR	100	31	Yes	30	Yes	48	Yes	93	Yes
			EBLR	170	162	Yes	140	Yes	280	No	167	Yes
			EBR	100	25	Yes	32	Yes	37	Yes	34	Yes
615	D St & Vineyard Ave	Sig	NBL	125	48	Yes	63	Yes	76	Yes	77	Yes
			NBTR	1,180 <sup>1</sup>	146	Yes	376	Yes	225	Yes	450	Yes
			SBL	150	107	Yes	216	No	167	No	317	No
			SBTR	430 <sup>2</sup>	25	Yes	25	Yes	214	Yes	127	Yes
			EBL	125	209	No	243	No	296	No	436	No
			EBTR	635	50	Yes	32	Yes	75	Yes	41	Yes
			WBL	125	29	Yes	34	Yes	33	Yes	44	Yes
			WBT	1,230 <sup>1</sup>	26	Yes	66	Yes	31	Yes	90	Yes
			WBR	1,230 <sup>1</sup>	32	Yes	64	Yes	34	Yes	69	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

<sup>2</sup> 2 through lanes with storage lengths of 515' each lane and 1 lane with storage length of 260'. The average available storage is 430 feet per lane.

Note: The 95<sup>th</sup> percentile queues are compared to a lane group's average lane length.

Peak hour vehicle queues for freeway off-ramps at the Vineyard Avenue interchange for years 2025 and 2045 under Alternative 1 (No Build) conditions are summarized in **Table 3.4.12**. As shown in the table,

the expected 95<sup>th</sup> percentile queue for the westbound left turn movement at the westbound off-ramp to Vineyard Avenue exceeds the available storage length of 175 feet. The expected queue is 236 feet during the morning peak hour and 373 feet during the evening peak hour for year 2025. In year 2045, the 95<sup>th</sup> percentile queue increases to 293 feet during the morning peak hour and 425 feet during the evening peak hour. For the eastbound left turn movement at the eastbound off-ramp to Vineyard Avenue, the expected 95<sup>th</sup> percentile queue exceeds the available storage length of 370 feet during the morning peak hour for year 2045. The expected queue is 483 feet. The eastbound right turn movement at the eastbound off-ramp to Vineyard Avenue is expected to exceed the available storage length of 380 feet during the morning peak hour under year 2045. The expected queue is 400 feet.

The 95<sup>th</sup> percentile queue for the westbound right turn movement at the westbound off-ramp to Vineyard Avenue is 627 feet during the morning peak hour and 1,034 feet for the evening peak hour in year 2045. The available storage length for this movement accommodates the 95<sup>th</sup> percentile queue for both peak hours. However, the queues for both the morning and evening peak hours are longer than the 175 feet left turn lane resulting in storage blockage for the westbound left turn movement. Under this condition, the estimated longest queue is approximately 839 feet during the morning peak hour and 1,387 feet during the evening peak hour. The length of the ramp from the stop bar to the gore point is approximately 1,475 feet, leaving approximately 636 feet during the morning peak hour and 88 feet during the evening peak hour from the back of the queue to the gore point.

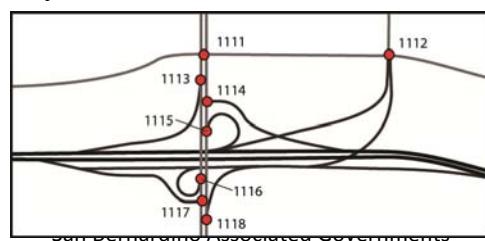
For the eastbound off-ramp to Vineyard Avenue, storage blockage due to inadequate available storage length is also expected during the morning peak hour. As shown in **Table 3.4.12**, the 95<sup>th</sup> percentile queue for the eastbound left turn movement and the eastbound right turn movement during the morning peak hour are anticipated to extend beyond the available storage. Under this condition, the estimated longest queue is approximately 567 feet during the morning peak hour. The length of the ramp from the stop bar to the gore point is approximately 1,050 feet, leaving approximately 483 feet from the back of the queue to the gore point.

**Table 3.4.12: Vineyard Avenue Interchange**  
**Alternative 1 (No Build) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control Sig	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
612	I-10 WB Ramps & Vineyard Ave	Sig	WBL	175	236	<u>No</u>	373	<u>No</u>	293	<u>No</u>	425	<u>No</u>
			WBR	1,475	386	Yes	884	Yes	627	Yes	1,034	Yes
613	I-10 EB Ramps & Vineyard Ave	Sig	EBL	370	314	Yes	212	Yes	483	<u>No</u>	272	Yes
			EBLTR	1,050	238	Yes	160	Yes	435	Yes	184	Yes
			EBR	380	215	Yes	77	Yes	400	<u>No</u>	166	Yes

### 3.4.5 Etiwanda Avenue/Commerce Drive Interchange Analysis

Alternative 1 (No Build) conditions analysis assumes the Etiwanda Avenue Widening Project to be constructed by year 2014. Based on the Etiwanda Avenue Widening Project, the



following improvements have been included as part of the analysis for years 2025 and 2045:

Etiwanda Avenue Widening Project (Riverside County Line to I-10) – RTP# SBD031228

- Add a 3<sup>rd</sup> exclusive through lane on the southbound approach at the intersection of Etiwanda Avenue and I-10 EB Loop On-Ramp (Intersection #1116)
- Add a 3<sup>rd</sup> exclusive through lane on the southbound approach at the intersection of Etiwanda Avenue and I-10 EB Off-Ramp (Intersection #1117)
- Add a 2<sup>nd</sup> exclusive through lane on the northbound approach at the intersection of Etiwanda and I-10 EB Slip On-Ramp (Intersection #1118)
- Add a 3<sup>rd</sup> exclusive through lane on the southbound approach at the intersection of Etiwanda Avenue and I-10 EB Slip On-Ramp (Intersection #1118)

Differences between existing and Alternative 1 (No Build) intersection lane configurations at the Etiwanda Avenue/Commerce Drive interchange are highlighted in **Figure 3.4.2** for year 2025 and **Figure 3.4.4** for year 2045.

Under Alternative 1 (No Build) for years 2025 and 2045, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours. For the uncontrolled intersections, the d/c ratio ranges from 0.06 to 0.52. A summary of LOS, d/c and average vehicle delay for Alternative 1 (No Build) conditions at the Etiwanda Avenue/Commerce Drive interchange study intersections is provided in **Table 3.4.13**.

**Table 3.4.13: Etiwanda Avenue/Commerce Drive Interchange**  
**Alternative 1 (No Build) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
1111	Valley Blvd/Ontario Mills Pkwy	Etiwanda Ave	Sig	0.44	18.7	B	0.56	22.6	C	0.45	18.6	B	0.63	26.2	C	
1112	Valley Blvd	Commerce Dr	Sig	0.30	34.0	C	0.39	31.7	C	0.36	33.6	C	0.48	36.2	D	
1113	I-10 WB On-Ramp	SB Etiwanda Ave	UC <sup>1</sup>	0.24	--	--	0.41	--	--	0.29	--	--	0.39	--	--	
1114	I-10 WB Off-Ramp	Etiwanda Ave	Sig	0.50	15.2	B	0.52	12.7	B	0.53	16.0	B	0.58	15.3	B	
1115	I-10 WB On-Ramp	NB Etiwanda Ave	UC <sup>1</sup>	0.23	--	--	0.40	--	--	0.26	--	--	0.44	--	--	
1116	I-10 EB On-Ramp	SB Etiwanda Ave	UC <sup>1</sup>	0.06	--	--	0.17	--	--	0.06	--	--	0.18	--	--	
1117	I-10 EB Off-Ramp	Etiwanda Ave	Sig	0.62	17.4	B	0.46	10.4	B	0.68	18.6	B	0.51	12.1	B	
1118	I-10 EB On-Ramp	NB Etiwanda Ave	UC <sup>1</sup>	0.15	--	--	0.45	--	--	0.18	--	--	0.52	--	--	

<sup>1</sup>For uncontrolled movements the d/c was calculated based on a saturation flow rate of 1,500 vehicles per hour. Average delay and LOS are not calculated for these intersections, denoted with double dashes (--).

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 1 (No Build) conditions are presented in **Table 3.4.14**. In

comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage. Queuing analysis was not conducted for uncontrolled intersections that do not have conflicting movements.

Table 3.4.14: Etiwanda Avenue/Commerce Drive Interchange Alternative 1 (No Build) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
1111	Valley Blvd/Ontario Mills Pkwy & Etiwanda Ave	Sig	NBL	300	107	Yes	51	Yes	93	Yes	34	Yes
			NBT R	670	47	Yes	173	Yes	61	Yes	138	Yes
			SBL	250	35	Yes	66	Yes	45	Yes	196	Yes
			SBTR	1,070 <sup>1</sup>	178	Yes	209	Yes	205	Yes	201	Yes
			EBL	200	25	Yes	76	Yes	25	Yes	118	Yes
			EBT	775	25	Yes	48	Yes	25	Yes	97	Yes
			EBR	775	39	Yes	120	Yes	35	Yes	58	Yes
			WBL	250	66	Yes	63	Yes	71	Yes	117	Yes
			WBT	1,450 <sup>1</sup>	25	Yes	26	Yes	25	Yes	64	Yes
			WBR	1,450 <sup>1</sup>	25	Yes	25	Yes	25	Yes	144	Yes
1112	Valley Blvd & Commerce Dr	Sig	SBL	300	31	Yes	26	Yes	31	Yes	35	Yes
			SBTR	2,115 <sup>1</sup>	48	Yes	58	Yes	48	Yes	36	Yes
			EBL	220	25	Yes	39	Yes	25	Yes	57	Yes
			EBT	850	29	Yes	95	Yes	36	Yes	234	Yes
			EBR	850	0	Yes	25	Yes	0	Yes	27	Yes
			WBL	270	111	Yes	149	Yes	125	Yes	177	Yes
			WBT	770	65	Yes	105	Yes	97	Yes	176	Yes
			WBR	770	25	Yes	25	Yes	25	Yes	10	Yes
1114	I-10 WB Off-Ramp & Etiwanda Ave	Sig	NBT	850	49	Yes	78	Yes	70	Yes	104	Yes
			SBT	730	60	Yes	59	Yes	101	Yes	68	Yes
1117	I-10 EB Off-Ramp & Etiwanda Ave	Sig	NBT	315	166	Yes	194	Yes	163	Yes	245	Yes
			SBT	850	151	Yes	38	Yes	163	Yes	60	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

Peak hour vehicle queues for freeway off-ramps at the Etiwanda Avenue/Commerce Drive interchange for years 2025 and 2045 under Alternative 1 (No Build) conditions are summarized in **Table 3.4.15**. As shown in the table, none of the queues are expected to exceed the available storage.

**Table 3.4.15: Etiwanda Avenue/Commerce Drive Interchange  
Alternative 1 (No Build) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
1112	Valley Blvd & Commerce Dr/I-10 EB Off-Ramp	Sig	NBL	550 <sup>1</sup>	30	Yes	27	Yes	37	Yes	31	Yes
			NBT	900	127	Yes	147	Yes	133	Yes	139	Yes
			NBR	900	88	Yes	95	Yes	91	Yes	183	Yes
1114	I-10 WB Off- Ramp & Etiwanda Ave	Sig	WBL	650	319	Yes	214	Yes	333	Yes	277	Yes
			WBR	1,200 <sup>2</sup>	28	Yes	69	Yes	43	Yes	88	Yes
1117	I-10 EB Off- Ramp & Etiwanda Ave	Sig	EBL	1,000 <sup>3</sup>	50	Yes	56	Yes	57	Yes	63	Yes
			EBR	470	321	Yes	136	Yes	350	Yes	171	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 200' and 2<sup>nd</sup> storage lane is 900'. The average available storage is 550 feet per lane.

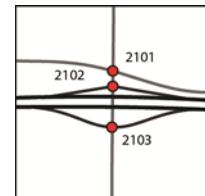
<sup>2</sup> 1<sup>st</sup> storage lane is 400' and 2<sup>nd</sup> lane extends 2,000' to the beginning of the painted gore'. The average available storage is 1,200 feet per lane.

<sup>3</sup> 1<sup>st</sup> storage lane is 470' and 2<sup>nd</sup> lane extends 1,530' to the beginning of the painted gore'. The average available storage is 1,000 feet per lane.

Note: The 95<sup>th</sup> percentile queues are compared to a lane group's average lane length.

### 3.4.6 Pepper Avenue Interchange Analysis

Alternative 1 (No Build) conditions analysis assumes the I-10/Pepper Avenue Interchange Project and Pepper Avenue Widening Project to be constructed by year 2020. Based on the improvement projects, the following improvements have been included as part of the analysis for years 2025 and 2045:



#### I-10/Pepper Avenue Bridge Replacement

- Add a 2<sup>nd</sup> exclusive left turn lane on the northbound approach at the intersection of Pepper Avenue and Valley Boulevard (Intersection #2101)
- Convert the existing exclusive southbound right turn lane to a shared through/right lane at the intersection of Pepper Avenue and Valley Boulevard (Intersection #2101)
- Add a 2<sup>nd</sup> exclusive through lane on the northbound approach at the intersection of Pepper Avenue and I-10 WB Ramps (Intersection #2102)
- Add a 2<sup>nd</sup> exclusive through lane on the southbound approach at the intersection of Pepper Avenue and I-10 WB Ramps (Intersection #2102)
- Add a 2<sup>nd</sup> exclusive through lane on the northbound approach at the intersection of Pepper Avenue and I-10 EB Ramps (Intersection #2103)
- Add a 2<sup>nd</sup> exclusive left turn lane on the southbound approach at the intersection of Pepper Avenue and I-10 EB Ramps (Intersection #2103)

Widen Pepper Avenue from Slover Avenue to Valley Boulevard from 2 to 4 Lanes – RTP# 4A07200

- Add a 2<sup>nd</sup> exclusive through lane on the southbound approach at the intersection of Pepper Avenue and I-10 EB Ramps (Intersection #2103)

Differences between existing and Alternative 1 (No Build) intersection lane configurations at the Pepper Avenue interchange are highlighted in **Figure 3.4.2** for year 2025 and **Figure 3.4.4** for year 2045.

Under Alternative 1 (No Build) for years 2025 and 2045, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 1 (No Build) conditions at the Pepper Avenue interchange study intersections is provided in **Table 3.4.16**.

Table 3.4.16: Pepper Avenue Interchange Alternative 1 (No Build) Intersection Levels of Service – AM/PM Peak Hours																
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
2101	Valley Blvd	Pepper Ave	Sig	0.62	38.6	D	0.60	28.1	C	0.60	31.0	C	0.58	30.6	C	
2102	I-10 WB Ramps	Pepper Ave	Sig	0.50	24.9	C	0.42	21.3	C	0.64	28.8	C	0.61	23.2	C	
2103	I-10 EB Ramps	Pepper Ave	Sig	0.59	28.6	C	0.52	34.1	C	0.64	25.0	C	0.65	30.2	C	

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 1 (No Build) conditions are presented in **Table 3.4.17**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movement is expected to exceed the available storage under year 2025 Alternative 1 (No Build) conditions:

- Southbound left turn at I-10 EB Ramp & Pepper Ave (AM and PM Peak Hours)

As shown in **Table 3.4.17**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 1 (No Build) conditions:

- Westbound left turn at Valley Blvd & Pepper Ave (AM Peak Hour)
- Southbound through at I-10 WB Ramps & Pepper Ave (AM Peak Hour)
- Southbound right turn at I-10 WB Ramps & Pepper Ave (AM Peak Hour)

**Table 3.4.17: Pepper Avenue Interchange**  
**Alternative 1 (No Build) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2101	Valley Blvd & Pepper Ave	Sig	NBL	198 <sup>1</sup>	169	Yes	177	Yes	96	Yes	147	Yes
			NBT	340	131	Yes	112	Yes	93	Yes	151	Yes
			NBR	98	27	Yes	28	Yes	25	Yes	41	Yes
			SBL	230	45	Yes	50	Yes	52	Yes	60	Yes
			SBTR	575	194	Yes	219	Yes	283	Yes	307	Yes
			EBL	240	36	Yes	42	Yes	46	Yes	59	Yes
			EBT	300	108	Yes	165	Yes	108	Yes	180	Yes
			EBR	320	98	Yes	53	Yes	71	Yes	59	Yes
			WBL	220	202	Yes	110	Yes	220	No	97	Yes
			WBTR	1,330 <sup>2</sup>	68	Yes	105	Yes	95	Yes	145	Yes
2102	I-10 WB Ramps & Pepper Ave	Sig	NBL	125	25	Yes	25	Yes	33	Yes	25	Yes
			NBT	410	286	Yes	115	Yes	194	Yes	215	Yes
			SBT	340	127	Yes	93	Yes	402	No	125	Yes
			SBR	340	101	Yes	329	Yes	409	No	116	Yes
2103	I-10 EB Ramps & Pepper Ave	Sig	NBT	1,700 <sup>2</sup>	123	Yes	105	Yes	128	Yes	230	Yes
			NBR	132	25	Yes	44	Yes	25	Yes	52	Yes
			SBL	200	315	No	286	No	235	No	226	No
			SBT	410	0	Yes	25	Yes	25	Yes	25	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 152' and 2<sup>nd</sup> storage lane is 244'. The average available storage is 198 feet per lane.

<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

Peak hour vehicle queues for freeway off-ramps at the Pepper Avenue interchange for years 2025 and 2045 under Alternative 1 (No Build) conditions are summarized in **Table 3.4.18**. As shown in the table, the expected 95<sup>th</sup> percentile queue for the exclusive westbound right turn lane at the westbound off-ramp to Pepper Avenue exceeds the average available storage length of 200 feet during the morning and evening peak hour for year 2045. The expected queue is 247 feet during the morning peak hour and 293 feet during the evening peak hour for year 2045.

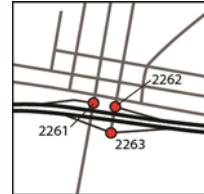
The 95<sup>th</sup> percentile queue for the shared left/through/right lane from the westbound exit ramp at Pepper Avenue is 245 feet during the morning peak hour and 302 feet for the evening peak hour. The available storage length for this movement accommodates the 95<sup>th</sup> percentile queue for both peak hours. However, the queues for both the morning and evening peak hours are longer than the 200 foot right turn lane resulting in storage blockage for the exclusive westbound right turn lane. Under this condition, the estimated longest queue is approximately 290 feet during the morning peak hour and 401 feet during the evening peak hour. The length of the ramp from the stop bar to the gore point is approximately 1,140 feet, leaving approximately 850 feet during the morning peak hour and 739 feet during the evening peak hour from the back of the queue to the gore point.

**Table 3.4.18: Pepper Avenue Interchange**  
**Alternative 1 (No Build) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
2102	I-10 WB Ramps & Pepper Ave	Sig	WBLTR	1,140	167	Yes	178	Yes	245	Yes	302	Yes
			WBR	200	161	Yes	177	Yes	247	No	293	No
2103	I-10 EB Ramps & Pepper Ave	Sig	EBL	1,175	210	Yes	234	Yes	285	Yes	277	Yes
			EBLTR	770	194	Yes	228	Yes	218	Yes	254	Yes

### 3.4.7 La Cadena Drive/9<sup>th</sup> Street Interchange Analysis

Alternative 1 (No Build) conditions analysis assumes the La Cadena Drive/9<sup>th</sup> Street Eastbound Ramp Entrance Widening Project to be constructed by year 2014. Based on the La Cadena Drive/9<sup>th</sup> Street Eastbound Ramp Entrance Widening Project, the following improvement has been included as part of the analysis for years 2025 and 2045:



#### La Cadena Drive/9<sup>th</sup> Street Eastbound Ramp Entrance Widening Project – RTP# 4M04023

- Add an exclusive left turn lane on the southbound approach at the intersection of La Cadena Drive/9<sup>th</sup> Street and I-10 EB Ramps (Intersection #2263)

Differences between existing and Alternative 1 (No Build) intersection lane configurations at the La Cadena Drive/9<sup>th</sup> Street interchange are highlighted in **Figure 3.4.2** for year 2025 and **Figure 3.4.4** for year 2045.

Under Alternative 1 (No Build) for years 2025 and 2045, the study intersections are expected to operate at LOS C or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 1 (No Build) conditions at the La Cadena Drive/9<sup>th</sup> Street interchange study intersections is provided in **Table 3.4.19**.

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 1 (No Build) conditions are presented in **Table 3.4.20**. In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage under years 2025 and 2045 Alternative 1 (No Build) conditions.

Peak hour vehicle queues for freeway off-ramps at the La Cadena Drive/9<sup>th</sup> Street interchange for years 2025 and 2045 under Alternative 1 (No Build) conditions are summarized in **Table 3.4.21**. As shown in the table, none of the 95<sup>th</sup> percentile queues are expected to exceed the available storage length.

Table 3.4.19: La Cadena Drive/9 <sup>th</sup> Street Interchange Alternative 1 (No Build) Intersection Levels of Service – AM/PM Peak Hours																
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
2261	I-10 WB On-Ramp	La Cadena Dr	UC <sup>1</sup>	0.11	4.5	A	0.20	5.7	A	0.14	4.8	A	0.24	6.4	A	
2262	I-10 WB Off-Ramp	9 <sup>th</sup> St	SC <sup>2</sup>	0.43	12.5	B	0.65	16.9	C	0.49	13.3	B	0.80	24.8	C	
2263	I-10 EB Ramps	9 <sup>th</sup> St	AWS	0.23	10.0	B	0.35	11.1	B	0.26	10.9	B	0.38	11.7	B	

<sup>1</sup> The d/c ratio, average delay and LOS for this intersection are for northbound left turn movement only which conflicts with the free southbound through movement.

<sup>2</sup> For two-way stop control (SC) intersection, the average delay and LOS are for the worst stop-controlled approach; the d/c ratio is for the worst stop-controlled movement/approach.

Table 3.4.20: La Cadena Drive/9 <sup>th</sup> Street Interchange Alternative 1 (No Build) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours													
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions				
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	
2261	I-10 WB On-Ramp & La Cadena Dr	UC	NBLT	1,500 <sup>2</sup>	25	Yes	25	Yes	25	Yes	25	Yes	
2263	I-10 EB Ramps & 9 <sup>th</sup> St	AWS <sup>1</sup>	SBL	400	--	--	--	--	--	--	--	--	

<sup>1</sup> -- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

Table 3.4.21: La Cadena Drive/9 <sup>th</sup> Street Interchange Alternative 1 (No Build) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours													
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions				
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	
2262	I-10 WB Off-Ramp & 9 <sup>th</sup> St	SC	WBLR	900	56	Yes	121	Yes	68	Yes	211	Yes	
2263	I-10 EB Ramp & 9 <sup>th</sup> St	AWS <sup>1</sup>	EBLTR	830 <sup>1</sup>	--	--	--	--	--	--	--	--	

<sup>1</sup> -- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

### 3.4.8 Tennessee Street Interchange Analysis

Under Alternative 1 (No Build) for year 2025, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours. In year 2045, the I-10 WB Ramps and Tennessee Street intersection is expected to operate at LOS B during the morning and evening peak hours. The I-10 EB Ramps and Tennessee Street intersection is expected to operate at LOS C and F during the morning and evening peak hours, respectively. A summary of LOS, d/c and average vehicle delay for Alternative 1 (No Build) conditions at the Tennessee Street interchange study intersections is provided in **Table 3.4.22**.

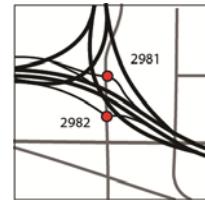


Table 3.4.22: Tennessee Street Interchange Alternative 1 (No Build) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
2981	I-10 WB Ramps	Tennessee St	Sig	0.61	18.0	B	0.51	19.8	B	0.62	15.9	B	0.70	18.0	B
2982	I-10 EB Ramps	Tennessee St	Sig	0.55	15.8	B	0.98	52.9	D	0.68	23.8	C	1.07	81.0	F

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 1 (No Build) conditions are presented in **Table 3.4.23**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements are expected to exceed the available storage under year 2025 Alternative 1 (No Build) conditions:

- Northbound shared through/right at I-10 EB Ramps & Tennessee St (PM Peak Hour)
- Southbound left turn at I-10 EB Ramps & Tennessee St (PM Peak Hour)

Table 3.4.23: Tennessee Street Interchange Alternative 1 (No Build) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2981	I-10 WB Ramps & Tennessee St	Sig	NBL	150	25	Yes	31	Yes	25	Yes	261	No
			NBT	490	25	Yes	55	Yes	25	Yes	52	Yes
			SBTR	1,350 <sup>1</sup>	108	Yes	267	Yes	105	Yes	194	Yes
2982	I-10 EB Ramps & Tennessee St	Sig	NBTR	522	149	Yes	632	No	176	Yes	747	No
			SBL	150	25	Yes	380	No	47	Yes	490	No
			SBT	490	25	Yes	64	Yes	75	Yes	126	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

As shown in **Table 3.4.23**, the following additional movement is expected to exceed the available storage under year 2045 Alternative 1 (No Build) conditions:

- Northbound left turn at I-10 WB Ramps & Tennessee St (PM Peak Hour)

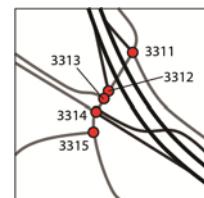
Peak hour vehicle queues for freeway off-ramps at the Tennessee Street interchange for years 2025 and 2045 under Alternative 1 (No Build) conditions are summarized in **Table 3.4.24**. As shown in the table, the expected 95<sup>th</sup> percentile queues for the eastbound left/through lane and the eastbound shared through/right lane at the eastbound off-ramp to Tennessee Street exceed the available storage length of 470 feet during the evening peak hour in years 2025 and 2045. The expected queue for both lanes is 556 feet in year 2025 and 754 feet in year 2045. Since both movements exceed the available storage, storage blockage for both movements is expected to occur. Under this condition, the estimated longest queue is approximately 1,038 feet during the evening peak hour. This represents a worst case condition and assumes that all traffic into the intersection is from the exit ramp and none is from Alabama Street. The distance from the stop bar to the gore point is approximately 1,425 feet, leaving approximately 387 feet from the back of the queue to the freeway gore, assuming the worst case condition.

**Table 3.4.24: Tennessee Street Interchange**  
**Alternative 1 (No Build) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
2981	I-10 WB Ramps & Tennessee St	Sig	WBLT	1,140	92	Yes	115	Yes	99	Yes	118	Yes
			WBTR	690	92	Yes	115	Yes	99	Yes	118	Yes
2982	I-10 EB Ramps & Tennessee St	Sig	EBLT	470	121	Yes	556	No	176	Yes	754	No
			EBTR	470	121	Yes	556	No	176	Yes	754	No

### 3.4.9 Ford Street Interchange Analysis

Alternative 1 (No Build) conditions analysis assumes the Ford Street Signalization Improvement Project to be constructed prior to year 2025 and the Ford Street Widening Project to be constructed by year 2030. Based on the improvement projects, the following improvements have been included as part of the analysis for years 2025 and 2045:



#### Ford Street Signalization Improvement Project – RTP# 2004323

- For year 2025, install a traffic signal at the intersection of Ford Street and I-10 WB On-Ramp (Intersection #3311)
- For year 2025, add a 2<sup>nd</sup> exclusive left turn lane on the northbound approach at the intersection of Ford Street and I-10 WB On-Ramp (Intersection #3311)
- For year 2025, convert exclusive through lane to shared through/right lane on the northbound approach at the intersection of Ford Street and I-10 WB On-Ramp (Intersection #3311)

- For year 2025, remove exclusive right turn lane on the northbound approach at the intersection of Ford Street and I-10 WB On-Ramp (Intersection #3311)

#### Ford Street Widening Project – RTP# 4A01243

- For year 2045, add an exclusive through lane on the southbound approach at the intersection of Ford Street and I-10 WB On-Ramp (Intersection #3311)

Differences between existing and Alternative 1 (No Build) intersection lane configurations at the Ford Street interchange are highlighted in **Figure 3.4.2** for year 2025 and **Figure 3.4.4** for year 2045.

Under Alternative 1 (No Build) for years 2025 and 2045, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours except for the I-10 EB off-ramp and Parkford Drive intersections with Ford Street. The I-10 EB Off-Ramp and Ford Street intersection is expected to operate at LOS F during the evening peak hour in both years 2025 and 2045. The Parkford Drive and Ford Street intersection is expected to operate at LOS E and F during the evening peak hour in years 2025 and 2045, respectively. A summary of LOS, d/c and average vehicle delay for Alternative 1 (No Build) conditions at the Ford Street interchange study intersections is provided in **Table 3.4.25**.

Table 3.4.25: Ford Street Interchange Alternative 1 (No Build) Intersection Levels of Service – AM/PM Peak Hours																
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
3311	Reservoir Rd/I-10 WB On-Ramp	Ford St	Sig	0.89	32.9	C	0.75	20.6	C	0.55	20.9	C	0.50	22.0	C	
3312	I-10 EB Off-Ramp	Ford St	SC <sup>1</sup>	0.71	19.1	C	1.09	85.3	F	0.72	17.4	C	1.07	76.3	F	
3313	Parkford Dr	Ford St	SC <sup>1</sup>	0.47	27.9	D	0.79	48.8	E	0.45	24.9	C	1.18	162.3	F	
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp	Ford St	Sig	0.62	23.3	C	0.48	18.1	B	0.84	35.1	D	1.01	44.0	D	
3315	Oak St	Ford St	SC <sup>1</sup>	0.25	19.1	C	0.12	14.0	B	0.27	20.6	C	0.12	14.6	B	

<sup>1</sup>For two-way stop control intersection, the average delay and LOS are for the worst stop-controlled approach; the d/c ratio is for the worst stop-controlled movement/approach.

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 1 (No Build) conditions are presented in **Table 3.4.29**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements are expected to exceed the available storage under year 2025 Alternative 1 (No Build) conditions:

- Northbound left turn at Reservoir Rd/I-10 WB On-Ramp & Ford St (AM and PM Peak Hours)
- Northbound shared through/right at Reservoir Rd/I-10 WB On-Ramp & Ford St (PM Peak Hour)
- Southbound left turn at Reservoir Rd/I-10 WB On-Ramp & Ford St (AM Peak Hour)
- Northbound left turn at Redlands Blvd/I-10 EB On-Ramp & Ford St (AM Peak Hour)
- Northbound shared through/right at Redlands Blvd/I-10 EB On-Ramp & Ford St (AM and PM Peak Hours)
- Southbound left turn at Redlands Blvd/I-10 EB On-Ramp & Ford St (AM and PM Peak Hours)
- Eastbound left turn at Redlands Blvd/I-10 EB On-Ramp & Ford St (AM Peak Hour)

As shown in **Table 3.4.26**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 1 (No Build) conditions:

- Southbound shared through/right at Redlands Blvd/I-10 EB On-Ramp & Ford St (PM Peak Hour)

Peak hour vehicle queues for freeway off-ramps at the Ford Street interchange for years 2025 and 2045 under Alternative 1 (No Build) conditions are summarized in **Table 3.4.27**. As shown in the table, the expected 95<sup>th</sup> percentile queue for the exclusive westbound left turn lane at the Redlands Blvd/I-10 eastbound on-ramp/I-10 westbound off-ramp/Ford Street intersection exceeds the available storage length of 120 feet during the morning peak hour in year 2045. The expected queue is 135 feet.

The 95<sup>th</sup> percentile queue for the westbound shared through/right movement at the westbound off-ramp to Ford Street is 364 feet during the morning peak hour. The available storage length for this movement accommodates the 95<sup>th</sup> percentile queue. However, the queue during the morning peak hour is longer than the 120 feet left turn lane resulting in storage blockage for the westbound left turn movement. Under this condition, the estimated longest queue is approximately 841 feet during the morning peak hour. The length of the ramp from the stop bar to the gore point is approximately 1,175 feet, leaving approximately 334 feet during the evening peak hour from the back of the queue to the gore point.

**Table 3.4.26: Ford Street Interchange**  
**Alternative 1 (No Build) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
3311	Reservoir Rd/I-10 WB On-Ramp & Ford St	Sig	NBL	100	255	No	126	No	219	No	133	No
			NBTR	280	115	Yes	410	No	143	Yes	328	No
			SBL	45	50	No	29	Yes	41	Yes	48	No
			SBTR	1,215 <sup>1</sup>	524	Yes	181	Yes	175	Yes	82	Yes
			WBLTR	2,160 <sup>1</sup>	194	Yes	96	Yes	119	Yes	136	Yes
3313	Parkford Dr & Ford St	SC	NBL	30	25	Yes	25	Yes	25	Yes	25	Yes
			EBLR	820	60	Yes	157	Yes	55	Yes	318	Yes
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St	Sig	NBL	85	101	No	45	Yes	128	No	57	Yes
			NBTR	85	156	No	88	No	170	No	126	No
			SBL	40	91	No	81	No	238	No	460	No
			SBTR	105	70	Yes	68	Yes	96	Yes	122	No
			EBL	115	120	No	74	Yes	177	No	117	No
			EBTR	3,100 <sup>1</sup>	107	Yes	141	Yes	147	Yes	552	Yes
3315	Oak St & Ford St	SC	NBL	60	0	Yes	0	Yes	0	Yes	0	Yes
			NEL	325 <sup>2</sup>	25	Yes	25	Yes	26	Yes	25	Yes
			NER	80 <sup>2</sup>	--	--	--	--	--	--	--	--

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

<sup>2</sup> For the northeast approach calculated queues are based on the HCM shared lane capacity analysis. The northeast approach consists of 2 lanes: 325 feet and 80 feet. The 95<sup>th</sup> percentile queue length is the total queue length for both movements.

**Table 3.4.27: Ford Street Interchange**

**Alternative 1 (No Build) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

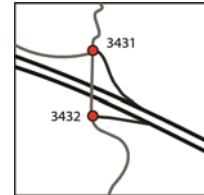
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3312	I-10 EB Off-Ramp & Ford St	SC	EBL	1,025 <sub>1</sub>	154	Yes	550	Yes	159	Yes	528	Yes
			EBR	30 <sup>1</sup>	--	--	--	--	--	--	--	--
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St	Sig	WBL	120	93	Yes	41	Yes	135	No	103	Yes
			WBTR	1675	180	Yes	61	Yes	364	Yes	119	Yes

<sup>1</sup> For the eastbound approach calculated queues are based on the HCM shared lane capacity analysis. The eastbound approach consists of 2 lanes: 1,025 feet and 30 feet. The 95<sup>th</sup> percentile queue length is the total queue length for both movements.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

### 3.4.10 Wabash Avenue Interchange Analysis

Alternative 1 (No Build) conditions analysis assumes the Wabash Avenue Widening Project to be constructed by year 2020. Based on the improvement projects, the following improvement has been included as part of the analysis for year 2025:



#### Wabash Avenue Widening Project – RTP# 200035

- Convert existing shared through/right lane to an exclusive through lane on the southbound approach at the intersection of Wabash Avenue and I-10 WB Ramps (Intersection #3431)
- Add an exclusive right turn lane on the southbound approach at the intersection of Wabash Avenue and I-10 WB Ramps (Intersection #3431)

Differences between existing and Alternative 1 (No Build) intersection lane configurations at the Wabash Avenue interchange are highlighted in **Figure 3.4.2** for year 2025 and **Figure 3.4.4** for year 2045.

Under Alternative 1 (No Build) in year 2025, the study intersections are expected to operate at LOS B or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 1 (No Build) conditions at the Wabash Avenue interchange study intersections is provided in **Table 3.4.28**. Analysis for year 2045 is not conducted for the Wabash Avenue interchange due to studies currently being conducted to improve the interchange between years 2025 and 2045 under RTP# 4M01032. Those improvements are assumed to address year 2045 traffic at the interchange.

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 1 (No Build) conditions are presented in **Table 3.4.29**. In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage under year 2025 Alternative 1 (No Build) conditions.

Peak hour vehicle queues for the freeway off-ramp at the Wabash Avenue interchange for years 2025 and 2045 under Alternative 1 (No Build) conditions are summarized in **Table 3.4.30**. As shown in the table, the projected 95<sup>th</sup> percentile queue for the westbound shared left/through/right lane can be accommodated within the available storage.

Table 3.4.28: Wabash Avenue Interchange Alternative 1 (No Build) Intersection Levels of Service – AM/PM Peak Hours								
Intersection #	Location			Traffic Control	Year 2025 Level of Service			
	East/West Street	North/South Street			AM Peak Hour		PM Peak Hour	
		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
3431	I-10 WB Off-Ramp/Reservoir Rd	Wabash Ave	SC <sup>1</sup>	0.19	12.2	B	0.17	10.9
3432	I-10 EB On-Ramp	Wabash Ave	UC <sup>2</sup>	0.03	2.2	A	0.04	2.5

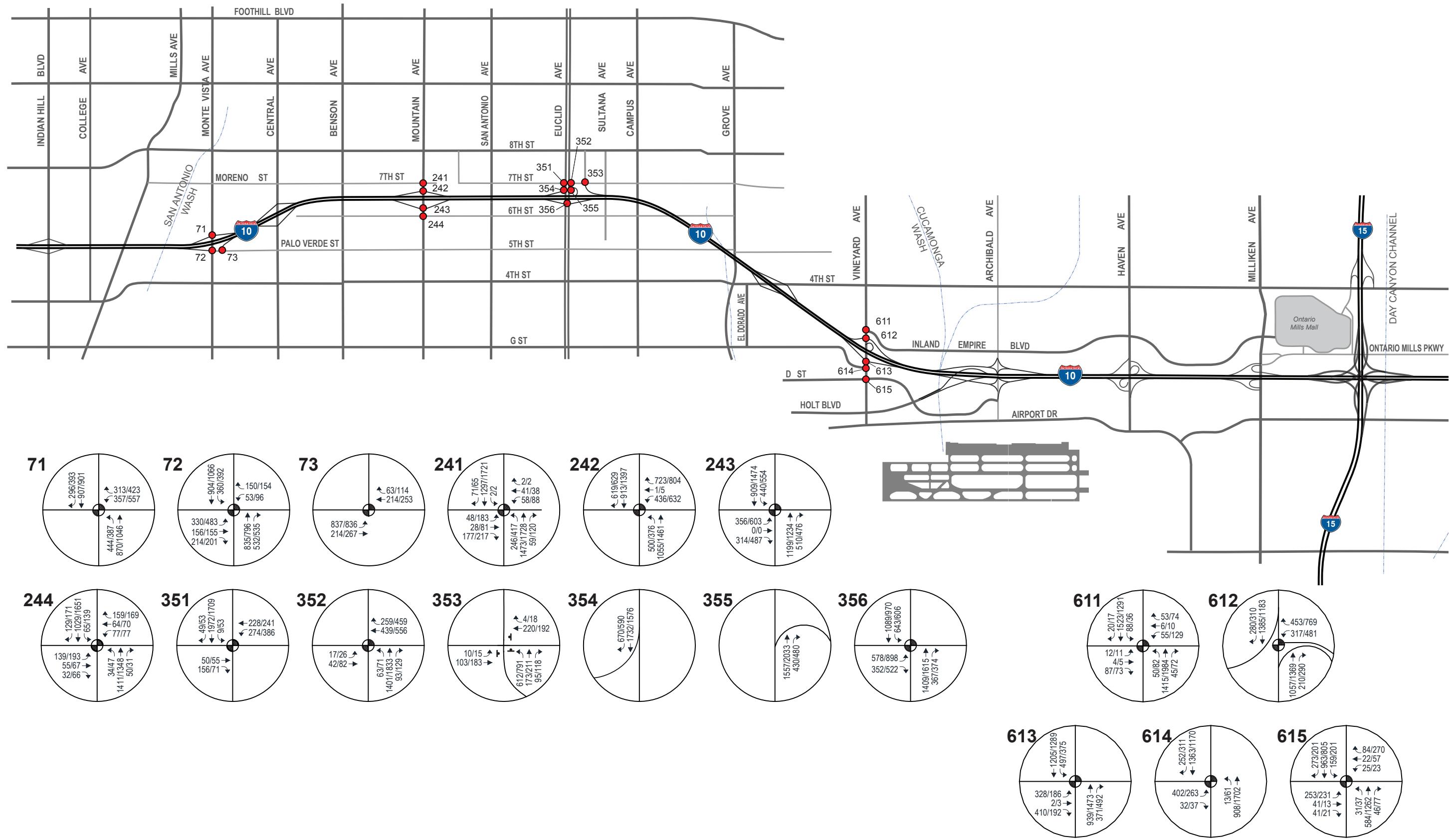
<sup>1</sup> For two-way stop control intersection, the average delay and LOS are for the worst stop-controlled approach; the d/c ratio is for the worst stop-controlled movement/approach.

<sup>2</sup> The d/c ratio, average delay and LOS for this intersection is for southbound left turn movement only which conflicts with the free northbound through movement.

Table 3.4.29: Wabash Avenue Interchange Alternative 1 (No Build) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions			
					AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3431	I-10 WB Off-Ramp/Reservoir Rd & Wabash Ave	SC	NBLT	590	25	Yes	25	Yes
			EBLTR	2,077	25	Yes	25	Yes
3432	I-10 EB On-Ramp & Wabash Ave	UC	SBLT	590	25	Yes	25	Yes

Table 3.4.30: Wabash Avenue Interchange Alternative 1 (No Build) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions			
					AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3431	I-10 WB Off-Ramp/Reservoir Rd & Wabash Ave	SC	WBLTR	1,050	25	Yes	25	Yes

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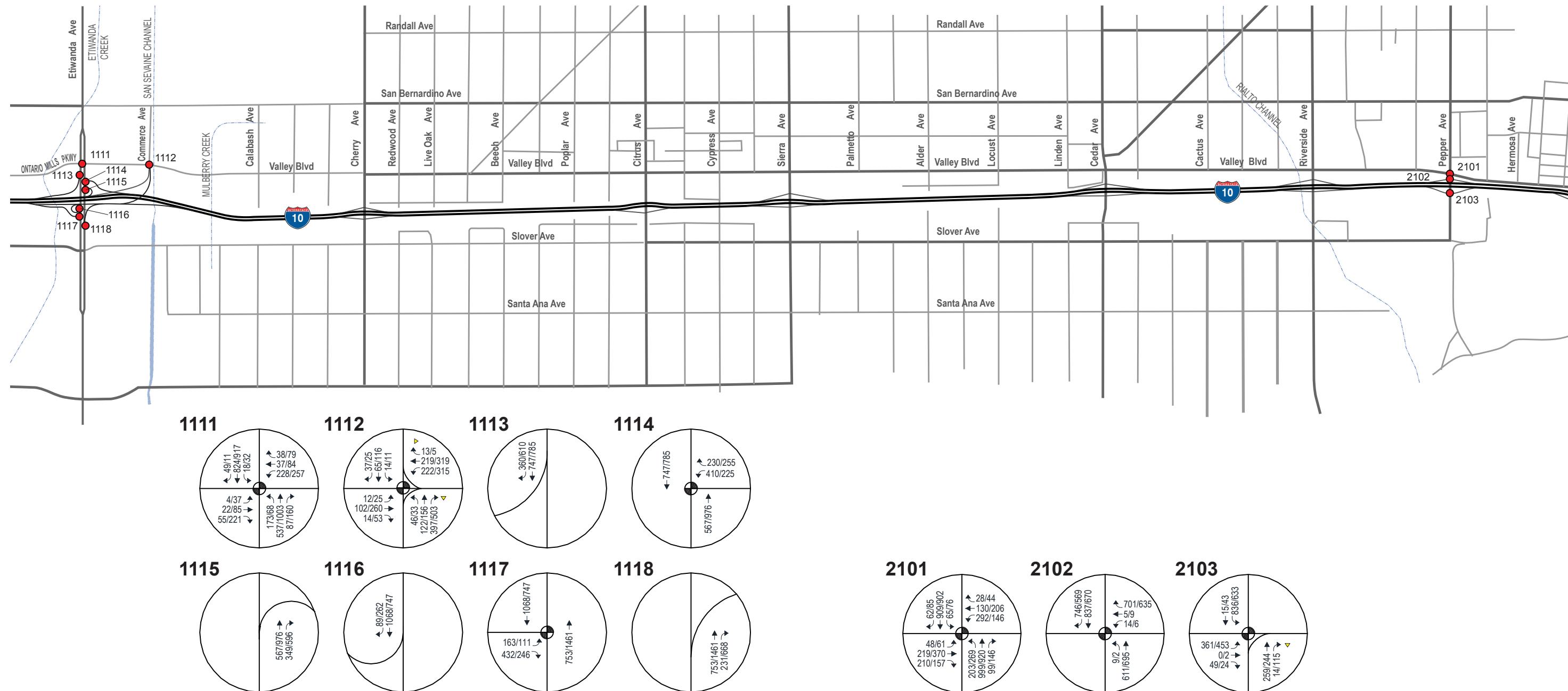


#### LEGEND

- Traffic Signal      ↗ Turning Movement      1234 ● Intersection Number
- Stop Sign      → Through Movement      XX/XX AM/PM Peak Hour Volumes
- ▼ Yield Sign

FIGURE 3.4.1

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES



#### LEGEND

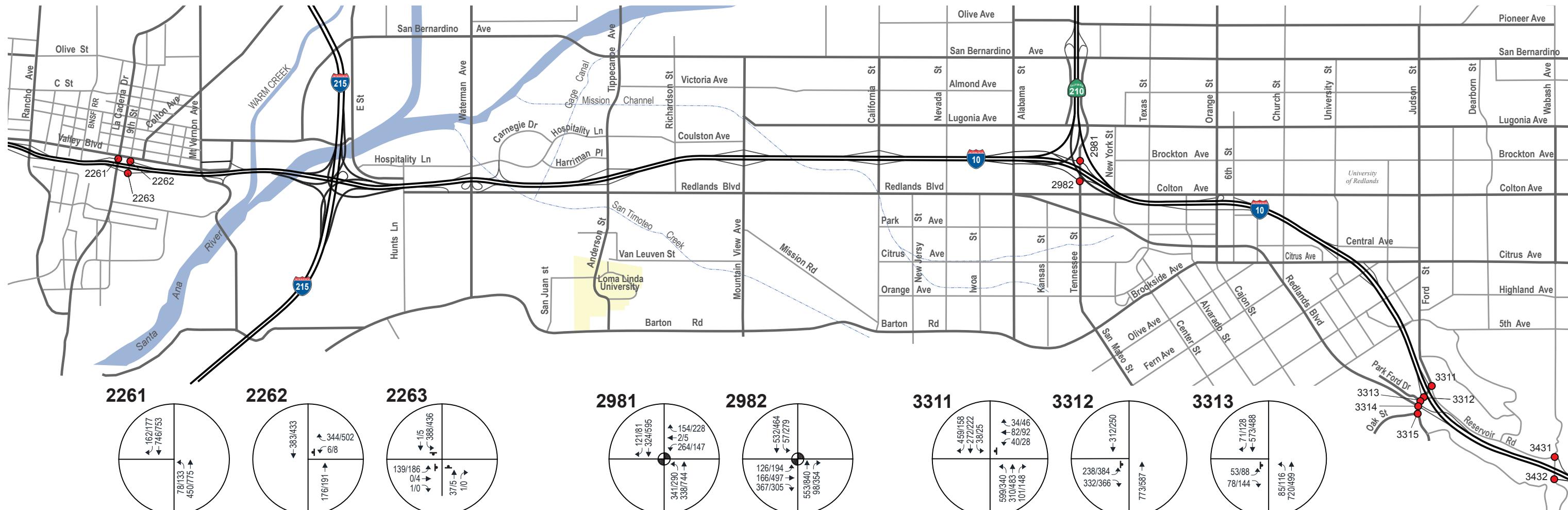
- |                  |                               |
|------------------|-------------------------------|
| ● Traffic Signal | ↗ Turning Movement            |
| ◆ Stop Sign      | → Through Movement            |
| ▼ Yield Sign     | XX/XX AM/PM Peak Hour Volumes |

1234 ● Intersection Number



**FIGURE 3.4.1**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

SHEET 2 OF 3

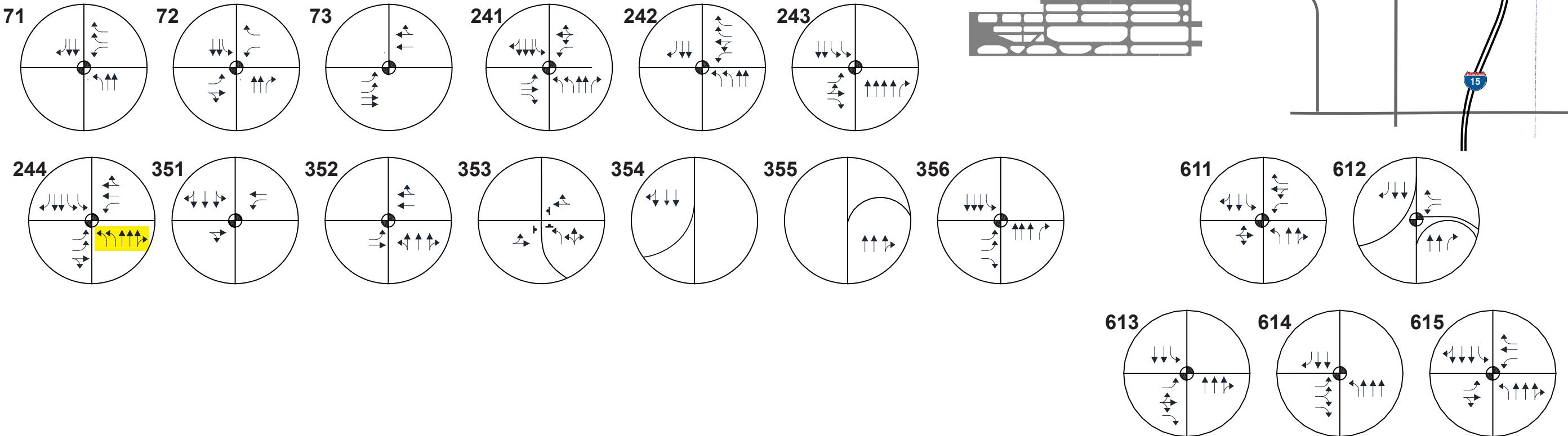
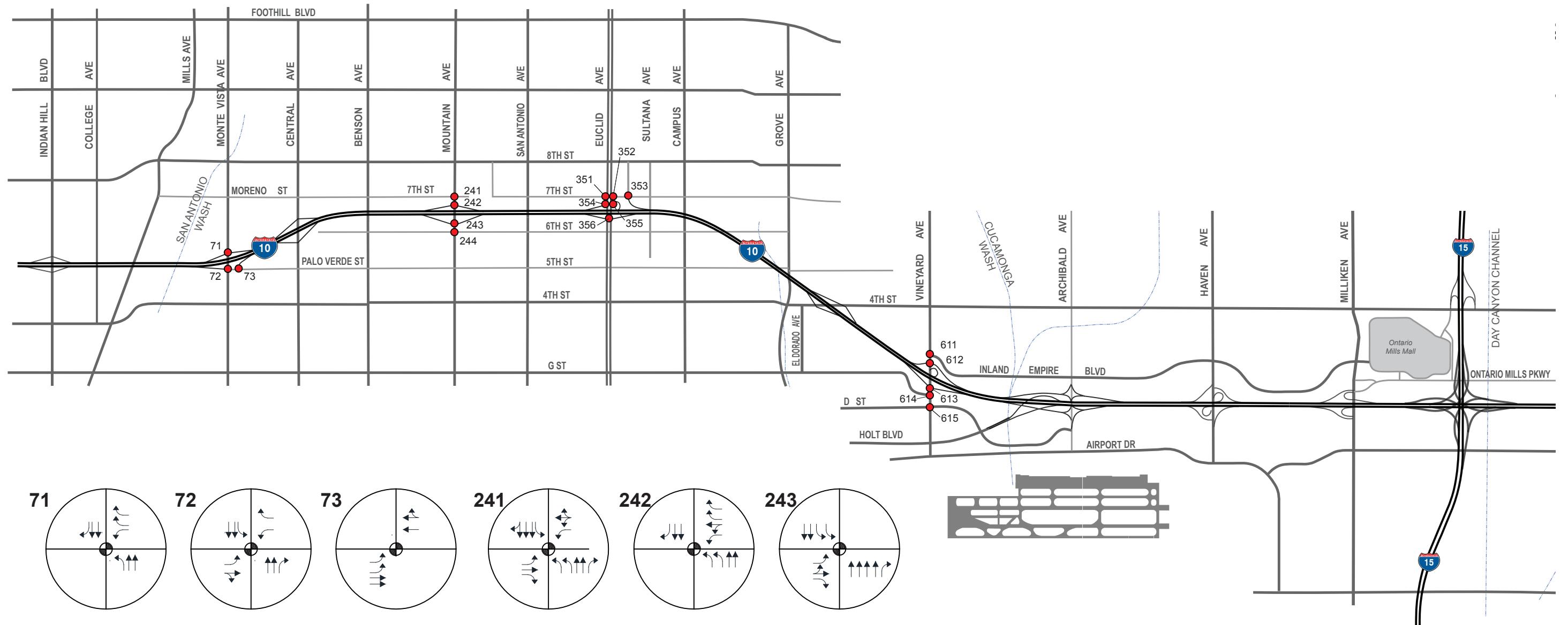


#### LEGEND

- |                            |                               |
|----------------------------|-------------------------------|
| ● Traffic Signal           | ↗ Turning Movement            |
| ■ Stop Sign                | → Through Movement            |
| ▼ Yield Sign               | XX/XX AM/PM Peak Hour Volumes |
| 1234 ● Intersection Number |                               |



**FIGURE 3.4.1**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

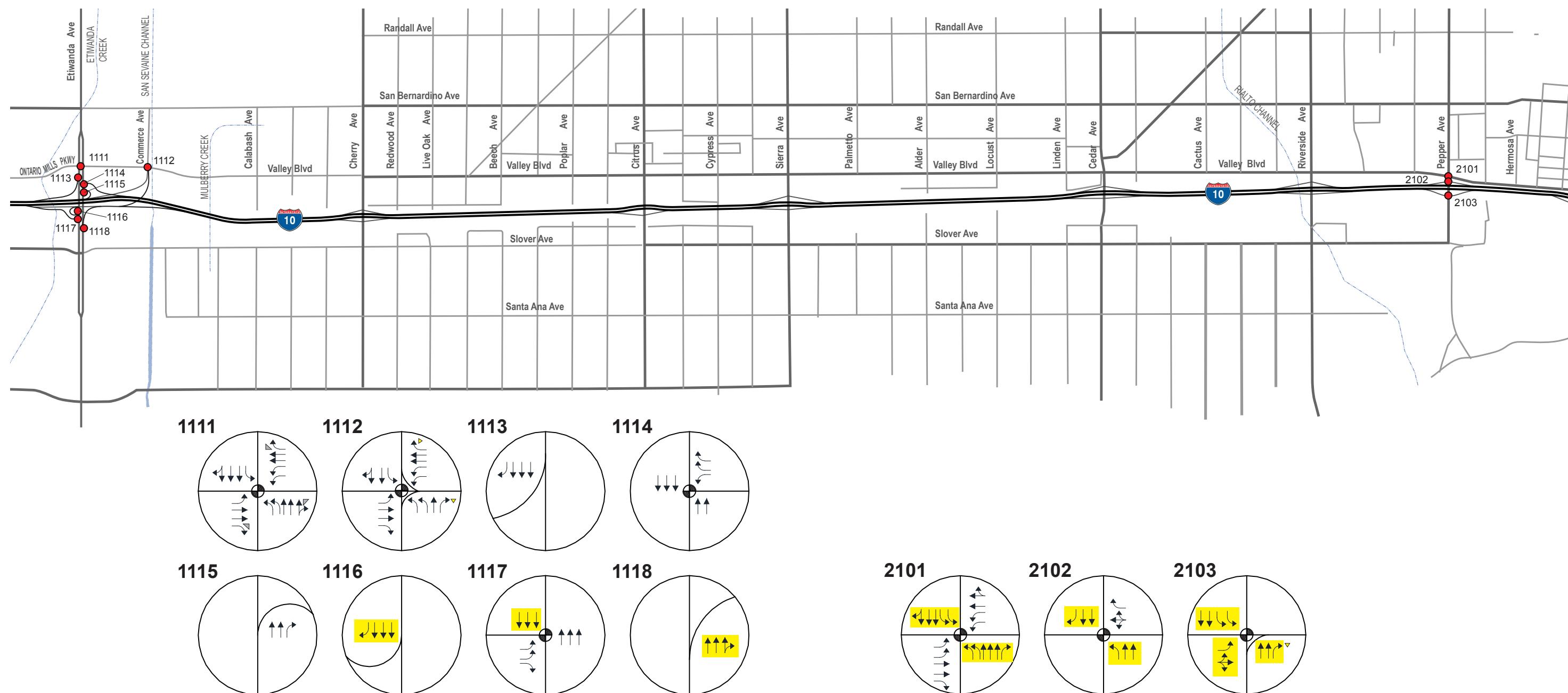


#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	1234 ● Intersection Number
▼ Yield Sign	↗ Turning Lanes	◀▶ Lane Configuration with Assumed RTP Improvements

**FIGURE 3.4.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 1 OF 3



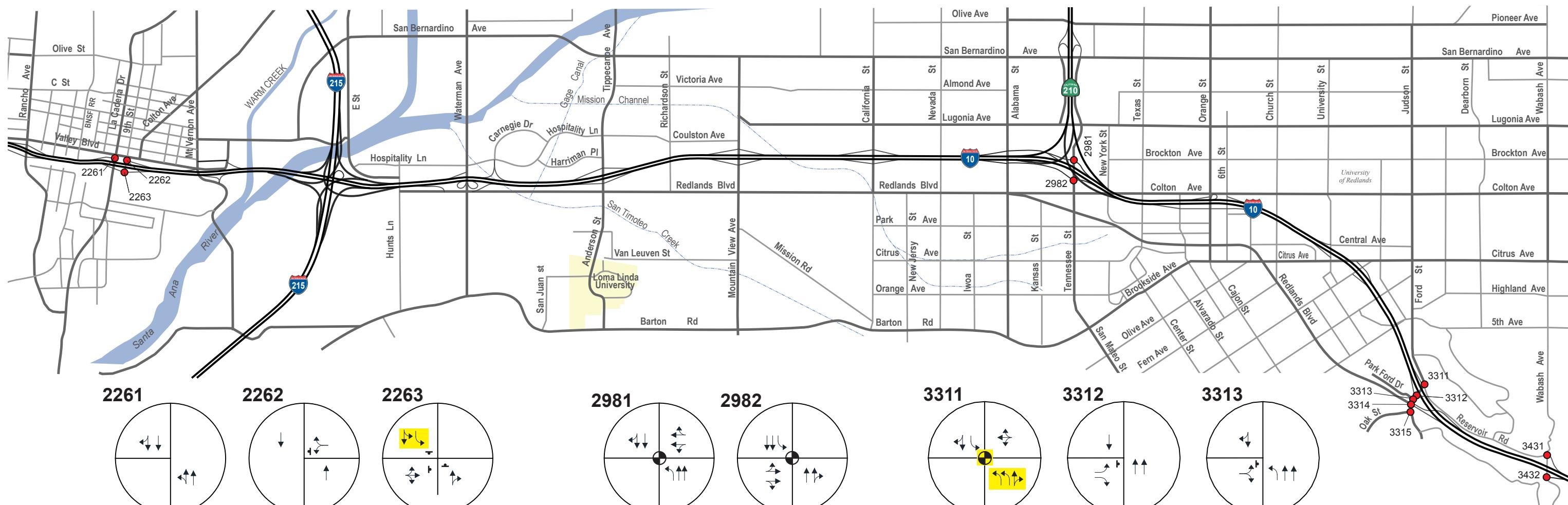


#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	1234 ● Intersection Number
▼ Yield Sign	↗ Turning Lanes	Lane Configuration with Assumed RTP Improvements



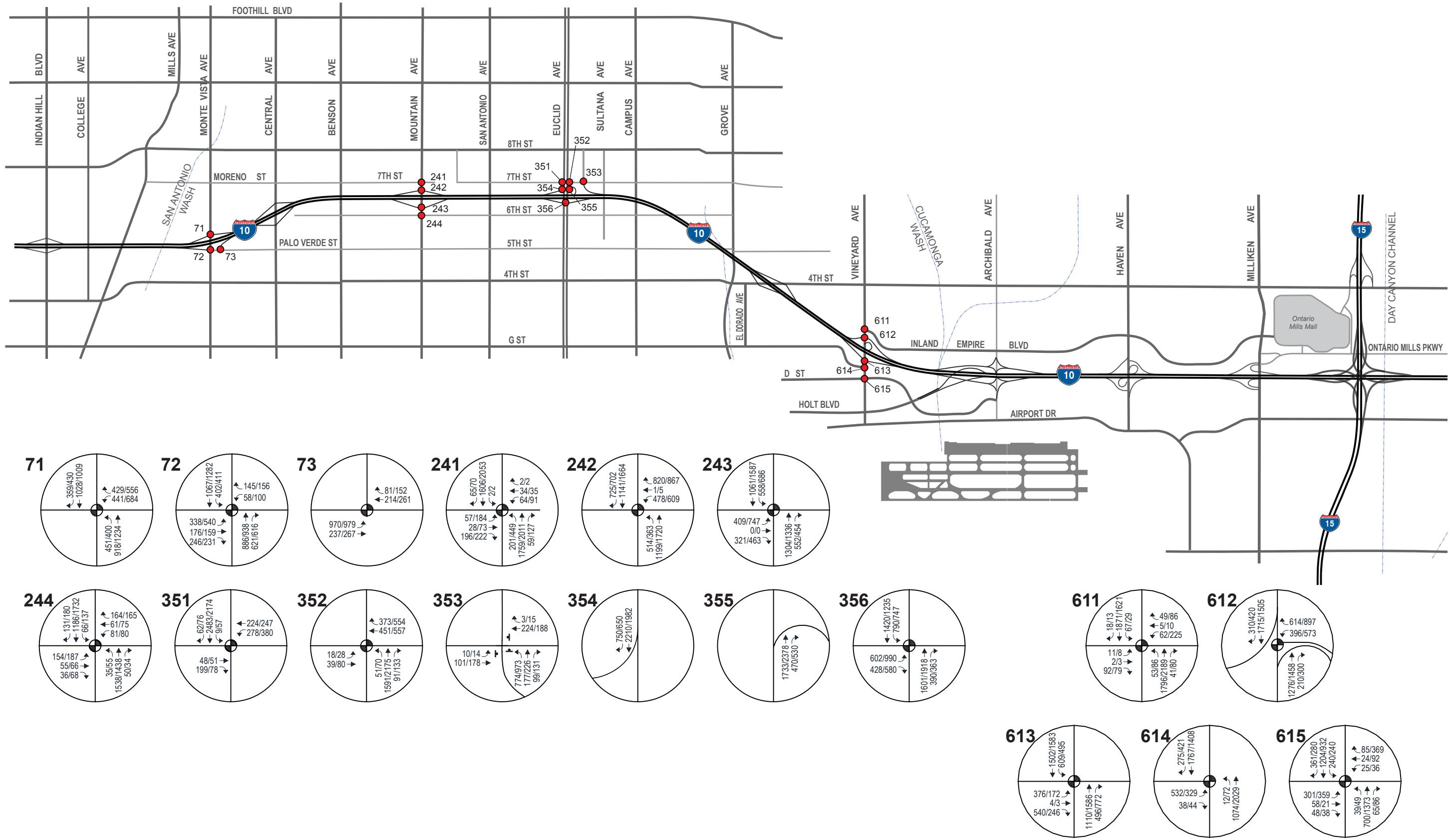
**FIGURE 3.4.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 2 OF 3



#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	↑↑↑↑ Lane Configuration with Assumed RTP Improvements
▼ Yield Sign	↗ Turning Lanes	

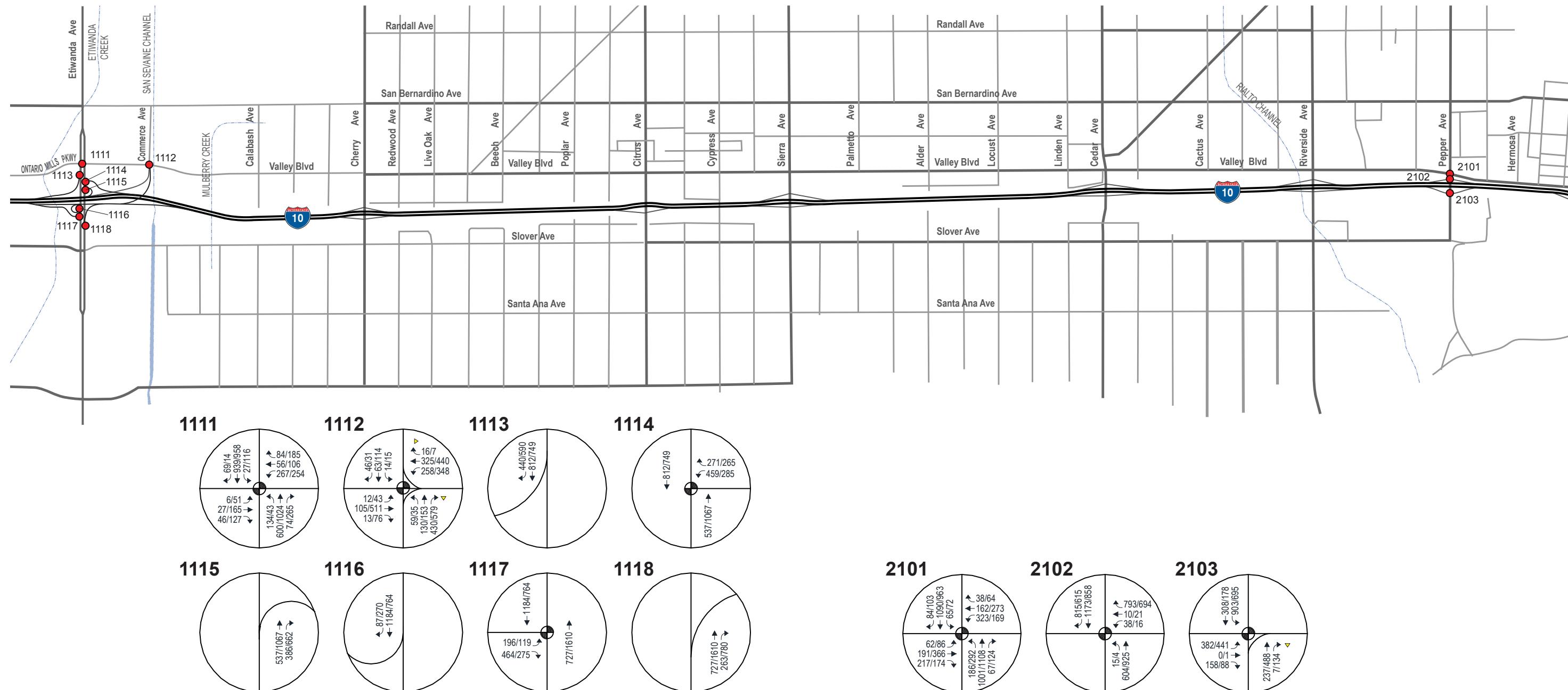
**FIGURE 3.4.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 3 OF 3



#### LEGEND

- Traffic Signal      ↗ Turning Movement      1234 ● Intersection Number
- Stop Sign      → Through Movement      XX/XX AM/PM Peak Hour Volumes
- ▼ Yield Sign

**FIGURE 3.4.3**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES



#### LEGEND

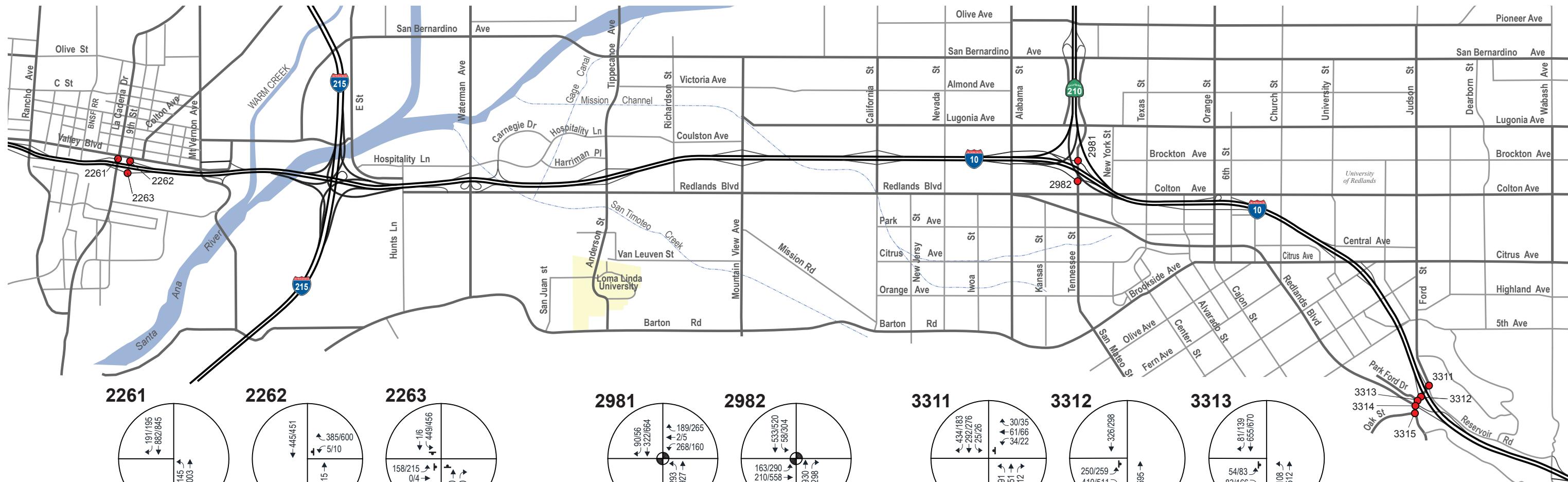
- Traffic Signal      ↗ Turning Movement
- Stop Sign      → Through Movement
- ▼ Yield Sign      1234 ● Intersection Number
- XX/XX AM/PM Peak Hour Volumes



FIGURE 3.4.3

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

SHEET 2 OF 3



#### LEGEND

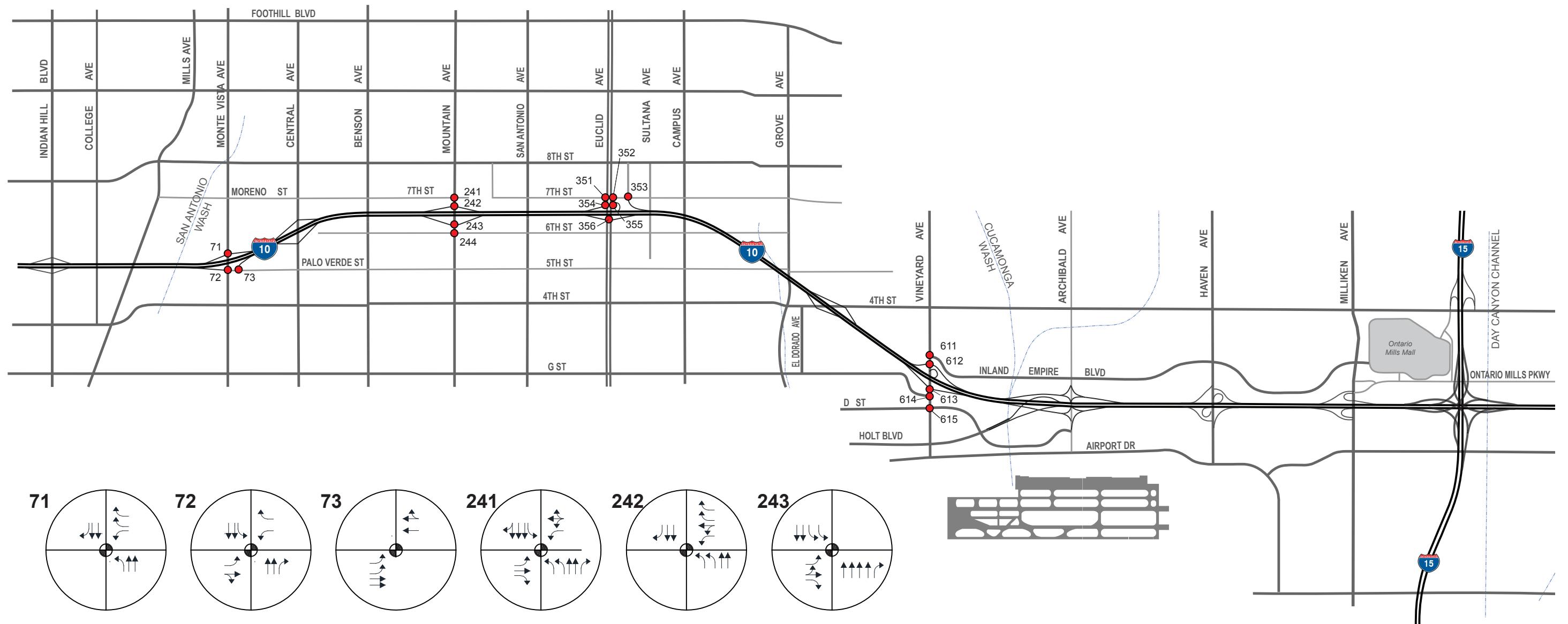
- |                  |                               |
|------------------|-------------------------------|
| ● Traffic Signal | ↗ Turning Movement            |
| ■ Stop Sign      | → Through Movement            |
| ▼ Yield Sign     | XX/XX AM/PM Peak Hour Volumes |
- 1234 ● Intersection Number



FIGURE 3.4.3

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

SHEET 3 OF 3

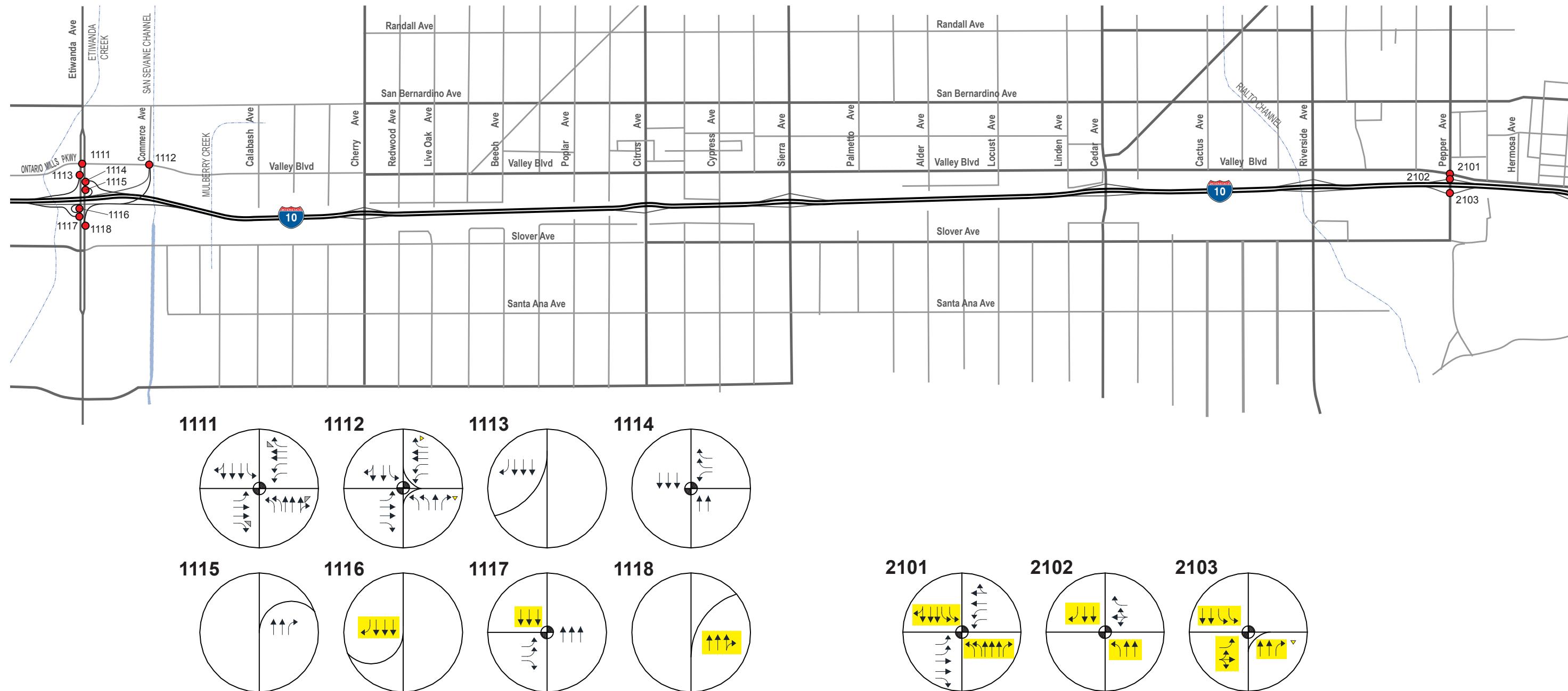


#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	1234 ● Intersection Number
▼ Yield Sign	↗ Turning Lanes	↑↑↑ Lane Configuration with Assumed RTP Improvements

**FIGURE 3.4.4**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 1 OF 3



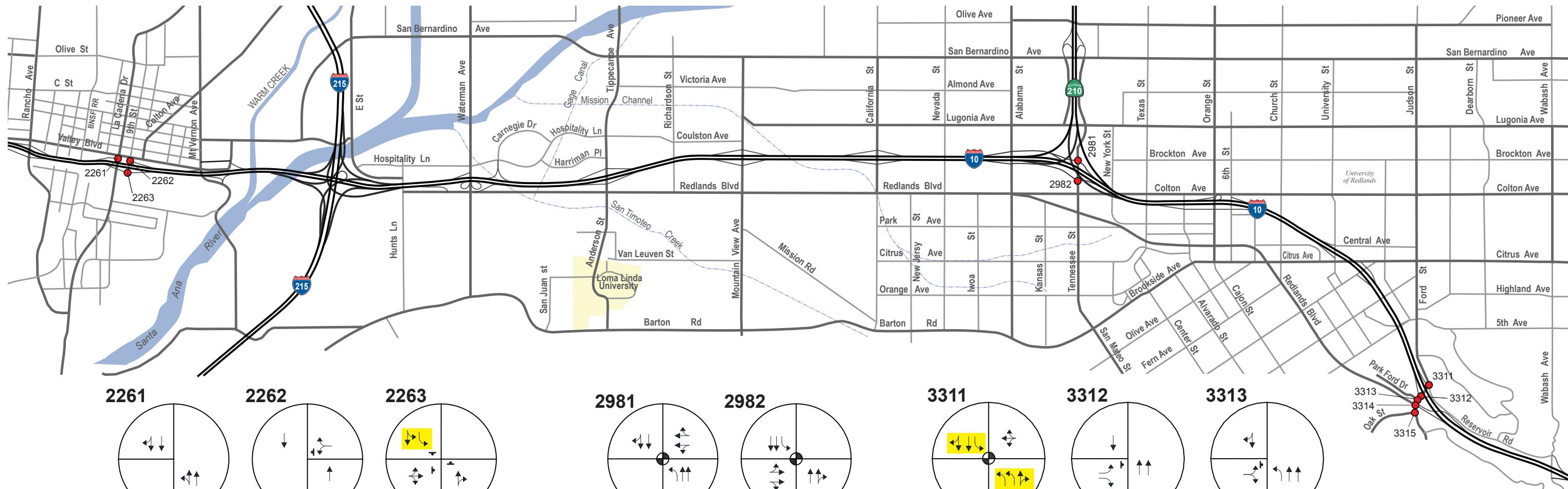


#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	1234 ● Intersection Number
▼ Yield Sign	↗ Turning Lanes	Lane Configuration with Assumed RTP Improvements



**FIGURE 3.4.4**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 2 OF 3



#### LEGEND

- |                  |                          |  |
|------------------|--------------------------|--|
| ● Traffic Signal | ↗ Free-Right Turn        | → Through Lanes                                    |
| ■ Stop Sign      | def ↗ Defacto Right Turn | ● Intersection Number                              |
| ▼ Yield Sign     | ↗ Turning Lanes          | ■ Lane Configuration with Assumed RTP Improvements |



FIGURE 3.4.4

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 1 - NO BUILD (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION

SHEET 3 OF 3

### 3.5 Alternative 2: One HOV in Each Direction Conditions Analysis

Level-of-service (LOS) analyses, demand volume-to-capacity (d/c) calculations and queue analysis were conducted for the arterial/ramp intersections and other key arterial intersections within each interchange area for both Opening Year (2025) and Design Year (2045) traffic conditions. The results of these analyses are presented in the following sections by interchange. Summary tables of LOS, d/c, average delay and the queuing analysis are included in each interchange section. The analysis worksheets for Alternative 2 (HOV) conditions for Opening Year (2025) and Design Year (2045) are provided in [Appendix H-1](#) and [Appendix H-2](#), respectively.

Alternative 2, the HOV Build alternative, includes extension of the existing HOV lane in each direction of I-10 from the current HOV terminus near Haven Avenue in the City of Ontario to Ford Street in the City of Redlands. In addition to the extension of the current HOV lane, Alternative 2 would provide improvements at the Alabama Street and Tennessee Street interchanges. Detailed intersection improvements for the Alabama Street and Tennessee Street are described below in the sections covering those interchanges. They are based on the latest set of alternative layout plans. Alternative 2 assumes the completion of improvements along the project corridor included in Alternative 1 (No Build).

The intersections analyzed for Alternative 2 conditions are the same intersections analyzed under Alternative 1 (No Build) conditions. Alternative 2 (Year 2025) intersection peak hour volumes and lane geometry are shown in [Figure 3.5.1](#) and [Figure 3.5.2](#), respectively. Alternative 2 (Year 2045) intersection peak hour volumes and lane geometry are shown in [Figure 3.5.3](#) and [Figure 3.5.4](#), respectively. A detailed discussion of the methodology to develop future condition intersection turning movement traffic volumes is presented in [Section 2.2.1](#) of this report.

#### 3.5.1 Monte Vista Avenue Interchange Analysis

Under Alternative 2 for years 2025 and 2045, the study intersections for the Monte Vista Avenue interchange are expected to operate at LOS E or better during the morning and evening peak hours in year 2045. A summary of LOS, d/c and average vehicle delay for Alternative 2 conditions at the Monte Vista Avenue interchange study intersections is provided in [Table 3.5.1](#).

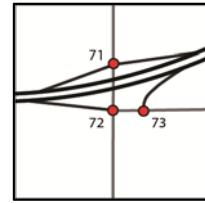


Table 3.5.1: Monte Vista Avenue Interchange Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours																
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
71	I-10 WB Ramps	Monte Vista Ave	Sig	0.93	31.2	C	0.92	34.7	C	1.00	46.4	D	1.09	49.8	D	
72	I-10 EB Off-Ramp/Palo Verde St	Monte Vista Ave	Sig	0.94	33.8	C	1.01	50.5	D	1.07	49.5	D	1.19	69.9	E	
73	Palo Verde St	I-10 EB On-Ramp	Sig	0.38	10.2	B	0.40	14.5	B	0.42	10.6	B	0.46	13.5	B	

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 2 conditions are presented in **Table 3.5.2**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the queues for the following movements are expected to exceed the available storage under year 2025 Alternative 2 conditions:

- Northbound left turn at I-10 WB Ramp & Monte Vista Ave (PM peak hour)
- Northbound right turn at I-10 EB Off-Ramp & Palo Verde St (AM and PM Peak Hours)
- Southbound left turn at I-10 EB Off-Ramp & Palo Verde St (AM and PM Peak Hours)

As shown in **Table 3.5.2**, no additional movements are expected to exceed the available storage under year 2045 Alternative 2 conditions.

Table 3.5.2: Monte Vista Avenue Interchange Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
71	I-10 WB Ramps & Monte Vista Ave	Sig	NBL	100	86	Yes	240	No	359	No	308	No
			NBT	340	143	Yes	232	Yes	129	Yes	234	Yes
			SBT	810	332	Yes	412	Yes	490	Yes	527	Yes
			SBR	810	56	Yes	69	Yes	64	Yes	99	Yes
72	I-10 EB Off- Ramp/Palo Verde St & Monte Vista Ave	Sig	NBT	700	320	Yes	397	Yes	405	Yes	461	Yes
			NBR	140	189	No	335	No	413	No	462	No
			SBL	100	218	No	342	No	211	No	349	No
			SBT	340	143	Yes	235	Yes	171	Yes	251	Yes
			WBL	225	98	Yes	180	Yes	118	Yes	221	Yes
			WBR	225	0	Yes	0	Yes	0	Yes	124	Yes
73	Palo Verde St & I-10 EB On- Ramp	Sig	EBL	150	30	Yes	35	Yes	32	Yes	37	Yes
			EBT	225	0	Yes	0	Yes	0	Yes	0	Yes
			WBTR	930	111	Yes	161	Yes	125	Yes	162	Yes

Peak hour vehicle queues for freeway off-ramps at the Monte Vista Avenue interchange for years 2025 and 2045 under Alternative 2 conditions are summarized in **Table 3.5.3**. As shown in the table, the 95<sup>th</sup> percentile queue for the westbound right turn movement at the westbound off-ramp to Monte Vista Avenue is expected to exceed the average available storage length of 123 feet during the peak hours under both years for Alternative 2. The expected 95<sup>th</sup> percentile queue for this movement is 134 feet during the morning peak hour and 202 feet during the evening peak hour for year 2025. Under year 2045, the 95<sup>th</sup> percentile queue is expected to increase to 202 feet during the morning peak hour and 268 feet during the evening peak hour.

The 95<sup>th</sup> percentile queue for the westbound left turn movement at the westbound off-ramp to Monte Vista Avenue is 533 feet during the morning peak hour and 782 feet for the evening peak hour in year 2045. The available storage length for this movement accommodates the 95<sup>th</sup> percentile queue for both

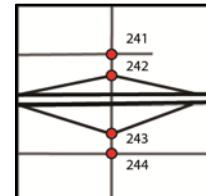
peak hours. However, the queues for both the morning and evening peak hours are longer than the 160 foot right turn lane resulting in storage blockage for the westbound right turn movement. Under this condition, the estimated longest queue is approximately 816 feet during the morning peak hour and 1,208 feet during the evening peak hour. The length of the ramp from the stop bar to the gore point is approximately 875 feet, leaving approximately 59 feet during the morning peak hour from the back of the queue to the gore point. For the evening peak hour, the longest queue is expected to spill back onto the freeway mainline.

Table 3.5.3: Monte Vista Avenue Interchange Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
71	I-10 WB Ramps & Monte Vista Ave	Sig	WBL	875	402	Yes	602	Yes	533	Yes	782	Yes
			WBR	123 <sup>1</sup>	134	No	202	No	202	No	268	No
72	I-10 EB Off-Ramp/Palo Verde St & Monte Vista Ave	Sig	EBL	690	283	Yes	555	Yes	311	Yes	641	Yes
			EBTR	1,550	402	Yes	384	Yes	529	Yes	492	Yes

<sup>1</sup>1<sup>st</sup> storage lane is 85' and 2<sup>nd</sup> storage lane is 160'. The average storage length is 123 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

### 3.5.2 Mountain Avenue Interchange Analysis



Under Alternative 2 for years 2025 and 2045, the study intersections are expected to operate at LOS E or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 2 conditions at the Mountain Avenue interchange study intersections is provided in **Table 3.5.4**.

Table 3.5.4: Mountain Avenue Interchange Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service					Year 2045 Level of Service						
				AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour				
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
241	7 <sup>th</sup> St/ Shopping Center	Mountain Ave	Sig	0.71	17.0	B	1.02	38.7	D	0.78	21.3	C	1.03	46.1	D
242	I-10 WB Ramp	Mountain Ave	Sig	0.88	35.1	D	1.04	43.1	D	0.99	45.7	D	1.14	59.4	E

Table 3.5.4 continued: Mountain Avenue Interchange Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
243	I-10 EB Ramp	Mountain Ave	Sig	0.60	17.5	B	0.83	32.8	C	0.67	21.5	C	0.82	35.9	D
244	6th St	Mountain Ave	Sig	0.48	16.7	B	0.73	23.2	C	0.54	18.2	B	0.72	24.0	C

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 2 conditions are presented in **Table 3.5.5**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the queues for the following movements are expected to exceed the available storage under year 2025 Alternative 2 conditions:

- Northbound left turn at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Northbound through at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Eastbound left turn at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Westbound left turn at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Westbound shared left/through/right at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Northbound left at I-10 WB Ramp & Mountain Ave (PM Peak Hour)
- Northbound through at I-10 WB Ramp & Mountain Ave (AM Peak Hour)
- Southbound through at I-10 WB Ramp & Mountain Ave (PM Peak Hour)
- Southbound right turn at I-10 WB Ramp & Mountain Ave (AM Peak Hour)
- Southbound through at I-10 EB Ramp & Mountain Ave (PM Peak Hour)
- Eastbound left turn at 6<sup>th</sup> St & Mountain Ave (PM Peak Hour)

As shown in **Table 3.5.5**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 2 conditions:

- Southbound shared through/right at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Southbound left turn at I-10 EB Ramp & Mountain Ave (AM and PM Peak Hours)
- Southbound through at 6<sup>th</sup> St & Mountain Ave (PM Peak Hour)

Peak hour vehicle queues for freeway off-ramps at the Mountain Avenue interchange for years 2025 and 2045 under Alternative 2 conditions are summarized in **Table 3.5.6**. As shown in the table, the expected 95<sup>th</sup> percentile queue for the westbound right turn movement at the westbound off-ramp to Mountain Avenue exceeds the average available storage length of 305 feet. The expected queue is 357 feet during the morning peak hour and 625 feet during the evening peak hour for year 2025. In year 2045, the 95<sup>th</sup> percentile queue increases to 531 feet during the morning peak hour and 727 feet during the evening peak hour. At the I-10 EB ramp and Mountain Avenue intersection, the eastbound left turn 95<sup>th</sup> percentile queue of 471 feet exceeds the available storage length of 300 feet during the evening peak hour for year 2045. For the eastbound right turn movement at the eastbound off-ramp to Mountain Avenue, the expected 95<sup>th</sup> percentile queue exceeds the available storage length of 300 feet

during the evening peak hour for both years 2025 and 2045. The expected queue is 550 feet for year 2025 and 490 feet for year 2045.

In year 2045 the projected queue for the right turn lane on the westbound off-ramp is expected to exceed the available storage resulting in a storage blockage for the westbound left turn vehicles. Under this condition, the estimated longest queue is approximately 1,473 feet during the morning peak hour and 2,012 feet during the evening peak hour. The length of the ramp from the stop bar to the gore point is approximately 980 feet. In comparing the estimated longest queue and the length of the ramp, vehicles are expected to queue onto the freeway mainline during the morning and evening peak hours. Similarly, the year 2045 queue for the right turn lane on the eastbound off-ramp is expected to exceed the available storage resulting in a storage blocked for the eastbound left turn vehicles during the evening peak hour. Under this condition, the estimated longest queue is approximately 812 feet. The length of the ramp from the stop bar to the gore point is approximately 930 feet, leaving approximately 74 feet from the back of the queue to the gore point.

**Table 3.5.5: Mountain Avenue Interchange**  
**Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control Sig	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
241	7 <sup>th</sup> St/ Shopping Center & Mountain Ave	Sig	NBL	230	91	Yes	261	<u>No</u>	102	Yes	229	Yes
			NBT	290	280	Yes	771	<u>No</u>	812	<u>No</u>	1,077	<u>No</u>
			NBR	290	25	Yes	25	Yes	25	Yes	25	Yes
			SBL	200	25	Yes	25	Yes	25	Yes	25	Yes
			SBTR	670	277	Yes	581	Yes	432	Yes	880	<u>No</u>
			EBL	150	96	Yes	319	<u>No</u>	83	Yes	327	<u>No</u>
			EBT	660	48	Yes	114	Yes	48	Yes	112	Yes
			EBR	660	97	Yes	76	Yes	70	Yes	80	Yes
			WBL	100	67	Yes	101	<u>No</u>	78	Yes	107	<u>No</u>
			WBLTR	100	66	Yes	102	<u>No</u>	80	Yes	108	<u>No</u>
242	I-10 WB Ramp & Mountain Ave	Sig	NBL	240	235	Yes	248	<u>No</u>	307	<u>No</u>	293	<u>No</u>
			NBT	240	283	<u>No</u>	224	Yes	380	<u>No</u>	377	<u>No</u>
			SBT	290	261	Yes	746	<u>No</u>	528	<u>No</u>	936	<u>No</u>
			SBR	290	441	<u>No</u>	127	Yes	639	<u>No</u>	59	Yes
243	I-10 EB Ramp & Mountain Ave	Sig	NBT	305 <sub>1</sub>	135	Yes	197	Yes	189	Yes	290	Yes
			NBR	510	51	Yes	25	Yes	25	Yes	25	Yes
			SBL	240	167	Yes	223	Yes	257	<u>No</u>	248	<u>No</u>
			SBT	240	172	Yes	367	<u>No</u>	268	<u>No</u>	313	<u>No</u>

**Table 3.5.5 continued: Mountain Avenue Interchange**  
**Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
244	6th St & Mountain Ave	Sig	NBL	100	25	Yes	41	Yes	30	Yes	54	Yes
			NBTR	590	268	Yes	315	Yes	346	Yes	353	Yes
			SBL	200	40	Yes	74	Yes	47	Yes	74	Yes
			SBT	510	106	Yes	336	Yes	120	Yes	577	No
			SBR	510	25	Yes	25	Yes	25	Yes	25	Yes
			EBL	100	70	Yes	118	No	90	Yes	121	No
			EBTR	213	76	Yes	142	Yes	98	Yes	158	Yes
			WBL	200	122	Yes	168	Yes	117	Yes	148	Yes
			WBTR	575	58	Yes	71	Yes	75	Yes	78	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 100' and 2<sup>nd</sup> storage lane is 510'. The average available storage length is 305 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

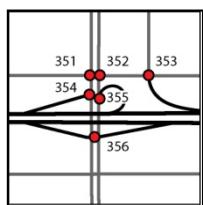
**Table 3.5.6: Mountain Avenue Interchange**  
**Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
242	I-10 WB Ramp & Mountain Ave	Sig	WBL	375	183	Yes	282	Yes	241	Yes	310	Yes
			WBLT	980	185	Yes	288	Yes	242	Yes	316	Yes
			WBR	305 <sup>1</sup>	357	No	625	No	531	No	727	No
243	I-10 EB Ramp & Mountain Ave	Sig	EBL	300	177	Yes	288	Yes	232	Yes	471	No
			EBLT	930	177	Yes	288	Yes	233	Yes	471	Yes
			EBR	300	200	Yes	550	No	262	Yes	490	No

<sup>1</sup> 1<sup>st</sup> storage lane is 235' and 2<sup>nd</sup> storage lane is 375'. The average available storage is 305 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

### 3.5.3 Euclid Avenue Interchange Analysis



Under Alternative 2 for years 2025 and 2045, the study intersections are expected to operate at LOS E or better during the morning and evening peak hours except for the 7<sup>th</sup> Street/I-10 WB Off-Ramp and I-10 EB Ramp/Euclid Avenue intersections. In year 2025, both intersections are expected to operate at LOS D and F during the morning and evening peak hours, respectively. In year 2045, the 7<sup>th</sup> Street and I-10 WB off-ramp intersection is expected to operate at LOS E and F during the morning and evening peak hours, respectively. The I-10 EB ramp and Euclid Avenue intersection is expected to operate at LOS F during the morning and evening peak hours. For the

uncontrolled intersections, the d/c ratio ranges from 0.29 to 0.50. A summary of LOS, d/c and average vehicle delay for Alternative 2 conditions at the Euclid Avenue interchange study intersections is provided in **Table 3.5.7**.

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 2 conditions are presented in **Table 3.5.8**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the queues for the following movements are expected to exceed the available storage under year 2025 Alternative 2 conditions:

- Westbound left turn at 7<sup>th</sup> St & SB Euclid Ave (AM Peak Hour)
- Westbound through at 7<sup>th</sup> St & SB Euclid Ave (AM and PM Peak Hours)
- Eastbound through at 7<sup>th</sup> St & NB Euclid Ave (PM Peak Hour)
- Northbound through at I-10 EB Ramp & Euclid Ave (PM Peak Hour)
- Northbound right turn at I-10 EB Ramp & Euclid Ave (AM and PM Peak Hours)
- Southbound left turn at I-10 EB Ramp & Euclid Ave (AM and PM Peak Hours)

As shown in **Table 3.5.8**, the following additional movement is expected to exceed the available storage under year 2045 Alternative 2 conditions:

- Southbound shared left/through/right at 7<sup>th</sup> St & SB Euclid Ave (AM and PM Peak Hours)
- Eastbound left turn at 7<sup>th</sup> St & NB Euclid Ave (PM Peak Hour)

Queuing analysis for the I-10 WB on-ramps from SB Euclid and NB Euclid were not conducted since there are no conflicting movements at these locations.

**Table 3.5.7: Euclid Avenue Interchange**  
**Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
351	7 <sup>th</sup> St	SB Euclid Ave	Sig	0.79	21.3	C	0.77	21.1	C	0.94	32.0	C	0.88	28.1	C	
352	7 <sup>th</sup> St	NB Euclid Ave	Sig	0.62	12.9	B	0.85	18.5	B	0.71	14.9	B	0.97	21.5	C	
353	7 <sup>th</sup> St	I-10 WB Off-Ramp/2 <sup>nd</sup> St	AWS	0.58	25.3	D	<b>0.71</b>	<b>55.2</b>	F	0.66	46.2	E	<b>0.79</b>	<b>105.7</b>	F	
354	I-10 WB On-Ramp	SB Euclid Ave	UC <sup>1</sup>	0.45	--	--	0.39	--	--	0.50	--	--	0.42	--	--	
355	I-10 WB Loop On-Ramp	NB Euclid Ave	UC <sup>1</sup>	0.29	--	--	0.32	--	--	0.31	--	--	0.35	--	--	
356	I-10 EB Ramps	Euclid Ave	Sig	1.01	53.3	D	<b>1.15</b>	<b>95.9</b>	F	<b>1.24</b>	<b>93.9</b>	F	<b>1.42</b>	<b>166.5</b>	F	

<sup>1</sup> For uncontrolled movements the d/c was calculated based on a saturation flow rate of 1500 vehicles per hour. Average delay and LOS are not calculated for these intersections, denoted with double dashes (--).

Table 3.5.8: Euclid Avenue Interchange  
Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
351	7 <sup>th</sup> St & SB Euclid Ave	Sig	SBLTR	605	576	Yes	469	Yes	867	No	721	No
			EBTR	284	173	Yes	117	Yes	243	Yes	124	Yes
			WBL	60	72	No	25	Yes	333	No	25	Yes
			WBT	60	75	No	84	No	63	No	77	No
352	7 <sup>th</sup> St & NB Euclid Ave	Sig	NBLTR	605	63	Yes	99	Yes	0	Yes	52	Yes
			EBL	60	25	Yes	48	Yes	25	Yes	75	No
			EBT	60	25	Yes	82	No	25	Yes	69	No
			WBTR	660	313	Yes	562	Yes	444	Yes	658	Yes
353	7 <sup>th</sup> St & I- 10 WB Off Ramp/2 <sup>nd</sup> St	AWS <sup>1</sup>	EBLT	648	--	--	--	--	--	--	--	--
			WBTR	279	--	--	--	--	--	--	--	--
356	I-10 EB Ramps & Euclid Ave	Sig	NBT	602	515	Yes	711	No	704	No	921	No
			NBR	100	278	No	328	No	349	No	330	No
			SLB	300	802	No	865	No	990	No	1,082	No
			SBT	605	36	Yes	66	Yes	43	Yes	65	Yes

-- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

Peak hour vehicle queues for freeway off-ramps at the Euclid Avenue interchange for years 2025 and 2045 under Alternative 2 conditions are summarized in **Table 3.5.9**. As shown in the table, the expected 95<sup>th</sup> percentile queue for the eastbound left and right turn movements at the eastbound off-ramp to Euclid Avenue exceeds the available storage length. The eastbound left turn movement exceeds the average available storage length of 628 feet during the evening peak hour in year 2045. The 95<sup>th</sup> percentile queue expected for this movement is 727 feet during the evening peak hour. For the eastbound right turn movement, the expected 95<sup>th</sup> percentile queue exceeds the available storage of 225 feet during the morning and evening peak hours in both years 2025 and 2045. Under year 2025, the expected 95<sup>th</sup> percentile queue is 408 feet during the morning peak hour and 664 feet during the evening peak hour. For year 2045, the expected 95<sup>th</sup> percentile queue is 663 feet during the morning peak hour and 903 feet during the evening peak hour.

In year 2045 the projected queue for the right turn lane on the eastbound off-ramp is expected to exceed the available storage resulting in storage blockage for the eastbound left turn vehicles. Under this condition, the estimated longest queue is approximately 942 feet during the morning peak hour and 1,786 during the evening peak hour. The length of the ramp from the stop bar to the gore point is approximately 900 feet. In comparing the estimated longest queue and the length of the ramp, vehicles are expected to queue onto the freeway mainline during the morning and evening peak hours.

Table 3.5.9: Euclid Avenue Interchange Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
353	7 <sup>th</sup> St & I-10 WB Off-Ramp/ 2nd Ave	AW S	NBL	350	--	--	--	--	--	--	--	--
			NBLTR	980	--	--	--	--	--	--	--	--
356	I-10 EB Ramps & Euclid Ave	Sig	EBL	628 <sup>1</sup>	371	Yes	620	Yes	412	Yes	727	No
			EBR	225	408	No	664	No	663	No	903	No

<sup>1</sup> 1<sup>st</sup> storage lane is 355' and 2<sup>nd</sup> lane extends 900' to the beginning of the painted gore'. The average available storage is 628 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

-- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

### 3.5.4 Vineyard Avenue Interchange Analysis

Under Alternative 2 for years 2025 and 2045, the study intersections for the Vineyard Avenue interchange are expected to operate at LOS E or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 2 conditions at the Vineyard Avenue interchange study intersections is provided in **Table 3.5.10**.

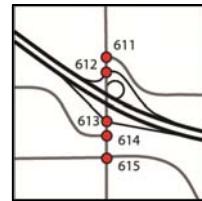


Table 3.5.10: Vineyard Avenue Interchange Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
611	Inland Empire Blvd	Vineyard Ave	Sig	0.64	9.1	A	0.82	12.5	B	0.72	8.4	A	0.62	8.8	A
612	I-10 WB Ramps	Vineyard Ave	Sig	0.90	18.1	B	1.08	45.2	D	0.96	28.2	C	1.07	41.5	D
613	I-10 EB Ramps	Vineyard Ave	Sig	0.94	26.7	C	0.89	21.8	C	1.11	58.7	E	1.10	49.8	D
614	G St	Vineyard Ave	Sig	0.65	12.0	B	0.51	11.4	B	0.83	16.8	B	0.72	10.4	B
615	D St	Vineyard Ave	Sig	0.63	16.1	B	0.70	27.3	C	0.75	19.5	B	0.92	35.8	D

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 2 conditions are presented in **Table 3.5.11**. In comparing the

95<sup>th</sup> percentile queues to the available storage, the queues for the following movements are expected to exceed the available storage under year 2025 Alternative 2 conditions:

- Northbound shared through/right at Inland Empire Blvd & Vineyard Ave (PM Peak Hour)
- Eastbound shared left/through/right at Inland Empire Blvd & Vineyard Ave (PM Peak Hour)
- Northbound through at I-10 WB Ramps & Vineyard Ave (PM Peak Hour)
- Southbound through at I-10 WB Ramps & Vineyard Ave (AM and PM Peak Hours)
- Southbound left turn at I-10 EB Ramps & Vineyard Ave (AM and PM Peak Hours)
- Southbound through at G St & Vineyard Ave (AM Peak Hour)
- Southbound left turn at D St & Vineyard Ave (PM Peak Hour)
- Eastbound left turn at D St & Vineyard Ave (AM and PM Peak Hours)

As shown in **Table 3.5.11**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 2 conditions:

- Northbound shared through/right at I-10 EB & Vineyard Ave (AM and PM Peak Hours)
- Eastbound left/right turn at G St & Vineyard Ave (AM and PM Peak Hours)

**Table 3.5.11: Vineyard Avenue Interchange**  
**Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
611	Inland Empire Blvd & Vineyard Ave	Sig	NBL	140	25	Yes	25	Yes	25	Yes	25	Yes
			NBTR	250	185	Yes	263	<u>No</u>	154	Yes	148	Yes
			SBL	150	129	Yes	57	Yes	72	Yes	63	Yes
			SBTR	915	340	Yes	293	Yes	243	Yes	240	Yes
			EBLTR	74	69	Yes	92	<u>No</u>	83	<u>No</u>	74	<u>No</u>
			WBL	165	46	Yes	107	Yes	56	Yes	116	Yes
			WBLT	5,500 <sup>1</sup>	46	Yes	109	Yes	56	Yes	118	Yes
612	I-10 WB Ramps & Vineyard Ave	Sig	WBR	5,500 <sup>1</sup>	36	Yes	73	Yes	39	Yes	25	Yes
			NBT	525	75	Yes	829	<u>No</u>	207	Yes	355	Yes
			NBR	345	0	Yes	0	Yes	--	--	--	--
			SBT	250	487	<u>No</u>	592	<u>No</u>	539	<u>No</u>	487	<u>No</u>
613	I-10 EB Ramps & Vineyard Ave	Sig	SBR	240	25	Yes	107	Yes	54	Yes	212	Yes
			NBTR	265	256	Yes	126	Yes	522	<u>No</u>	884	<u>No</u>
			SBL	525	411	<u>No</u>	477	<u>No</u>	640	<u>No</u>	601	<u>No</u>
			SBT	525	101	Yes	137	Yes	202	Yes	183	Yes

**Table 3.5.11 continued: Vineyard Avenue Interchange**  
**Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
614	G St & Vineyard Ave	Sig	NBL	150	25	Yes	96	Yes	25	Yes	74	Yes
			NBT	515	83	Yes	130	Yes	84	Yes	165	Yes
			SBT	265	272	No	168	Yes	532	No	350	No
			SBR	100	27	Yes	50	Yes	46	Yes	70	Yes
			E BLR	170	155	Yes	160	Yes	244	No	177	No
			EBR	100	25	Yes	35	Yes	34	Yes	36	Yes
615	D St & Vineyard Ave	Sig	NBL	125	50	Yes	69	Yes	83	Yes	83	Yes
			NBTR	1,180 <sup>1</sup>	144	Yes	441	Yes	219	Yes	517	Yes
			SBL	150	94	Yes	250	No	169	No	368	No
			SBTR	430 <sup>2</sup>	25	Yes	93	Yes	212	Yes	121	Yes
			EBL	125	208	No	280	No	289	No	475	No
			EBTR	635	47	Yes	35	Yes	74	Yes	42	Yes
			WBL	125	30	Yes	39	Yes	38	Yes	49	Yes
			WBT	1,230 <sup>1</sup>	26	Yes	78	Yes	33	Yes	101	Yes
			WBR	1,230 <sup>1</sup>	32	Yes	72	Yes	38	Yes	128	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

<sup>2</sup> 2 through lanes with storage lengths of 515' and 1 lane with storage length of 260'. The average available storage is 430 feet per lane.

Note: The 95<sup>th</sup> percentile queues are compared to a lane group's average lane length.

Peak hour vehicle queues for freeway off-ramps at the Vineyard Avenue interchange for years 2025 and 2045 under Alternative 2 conditions are summarized in **Table 3.5.12**. As shown in the table, the expected 95<sup>th</sup> percentile queue for the westbound left turn movement at the westbound off-ramp to Vineyard Avenue exceeds the available storage length of 175 feet. The expected queue is 247 feet during the morning peak hour and 453 feet during the evening peak hour in year 2025. In year 2045, the 95<sup>th</sup> percentile queue increases to 423 feet during the morning peak hour and 488 feet during the evening peak hour. The expected 95<sup>th</sup> percentile queue, for the eastbound left turn movement at the eastbound off-ramp to Vineyard Avenue, exceeds the available storage length of 370 feet during the morning peak hour in year 2045. The expected queue is 480 feet. The eastbound right turn movement at the eastbound off-ramp to Vineyard Avenue is expected to exceed the available storage length of 380 feet during the morning peak hour in year 2045. The expected queue is 418 feet.

The 95<sup>th</sup> percentile queue for the westbound right turn movement at the westbound off-ramp to Vineyard Avenue is 792 feet during the morning peak hour and 1,052 feet for the evening peak hour in year 2045. The available storage length for this movement accommodates the 95<sup>th</sup> percentile queue for both peak hours. However, the queues for both the morning and evening peak hours are longer than the 175 feet left turn lane resulting in storage blockage for the westbound left turn movement. Under this condition, the estimated longest queue is approximately 1,122 feet during the morning peak hour and 1,459 feet during the evening peak hour. The length of the ramp from the stop bar to the gore

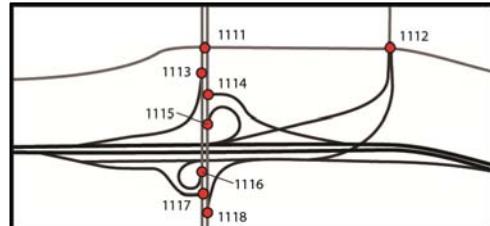
point is approximately 1,475 feet, leaving approximately 353 feet during the morning peak hour and 16 feet during the evening peak hour from the back of the queue to the gore point.

Table 3.5.12: Vineyard Avenue Interchange Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
612	I-10 WB Ramps & Vineyard Ave	Sig	WBL	175	247	No	453	No	423	No	488	No
			WBR	1475	504	Yes	1,080	Yes	792	Yes	1,052	Yes
613	I-10 EB Ramps & Vineyard Ave	Sig	EBL	370	320	Yes	237	Yes	480	No	283	Yes
			EBLTR	1,050	243	Yes	204	Yes	448	Yes	230	Yes
			EBR	380	217	Yes	74	Yes	418	No	213	Yes

For the eastbound off-ramp to Vineyard Avenue, storage blockage due to inadequate available storage length is also expected during the morning peak hour. As shown in [Table 3.4.12](#), the 95<sup>th</sup> percentile queue for the eastbound left turn movement and the eastbound right turn movement during the morning peak hour are anticipated to extend beyond the available storage. Under this condition, the estimated longest queue is approximately 679 feet during the morning peak hour. The length of the ramp from the stop bar to the gore point is approximately 1,050 feet, leaving approximately 371 feet from the back of the queue to the gore point.

### 3.5.5 Etiwanda Avenue/Commerce Drive Interchange Analysis

Under Alternative 2 for years 2025 and 2045, the study intersections are expected to operate at LOS C or better during the morning and evening peak hours. For the uncontrolled intersections, the d/c ratio ranges from 0.06 to 0.57. A summary of LOS, d/c and average vehicle delay for Alternative 2 conditions at the Etiwanda Avenue/Commerce Drive interchange study intersections is provided in [Table 3.5.13](#).



The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 2 conditions are presented in [Table 3.5.14](#). In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage. Queuing analysis was not conducted for uncontrolled intersections that do not have conflicting movements.

**Table 3.5.13: Etiwanda Avenue/Commerce Drive Interchange**  
**Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
1111	Valley Blvd/Ontario Mills Pkwy	Etiwanda Ave	Sig	0.40	19.4	B	0.68	23.7	C	0.48	18.0	B	0.67	21.9	C
1112	Valley Blvd	Commerce Dr	Sig	0.32	33.2	C	0.36	33.1	C	0.39	32.7	C	0.45	32.8	C
1113	I-10 WB On-Ramp	SB Etiwanda Ave	UC <sup>1</sup>	0.29	--	--	0.53	--	--	0.32	--	--	0.53	--	--
1114	I-10 WB Off-Ramp	Etiwanda Ave	Sig	0.54	15.5	B	0.59	15.0	B	0.57	17.0	B	0.67	18.9	B
1115	I-10 WB On-Ramp	NB Etiwanda Ave	UC <sup>1</sup>	0.25	--	--	0.42	--	--	0.26	--	--	0.44	--	--
1116	I-10 EB On-Ramp	SB Etiwanda Ave	UC <sup>1</sup>	0.06	--	--	0.18	--	--	0.06	--	--	0.19	--	--
1117	I-10 EB Off-Ramp	Etiwanda Ave	TS	0.63	17.6	B	0.47	10.0	B	0.72	20.1	C	0.51	12.1	B
1118	I-10 EB On-Ramp	NB Etiwanda Ave	UC <sup>1</sup>	0.15	--	--	0.45	--	--	0.19	--	--	0.57	--	--

<sup>1</sup>For uncontrolled (UC) movements the d/c was calculated based on a saturation flow rate of 1500 vehicles per hour. Average delay and LOS are not calculated for these intersections, denoted with double dashes (--).

**Table 3.5.14: Etiwanda Avenue/Commerce Drive Interchange**  
**Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
1111	Valley Blvd/Ontario Mills Pkwy & Etiwanda Ave	Sig	NBL	300	105	Yes	59	Yes	88	Yes	32	Yes
			NBTR	670	65	Yes	180	Yes	52	Yes	115	Yes
			SBL	250	38	Yes	40	Yes	53	Yes	146	Yes
			SBTR	1,070 <sup>1</sup>	190	Yes	236	Yes	204	Yes	226	Yes
			EBL	200	25	Yes	60	Yes	25	Yes	100	Yes
			EBT	775	25	Yes	35	Yes	25	Yes	84	Yes
			EBR	775	38	Yes	148	Yes	34	Yes	82	Yes
			WBL	250	68	Yes	67	Yes	67	Yes	64	Yes
			WBT	1,450 <sup>1</sup>	25	Yes	25	Yes	25	Yes	29	Yes
			WBR	1,450 <sup>1</sup>	25	Yes	25	Yes	25	Yes	25	Yes

**Table 3.5.14 continued: Etiwanda Avenue/Commerce Drive Interchange**  
**Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
1112	Valley Blvd & Commerce Dr	Sig	SBL	300	33	Yes	28	Yes	33	Yes	35	Yes
			SBTR	2,115 <sup>1</sup>	50	Yes	59	Yes	48	Yes	61	Yes
			EBL	220	26	Yes	32	Yes	25	Yes	42	Yes
			EBT	850	25	Yes	67	Yes	44	Yes	132	Yes
			EBR	850	0	Yes	25	Yes	25	Yes	25	Yes
			WBL	270	122	Yes	159	Yes	128	Yes	181	Yes
			WBT	770	81	Yes	114	Yes	108	Yes	167	Yes
			WBR	770	25	Yes	25	Yes	25	Yes	25	Yes
1114	I-10 WB Off-Ramp & Etiwanda Ave	Sig	NBT	850	54	Yes	113	Yes	76	Yes	399	Yes
			SBT	730	78	Yes	63	Yes	130	Yes	63	Yes
1117	I-10 EB Off-Ramp & Etiwanda Ave	Sig	NBT	315	184	Yes	200	Yes	168	Yes	247	Yes
			SBT	850	156	Yes	51	Yes	175	Yes	61	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

Peak hour vehicle queues for freeway off-ramps at the Etiwanda Avenue/Commerce Drive interchange for years 2025 and 2045 under Alternative 2 conditions are summarized in **Table 3.5.15**. As shown in the table, none of the queues are expected to exceed the available storage.

**Table 3.5.15: Etiwanda Avenue/Commerce Drive Interchange**  
**Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
1112	Valley Blvd & Commerce Dr/I-10 EB Off-Ramp	Sig	NBL	500 <sup>1</sup>	30	Yes	26	Yes	37	Yes	29	Yes
			NBT	900	125	Yes	148	Yes	133	Yes	156	Yes
			NBR	900	87	Yes	96	Yes	92	Yes	110	Yes

Table 3.5.15 continued: Etiwanda Avenue/Commerce Drive Interchange  
Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
1114	I-10 WB Off-Ramp & Etiwanda Ave	Sig	WBL	650	334	Yes	267	Yes	357	Yes	366	Yes
			WBR	1,200 <sup>2</sup>	38	Yes	73	Yes	37	Yes	90	Yes
1117	I-10 EB Off-Ramp & Etiwanda Ave	Sig	EBL	1,000 <sup>3</sup>	51	Yes	57	Yes	50	Yes	62	Yes
			EBR	470	328	Yes	130	Yes	377	Yes	174	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 200' and 2<sup>nd</sup> storage lane is 900'. The average available storage is 550 feet per lane.

<sup>2</sup> 1<sup>st</sup> storage lane is 400' and 2<sup>nd</sup> lane extends 2,000' to the beginning of the painted gore'. The average available storage is 1,200 feet per lane.

<sup>3</sup> 1<sup>st</sup> storage lane is 470' and 2<sup>nd</sup> lane extends 1,530' to the beginning of the painted gore'. The average available storage is 1,000 feet per lane.

Note: The 95<sup>th</sup> percentile queues are compared to a lane group's average lane length.

Peak hour ramp meter queues expected in year 2045 on the four I-10 on-ramps from Etiwanda Avenue under Alternative 2 are summarized in **Table 3.5.16**. All four on-ramps are assumed to have one HOV lane and one GP lane. As shown in the table, the on-ramps from Etiwanda Avenue provide sufficient storage for the maximum queue expected for year 2045 except for the eastbound on-ramp from Etiwanda Avenue. The maximum queue expected for the eastbound on-ramp from Etiwanda Avenue is 720 feet, exceeding the available storage of 650 feet.

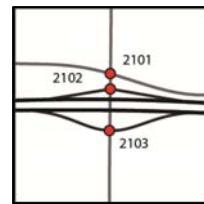
Table 3.5.16: Etiwanda Avenue Interchange  
Year 2045 Alternative 2 (HOV) On-Ramp Meter Queues vs. Storage

Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)			Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)		
		AM	PM	HOV	GP								
1113	I-10 WB On-Ramp	480	790	1	1	400	90	680	Yes	800	660	835	Yes
1115	I-10 WB Loop On-Ramp	386	662	1	1	400	0	540	Yes	720	0	652	Yes
1116	I-10 EB Loop On-Ramp	91	290	1	1	400	0	430	Yes	400	0	600	Yes
1118	I-10 EB On-Ramp	279	860	1	1	400	90	400	Yes	900	720	650	No

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

### 3.5.6 Pepper Avenue Interchange Analysis

Under Alternative 2 for years 2025 and 2045, the study intersections are expected to operate at LOS C or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 2 conditions at the Pepper Avenue interchange study intersections is provided in **Table 3.5.17**.



**Table 3.5.17: Pepper Avenue Interchange  
Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
2101	Valley Blvd	Pepper Ave	Sig	0.60	30.7	C	0.57	28.0	C	0.71	32.8	C	0.75	32.2	C	
2102	I-10 WB Ramps	Pepper Ave	Sig	0.50	19.2	B	0.39	18.8	B	0.71	30.1	C	0.61	20.8	C	
2103	I-10 EB Ramps	Pepper Ave	Sig	0.56	26.9	C	0.50	34.1	C	0.71	27.9	C	0.68	34.0	C	

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 2 conditions are presented in **Table 3.5.18**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements are expected to exceed the available storage under year 2025 Alternative 2 conditions:

- Southbound left turn at I-10 EB Ramp & Pepper Ave (AM and PM Peak Hours)

As shown in **Table 3.5.18**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 2 conditions:

- Westbound left turn at Valley Blvd & Pepper Ave (AM Peak Hour)
- Southbound through at I-10 WB Ramps & Pepper Ave (AM Peak Hour)
- Southbound right turn at I-10 WB Ramps & Pepper Ave (AM Peak Hour)

Peak hour vehicle queues for freeway off-ramps at the Pepper Avenue interchange for years 2025 and 2045 under Alternative 2 (HOV) conditions are summarized in **Table 3.5.19**. As shown in the table, the expected 95<sup>th</sup> percentile queue for the westbound right turn movement at the westbound off-ramp to Pepper Avenue exceeds the average available storage length of 200 feet during the morning and evening peak hour for year 2045. The expected queue is 314 feet during the morning peak hour and 322 feet during the evening peak hour for year 2045.

The 95<sup>th</sup> percentile queue for the westbound left/through/right lane at the westbound off-ramp to Pepper Avenue is 324 feet during the morning peak hour and 326 feet for the evening peak hour. The available storage length for this movement accommodates the 95<sup>th</sup> percentile queue for both peak hours. However, the queues for both the morning and evening peak hours are longer than the 200 foot right turn lane resulting in storage blockage of the westbound right turn movement. Under this

condition, the estimated longest queue is approximately 445 feet during the morning peak hour and 451 feet during the evening peak hour. The length of the ramp from the stop bar to the gore point is approximately 1,140 feet, leaving approximately 695 feet during the morning peak hour and 689 feet during the evening peak hour from the back of the queue to the gore point.

Peak hour ramp meter queues expected in year 2045 on the two I-10 on-ramps from Pepper Avenue under Alternative 2 are summarized in **Table 3.5.20**. The westbound on-ramp is assumed to have one HOV lane and GP lane. The eastbound on-ramp is assumed to have one HOV lane and two GP lanes. As shown in the table, the westbound on-ramp from Pepper Avenue does not provide sufficient storage for the maximum queue of 960 feet in year 2045. The eastbound on-ramp from Pepper Avenue provides sufficient storage for the maximum queue expected in year 2045.

**Table 3.5.18: Pepper Avenue Interchange  
Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2101	Valley Blvd & Pepper Ave	Sig	NBL	198 <sup>1</sup>	83	Yes	151	Yes	101	Yes	156	Yes
			NBT	340	105	Yes	104	Yes	177	Yes	238	Yes
			NBR	98	25	Yes	25	Yes	25	Yes	90	Yes
			SBL	230	42	Yes	49	Yes	92	Yes	79	Yes
			SBTR	575	222	Yes	216	Yes	309	Yes	301	Yes
			EBL	240	51	Yes	73	Yes	45	Yes	45	Yes
			EBT	300	117	Yes	163	Yes	161	Yes	241	Yes
			EBR	320	91	Yes	62	Yes	82	Yes	48	Yes
			WBL	220	183	Yes	93	Yes	222	No	135	Yes
			WBTR	1,330 <sup>2</sup>	81	Yes	119	Yes	83	Yes	133	Yes
2102	I-10 WB Ramps & Pepper Ave	Sig	NBL	125	25	Yes	0	Yes	29	Yes	25	Yes
			NBT	410	150	Yes	101	Yes	205	Yes	222	Yes
			SBT	340	54	Yes	68	Yes	408	No	66	Yes
			SBR	340	136	Yes	325	Yes	458	No	121	Yes
2103	I-10 EB Ramps & Pepper Ave	Sig	NBT	1,700 <sup>2</sup>	103	Yes	90	Yes	205	Yes	262	Yes
			NBR	132	25	Yes	46	Yes	25	Yes	60	Yes
			SBL	200	257	No	269	No	356	No	346	No
			SBT	410	0	Yes	34	Yes	25	Yes	25	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 152' and 2<sup>nd</sup> storage lane is 244'. The average available storage is 198 feet per lane.

<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

Note: The 95<sup>th</sup> percentile queues are compared to a lane group's average lane length.

Table 3.5.19: Pepper Avenue Interchange Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2102	I-10 WB Ramps & Pepper Ave	Sig	WBLTR	1,140	113	Yes	143	Yes	324	Yes	326	Yes
			WBR	200	109	Yes	143	Yes	314	No	322	No
2103	I-10 EB Ramps & Pepper Ave	Sig	EBL	1,175	212	Yes	230	Yes	302	Yes	288	Yes
			EBLTR	770	183	Yes	226	Yes	252	Yes	263	Yes

Table 3.5.20: Pepper Avenue Interchange Year 2045 Alternative 2 (HOV) On-Ramp Meter Queues vs. Storage													
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM	HOV	GP	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
	I-10 WB On-Ramp	840	640	1	1	400	90	350	Yes	900	720	350	No
2103	I-10 EB On-Ramp	920	830	1	2	400	90	450	Yes	480	0	450	Yes

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.5.7 La Cadena Drive/9<sup>th</sup> Street Interchange Analysis

Under Alternative 2 for years 2025 and 2045, the study intersections are expected to operate at LOS C or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 2 conditions at the La Cadena Drive/9<sup>th</sup> Street interchange study intersections is provided in **Table 3.5.21**.



The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 2 conditions are presented in **Table 3.5.22**. In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage under years 2025 and 2045 Alternative 2 conditions.

**Table 3.5.21: La Cadena Drive/9<sup>th</sup> Street Interchange  
Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
2261	I-10 WB On-Ramp	La Cadena Dr	UC <sup>1</sup>	0.12	4.6	A	0.21	5.9	A	0.16	5.7	A	0.26	7.2	A	
2262	I-10 WB Off-Ramp	9 <sup>th</sup> St	SC <sup>2</sup>	0.40	11.6	B	0.51	13.7	B	0.51	14.0	B	0.64	18.3	C	
2263	I-10 EB Ramps	9 <sup>th</sup> St	AWS	0.20	9.5	A	0.34	10.9	B	0.27	10.7	B	0.41	12.2	B	

<sup>1</sup> The d/c ratio, average delay and LOS for this intersection are for northbound left turn movement only which conflicts with the free southbound through movement.

<sup>2</sup> For two-way stop control (SC) intersection, the average delay and LOS are for the worst stop-controlled approach; the d/c ratio is for the worst stop-controlled movement/approach.

**Table 3.5.22: La Cadena Drive/9<sup>th</sup> Street Interchange  
Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
2261	I-10 WB On-Ramp & La Cadena Dr	UC	NBLT	1,500 <sup>2</sup>	25	Yes	25	Yes	25	Yes	26	Yes
2263	I-10 EB Ramps & 9 <sup>th</sup> St	AWS <sup>1</sup>	SBL	400	--	--	--	--	--	--	--	--

<sup>1</sup> Queue length is not calculated by Synchro for all-way stop (AWS) controlled intersections.

<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

Peak hour vehicle queues for freeway off-ramps at the La Cadena Drive/9<sup>th</sup> Street interchange for years 2025 and 2045 under Alternative 2 conditions are summarized in **Table 3.5.23**. As shown in the table, none of the 95<sup>th</sup> percentile queues are expected to exceed the available storage length.

Peak hour ramp meter queues expected in year 2045 on the two I-10 on-ramps from La Cadena Drive and 9<sup>th</sup> Street under Alternative 2 are summarized in **Table 3.5.24**. The westbound on-ramp from La Cadena Drive and 9<sup>th</sup> Street is assumed to have one GP lane. The eastbound on-ramp from La Cadena Drive and 9<sup>th</sup> Street is assumed to have one HOV lane and one GP lane. As shown in the table, both on-ramps from La Cadena Drive and 9<sup>th</sup> Street provide sufficient storage for the maximum queue expected for year 2045.

Table 3.5.23: La Cadena Drive/9 <sup>th</sup> Street Interchange Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
2262	I-10 WB Off-Ramp & 9 <sup>th</sup> St	SC	WBLR	900	49	Yes	73	Yes	73	Yes	116	Yes
2263	I-10 EB Ramp & 9 <sup>th</sup> St	AWS <sub>1</sub>	EBLTR	830	--	--	--	--	--	--	--	--

<sup>1</sup> Queue length is not calculated by Synchro for all-way stop (AWS) controlled intersections.

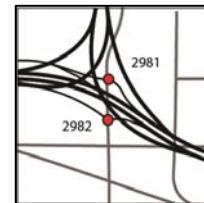
Table 3.5.24: La Cadena Drive/9 <sup>th</sup> Street Interchange Year 2045 Alternative 2 (HOV) On-Ramp Meter Queues vs. Storage													
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM	HOV	GP	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
2261	I-10 WB On-Ramp	270	340	0	1	--	--	--	--	400	0	510	Yes
2263	I-10 EB On-Ramp	440	460	1	1	400	0	450	Yes	480	0	450	Yes

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.5.8 Tennessee Street Interchange Analysis

Alternative 2 (HOV) conditions analysis for the Tennessee Street interchange includes the following improvements for years 2025 and 2045 as part of the proposed project:



#### Tennessee Street and I-10 Westbound Ramp Intersection (Intersection #2981)

- Add 2<sup>nd</sup> exclusive left turn lane with a storage length of 180 feet on the northbound approach
- Extend existing exclusive left turn lane storage length to 180 feet on the northbound approach
- Reduce the storage length of the shared through/right lane from 690 feet to 580 feet on the westbound approach.

#### Tennessee Street and I-10 Eastbound Ramp Intersection (Intersection #2982)

- Convert shared through/right lane into an exclusive through lane on the northbound approach
- Add an exclusive right turn lane with storage length of 250 feet on the northbound approach
- Add a 2<sup>nd</sup> exclusive left turn lane with storage length of 190 feet on the southbound approach

- Extend existing exclusive left turn lane storage to 190 feet on the southbound approach
- Convert shared left/through lane into an exclusive through lane on the eastbound approach
- Add an exclusive left turn lane with storage length of 260 feet on the eastbound approach

Differences between Alternative 1 (No Build) and Alternative 2 (HOV) intersection lane configurations at the Tennessee Street interchange are highlighted in **Figure 3.5.2** for year 2025 and **Figure 3.5.4** for year 2045.

Under Alternative 2 for years 2025 and 2045, the study intersections for the Tennessee Street interchange are expected to operate at LOS C or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 2 conditions at the Tennessee Street interchange study intersections is provided in **Table 3.5.25**.

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 2 conditions are presented in **Table 3.5.26**. In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage.

**Table 3.5.25: Tennessee Street Interchange**  
**Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
2981	I-10 WB Ramps	Tennessee St	Sig	0.47	15.7	B	0.52	11.3	B	0.48	14.9	B	0.57	13.9	B	
2982	I-10 EB Ramps	Tennessee St	Sig	0.44	13.5	B	0.80	23.8	C	0.52	15.1	B	0.86	28.5	C	

**Table 3.5.26: Tennessee Street Interchange**  
**Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2981	I-10 WB Ramps & Tennessee St	Sig	NBL	180	38	Yes	28	Yes	30	Yes	43	Yes
			NBT	490	25	Yes	36	Yes	25	Yes	158	Yes
			SBTR	1,350 <sup>1</sup>	90	Yes	152	Yes	95	Yes	196	Yes
2982	I-10 EB Ramps & Tennessee St	Sig	NBT	457	123	Yes	205	Yes	140	Yes	270	Yes
			NBR	250	26	Yes	214	Yes	27	Yes	245	Yes
			SBL	190	25	Yes	100	Yes	25	Yes	132	Yes
			SBT	490	25	Yes	25	Yes	25	Yes	25	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

Peak hour vehicle queues for freeway off-ramps at the Tennessee Street interchange for years 2025 and 2045 under Alternative 2 conditions are summarized in **Table 3.5.27**. As shown in the table, none of the queues are expected to exceed the available storage.

Table 3.5.27: Tennessee Street Interchange Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2981	I-10 WB Ramps & Tennessee St	Sig	WBLT	1,140	90	Yes	66	Yes	87	Yes	105	Yes
			WBTR	580	90	Yes	66	Yes	87	Yes	105	Yes
2982	I-10 EB Ramps & Tennessee St	Sig	EBL	260	76	Yes	113	Yes	92	Yes	155	Yes
			EBTR	470	84	Yes	227	Yes	112	Yes	297	Yes

Peak hour ramp meter queues expected in year 2045 on the I-10 eastbound on-ramp from Tennessee Street under Alternative 2 is summarized in **Table 3.5.28**. The eastbound on-ramp is assumed to have two GP lanes. As shown in the table, the eastbound on-ramp from Tennessee Street does not provide sufficient storage for the maximum queue of 390 feet in year 2045.

Table 3.5.28: Tennessee Street Interchange Year 2045 Alternative 2 (HOV) On-Ramp Meter Queues vs. Storage													
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM	HOV	GP	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
2982	I-10 EB On-Ramp	370	1,290	0	2	--	--	--	--	720	390	330	No

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.5.9 Ford Street Interchange Analysis

Under Alternative 2 for years 2025 and 2045, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours except for the Parkford Drive and Ford Street intersection. The Parkford Drive and Ford Street intersection is expected to operate at LOS F during the evening peak hour in years 2025 and 2045. A summary of LOS, d/c and average vehicle delay for Alternative 2 conditions at the Ford Street interchange study intersections is provided in **Table 3.5.29**.

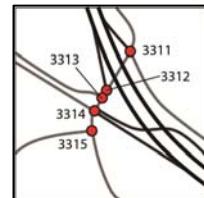


Table 3.5.29: Ford Street Interchange Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
3311	Reservoir Rd/I-10 WB On-Ramp	Ford St	Sig	0.88	37.2	D	0.73	20.0	C	0.59	19.1	B	0.66	17.8	B
3312	I-10 EB Off-Ramp	Ford St	SC <sup>1</sup>	0.67	22.5	C	0.87	29.2	D	0.67	17.1	C	0.81	27.3	D
3313	Parkford Dr	Ford St	SC <sup>1</sup>	0.53	33.3	D	0.83	57.0	F	0.51	30.0	D	0.97	89.6	F
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp	Ford St	Sig	0.66	23.2	C	0.55	18.8	B	0.87	31.7	C	0.89	28.6	C
3315	Oak St	Ford St	SC <sup>1</sup>	0.25	19.2	C	0.12	14.1	B	0.26	20.1	C	0.12	14.2	B

<sup>1</sup>For two-way stop control intersection, the average delay and LOS are for the worst stop-controlled approach; the d/c ratio is for the worst stop-controlled movement/approach.

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 2 conditions are presented in **Table 3.5.30**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements are expected to exceed the available storage under year 2025 Alternative 2 conditions:

- Northbound left turn at Reservoir Rd/I-10 WB On-Ramp & Ford St (AM and PM Peak Hours)
- Northbound shared through/right at Reservoir Rd/I-10 WB On-Ramp & Ford St (PM Peak Hour)
- Southbound left turn at Reservoir Rd/I-10 WB On-Ramp & Ford St (AM Peak Hour)
- Northbound left turn at Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St (AM Peak Hour)
- Northbound shared through/right at Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St (AM and PM Peak Hours)
- Southbound left turn at Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St (AM and PM Peak Hours)
- Eastbound left turn at Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St (AM Peak Hour)

As shown in **Table 3.5.30**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 2 conditions:

- Southbound shared through/right at Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St (PM Peak Hour)

Peak hour vehicle queues for freeway off-ramps at the Ford Street interchange for years 2025 and 2045 under Alternative 2 conditions are summarized in **Table 3.5.31**. As shown in the table, none of the queues are expected to exceed the available storage.

Peak hour ramp meter queues expected in year 2045 on the two on-ramps from Ford Street under Alternative 2 are summarized in **Table 3.5.32**. Both on-ramps are assumed to have one HOV lane and

two GP lane. As shown in the table, the both on-ramps from Ford Street provides sufficient storage for the maximum queue expected for year 2045.

**Table 3.5.30: Ford Street Interchange**  
**Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3311	Reservoir Rd/I-10 WB On-Ramp & Ford St	Sig	NBL	100	298	No	112	No	187	No	125	No
			NBTR	280	175	Yes	453	No	154	Yes	297	No
			SBL	45	54	No	32	Yes	42	Yes	35	Yes
			SBTR	1,215 <sup>2</sup>	610	Yes	222	Yes	175	Yes	70	Yes
			WBLTR	2,160 <sup>2</sup>	147	Yes	111	Yes	99	Yes	100	Yes
3313	Parkford Dr & Ford St	SC	NBL	30	25	Yes	25	Yes	25	Yes	25	Yes
			EBLR	820	72	Yes	175	Yes	68	Yes	234	Yes
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St	Sig	NBL	85	101	No	47	Yes	137	No	59	Yes
			NBTR	85	155	No	90	No	154	No	103	No
			SBL	40	112	No	95	No	239	No	278	No
			SBTR	105	81	Yes	71	Yes	81	Yes	113	No
			EBL	115	139	No	87	Yes	180	No	103	Yes
			EBTR	3,100 <sup>2</sup>	121	Yes	156	Yes	129	Yes	352	Yes
3315	Oak St & Ford St	SC	NBL	60	0	Yes	0	Yes	0	Yes	0	Yes
			NEL	325 <sup>1</sup>	25	Yes	25	Yes	25	Yes	25	Yes
			NER	80 <sup>1</sup>	--	--	--	--	--	--	--	--

<sup>1</sup> For the northeast approach calculated queues are based on the HCM shared lane capacity analysis. The northeast approach consists of 2 lanes: 325 feet and 80 feet. The 95<sup>th</sup> percentile queue length is the total queue length for both movements.

<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

**Table 3.5.31: Ford Street Interchange**  
**Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3312	I-10 EB Off-Ramp & Ford St	SC	EBL	1,025 <sup>1</sup>	137	Yes	297	Yes	135	Yes	234	Yes
			EBR	30 <sup>1</sup>	--	--	--	--	--	--	--	--

Table 3.5.31 continued: Ford Street Interchange Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours													
Intersection #	Location E/W St & N/S St	Traffic Control Sig	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions				
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		
			95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St		WBL	120	78	Yes	38	Yes	99	Yes	64	Yes	
			WBTR	1675	168	Yes	68	Yes	293	Yes	109	Yes	

<sup>1</sup> For the eastbound approach calculated queues are based on the HCM shared lane capacity analysis. The eastbound approach consists of 2 lanes: 1025 feet and 30 feet. The 95<sup>th</sup> percentile queue length is the total queue length for both movements.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

Table 3.5.32: Ford Street Interchange Year 2045 Alternative 2 (HOV) – Expected Peak Hour Queues vs. Storage at Ramp Meters													
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
						Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
		AM	PM	HOV	GP								
3311	I-10 WB On-Ramp	1,110	550	1	2	400	90	395	Yes	550	360	395	Yes
3314	I-10 EB On-Ramp	600	1,210	1	2	400	90	920	Yes	600	390	920	Yes

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.5.10 Wabash Avenue Interchange Analysis

Under Alternative 2 for year 2025, the study intersections are expected to operate at LOS B or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 2 conditions at the Wabash Avenue interchange study intersections is provided in **Table 3.5.33**. Analysis for year 2045 is not conducted for the Wabash Avenue interchange due to studies currently being conducted to improve the interchange between years 2025 and 2045 under RTP# 4M01032. Those improvements are assumed to address year 2045 traffic at the interchange.



The queuing analysis for the arterial intersection approaches and available storage for each movement for year 2025 under Alternative 2 conditions are presented in **Table 3.5.34**. In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage.

Table 3.5.33: Wabash Avenue Interchange Alternative 2 (HOV) Intersection Levels of Service – AM/PM Peak Hours								
Intersection #	Location			Traffic Control	Year 2025 Level of Service			
	East/West Street		North/South Street		AM Peak Hour		PM Peak Hour	
	d/c	Avg. Delay (sec)	LOS		d/c	Avg. Delay (sec)	LOS	
3431	I-10 WB Off-Ramp/Reservoir Rd	Wabash Ave	SC <sup>1</sup>	0.19	12.2	B	0.17	10.9
3432	I-10 EB On-Ramp	Wabash Ave	UC <sup>2</sup>	0.03	2.2	A	0.04	2.5

<sup>1</sup> For two-way stop control intersection, the average delay and LOS are for the worst stop-controlled approach; the d/c ratio is for the worst stop-controlled movement/approach.

<sup>2</sup> The d/c ratio, average delay and LOS for this intersection are for southbound left turn movement only which conflicts with the free northbound through movement.

Peak hour vehicle queues for freeway off-ramps at the Wabash Avenue interchange for year 2025 under Alternative 2 conditions are summarized in **Table 3.5.35**. As shown in the table, none of the queues are expected to exceed the available storage.

Table 3.5.34: Wabash Avenue Interchange Alternative 2 (HOV) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours										
Intersection #	Location		Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				
	E/W St & N/S St					AM Peak Hour		PM Peak Hour		
	95 <sup>th</sup> Percentile Queue (ft)		Adequa te Storage ? (Yes or No)		95 <sup>th</sup> Percentil e Queue (ft)		Adequat e Storage? (Yes or No)			
3431	I-10 WB Off-Ramp/Reservoir Rd & Wabash Ave	SC	NBLT	590	25	Yes	25	Yes		
			EBLTR	2,077 <sup>1</sup>	25	Yes	25	Yes		
3432	I-10 EB On-Ramp & Wabash Ave	UC	SBLT	590	25	Yes	25	Yes		

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

Table 3.5.35: Wabash Avenue Interchange Alternative 2 (HOV) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours										
Intersection #	Location		Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				
	E/W St & N/S St					AM Peak Hour		PM Peak Hour		
	95 <sup>th</sup> Percentile Queue (ft)		Adequate Storage? (Yes or No)		95 <sup>th</sup> Percentile Queue (ft)		Adequate Storage? (Yes or No)			
3431	I-10 WB Off-Ramp/Reservoir Rd & Wabash Ave	SC	WBLTR	1,050	25	Yes	25	Yes		

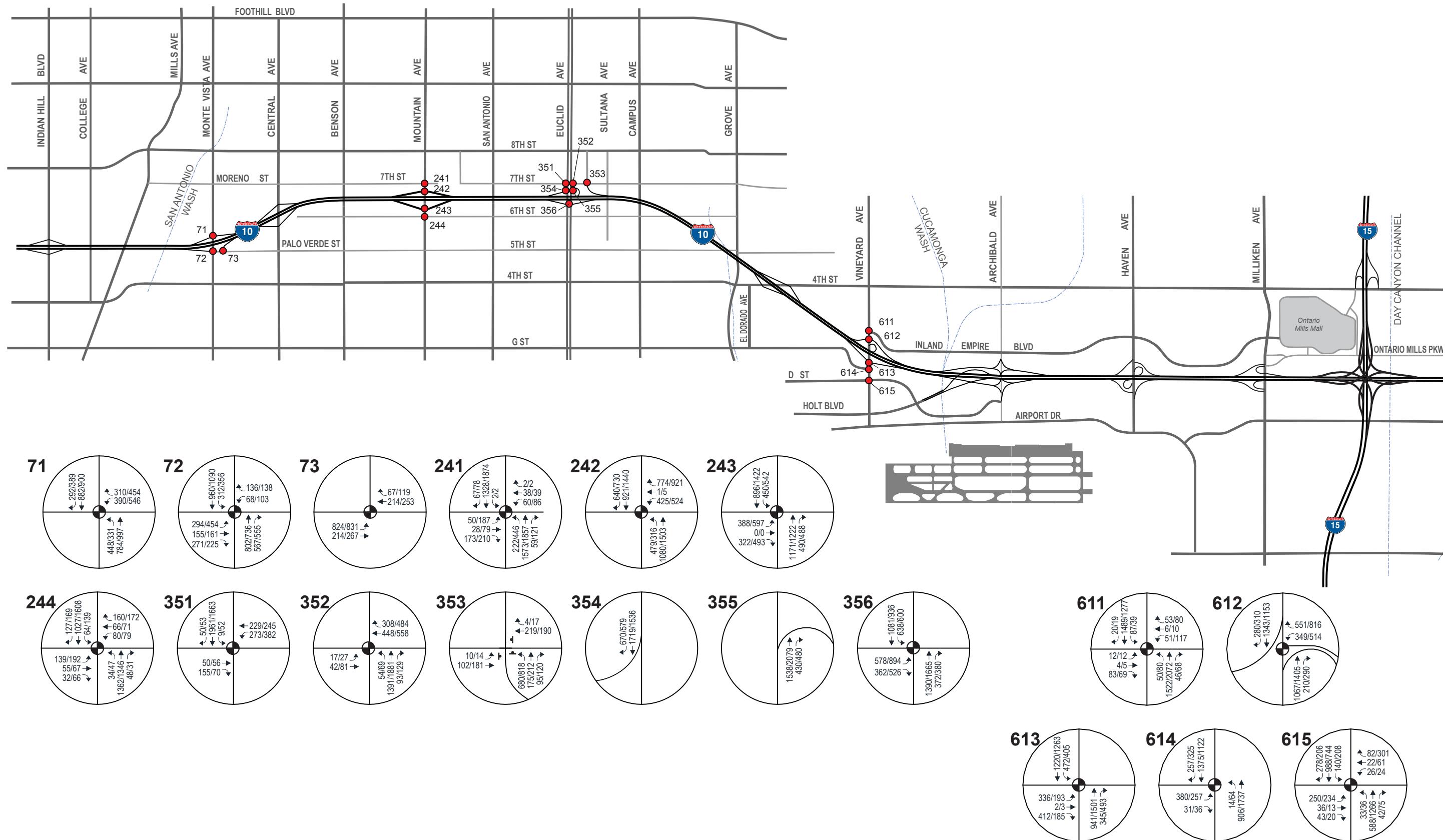
### **3.5.11 Significant Impact Determination and Recommended Improvements**

**Table 3.5.36** compares the expected LOS and d/c ratios for Alternative 2 (HOV) and Alternative 1 (No Build) under years 2025 and 2045 for all study intersections. As shown in the table, none of the study intersections meet the significant impact criteria of an increase in intersection d/c of 0.10 or more with an LOS F in the build condition. Therefore, there are no significant traffic impacts at any of the study intersections.

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Table 3.5.36: Years 2025 and 2045 Alternative 2 (HOV) Peak Hour Intersection Significant Impact Determination																																				
Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2012					Year 2025										Year 2045																
					Existing Traffic					Alternative 1 (No Build) Traffic on No Build Geometry					Alternative 2 (HOV) Traffic on Build Geometry					Significant Impact?	Alternative 1 (No Build) Traffic on No Build Geometry					Alternative 2 (HOV) Traffic on Build Geometry										
		AM Peak Hour			PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour									
		v/c	Avg Delay (sec)	LOS	v/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS		d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS							
Monte Vista Avenue	71	I-10 WB Ramp	Monte Vista Ave	Sig	0.83	25.3	C	0.77	22.3	C	0.90	28.6	C	1.02	38.2	D	0.93	31.2	C	0.92	34.7	C	N	0.99	39.6	D	1.19	57.7	E	1.00	46.4	D	1.09	49.8	D	N
	72	I-10 EB Off-Ramp/ Palo Verde St	Monte Vista Ave	Sig	0.83	31.7	C	1.00	45.8	D	0.93	36.1	D	1.18	57.4	E	0.94	33.8	C	1.01	50.5	D	N	1.01	46.1	D	1.29	74.6	E	1.07	49.5	D	1.19	69.9	E	N
	73	Palo Verde St	I-10 EB On-Ramp	Sig	0.36	10.7	B	0.37	13.0	B	0.38	9.8	A	0.41	11.6	B	0.38	10.2	B	0.40	14.5	B	N	0.43	10.3	B	0.46	13.1	B	0.42	10.6	B	0.46	13.5	B	N
Mountain Avenue	241	7 <sup>th</sup> St/Shopping Center	Mountain Ave	Sig	0.56	16.5	B	0.79	26.4	C	0.67	17.2	B	0.96	35.1	D	0.71	17.0	B	1.02	38.7	D	N	0.84	19.6	B	1.01	40.3	D	0.78	21.3	C	1.03	46.1	D	N
	242	I-10 WB On/Off Ramp	Mountain Ave	Sig	0.70	20.0	C	0.79	25.3	C	0.85	32.2	C	0.99	35.2	D	0.88	35.1	D	1.04	43.1	D	N	0.98	40.9	D	1.11	52.0	D	0.99	45.7	D	1.14	59.4	E	N
	243	I-10 EB On/Off Ramp	Mountain Ave	Sig	0.57	16.2	B	0.78	29.1	C	0.59	16.7	B	0.85	32.8	C	0.60	17.5	B	0.83	32.8	C	N	0.68	25.7	C	0.87	34.6	C	0.67	21.5	C	0.82	35.9	D	N
	244	6th St	Mountain Ave	Sig	0.65	18.7	B	0.71	21.7	C	0.48	16.7	B	0.74	22.8	C	0.48	16.7	B	0.73	23.2	C	N	0.57	18.5	B	0.77	23.3	C	0.54	18.2	B	0.72	24.0	C	N
Euclid Avenue	351	7 <sup>th</sup> St	SB Euclid Ave	Sig	0.74	18.1	B	0.73	20.6	C	0.79	22.8	C	0.78	21.8	C	0.79	21.3	C	0.77	21.1	C	N	0.95	32.8	C	0.89	29.6	C	0.94	32.0	C	0.88	28.1	C	N
	352	7 <sup>th</sup> St	NB Euclid Ave	Sig	0.52	10.3	B	0.66	13.8	B	0.60	12.9	B	0.83	17.8	B	0.62	12.9	B	0.85	18.5	B	N	0.69	13.6	B	0.95	20.4	C	0.71	14.9	B	0.97	21.5	C	N
	354	I-10 WB On-Ramp	SB Euclid Ave	UC	0.43	--	--	0.37	--	--	0.45	--	--	0.39	--	--	0.45	--	--	0.39	--	--	N	0.50	--	--	0.43	--	--	0.50	--	--	0.42	--	--	--
	355	I-10 WB On-Ramp	NB Euclid Ave	UC	0.27	--	--	0.31	--	--	0.29	--	--	0.32	--	--	0.29	--	--	0.32	--	--	N	0.31	--	--	0.35	--	--	0.31	--	--	0.35	--	--	--
	356	I-10 EB Ramp	Euclid Ave	Sig	0.97	45.3	D	1.00	52.0	D	1.00	53.6	D	<b>1.14</b>	<b>92.1</b>	F	1.01	53.3	D	<b>1.15</b>	<b>95.9</b>	F	N	<b>1.23</b>	<b>92.5</b>	F	<b>1.39</b>	<b>156.7</b>	F	<b>1.24</b>	<b>93.9</b>	F	<b>1.42</b>	<b>166.5</b>	F	N
	353	7 <sup>th</sup> St	I-10 WB Off-Ramp/ 2nd Ave	AWS	0.43	13.7	B	0.57	20.9	C	0.55	21.1	C	<b>0.70</b>	<b>50.1</b>	F	0.58	25.3	D	<b>0.71</b>	<b>55.2</b>	F	N	0.63	35.2	E	<b>0.78</b>	<b>98.1</b>	F	0.66	46.2	E	<b>0.79</b>	<b>105.7</b>	F	N
Vineyard Avenue	611	Inland Empire Blvd	Vineyard Ave	Sig	0.52	8.3	A	0.55	9.2	A	0.63	8.9	A	0.82	12.0	B	0.64	9.1	A	0.82	12.5	B	N	0.57	8.2	A	0.67	10.8	B	0.72	8.4	A	0.62	8.8	A	N
	612	I-10 WB Ramp	Vineyard Ave	Sig	0.59	10.0	A	0.64	11.9	B	0.83	14.5	B	1.05	36.8	D	0.90	18.1	B	1.08	45.2	D	N	0.87	20.8	C	1.10	44.3	D	0.96	28.2	C	1.07	41.5	D	N
	613	I-10 EB Ramp	Vineyard Ave	Sig	0.71	16.6	B	0.65	12.1	B	0.95	29.7	C	0.89	18.7	B	0.94	26.7	C	0.89	21.8	C	N	1.12	61.9	E	1.09	41.5	D	1.11	58.7	E	1.10	49.8	D	N
	614	E G St	Vineyard Ave	Sig	0.44	9.8	A	0.43	8.9	A	0.65	12.2	B	0.54	9.8	A	0.65	12.0	B	0.51	11.4	B	N	0.81	18.2	B	0.66	12.2	B	0.83	16.8	B	0.72	10.4	B	N
	615	E D St	Vineyard Ave	Sig	0.40	15.0	B	0.55	18.3	B	0.63	16.1	B	0.71	23.7	C	0.63	16.1	B	0.70	27.3	C	N	0.74	20.0	C	0.90	31.5	C	0.75	19.5	B	0.92	35.8	D	N
Etiwanda Ave/Commerce Dr	1112	Valley Blvd	Commerce Dr	Sig	0.36	31.6	C	0.44	32.5	C	0.30	34.0	C	0.39	31.7	C	0.32	33.2	C	0.36	33.1	C	N	0.36	33.6	C	0.48	36.2	D	0.39	32.7	C	0.45	32.8	C	N
	1111	Valley Blvd/ Ontario Mills Pkwy	Etiwanda Ave	Sig	0.38	16.5	B	0.47	20.3	C	0.44	18.7	B	0.56	22.6	C	0.40	19.4	B</																	

Table 3.5.36 continued: Years 2025 and 2045 Alternative 2 (HOV) Peak Hour Intersection LOS Significant Impact Determination																																				
Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2012					Year 2025										Significant Impact?	Year 2045															
					Existing Traffic					Alternative 1 (No Build) Traffic on No Build Geometry					Alternative 2 (HOV) Traffic on Build Geometry						Alternative 1 (No Build) Traffic on No Build Geometry					Alternative 2 (HOV) Traffic on Build Geometry										
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour						AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour									
		East/West Street	North/South Street		v/c	Avg Delay (sec)	LOS	v/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS		d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	Significant Impact?						
Etiwanda Ave/Commerce Dr	1114	I-10 WB Off-Ramp	Etiwanda Ave	Sig	0.55	17.8	B	0.42	12.9	B	0.50	15.2	B	0.52	12.7	B	0.54	15.5	B	0.59	15.0	B	0.53	16.0	B	0.58	15.3	B	0.57	17.0	B	0.67	18.9	B	N	
	1115	I-10 WB On-Ramp	NB Etiwanda Ave	UC	0.23	--	--	0.38	--	--	0.23	--	--	0.40	--	--	0.25	--	--	0.42	--	--	N	0.26	--	--	0.44	--	--	0.26	--	--	0.44	--	--	--
	1116	I-10 EB On-Ramp	SB Etiwanda Ave	UC	0.06	--	--	0.19	--	--	0.06	--	--	0.17	--	--	0.06	--	--	0.18	--	--	N	0.06	--	--	0.18	--	--	0.06	--	--	0.19	--	--	--
	1117	I-10 EB Off-Ramp	Etiwanda Ave	Sig	0.77	24.5	C	0.44	13.3	B	0.62	17.4	B	0.46	10.4	B	0.63	17.6	B	0.47	10.0	B	N	0.68	18.6	B	0.51	12.1	B	0.72	20.1	C	0.51	12.1	B	N
	1118	I-10 EB On-Ramp	NB Etiwanda Ave	UC	0.14	--	--	0.41	--	--	0.15	--	--	0.45	--	--	0.15	--	--	0.45	--	--	N	0.18	--	--	0.52	--	--	0.19	--	--	0.57	--	--	--
Pepper Ave	2101	Valley Blvd	Pepper Ave	Sig	0.64	30.9	C	0.62	31.3	C	0.62	38.6	D	0.60	28.1	C	0.60	30.7	C	0.57	28.0	C	N	0.60	31.0	C	0.58	30.6	C	0.71	32.8	C	0.75	32.2	C	N
	2102	I-10 WB Ramp	Pepper Ave	Sig	0.65	24.3	C	0.52	14.9	B	0.50	24.9	C	0.42	21.3	C	0.50	19.2	B	0.39	18.8	B	N	0.64	28.8	C	0.61	23.2	C	0.71	30.1	C	0.61	20.8	C	N
	2103	I-10 EB Ramp	Pepper Ave	Sig	0.98	53.1	D	0.89	49.6	D	0.59	28.6	C	0.52	34.1	C	0.56	26.9	C	0.50	34.1	C	N	0.64	25.0	C	0.65	30.2	C	0.71	27.9	C	0.68	34.0	C	N
La Cadena Dr/9 <sup>th</sup> St	2261	I-10 WB On-Ramp	La Cadena Dr	UC	0.09	4.0	A	0.17	5.3	A	0.11	4.5	A	0.20	5.7	A	0.12	4.6	A	0.21	5.9	A	N	0.14	4.8	A	0.24	6.4	A	0.16	5.7	A	0.26	7.2	A	N
	2262	I-10 WB Off-Ramp	9 <sup>th</sup> St	SC	0.49	12.9	B	0.46	12.9	B	0.43	12.5	B	0.65	16.9	C	0.40	11.6	B	0.51	13.7	B	N	0.49	13.3	B	0.80	24.8	C	0.51	14.0	B	0.64	18.3	C	N
	2263	I-10 EB Ramp	9 <sup>th</sup> St	AWS	0.38	11.3	B	0.44	11.9	B	0.23	10.0	B	0.35	11.1	B	0.20	9.5	A	0.34	10.9	B	N	0.26	10.9	B	0.38	11.7	B	0.27	10.7	B	0.41	12.2	B	N
Alabama St	2931	I-10 WB Ramp	Alabama St	Sig	0.80	25.6	C	0.83	22.0	C	0.91	37.3	D	0.97	36.8	D	0.68	20.2	C	0.79	17.4	B	N	1.00	59.7	E	1.16	70.3	E	0.79	25.7	C	0.88	24.1	C	N
	2932	I-10 EB Ramp	Alabama St	Sig	0.50	15.2	B	0.85	26.8	C	0.61	20.5	C	1.01	49.1	D	0.42	14.3	B	0.86	21.6	C	N	0.63	26.8	C	1.21	96.9	F	0.53	16.2	B	0.97	33.5	C	N
Tennessee St	2981	I-10 WB Ramp	Tennessee St	Sig	0.74	20.5	C	0.57	16.9	B	0.61	18.0	B	0.51	19.8	B	0.47	15.7	B	0.52	11.3	B	N	0.62	15.9	B	0.70	18.0	B	0.48	14.9	B	0.57	13.9	B	N
	2982	I-10 EB Ramp	Tennessee St	Sig	0.52	14.7	B	0.90	37.2	D	0.55	15.8	B	0.98	52.9	D	0.44	13.5	B	0.80	23.8	C	N	0.68	23.8	C	1.07	81.0	F	0.52	15.1	B	0.86	28.5	C	N
Ford St	3311	Reservoir Rd/I-10 WB On-Ramp	Ford St	SC	<b>1.25</b>	<b>253.2</b>	<b>F</b>	0.60	45.6	E	0.89	32.9	C	0.75	20.6	C	0.88	37.2	D	0.73	20.0	C	N	0.55	20.9	C	0.50	22.0	C	0.59	19.1	B	0.66	17.8	B	N
	3312	I-10 EB Off-Ramp	Ford St	SC	0.50	13.9	B	0.86	29.5	D	0.71	19.1	C	<b>1.09</b>	<b>85.3</b>	<b>F</b>	0.67	22.5	C	0.87	29.2	D	N	0.72	17.4	C	<b>1.07</b>	<b>76.3</b>	<b>F</b>	0.67	17.1	C	0.81	27.3	D	N
	3313	Parkford Dr	Ford St	SC	0.40	21.9	C	0.65	31.8	D	0.47	27.9	D	0.79	48.8	E	0.53	33.3	D	<b>0.83</b>	<b>57.0</b>	<b>F</b>	N	0.45	24.9	C	<b>1.18</b>	<b>162.3</b>	<b>F</b>	0.51	30.0	D	<b>0.97</b>	<b>89.6</b>	F	N
	3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp	Ford St	Sig	0.62	19.8	B	0.52	32.8	C	0.62	23.3	C	0.48	18.1	B	0.66	23.2	C	0.55	18.8	B	N	0.84	35.1	D	1.01	44.0	D	0.87	31.7	C	0.89	28.6	C	N
	3315	Oak St	Ford St	SC	0.27	19.2	C	0.10	12.5	B	0.25	19.1	C	0.12	14.0	B	0.25	19.2	C	0.12																



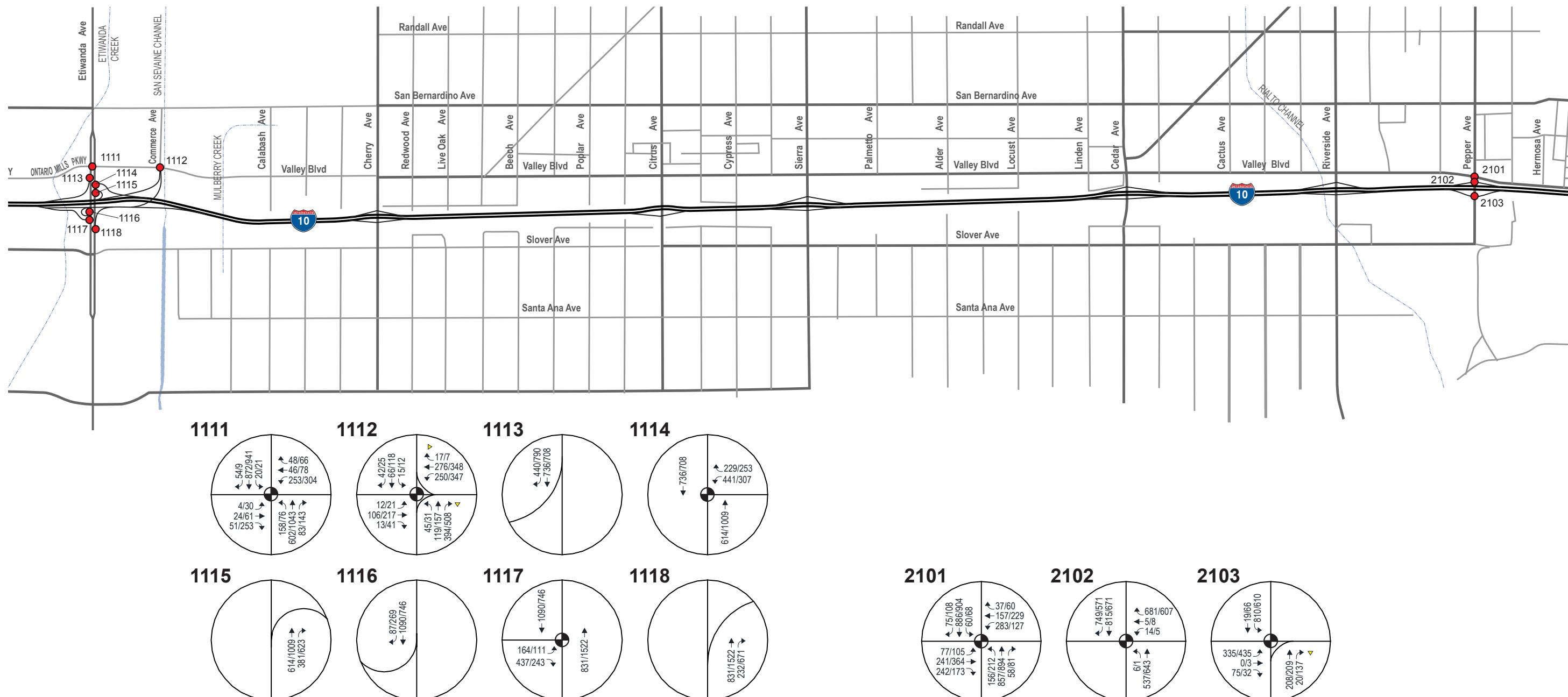
#### LEGEND

- Traffic Signal
- ↗ Turning Movement
- 1234 ● Intersection Number
- Stop Sign
- Through Movement
- XX/XX AM/PM Peak Hour Volumes
- ▼ Yield Sign



FIGURE 3.5.1

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES



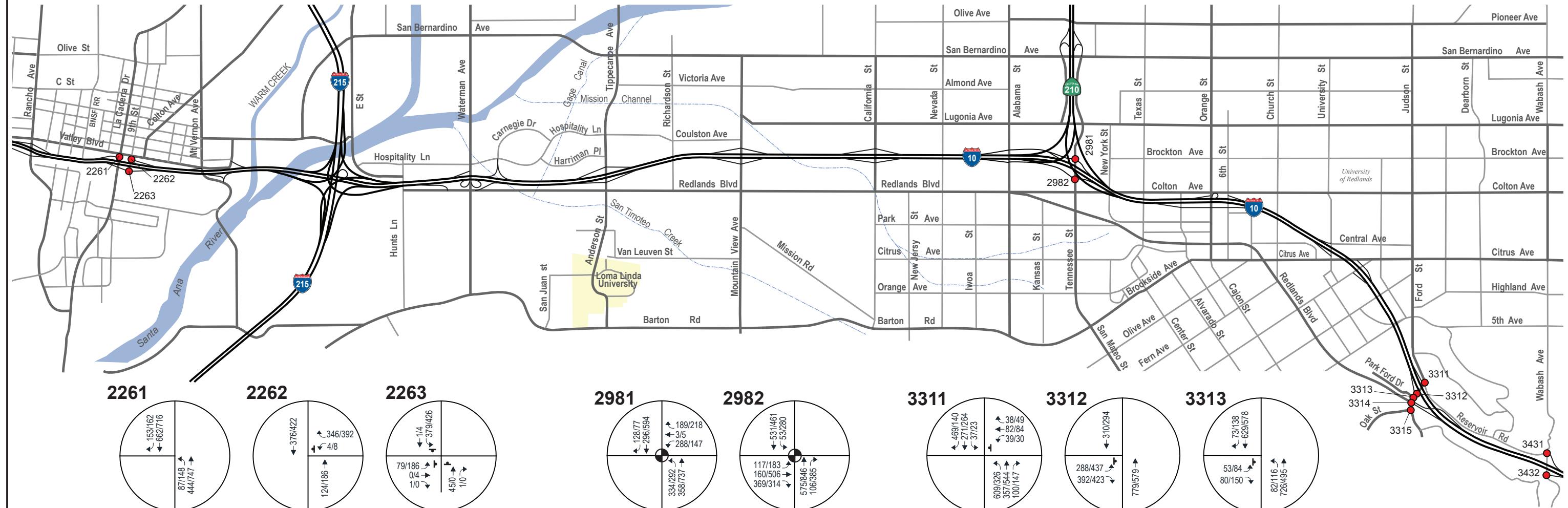
#### LEGEND

- |                  |                    |                               |
|------------------|--------------------|-------------------------------|
| ● Traffic Signal | ↗ Turning Movement | 1234 ● Intersection Number    |
| ◆ Stop Sign      | → Through Movement | XX/XX AM/PM Peak Hour Volumes |
| ▼ Yield Sign     |                    |                               |



FIGURE 3.5.1

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES



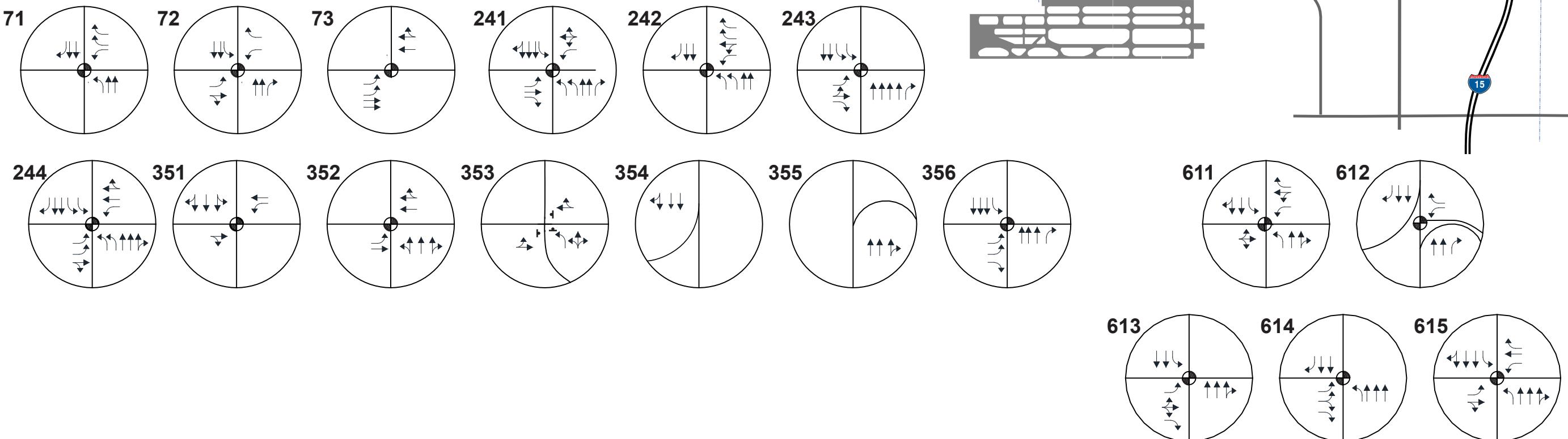
#### LEGEND

- |                            |                               |
|----------------------------|-------------------------------|
| ● Traffic Signal           | ↗ Turning Movement            |
| ■ Stop Sign                | → Through Movement            |
| ▼ Yield Sign               | XX/XX AM/PM Peak Hour Volumes |
| 1234 ● Intersection Number |                               |



FIGURE 3.5.1

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

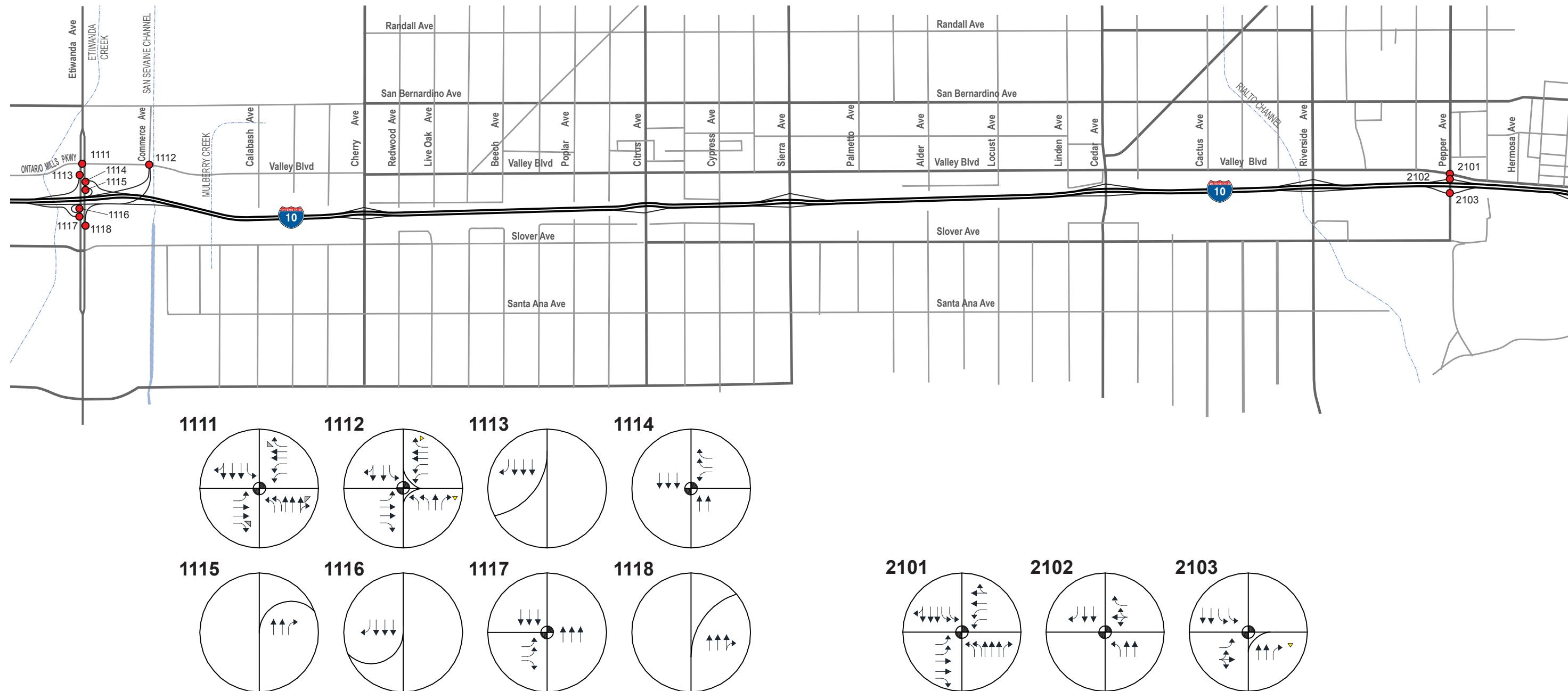


#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	↑ Turning Lanes
▼ Yield Sign		Lane Configuration Based on Project Improvements (compared to 2025 Alt 1-No Build)

**FIGURE 3.5.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 1 OF 3



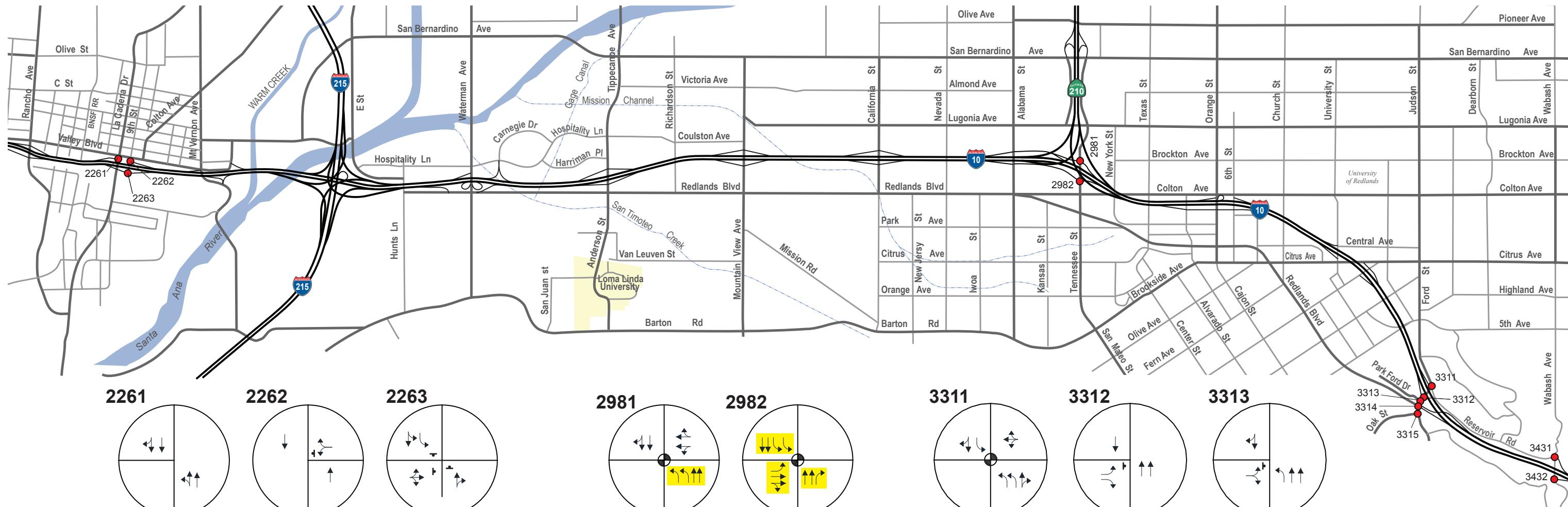


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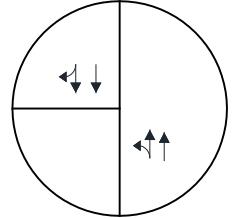
● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	1234 ● Intersection Number
▼ Yield Sign	↗ Turning Lanes	Lane Configuration Based on Project Improvements (compared to 2025 Alt 1-No Build)



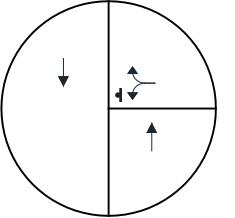
**FIGURE 3.5.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 2 OF 3



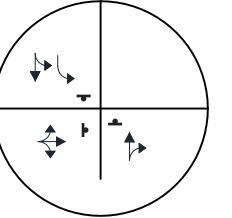
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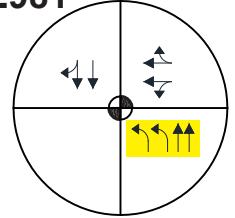
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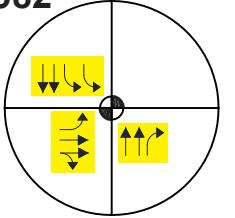
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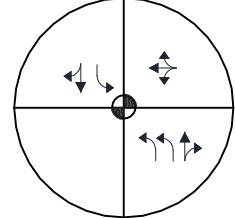
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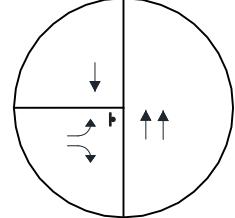
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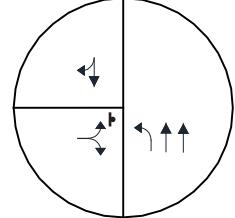
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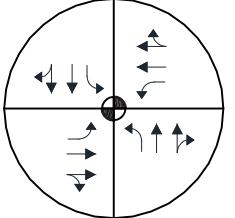
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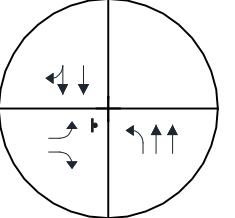
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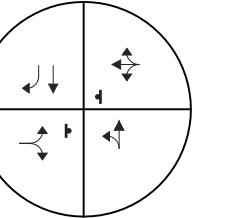
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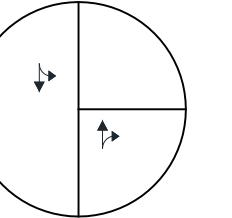
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3431



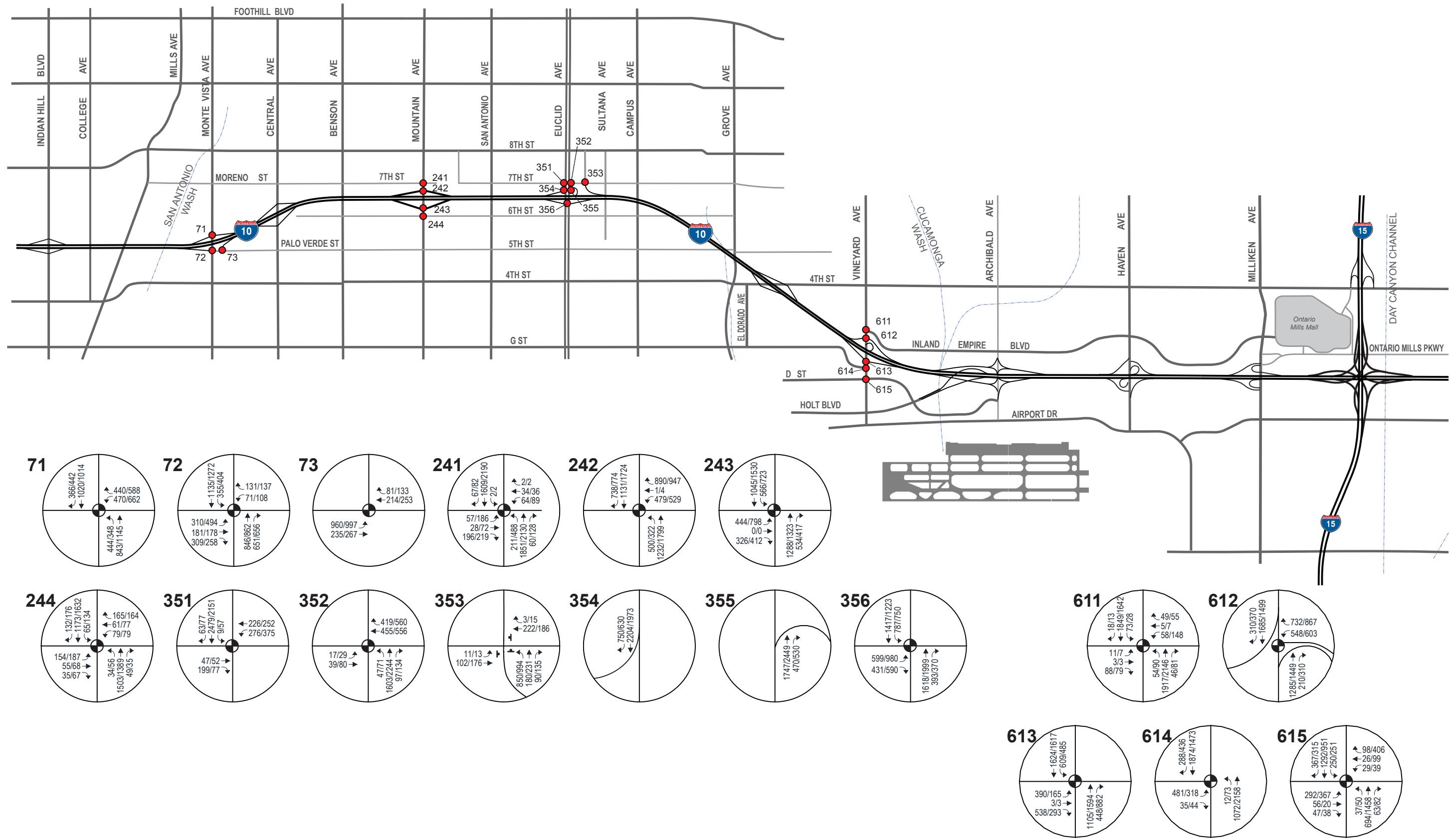
3432

**LEGEND**

- |                  |                            |  |
|------------------|----------------------------|--|
| ● Traffic Signal | ↗ Free-Right Turn          | → Through Lanes  |
| ■ Stop Sign      | def ↗ Defacto Right Turn   | ↑ Turning Lanes  |
| ▼ Yield Sign     | 1234 ● Intersection Number | Lane Configuration Based on Project Improvements (compared to 2025 Alt 1-No Build) |



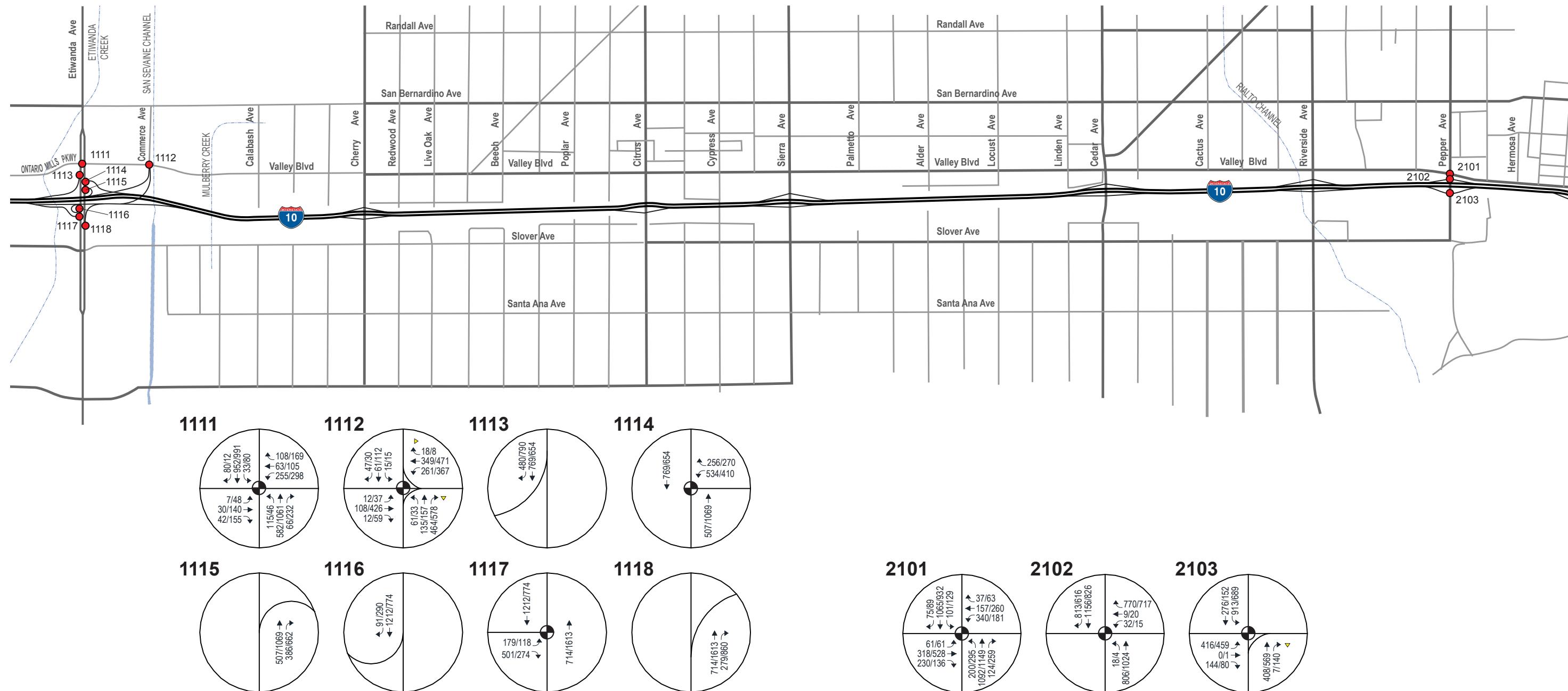
**FIGURE 3.5.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 3 OF 3



**LEGEND**

● Traffic Signal	↗ Turning Movement	1234 ● Intersection Number
■ Stop Sign	→ Through Movement	XX/XX AM/PM Peak Hour Volumes
▽ Yield Sign		

**FIGURE 3.5.3**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

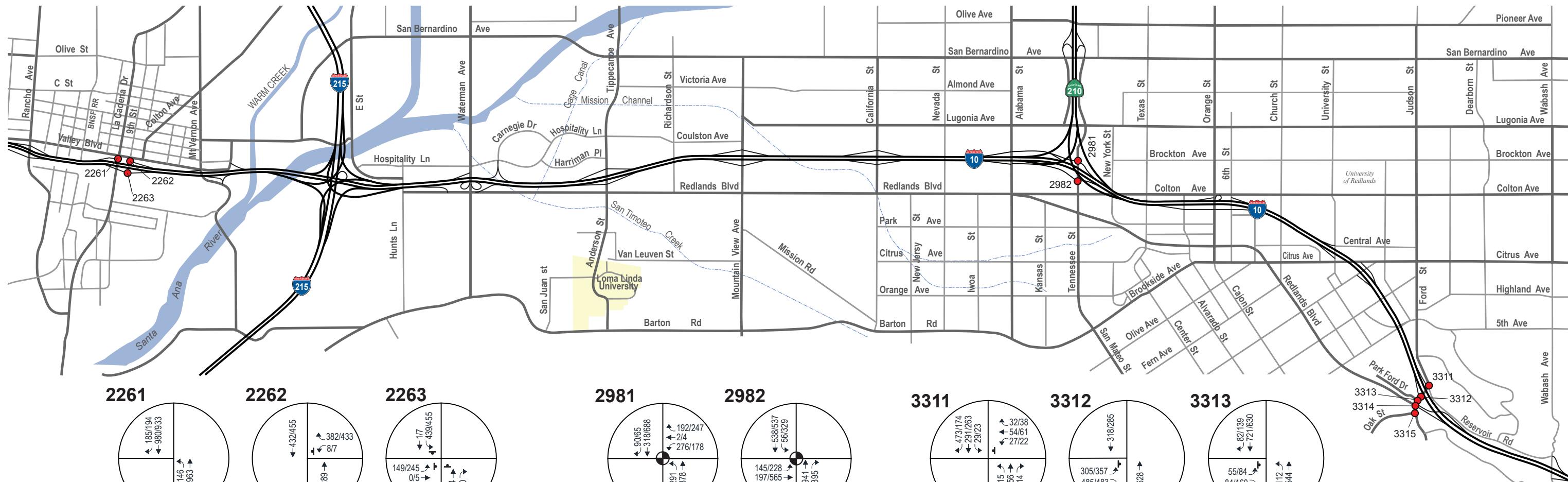


#### LEGEND

- Traffic Signal      ↗ Turning Movement
  - ◆ Stop Sign      → Through Movement
  - ▼ Yield Sign
- <sup>1234</sup> ● Intersection Number  
 XX/XX AM/PM Peak Hour Volumes



**FIGURE 3.5.3**  
 I-10 CORRIDOR STUDY PA/ED  
 ALTERNATIVE 2 - HOV (YEAR 2045) CONDITIONS  
 INTERSECTION TRAFFIC VOLUMES



#### LEGEND

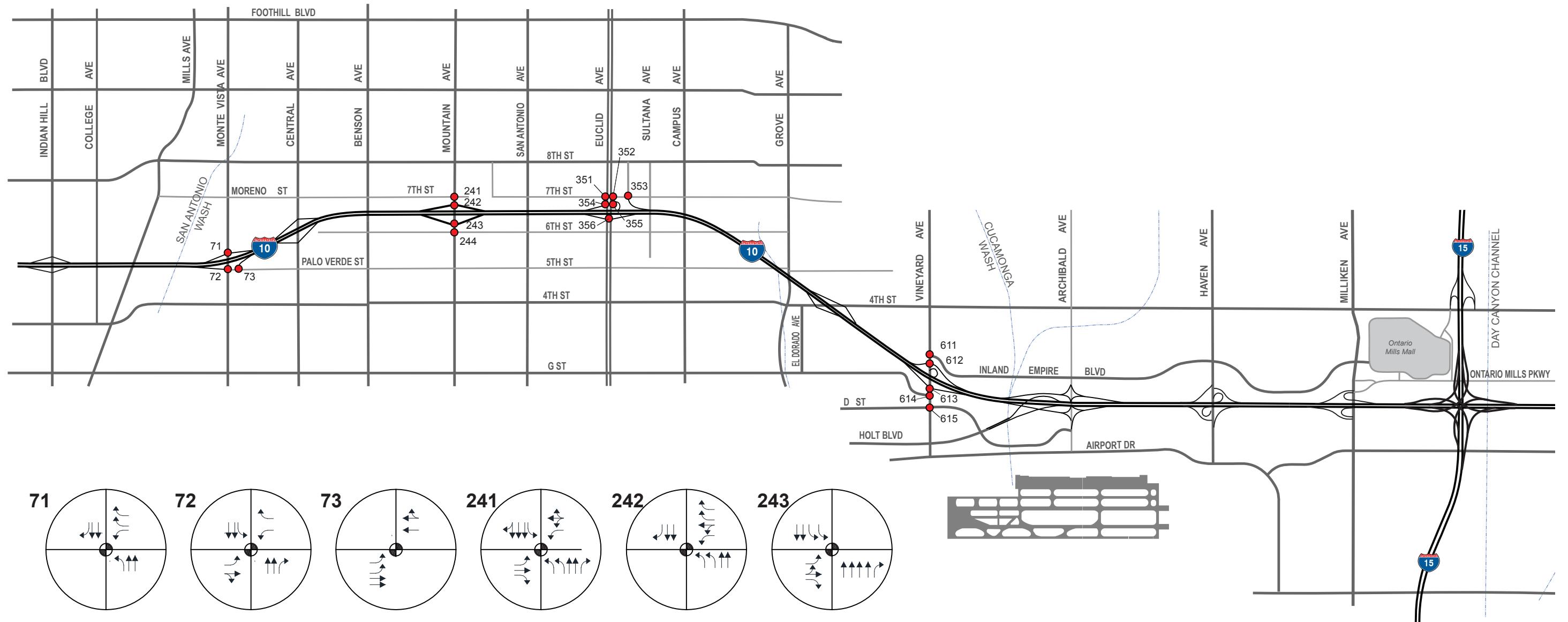
- |                            |                               |
|----------------------------|-------------------------------|
| ● Traffic Signal           | ↗ Turning Movement            |
| ■ Stop Sign                | → Through Movement            |
| ▼ Yield Sign               | XX/XX AM/PM Peak Hour Volumes |
| 1234 ● Intersection Number |                               |



FIGURE 3.5.3

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

SHEET 3 OF 3

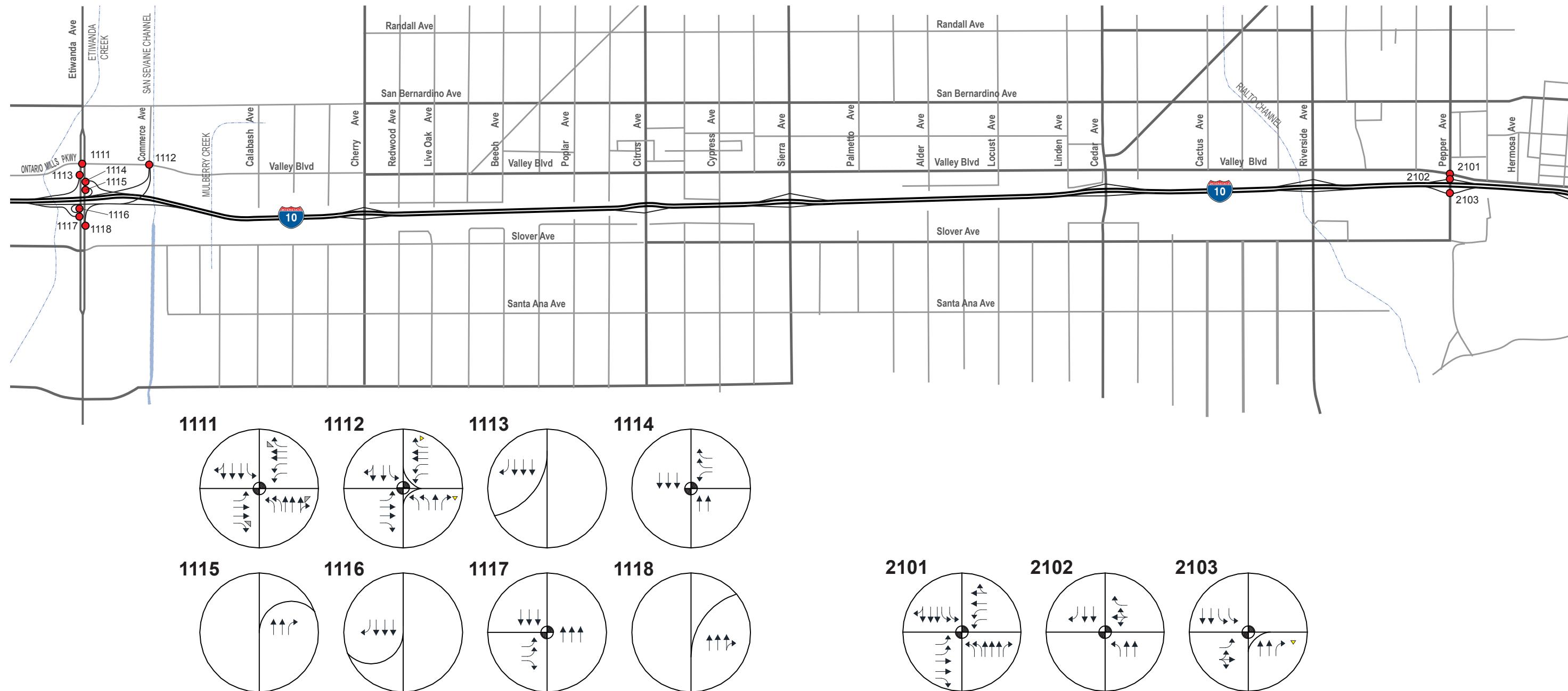


#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	1234 ● Intersection Number
▼ Yield Sign	↗ Turning Lanes	Lane Configuration Based on Project Improvements (compared to 2045 Alt 1-No Build)

**FIGURE 3.5.4**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 1 OF 3



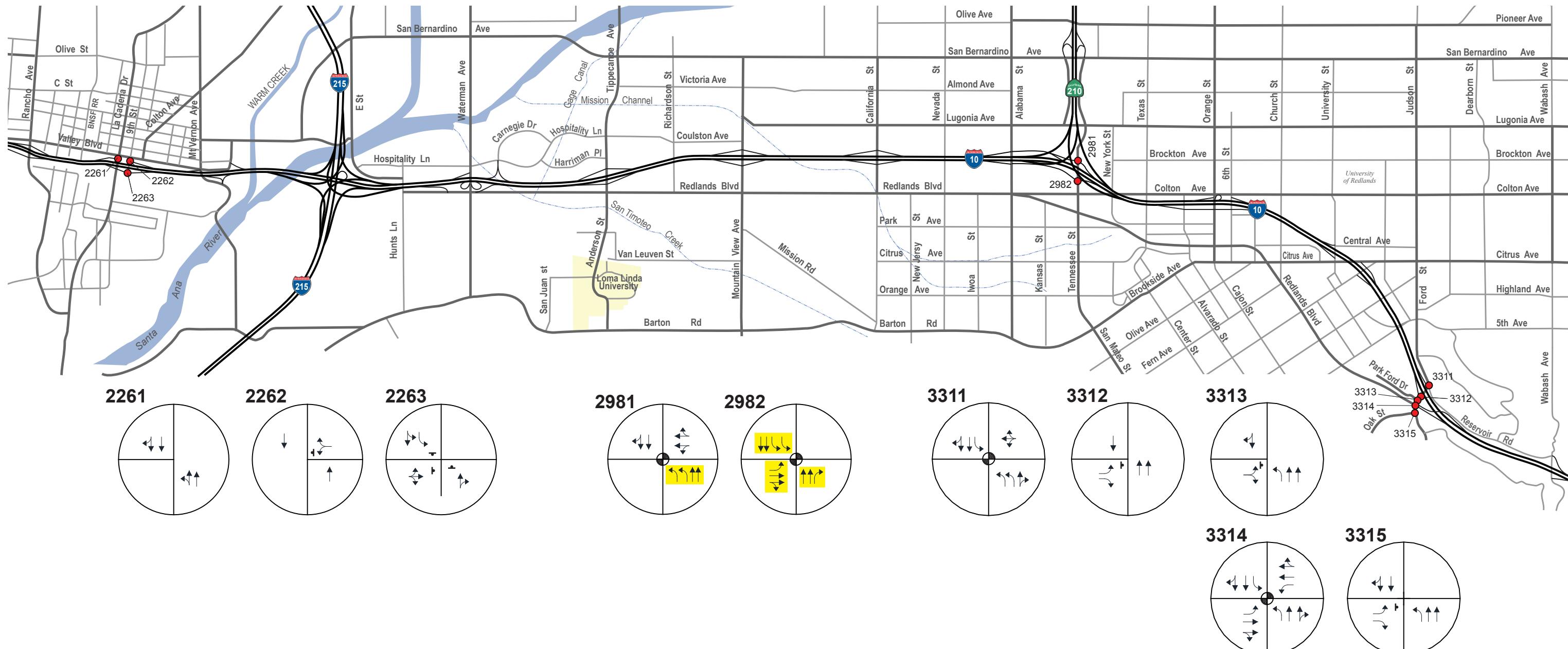


#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	1234 ● Intersection Number
▼ Yield Sign	↗ Turning Lanes	Lane Configuration Based on Project Improvements (compared to 2045 Alt 1-No Build)



**FIGURE 3.5.4**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 2 OF 3



#### LEGEND

- |                  |  |                 |
|------------------|--|-----------------|
| ● Traffic Signal | ↗ Free-Right Turn  | → Through Lanes |
| ■ Stop Sign      | def ↗ Defacto Right Turn   | ↗ Turning Lanes |
| ▼ Yield Sign     | Lane Configuration Based on Project Improvements (compared to 2045 Alt 1-No Build) |                 |



**FIGURE 3.5.4**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 2 - HOV (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 3 OF 3

### 3.6 Alternative 3: Two Express Lanes in Each Direction Conditions Analysis

Level-of-service (LOS) analyses, demand volume-to-capacity (d/c) calculations and queue analysis were conducted for the arterial/ramp intersections and other key arterial intersections within each interchange area for both Opening Year (2025) and Design Year (2045) traffic conditions. The results of these analyses are presented in the following sections by interchange. Summary tables of LOS, d/c, average delay and the queuing analysis are included in each interchange section. The analysis worksheets for Alternative 3 (Express) conditions for Opening Year (2025) and Design Year (2045) are provided in [Appendix I-1](#) and [Appendix I-2](#), respectively.

Alternative 3 would provide two express lanes in each direction of I-10 from the LA/SB County Line to California Street (near SR-210) in the City of Redlands and one express lane in each direction from California Street to Ford Street in the City of Redlands. In addition to the express lanes, Alternative 3 would provide improvements at the following interchanges:

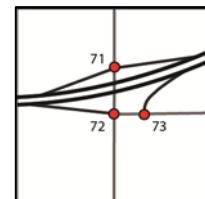
- Monte Vista Avenue Interchange
- Euclid Avenue Interchange
- Vineyard Avenue Interchange
- La Cadena Drive/9<sup>th</sup> Street Interchange
- Alabama Street Interchange
- Tennessee Street Interchange

Detailed intersection improvements for the interchanges listed above are described below by interchange. They are based on the latest set of alternative layout plans. Alternative 3 assumes the completion of improvements along the project corridor included in Alternative 1 (No Build).

The intersections analyzed for Alternative 3 conditions are the same intersections analyzed under Alternative 1 (No Build) and Alternative 2 (HOV) conditions. Alternative 3 (Year 2025) intersection peak hour volumes and lane geometry are shown in [Figure 3.6.1](#) and [Figure 3.6.2](#), respectively. Alternative 3 (Year 2045) intersection peak hour volumes and lane geometry are shown in [Figure 3.6.3](#) and [Figure 3.6.4](#), respectively. A detailed discussion of the methodology to develop future condition intersection turning movement traffic volumes is presented in [Section 2.2.1](#) of this report.

#### 3.6.1 Monte Vista Avenue Interchange Analysis

Alternative 3 (Express) conditions analysis for the Monte Vista Avenue interchange includes the following improvements for years 2025 and 2045 as part of the proposed project:



##### Monte Vista Avenue and I-10 Westbound Ramp Intersection (Intersection #71)

- Add a 2<sup>nd</sup> exclusive left turn lane with a storage length of 190 feet on the northbound approach
- Extend existing exclusive left turn lane storage length to 190 feet on the northbound approach
- Add a 3<sup>rd</sup> through lane on the southbound approach
- Add a shared left/through lane on the westbound approach
- Extend exclusive left turn lane storage length to 195 feet on the westbound approach
- Extend exclusive right turn lane storage length to 105 feet on the westbound approach

Monte Vista Avenue and I-10 Eastbound Ramp Intersection (Intersection #72)

- Add a 2nd exclusive left turn lane with a storage length of 85 feet on the southbound approach
- Extend existing exclusive left turn lane to the upstream intersection on the southbound approach
- Reduce left turn storage length from 690 feet to 400 feet on the eastbound approach
- Convert shared through/right lane to shared left/through/right lane on the eastbound approach
- Add an exclusive right turn lane with a storage length of 740 feet on the eastbound approach
- Add a 2<sup>nd</sup> exclusive left turn lane with a storage length of 150 feet on the westbound approach

Monte Vista Avenue and Palo Verde Street Intersection (Intersection #73)

- Remove 2<sup>nd</sup> exclusive left turn lane on the eastbound approach
- Convert one through lane into a shared left/through lane on the eastbound approach

Differences between Alternative 1 (No Build) and Alternative 3 (Express) intersection lane configurations at the Monte Vista Avenue interchange are highlighted in **Figure 3.6.2** for year 2025 and **Figure 3.6.4** for year 2045.

Under Alternative 3 for years 2025 and 2045, the study intersections for the Monte Vista Avenue interchange are expected to operate at LOS D or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 3 conditions at the Monte Vista Avenue interchange study intersections is provided in **Table 3.6.1**.

Table 3.6.1: Monte Vista Avenue Interchange Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
71	I-10 WB Ramps	Monte Vista Ave	Sig	0.54	22.3	C	0.58	21.0	C	0.68	21.3	C	0.67	24.7	C
72	I-10 EB Off-Ramp/Palo Verde St	Monte Vista Ave	Sig	0.76	31.9	C	0.79	39.1	D	0.85	39.5	D	1.00	46.7	D
73	Palo Verde St	I-10 EB On-Ramp	Sig	0.41	12.1	B	0.49	14.3	B	0.47	12.1	B	0.55	16.3	B

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 3 conditions are presented in **Table 3.6.2**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the queues for the following movements are expected to exceed the available storage under year 2025 Alternative 3 conditions:

- Northbound right turn at I-10 EB Off-Ramp/Palo Verde St & Monte Vista Ave (AM and PM Peak Hours)
- Southbound left turn at I-10 EB Off-Ramp/Palo Verde St & Monte Vista Ave (PM Peak Hour)

- Eastbound shared left/through at Palo Verde St & I-10 EB On-Ramp (PM Peak Hour)

As shown in **Table 3.6.2**, no additional movements are expected to exceed the available storage under year 2045 Alternative 3 conditions.

Table 3.6.2: Monte Vista Avenue Interchange Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
71	I-10 WB Ramps & Monte Vista Ave	Sig	NBL	190 <sup>1</sup>	139	Yes	136	Yes	168	Yes	74	Yes
			NBT	340	260	Yes	206	Yes	217	Yes	227	Yes
			SBT	590 <sup>2</sup>	216	Yes	245	Yes	252	Yes	263	Yes
			SBR	810	59	Yes	62	Yes	62	Yes	69	Yes
72	I-10 EB Off- Ramp/Palo Verde St & Monte Vista Ave	Sig	NBT	700	334	Yes	276	Yes	382	Yes	315	Yes
			NBR	140	258	No	351	No	432	No	634	No
			SBL	213 <sup>3</sup>	192	Yes	287	No	251	No	268	No
			SBT	340	212	Yes	292	Yes	305	Yes	300	Yes
			WBL	188 <sup>4</sup>	47	Yes	82	Yes	50	Yes	92	Yes
			WBR	225	140	Yes	128	Yes	133	Yes	113	Yes
73	Palo Verde St & I-10 EB On-Ramp	Sig	EBL	225	137	Yes	51	Yes	112	Yes	220	Yes
			EBLT	225	25	Yes	276	No	78	Yes	39	Yes
			WBTR	930	124	Yes	147	Yes	126	Yes	152	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 140' and 2<sup>nd</sup> storage lane is 240'. The average storage length is 190 feet per lane.

<sup>2</sup> 1<sup>st</sup> storage lane is 150' and 2<sup>nd</sup> and 3<sup>rd</sup> storage lane are 810'. The average storage length is 590 feet per lane.

<sup>3</sup> 1<sup>st</sup> storage lane is 85' and 2<sup>nd</sup> storage lane is 340'. The average storage length is 213 feet per lane.

<sup>4</sup> 1<sup>st</sup> storage lane is 150' and 2<sup>nd</sup> storage lane is 225'. The average storage length is 188 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

Peak hour vehicle queues for freeway off-ramps at the Monte Vista Avenue interchange for years 2025 and 2045 under Alternative 3 conditions are summarized in **Table 3.6.3**. As shown in the table, none of the queues are expected to exceed the available storage.

Peak hour ramp meter queues expected in year 2045 on the two I-10 on-ramps from Monte Vista Avenue under Alternative 3 are summarized in **Table 3.6.4**. Both on-ramps to I-10 in Alternative 3 are assumed to have two lanes at the ramp meter. Since no high occupancy vehicle (HOV) lanes are assumed on I-10 in year 2045, both lanes at the ramp meter are assumed to be general purpose (GP) lanes. As shown in the table, the I-10 WB on-ramp from Monte Vista Avenue provides sufficient storage for the maximum queue expected for year 2045. The available storage on the I-10 EB on-ramp from Monte Vista Avenue will not be sufficient for year 2045.

**Table 3.6.3: Monte Vista Avenue Interchange**  
**Alternative 3 (Express) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
71	I-10 WB Ramps & Monte Vista Ave	Sig	WBL	535 <sup>1</sup>	209	Yes	273	Yes	234	Yes	304	Yes
			WBLT	535 <sup>2</sup>	209	Yes	273	Yes	234	Yes	305	Yes
72	I-10 EB Off-Ramp/Palo Verde St & Monte Vista Ave	Sig	WBR	490 <sup>3</sup>	205	Yes	226	Yes	236	Yes	289	Yes
			EBL	400	222	Yes	340	Yes	249	Yes	365	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 195' and 2<sup>nd</sup> storage lane is 875'. The average storage length is 535 feet per lane.

<sup>2</sup> 1<sup>st</sup> storage lane is 195' and 2<sup>nd</sup> storage lane is 875'. The average storage length is 535 feet per lane.

<sup>3</sup> 1<sup>st</sup> storage lane is 105' and 2<sup>nd</sup> storage lane is 875'. The average storage length is 490 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

**Table 3.6.4: Monte Vista Avenue Interchange**  
**Year 2045 Alternative 3 (Express) On-Ramp Meter Queues vs. Storage**

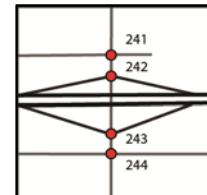
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM	HOV	GP	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
71	I-10 WB On-Ramp	810	790	0	2	--	--	--	--	450	360	450	Yes
73	I-10 EB On-Ramp	1,090	1,310	0	2	--	--	--	--	800	630	350	No

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.6.2 Mountain Avenue Interchange Analysis

Under Alternative 3 for years 2025 and 2045, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 3 conditions at the Mountain Avenue interchange study intersections is provided in **Table 3.6.5**.



The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 3 conditions are presented in **Table 3.6.6**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the queues for the following movements are expected to exceed the available storage under year 2025 Alternative 3 conditions:

- Northbound left turn at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Northbound through at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Eastbound left turn at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Westbound left turn at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Westbound shared left/through/right at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Northbound left turn at I-10 WB Ramp & Mountain Ave (AM and PM Peak Hours)
- Northbound through at I-10 WB Ramp & Mountain Ave (AM Peak Hour)
- Southbound through at I-10 WB Ramp & Mountain Ave (PM Peak Hour)
- Southbound right turn at I-10 WB Ramp & Mountain Ave (AM Peak Hour)
- Southbound through at I-10 EB Ramp & Mountain Ave (PM Peak Hour)
- Eastbound left turn at 6<sup>th</sup> St & Mountain Ave (PM Peak Hour)

**Table 3.6.5: Mountain Avenue Interchange**  
**Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
241	7 <sup>th</sup> St/ Shopping Center	Mountain Ave	Sig	0.70	17.6	B	0.94	36.2	D	0.78	21.2	C	0.99	42.7	D	
242	I-10 WB Ramp	Mountain Ave	Sig	0.89	33.3	C	1.03	40.0	D	0.99	46.2	D	1.11	54.2	D	
243	I-10 EB Ramp	Mountain Ave	Sig	0.62	17.8	B	0.83	32.3	C	0.69	19.0	B	0.84	36.9	D	
244	6th St	Mountain Ave	Sig	0.48	16.9	B	0.74	23.0	C	0.55	19.2	B	0.74	24.2	C	

As shown in **Table 3.6.6**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 3 conditions:

- Southbound shared through/right at 7<sup>th</sup> St/Shopping Center & Mountain Ave (PM Peak Hour)
- Southbound left turn at I-10 EB Ramp & Mountain Ave (PM Peak Hour)
- Southbound through at 6<sup>th</sup> St & Mountain Ave (PM Peak Hour)

Peak hour vehicle queues for freeway off-ramps at the Mountain Avenue interchange for years 2025 and 2045 under Alternative 3 conditions are summarized in **Table 3.6.7**. As shown in the table, the expected 95<sup>th</sup> percentile queue for the eastbound right turn movement at the eastbound off-ramp to Mountain Avenue exceeds the average available storage length of 385 feet. The expected queue is 501 feet during the evening peak hour in year 2025 and 515 feet in year 2045. In year 2045, at the I-10 EB ramp and Mountain Avenue intersection, the eastbound left turn 95<sup>th</sup> percentile queue of 508 feet exceeds the available storage length of 385 feet during the evening peak hour.

In year 2045, the projected queue for the right turn lane on the eastbound off-ramp is expected to exceed the available storage resulting in a storage blockage for the westbound left turn vehicles. Under this condition, the estimated longest queue is approximately 772 feet during the evening peak hour.

The length of the ramp from the stop bar to the gore point is approximately 930 feet, leaving approximately 158 feet from the back of the queue to the gore point.

Table 3.6.6: Mountain Avenue Interchange Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
241	7 <sup>th</sup> St/ Shopping Center & Mountain Ave	Sig	NBL	230	108	Yes	244	No	103	Yes	243	No
			NBT	290	268	Yes	769	No	805	No	1,029	No
			NBR	290	25	Yes	25	Yes	25	Yes	25	Yes
			SBL	200	25	Yes	25	Yes	25	Yes	25	Yes
			SBTR	670	274	Yes	548	Yes	428	Yes	823	No
			EBL	150	93	Yes	329	No	83	Yes	340	No
			EBT	660	48	Yes	115	Yes	48	Yes	114	Yes
			EBR	660	98	Yes	74	Yes	70	Yes	75	Yes
			WBL	100	67	Yes	101	No	78	Yes	107	No
			WBLTR	100	66	Yes	101	No	80	Yes	106	No
242	I-10 WB Ramp & Mountain Ave	Sig	NBL	240	246	No	274	No	313	No	341	No
			NBT	240	274	No	215	Yes	525	No	364	No
			SBT	290	253	Yes	778	No	541	No	978	No
			SBR	290	414	No	70	Yes	626	No	54	Yes
243	I-10 EB Ramp & Mountain Ave	Sig	NBT	305 <sub>1</sub>	154	Yes	228	Yes	139	Yes	294	Yes
			NBR	510	262	Yes	25	Yes	25	Yes	25	Yes
			SBL	240	176	Yes	239	Yes	195	Yes	263	No
			SBT	240	143	Yes	444	No	201	Yes	407	No
244	6th St & Mountain Ave	Sig	NBL	100	26	Yes	41	Yes	30	Yes	54	Yes
			NBTR	590	273	Yes	321	Yes	353	Yes	364	Yes
			SBL	200	39	Yes	71	Yes	43	Yes	73	Yes
			SBT	510	108	Yes	395	Yes	247	Yes	630	No
			SBR	510	25	Yes	25	Yes	25	Yes	25	Yes
			EBL	100	70	Yes	119	No	91	Yes	123	No
			EBTR	213	77	Yes	142	Yes	98	Yes	158	Yes
			WBL	200	121	Yes	163	Yes	122	Yes	162	Yes
			WBTR	575	58	Yes	71	Yes	74	Yes	79	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 100' and 2<sup>nd</sup> storage lane is 510'. The average available storage length is 305 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

**Table 3.6.7: Mountain Avenue Interchange**  
**Alternative 3 (Express) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
242	I-10 WB Ramp & Mountain Ave	Sig	WBL	400	195	Yes	377	Yes	250	Yes	398	Yes
			WBLT	1,060	196	Yes	387	Yes	250	Yes	413	Yes
			WBR	685 <sup>1</sup>	355	Yes	556	Yes	522	Yes	645	Yes
243	I-10 EB Ramp & Mountain Ave	Sig	EBL	385	191	Yes	326	Yes	233	Yes	508	No
			EBLT	930	191	Yes	326	Yes	233	Yes	508	Yes
			EBR	385	199	Yes	501	No	292	Yes	515	No

<sup>1</sup> 1<sup>st</sup> storage lane is 315' and 2<sup>nd</sup> storage lane is 1055'. The average available storage is 685 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

Peak hour ramp meter queues expected in year 2045 on the two I-10 on-ramps from Mountain Avenue under Alternative 3 are summarized in **Table 3.6.8**. Both on-ramps to I-10 in Alternative 3 are assumed to have two lanes at the ramp meter. Since no HOV lanes are assumed on I-10 in year 2045, both lanes at the ramp meter are assumed to be GP lanes. As shown in the table, neither on-ramp from Mountain Avenue will be sufficient to accommodate for the expected queues at the ramps.

**Table 3.6.8: Mountain Avenue Interchange**  
**Year 2045 Alternative 3 (Express) On-Ramp Meter Queues vs. Storage**

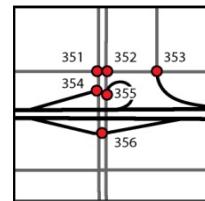
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM	HOV	GP	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
242	I-10 WB On-Ramp	1,240	1,120	0	2	--	--	--	--	720	630	553	No
243	I-10 EB On-Ramp	1,130	1,200	0	2	--	--	--	--	720	660	623	No

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.6.3 Euclid Avenue Interchange Analysis

Alternative 3 (Express) conditions analysis for the Euclid Avenue interchange includes the following improvements for years 2025 and 2045 as part of the proposed project:



#### NB Euclid Avenue and 7<sup>th</sup> Street Intersection (Intersection #352)

- Convert shared through/right lane to an exclusive through lane on the northbound approach

- Add an exclusive right turn lane with a storage length of 605 feet on the northbound approach

#### 7<sup>th</sup> Street and I-10 Westbound Hook-Ramp Intersection (Intersection #353)

- Add an exclusive right turn lane with a storage length of 660 feet on the eastbound approach
- Convert shared through/right lane to a shared left/through/right lane on the westbound approach

#### Euclid Avenue and I-10 Eastbound Ramp Intersection (Intersection #356)

- Add a 4<sup>th</sup> through lane on the northbound approach
- Extend exclusive right turn storage length to 250 feet on the northbound approach
- Add a 2<sup>nd</sup> exclusive left turn lane with a storage length of 275 feet on the southbound approach
- Extend existing exclusive left turn lane storage length to 275 feet on the southbound approach
- Add a 2<sup>nd</sup> exclusive right turn lane with a storage length of 298 feet on the eastbound approach
- Extend existing exclusive right turn lane storage to the upstream intersection on the eastbound approach

Differences between Alternative 1 (No Build) and Alternative 3 (Express) intersection lane configurations at the Euclid Avenue interchange are highlighted in [Figure 3.6.2](#) for year 2025 and [Figure 3.6.4](#) for year 2045.

Under Alternative 3 for years 2025 and 2045, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours. For the uncontrolled intersections, the d/c ratio ranges from 0.29 to 0.50. A summary of LOS, d/c and average vehicle delay for Alternative 3 conditions at the Euclid Avenue interchange study intersections is provided in [Table 3.6.9](#).

**Table 3.6.9: Euclid Avenue Interchange**  
**Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025						Year 2045						
	East/West Street	North/South Street		Level of Service			Level of Service			Level of Service			Level of Service			
				d/c	Avg. Delay (sec)	LOS										
351	7 <sup>th</sup> St	SB Euclid Ave	Sig	0.82	16.5	B	0.86	18.8	C	0.97	29.0	C	0.92	31.5	C	
352	7 <sup>th</sup> St	NB Euclid Ave	Sig	0.66	8.2	A	0.88	13.9	B	0.72	14.6	B	0.94	18.1	B	
353	7 <sup>th</sup> St	I-10 WB Off-Ramp/2 <sup>nd</sup> St	AWS	0.56	31.9	C	0.73	39.2	D	0.62	22.0	C	0.79	28.7	C	
354	I-10 WB On-Ramp	SB Euclid Ave	UC <sup>1</sup>	0.45	--	--	0.39	--	--	0.50	--	--	0.43	--	--	
355	I-10 WB Loop On-Ramp	NB Euclid Ave	UC <sup>1</sup>	0.29	--	--	0.32	--	--	0.31	--	--	0.35	--	--	
356	I-10 EB Ramps	Euclid Ave	Sig	0.83	21.3	C	0.97	33.4	C	0.86	25.0	C	1.02	49.3	D	

<sup>1</sup> For uncontrolled movements the d/c was calculated based on a saturation flow rate of 1500 vehicles per hour. Average delay and LOS are not calculated for these intersections, denoted with double dashes (--) .

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 3 conditions are presented in **Table 3.6.10**. In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage under year 2025 Alternative 3 conditions. In year 2045, the following movements are expected to exceed the available storage under Alternative 3 conditions:

- Southbound shared left/through/right at 7<sup>th</sup> Street & SB Euclid Avenue (AM and PM Peak Hours)
- Westbound through at 7<sup>th</sup> Street & SB Euclid Avenue (PM Peak Hour)
- Eastbound through at 7<sup>th</sup> Street & NB Euclid Avenue (PM Peak Hour)
- Southbound left at I-10 EB Ramp & Euclid Avenue (PM Peak Hour)

Queuing analysis for the I-10 WB on-ramps from SB Euclid and NB Euclid were not conducted since there are no conflicting movements at these locations.

Table 3.6.10: Euclid Avenue Interchange Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)						
351	7 <sup>th</sup> St & SB Euclid Ave	Sig	SBLTR	605	352	Yes	371	Yes	662	No	805	No
			EBTR	284	122	Yes	81	Yes	190	Yes	118	Yes
			WBL	60	25	Yes	25	Yes	30	Yes	25	Yes
			WBT	60	52	Yes	55	Yes	48	Yes	70	No
352	7 <sup>th</sup> St & NB Euclid Ave	Sig	NBLT	605	15	Yes	179	Yes	60	Yes	162	Yes
			NBR	605	25	Yes	25	Yes	37	Yes	25	Yes
			EBL	60	25	Yes	25	Yes	25	Yes	34	Yes
			EBT	60	25	Yes	49	Yes	25	Yes	65	No
			WBTR	660	95	Yes	393	Yes	278	Yes	617	Yes
353	7 <sup>th</sup> St & I- 10 WB Off- Ramp/2nd Ave	Sig	EBLT	660	118	Yes	236	Yes	101	Yes	144	Yes
			EBR	660	100	Yes	99	Yes	35	Yes	81	Yes
			WBLTR	279	155	Yes	215	Yes	212	Yes	161	Yes
356	I-10 EB Ramps & Euclid Ave	Sig	NBT	602	205	Yes	277	Yes	292	Yes	529	Yes
			NBR	250	61	Yes	61	Yes	69	Yes	127	Yes
			SBL	275	164	Yes	255	Yes	219	Yes	407	No
			SBT	605	41	Yes	48	Yes	52	Yes	77	Yes

-- = No queue length is provided. Queue length is not calculated by Synchro for all-way stop controlled intersections.

Peak hour vehicle queues for freeway off-ramps at the Euclid Avenue interchange for years 2025 and 2045 under Alternative 3 conditions are summarized in **Table 3.6.11**. As shown in the table, none of the expected 95<sup>th</sup> percentile queues exceeds the available storage length.

Peak hour ramp meter queues expected in year 2045 on the three I-10 on-ramps from Euclid Avenue under Alternative 3 are summarized in **Table 3.6.12**. The westbound and eastbound on-ramps to I-10 are assumed to have two lanes at the ramp meter and no HOV lanes. The westbound hook on-ramp is assumed with one HOV lane and one GP lane. As shown in the table, the westbound on-ramp and hook on-ramp from Euclid Avenue provide sufficient storage for the maximum queue expected in year 2045. The available storage on the I-10 EB on-ramp from Euclid Avenue will not be sufficient in year 2045.

Table 3.6.11: Euclid Avenue Interchange Alternative 3 (Express) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
353	7 <sup>th</sup> St & I-10 WB Off-Ramp/ 2nd Ave	Sig	NBL	1,200	223	Yes	356	Yes	312	Yes	432	Yes
			NBLTR	580	211	Yes	336	Yes	293	Yes	426	Yes
356	I-10 EB Ramps & Euclid Ave	Sig	EBL	663 <sup>1</sup>	214	Yes	377	Yes	264	Yes	583	Yes
			EBR	639 <sup>2</sup>	96	Yes	151	Yes	176	Yes	263	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 345' and 2<sup>nd</sup> lane extends 980' to the beginning of the painted gore. The average available storage is 663 feet per lane.

<sup>2</sup> 1<sup>st</sup> storage lane is 298' and 2<sup>nd</sup> lane storage lane is 980'. The average available storage is 639 feet per lane.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

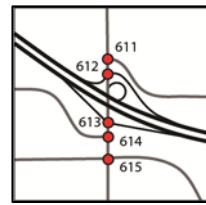
Table 3.6.12: Euclid Avenue Interchange Year 2045 Alternative 3 (Express) On-Ramp Meter Queues vs. Storage													
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM	HOV	GP	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
353	I-10 EB On-Ramp	1,200	1,170	0	2	--	--	--	--	720	600	545	No
354	I-10 WB On-Ramp	750	640	0	2	--	--	--	--	420	330	525	Yes
356	I-10 WB Hook On-Ramp	470	530	1	1	400	60	463	Yes	550	330	463	Yes

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.6.4 Vineyard Avenue Interchange Analysis

Alternative 3 (Express) conditions analysis for the Vineyard Avenue interchange includes the following improvements for years 2025 and 2045 as part of the proposed project:



#### Vineyard Avenue and I-10 Westbound Ramp Intersection (Intersection #612)

- Add a shared left/right turn lane on the westbound approach
- Extend exclusive left turn lane storage length to 978 feet on the westbound approach
- Extend exclusive right turn lane storage length to 425 feet on the westbound approach

#### Vineyard Avenue and I-10 Eastbound Ramp Intersection (Intersection #613)

- Convert shared through/right lane into a through lane with a storage length of 315 feet on the northbound approach
- Add two exclusive right turn lanes with storage lengths of 60 feet on the northbound approach
- Add a 2<sup>nd</sup> exclusive left turn lane with a storage length of 250 feet on the southbound approach
- Extend existing exclusive left turn lane storage length to 250 feet on the southbound approach
- Add a 3rd through lane on the southbound approach
- Extend storage lengths for all through lanes to 435 feet on the southbound approach

Under RTP project #4A01222, an additional through lane in each direction is added on Vineyard Avenue by 2030. This lane is not included in the 2025 Alternative 3 analysis and is included in the 2045 Alternative 3 analysis. Differences between Alternative 1 (No Build) and Alternative 3 (Express) intersection lane configurations at the Vineyard Avenue interchange are highlighted in **Figure 3.6.2** for year 2025 and **Figure 3.6.4** for year 2045.

Under Alternative 3 for years 2025 and 2045, the study intersections for the Vineyard Avenue interchange are expected to operate at LOS D or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 3 conditions at the Vineyard Avenue interchange study intersections is provided in **Table 3.6.13**.

Table 3.6.13: Vineyard Avenue Interchange Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
611	Inland Empire Blvd	Vineyard Ave	Sig	0.71	19.7	B	0.88	28.6	C	0.61	14.3	B	0.73	17.7	B
612	I-10 WB Ramps	Vineyard Ave	Sig	0.71	10.8	B	0.81	15.3	B	0.76	14.4	B	0.76	16.3	B

Table 3.6.13 continued: Vineyard Avenue Interchange Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
613	I-10 EB Ramps	Vineyard Ave	Sig	0.79	18.5	B	0.83	12.0	B	0.96	30.2	C	0.89	17.9	B
614	G St	Vineyard Ave	Sig	0.59	12.9	B	0.54	9.0	A	0.77	15.5	B	0.71	9.5	A
615	D St	Vineyard Ave	Sig	0.64	16.8	B	0.79	22.4	C	0.82	16.9	B	0.99	37.4	D

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 3 conditions are presented in **Table 3.6.14**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the queues for the following movements are expected to exceed the available storage under year 2025 Alternative 3 conditions:

- Northbound shared through/right at Inland Empire Boulevard & Vineyard Avenue (PM Peak Hour)
- Southbound left turn at D Street & Vineyard Avenue (AM and PM Peak Hours)
- Eastbound left turn at D Street & Vineyard Avenue (AM and PM Peak Hours)

As shown in **Table 3.6.14**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 2 conditions:

- Southbound through at I-10 WB Ramps & Vineyard Avenue (PM Peak Hour)
- Northbound shared through/right at I-10 EB Ramps & Vineyard Avenue (AM Peak Hour)
- Southbound left at I-10 EB Ramps & Vineyard Avenue (AM Peak Hour)
- Southbound through at I-10 EB Ramps & Vineyard Avenue (AM and PM Peak Hours)
- Southbound right at G Street & Vineyard Avenue (AM Peak Hour)
- Eastbound left/right turn at G Street & Vineyard Avenue (AM Peak Hour)

Table 3.6.14: Vineyard Avenue Interchange Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours													
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions				
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		
	E/W St & N/S St		95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	
611	Inland Empire Blvd & Vineyard Ave	Sig	NBL	120	69	Yes	76	Yes	68	Yes	117	Yes	
			NBTR	250	202	Yes	888	No	182	Yes	245	Yes	
			SBL	170	167	Yes	89	Yes	134	Yes	75	Yes	
			SBTR	915	500	Yes	398	Yes	340	Yes	313	Yes	
			EBLTR	74	73	Yes	66	Yes	69	Yes	68	Yes	
			WBL	200	45	Yes	71	Yes	47	Yes	92	Yes	
			WBLT	5,500 <sup>1</sup>	46	Yes	73	Yes	48	Yes	91	Yes	
			WBR	5,500 <sup>1</sup>	37	Yes	46	Yes	35	Yes	41	Yes	

Table 3.6.14 continued: Vineyard Avenue Interchange Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
612	I-10 WB Ramps & Vineyard Ave	Sig	NBT	450	137	Yes	275	Yes	102	Yes	205	Yes
			NBR	80	0	Yes	0	Yes	0	Yes	36	Yes
			SBT	250	36	Yes	60	Yes	198	Yes	371	No
			SBR	240	0	Yes	0	Yes	0	Yes	25	Yes
613	I-10 EB Ramps & Vineyard Ave	Sig	NBTR	315	149	Yes	160	Yes	433	No	293	Yes
			SBL	60	48	Yes	25	Yes	72	No	51	Yes
			SBT	250	223	Yes	176	Yes	318	No	306	No
614	G St & Vineyard Ave	Sig	NBL	435	100	Yes	75	Yes	155	Yes	119	Yes
			NBT	150	25	Yes	62	Yes	25	Yes	57	Yes
			SBT	515	87	Yes	106	Yes	83	Yes	133	Yes
			SBR	365	264	Yes	109	Yes	480	No	139	Yes
			E BLR	175	171	Yes	122	Yes	207	No	152	Yes
			EBR	100	25	Yes	29	Yes	27	Yes	31	Yes
615	D St & Vineyard Ave	Sig	NBL	125	48	Yes	54	Yes	66	Yes	75	Yes
			NBTR	1,180 <sup>1</sup>	151	Yes	328	Yes	178	Yes	487	Yes
			SBL	150	156	No	238	No	145	Yes	337	No
			SBTR	430 <sup>2</sup>	80	Yes	25	Yes	0	Yes	46	Yes
			EBL	125	214	No	251	No	292	No	449	No
			EBTR	635	49	Yes	30	Yes	66	Yes	38	Yes
			WBL	125	28	Yes	30	Yes	31	Yes	41	Yes
			WBT	1,230 <sup>1</sup>	26	Yes	59	Yes	28	Yes	91	Yes
			WBR	1,230 <sup>1</sup>	32	Yes	62	Yes	34	Yes	116	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

<sup>2</sup> 2 through lanes with storage lengths of 515' and 1 lane with storage length of 260'. The average available storage is 430 feet per lane.

Note: The 95<sup>th</sup> percentile queues are compared to a lane group's average lane length.

Peak hour vehicle queues for freeway off-ramps at the Vineyard Avenue interchange for years 2025 and 2045 under Alternative 3 conditions are summarized in **Table 3.6.15**. As shown in the table, none of the expected 95<sup>th</sup> percentile queues exceed the available storage.

Table 3.6.15: Vineyard Avenue Interchange Alternative 3 (Express) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
612	I-10 WB Ramps & Vineyard Ave	Sig	WBL	978	245	Yes	350	Yes	349	Yes	407	Yes
			WBR	1,475	204	Yes	382	Yes	357	Yes	431	Yes
613	I-10 EB Ramps & Vineyard Ave	Sig	EBL	425	191	Yes	350	Yes	326	Yes	392	Yes
			EBLTR	400	282	Yes	172	Yes	390	Yes	230	Yes
			EBR	1,050	218	Yes	94	Yes	385	Yes	206	Yes

Peak hour ramp meter queues expected in year 2045 on the three I-10 on-ramps from Vineyard Avenue under Alternative 3 are summarized in **Table 3.6.16**. The westbound on-ramp to I-10 is assumed to have one GP lane at the ramp meter. The westbound loop on-ramp is assumed with one HOV lane and one GP lane. The eastbound on-ramp to I-10 is assumed to have two GP lanes and one HOV lane. As shown in the table, the westbound on-ramp and loop on-ramp from Vineyard Avenue provide sufficient storage for the maximum queue expected in year 2045. The available storage on the I-10 EB on-ramp from Vineyard Avenue will not be sufficient in year 2045.

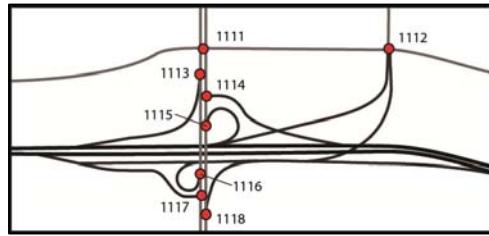
Table 3.6.16: Vineyard Avenue Interchange Year 2045 Alternative 3 (Express) On-Ramp Meter Queues vs. Storage													
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM	HOV	GP	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
612	I-10 WB On-Ramp	310	340	0	1	--	--	--	--	400	300	390	Yes
612	I-10 WB Loop On-Ramp	230	330	1	1	400	30	443	Yes	400	270	443	Yes
613	I-10 EB On-Ramp	1,130	1,570	1	2	400	150	520	Yes	750	840	520	No

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.6.5 Etiwanda Avenue/Commerce Drive Interchange Analysis

Under Alternative 3 for years 2025 and 2045, the study intersections are expected to operate at LOS C or better during the morning and evening peak hours. For the uncontrolled intersections, the d/c ratio ranges from 0.06 to 0.54. A summary of LOS, d/c and average vehicle delay for Alternative 3 conditions at the Etiwanda Avenue/Commerce Drive interchange study intersections is provided in **Table 3.6.17**.



**Table 3.6.17: Etiwanda Avenue/Commerce Drive Interchange  
Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
1111	Valley Blvd/Ontario Mills Pkwy	Etiwanda Ave	Sig	0.45	17.7	B	0.67	23.5	C	0.46	17.0	B	0.63	21.6	C	
1112	Valley Blvd	Commerce Dr	Sig	0.32	35.2	D	0.38	33.5	C	0.34	34.7	C	0.45	31.6	C	
1113	I-10 WB On-Ramp	SB Etiwanda Ave	UC <sup>1</sup>	0.27	--	--	0.41	--	--	0.25	--	--	0.41	--	--	
1114	I-10 WB Off-Ramp	Etiwanda Ave	Sig	0.55	14.8	B	0.53	12.6	B	0.59	16.7	B	0.62	13.0	B	
1115	I-10 WB On-Ramp	NB Etiwanda Ave	UC <sup>1</sup>	0.29	--	--	0.46	--	--	0.26	--	--	0.47	--	--	
1116	I-10 EB On-Ramp	SB Etiwanda Ave	UC <sup>1</sup>	0.06	--	--	0.18	--	--	0.06	--	--	0.20	--	--	
1117	I-10 EB Off-Ramp	Etiwanda Ave	Sig	0.63	17.6	B	0.49	10.3	B	0.72	19.6	B	0.57	12.4	B	
1118	I-10 EB On-Ramp	NB Etiwanda Ave	UC <sup>1</sup>	0.15	--	--	0.44	--	--	0.19	--	--	0.54	--	--	

<sup>1</sup>For uncontrolled (UC) movements the d/c was calculated based on a saturation flow rate of 1500 vehicles per hour. Average delay and LOS are not calculated for these intersections, denoted with double dashes (--).

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 3 conditions are presented in **Table 3.6.18**. In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage. Queuing analysis was not conducted for uncontrolled intersections that do not have conflicting movements.

Peak hour vehicle queues for freeway off-ramps at the Etiwanda Avenue/Commerce Drive interchange for years 2025 and 2045 under Alternative 3 conditions are summarized in **Table 3.6.19**. As shown in the table, none of the queues are expected to exceed the available storage.

Table 3.6.18: Etiwanda Avenue/Commerce Drive Interchange Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control Sig	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
1111	Valley Blvd/Ontario Mills Pkwy & Etiwanda Ave	Sig	NBL	300	104	Yes	57	Yes	96	Yes	35	Yes
			NBTR	670	52	Yes	217	Yes	49	Yes	150	Yes
			SBL	250	37	Yes	36	Yes	46	Yes	113	Yes
			SBTR	1,070 <sup>1</sup>	191	Yes	221	Yes	198	Yes	222	Yes
			EBL	200	25	Yes	76	Yes	25	Yes	103	Yes
			EBT	775	25	Yes	32	Yes	25	Yes	62	Yes
			EBR	775	39	Yes	148	Yes	36	Yes	92	Yes
			WBL	250	63	Yes	69	Yes	63	Yes	64	Yes
			WBT	1,450 <sup>1</sup>	25	Yes	25	Yes	25	Yes	31	Yes
			WBR	1,450 <sup>1</sup>	25	Yes	25	Yes	25	Yes	25	Yes
1112	Valley Blvd & Commerce Dr	Sig	SBL	300	30	Yes	25	Yes	30	Yes	30	Yes
			SBTR	2,115 <sup>1</sup>	57	Yes	68	Yes	52	Yes	63	Yes
			EBL	220	26	Yes	29	Yes	25	Yes	34	Yes
			SBL	300	30	Yes	25	Yes	30	Yes	30	Yes
			SBTR	2,115 <sup>1</sup>	57	Yes	68	Yes	52	Yes	63	Yes
			EBL	220	26	Yes	29	Yes	25	Yes	34	Yes
			EBT	850	31	Yes	70	Yes	34	Yes	110	Yes
			EBR	850	0	Yes	26	Yes	25	Yes	25	Yes
			WBL	270	129	Yes	169	Yes	121	Yes	170	Yes
			WBT	770	60	Yes	100	Yes	76	Yes	146	Yes
1114	I-10 WB Off-Ramp & Etiwanda Ave	Sig	NBT	850	51	Yes	86	Yes	80	Yes	84	Yes
			SBT	730	67	Yes	61	Yes	139	Yes	35	Yes
1117	I-10 EB Off-Ramp & Etiwanda Ave	Sig	NBT	315	205	Yes	215	Yes	184	Yes	283	Yes
			SBT	850	161	Yes	42	Yes	177	Yes	60	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

**Table 3.6.19: Etiwanda Avenue/Commerce Drive Interchange**  
**Alternative 3 (Express) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
1112	Valley Blvd & Commerce Dr/I-10 EB Off-Ramp	Sig	NBL	550 <sup>1</sup>	30	Yes	31	Yes	36	Yes	30	Yes
			NBT	900	128	Yes	157	Yes	135	Yes	158	Yes
			NBR	900	88	Yes	94	Yes	92	Yes	94	Yes
1114	I-10 WB Off-Ramp & Etiwanda Ave	Sig	WBL	650	335	Yes	216	Yes	364	Yes	259	Yes
			WBR	1,200 <sup>2</sup>	40	Yes	69	Yes	42	Yes	96	Yes
1117	I-10 EB Off-Ramp & Etiwanda Ave	Sig	EBL	1,000 <sup>3</sup>	52	Yes	57	Yes	50	Yes	59	Yes
			EBR	470	324	Yes	139	Yes	370	Yes	185	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 200' and 2<sup>nd</sup> storage lane is 900'. The average available storage is 550 feet per lane.

<sup>2</sup> 1<sup>st</sup> storage lane is 400' and 2<sup>nd</sup> lane extends 2,000' to the beginning of the painted gore'. The average available storage is 1,200 feet per lane.

<sup>3</sup> 1<sup>st</sup> storage lane is 470' and 2<sup>nd</sup> lane extends 1,530' to the beginning of the painted gore'. The average available storage is 1,000 feet per lane.

Note: The 95<sup>th</sup> percentile queues are compared to a lane group's average lane length.

Peak hour ramp meter queues expected in year 2045 on the four I-10 on-ramps from Etiwanda Avenue under Alternative 3 are summarized in **Table 3.6.20**. All four on-ramps are assumed to have one HOV lane and one GP lane. As shown in the table, all on-ramps from Etiwanda Avenue provide sufficient storage for the maximum queue expected in year 2045.

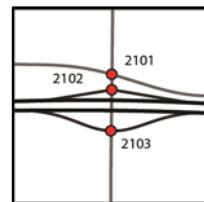
**Table 3.6.20: Etiwanda Avenue Interchange**  
**Year 2045 Alternative 3 (Express) On-Ramp Meter Queues vs. Storage**

Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes	HOV				GP				
					Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	
		AM	PM		HOV	GP							
1113	I-10 WB On-Ramp	370	610	1	1	400	60	680	Yes	650	480	835	Yes
1115	I-10 WB Loop On-Ramp	386	701	1	1	400	0	540	Yes	720	0	652	Yes
1116	I-10 EB Loop On-Ramp	93	300	1	1	400	0	430	Yes	400	0	600	Yes
1118	I-10 EB On-Ramp	278	810	1	1	400	90	400	Yes	900	630	650	Yes

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

### 3.6.6 Pepper Avenue Interchange Analysis

Under Alternative 3 for years 2025 and 2045, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 3 conditions at the Pepper Avenue interchange study intersections is provided in **Table 3.6.21**.



**Table 3.6.21: Pepper Avenue Interchange  
Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours**

Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
2101	Valley Blvd	Pepper Ave	Sig	0.58	29.9	C	0.55	29.4	C	0.65	52.3	D	0.75	33.8	C	
2102	I-10 WB Ramps	Pepper Ave	Sig	0.51	19.0	B	0.43	17.4	B	0.79	32.4	C	0.63	22.9	C	
2103	I-10 EB Ramps	Pepper Ave	Sig	0.59	27.0	C	0.50	29.4	C	0.77	26.7	C	0.68	34.6	C	

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 3 conditions are presented in **Table 3.6.22**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movement is expected to exceed the available storage under year 2025 Alternative 3 conditions:

- Southbound right turn at I-10 WB Ramp & Pepper Ave (AM Peak Hour)

As shown in **Table 3.6.22**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 3 conditions:

- Northbound left turn at Valley Blvd & Pepper Ave (PM Peak Hour)
- Westbound left turn at Valley Blvd & Pepper Ave (AM Peak Hour)
- Southbound through at I-10 WB Ramps & Pepper Ave (AM Peak Hour)

Peak hour vehicle queues for freeway off-ramps at the Pepper Avenue interchange for years 2025 and 2045 under Alternative 3 (Express) conditions are summarized in **Table 3.6.23**. As shown in the table, none of the expected 95<sup>th</sup> percentile queues exceed the available storage.

Peak hour ramp meter queues expected in year 2045 on the two I-10 on-ramps from Pepper Avenue under Alternative 3 are summarized in **Table 3.6.24**. The westbound on-ramp is assumed to have two GP lanes. The eastbound on-ramp is assumed to have one HOV lane and two GP lanes. As shown in the table, both the on-ramps from Pepper Avenue provide sufficient storage for the maximum queues expected in year 2045.

**Table 3.6.22: Pepper Avenue Interchange**  
**Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2101	Valley Blvd & Pepper Ave	Sig	NBL	198 <sup>1</sup>	77	Yes	104	Yes	164	Yes	212	No
			NBT	340	85	Yes	92	Yes	182	Yes	194	Yes
			NBR	98	25	Yes	25	Yes	38	Yes	72	Yes
			SBL	230	40	Yes	42	Yes	69	Yes	76	Yes
			SBTR	575	215	Yes	227	Yes	240	Yes	273	Yes
			EBL	240	46	Yes	85	Yes	35	Yes	45	Yes
			EBT	300	97	Yes	154	Yes	118	Yes	223	Yes
			EBR	320	66	Yes	57	Yes	96	Yes	53	Yes
			WBL	220	188	Yes	112	Yes	250	No	140	Yes
			WBTR	1,330 <sup>2</sup>	85	Yes	133	Yes	75	Yes	127	Yes
2102	I-10 WB Ramps & Pepper Ave	Sig	NBL	75	25	Yes	25	Yes	25	Yes	25	Yes
			NBT	455	150	Yes	205	Yes	212	Yes	230	Yes
			SBT	340	112	Yes	34	Yes	416	No	215	Yes
			SBR	340	341	No	95	Yes	318	Yes	101	Yes
2103	I-10 EB Ramps & Pepper Ave	Sig	NBT	1,700 <sup>2</sup>	120	Yes	85	Yes	197	Yes	260	Yes
			NBR	132	25	Yes	44	Yes	25	Yes	60	Yes
			SBL	353 <sup>2</sup>	272	Yes	238	Yes	221	Yes	346	Yes
			SBT	455	0	Yes	0	Yes	25	Yes	25	Yes

<sup>1</sup> 1<sup>st</sup> storage lane is 152' and 2<sup>nd</sup> storage lane is 244'. The average available storage is 198 feet per lane.

<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

Note: The 95<sup>th</sup> percentile queues are compared to a lane group's average lane length.

**Table 3.6.23: Pepper Avenue Interchange**  
**Alternative 3 (Express) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2102	I-10 WB Ramps & Pepper Ave	Sig	WBLTR	1,140	118	Yes	143	Yes	400	Yes	352	Yes
			WBR	455	116	Yes	146	Yes	384	Yes	342	Yes
2103	I-10 EB Ramps & Pepper Ave	Sig	EBL	1,175	207	Yes	227	Yes	336	Yes	302	Yes
			EBLTR	770	182	Yes	220	Yes	263	Yes	273	Yes

Table 3.6.24: Pepper Avenue Interchange Year 2045 Alternative 3 (Express) On-Ramp Meter Queues vs. Storage													
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM			Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
2102	I-10 WB On-Ramp	840	640	0	2	--	--	--	--	480	360	425	Yes
2103	I-10 EB On-Ramp	930	830	1	2	400	90	385	Yes	480	360	480	Yes

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.6.7 La Cadena Drive/9<sup>th</sup> Street Interchange Analysis

Alternative 3 (Express) conditions analysis for the La Cadena Drive/9<sup>th</sup> Street interchange includes the following improvements for years 2025 and 2045 as part of the proposed project:



#### 9<sup>th</sup> Street and I-10 Eastbound Ramp Intersection (Intersection #2263)

- Convert shared left/through/right lane to a shared through/right lane on the eastbound approach
- Add an exclusive left turn lane with a storage length of 400 feet on the eastbound approach

Differences between Alternative 1 (No Build) and Alternative 3 (Express) intersection lane configurations at the La Cadena Drive/9<sup>th</sup> Street interchange are highlighted in [Figure 3.6.2](#) for year 2025 and [Figure 3.6.4](#) for year 2045.

Under Alternative 3 for years 2025 and 2045, the study intersections are expected to operate at LOS D or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 3 conditions at the La Cadena Drive/9<sup>th</sup> Street interchange study intersections is provided in [Table 3.6.25](#).

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 3 conditions are presented in [Table 3.6.26](#). In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage under years 2025 and 2045 Alternative 3 conditions.

Table 3.6.25: La Cadena Drive/9 <sup>th</sup> Street Interchange Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
2261	I-10 WB On-Ramp	La Cadena Dr	UC <sup>1</sup>	0.13	4.6	A	0.23	6.6	A	0.15	5.2	A	0.24	6.6	A
2262	I-10 WB Off-Ramp	9 <sup>th</sup> St	SC <sup>2</sup>	0.41	11.7	B	0.70	19.0	C	0.53	14.6	B	0.80	26.4	D
2263	I-10 EB Ramps	9 <sup>th</sup> St	AWS	0.22	9.9	A	0.38	11.6	B	0.32	11.7	B	0.35	12.9	B

<sup>1</sup> The d/c ratio, average delay and LOS for this intersection are for northbound left turn movement only which conflicts with the free southbound through movement.

<sup>2</sup> For two-way stop control (SC) intersection, the average delay and LOS are for the worst stop-controlled approach; the d/c ratio is for the worst stop-controlled movement/approach.

Table 3.6.26: La Cadena Drive/9 <sup>th</sup> Street Interchange Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours															
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions						Year 2045 Conditions				
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	
2261	I-10 WB On-Ramp & La Cadena Dr	UC	NBLT	1,500 <sup>1</sup>	25	Yes									
2263	I-10 EB Ramps & 9 <sup>th</sup> St	AWS <sup>1</sup>	SBL	400	--	--	--	--	--	--	--	--	--	--	

<sup>1</sup> Queue length is not calculated by Synchro for all-way stop (AWS) controlled intersections.

<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

Peak hour vehicle queues for freeway off-ramps at the La Cadena Drive/9<sup>th</sup> Street interchange for years 2025 and 2045 under Alternative 3 conditions are summarized in **Table 3.6.27**. As shown in the table, none of the 95<sup>th</sup> percentile queues are expected to exceed the available storage length.

Peak hour ramp meter queues expected in year 2045 on the two I-10 on-ramps from La Cadena Drive and 9<sup>th</sup> Street under Alternative 3 are summarized in **Table 3.6.28**. The westbound on-ramp is assumed to have one GP lane. The eastbound on-ramp is assumed to have one HOV lane and one GP lane. As shown in the table, both on-ramps from La Cadena Drive and 9<sup>th</sup> Street provide sufficient storage for the maximum queue expected in year 2045.

**Table 3.6.27: La Cadena Drive/9<sup>th</sup> Street Interchange  
Alternative 3 (Express) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours**

Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage ? (Yes or No)
2262	I-10 WB Off-Ramp & 9 <sup>th</sup> St	SC	WBLR	900	51	Yes	148	Yes	78	Yes	210	Yes
2263	I-10 EB Ramp & 9 <sup>th</sup> St	AWS <sup>1</sup>	EBL	1,500	--	--	--	--	--	--	--	--

<sup>1</sup> Queue length is not calculated by Synchro for all-way stop (AWS) controlled intersections.

**Table 3.6.28: La Cadena Drive/9<sup>th</sup> Street Interchange  
Year 2045 Alternative 3 (Express) On-Ramp Meter Queues vs. Storage**

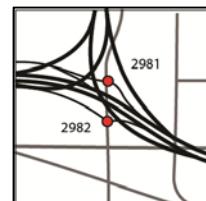
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM	HOV	GP	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
2261	I-10 WB On-Ramp	270	340	0	1	--	--	--	--	400	0	510	Yes
2263	I-10 EB On-Ramp	470	480	1	1	400	0	555	Yes	510	0	555	Yes

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.6.8 Tennessee Street Interchange Analysis

Alternative 3 (Express) conditions analysis for the Tennessee Street interchange includes the following improvements for years 2025 and 2045 as part of the proposed project:



#### Tennessee Street and I-10 Westbound Ramp Intersection (Intersection #2981)

- Add 2<sup>nd</sup> exclusive left turn lane with a storage length of 180 feet on the northbound approach
- Extend existing exclusive left turn lane storage length to 180 feet on the northbound approach
- Reduce the storage length of the shared through/right lane from 690 feet to 580 feet on the westbound approach.

#### Tennessee Street and I-10 Eastbound Ramp Intersection (Intersection #2982)

- Convert shared through/right lane into an exclusive through lane on the northbound approach

- Add an exclusive right turn lane with storage length of 250 feet on the northbound approach
- Add a 2<sup>nd</sup> exclusive left turn lane with storage length of 190 feet on the southbound approach
- Extend existing exclusive left turn lane storage to 190 feet on the southbound approach
- Convert shared left/through lane into an exclusive through lane on the eastbound approach
- Add an exclusive left turn lane with storage length of 260 feet on the eastbound approach

Differences between Alternative 1 (No Build) and Alternative 3 (Express) intersection lane configurations at the Tennessee Street interchange are highlighted in **Figure 3.6.2** for year 2025 and **Figure 3.6.4** for year 2045.

Under Alternative 3 for years 2025 and 2045, the study intersections for the Tennessee Street interchange are expected to operate at LOS C or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 3 conditions at the Tennessee Street interchange study intersections is provided in **Table 3.6.29**.

Table 3.6.29: Tennessee Street Interchange Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours																
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service						
	East/West Street	North/South Street		AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			
				d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	
2981	I-10 WB Ramps	Tennessee St	Sig	0.46	15.9	B	0.49	13.0	B	0.47	14.6	B	0.56	14.9	B	
2982	I-10 EB Ramps	Tennessee St	Sig	0.45	14.1	B	0.75	24.0	C	0.55	15.4	B	0.84	29.1	C	

The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 3 conditions are presented in **Table 3.6.30**. In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage.

Peak hour vehicle queues for freeway off-ramps at the Tennessee Street interchange for years 2025 and 2045 under Alternative 3 conditions are summarized in **Table 3.6.31**. As shown in the table, none of the queues are expected to exceed the available storage.

Peak hour ramp meter queues expected in year 2045 on the I-10 eastbound on-ramp from Tennessee Street under Alternative 3 is summarized in **Table 3.6.32**. The eastbound on-ramp is assumed to have two GP lanes. As shown in the table, the eastbound on-ramp from Tennessee Street provides sufficient storage for the maximum queue expected in year 2045.

Table 3.6.30: Tennessee Street Interchange Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2981	I-10 WB Ramps & Tennessee St	Sig	NBL	180	44	Yes	39	Yes	25	Yes	53	Yes
			NBT	490	25	Yes	56	Yes	25	Yes	212	Yes
			SBTR	1,350 <sup>1</sup>	88	Yes	176	Yes	97	Yes	222	Yes
2982	I-10 EB Ramps & Tennessee St	Sig	NBT	457	115	Yes	192	Yes	145	Yes	295	Yes
			NBR	250	26	Yes	231	Yes	29	Yes	195	Yes
			SBL	190	25	Yes	95	Yes	25	Yes	151	Yes
			SBT	490	25	Yes	67	Yes	26	Yes	63	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

Table 3.6.31: Tennessee Street Interchange Alternative 3 (Express) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours												
Intersection #	Location E/W St & N/S St	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
					95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
2981	I-10 WB Ramps & Tennessee St	Sig	WBLTR	1140	90	Yes	72	Yes	87	Yes	123	Yes
			WBLTR	580	90	Yes	72	Yes	87	Yes	123	Yes
2982	I-10 EB Ramps & Tennessee St	Sig	EBL	260	68	Yes	106	Yes	89	Yes	210	Yes
			EBTR	470	98	Yes	258	Yes	125	Yes	336	Yes

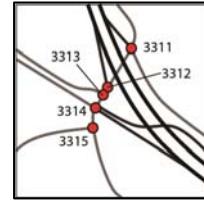
Table 3.6.32: Tennessee Street Interchange Year 2045 Alternative 3 (Express) On-Ramp Meter Queues vs. Storage													
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM	HOV	GP	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
2982	I-10 EB On-Ramp	380	1,240	0	2	--	--	--	--	720	420	300	No

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.6.9 Ford Street Interchange Analysis

Under Alternative 3 for years 2025 and 2045, the study intersections are expected to operate at LOS E or better during the morning and evening peak hours except for the Parkford Drive and Ford Street intersection. The Parkford Drive and Ford Street intersection is expected to operate at LOS F during the evening peak hour in year 2045. A summary of LOS, d/c and average vehicle delay for Alternative 3 conditions at the Ford Street interchange study intersections is provided in **Table 3.6.33**.



The queuing analysis for the arterial intersection approaches and available storage for each movement for years 2025 and 2045 under Alternative 3 conditions are presented in **Table 3.6.34**. In comparing the 95<sup>th</sup> percentile queues to the available storage, the following movements are expected to exceed the available storage under year 2025 Alternative 3 conditions:

- Northbound shared through/right at Reservoir Rd/I-10 WB On-Ramp & Ford St (PM Peak Hour)
- Northbound shared through/right at Redlands Blvd/I-10 EB On-Ramp & Ford St (AM and PM Peak Hours)
- Southbound left turn at Redlands Blvd/I-10 EB On-Ramp & Ford St (AM and PM Peak Hours)
- Eastbound left turn at Redlands Blvd/I-10 EB On-Ramp & Ford St (AM Peak Hour)

As shown in **Table 3.6.34**, the following additional movements are expected to exceed the available storage under year 2045 Alternative 3 conditions:

- Northbound left turn at Redlands Blvd/I-10 EB On-Ramp & Ford St (AM Peak Hour)
- Southbound shared through/right at Redlands Blvd/I-10 EB On-Ramp & Ford St (PM Peak Hour)

Peak hour vehicle queues for freeway off-ramps at the Ford Street interchange for years 2025 and 2045 under Alternative 3 conditions are summarized in **Table 3.6.35**. As shown in the table, none of the queues are expected to exceed the available storage.

Table 3.6.33: Ford Street Interchange Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours															
Intersection #	Location		Traffic Control	Year 2025 Level of Service						Year 2045 Level of Service					
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
	East/West Street	North/ South Street		d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
3311	Reservoir Rd/I-10 WB On-Ramp	Ford St	Sig	0.73	23.2	C	0.64	14.1	B	0.51	10.2	B	0.50	9.6	A
3312	I-10 EB Off-Ramp	Ford St	SC <sup>1</sup>	0.59	19.3	C	0.93	34.8	D	0.58	15.7	C	0.90	33.2	D
3313	Parkford Dr	Ford St	SC <sup>1</sup>	0.49	28.9	D	0.76	44.6	E	0.47	25.9	D	1.26	197.6	F
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off- Ramp	Ford St	Sig	0.86	23.7	C	0.55	24.9	C	0.84	32.4	C	1.04	42.6	D
3315	Oak St	Ford St	SC <sup>1</sup>	0.25	19.4	C	0.12	14.5	B	0.27	21.2	C	0.12	14.6	B

<sup>1</sup>For two-way stop control intersection, the average delay and LOS are for the worst stop-controlled approach; the d/c ratio is for the worst stop-controlled movement/approach.

Table 3.6.36: Ford Street Interchange

Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3311	Reservoir Rd/I-10 WB On-Ramp & Ford St	Sig	NBL	100	87	Yes	32	Yes	33	Yes	26	Yes
			NBTR	280	195	Yes	455	No	154	Yes	251	Yes
			SBL	45	25	Yes	25	Yes	25	Yes	25	Yes
			SBTR	1,215 <sup>2</sup>	610	Yes	179	Yes	119	Yes	60	Yes
			WBLTR	2,160 <sup>2</sup>	217	Yes	97	Yes	95	Yes	127	Yes
3313	Parkford Dr & Ford St	SC	NBL	30	25	Yes	25	Yes	25	Yes	25	Yes
			EBLR	820	63	Yes	148	Yes	59	Yes	348	Yes
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St	Sig	NBL	85	84	Yes	42	Yes	118	No	44	Yes
			NBTR	85	130	No	89	No	162	No	114	No
			SBL	40	90	No	75	No	220	No	491	No
			SBTR	105	80	Yes	74	Yes	80	Yes	119	No
			EBL	115	117	No	78	Yes	165	No	114	Yes
			EBTR	3,100 <sup>2</sup>	90	Yes	144	Yes	134	Yes	453	Yes
3315	Oak St & Ford St	SC	NBL	60	0	Yes	0	Yes	0	Yes	0	Yes
			NEL	325 <sup>1</sup>	25	Yes	25	Yes	27	Yes	25	Yes
			NER	80 <sup>1</sup>	--	--	--	--	--	--	--	--

<sup>1</sup> For the northeast approach calculated queues are based on the HCM shared lane capacity analysis. The northeast approach consists of 2 lanes: 325 feet and 80 feet. The 95<sup>th</sup> percentile queue length is the total queue length for both movements.

<sup>2</sup> Available storage is measured from the stop bar to the upstream intersection.

Table 3.6.35: Ford Street Interchange

Alternative 3 (Express) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours

Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions				Year 2045 Conditions			
					AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3312	I-10 EB Off-Ramp & Ford St	SC	EBL	1,025 <sub>1</sub>	99	Yes	358	Yes	99	Yes	341	Yes
			EBR	450 <sup>1</sup>	--	--	--	--	--	--	--	--
3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp & Ford St	Sig	WBL	120	70	Yes	40	Yes	114	Yes	72	Yes
			WBTR	1,675	160	Yes	61	Yes	296	Yes	107	Yes

<sup>1</sup> For the eastbound approach calculated queues are based on the HCM shared lane capacity analysis. The eastbound approach consists of 2 lanes: 1,025 feet and 30 feet. The 95<sup>th</sup> percentile queue length is the total queue length for both movements.

Note: The 95<sup>th</sup> percentile queue is compared to the lane group's average lane length.

Peak hour ramp meter queues expected in year 2045 on the two on-ramps from Ford Street under Alternative 3 are summarized in **Table 3.6.36**. Both of the on-ramps are assumed to have one HOV lane and two GP lanes. As shown in the table, both on-ramps from Ford Street provide sufficient storage for the maximum queues expected in year 2045.

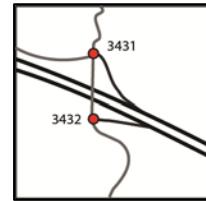
Table 3.6.36: Ford Street Interchange Year 2045 Alternative 3 – Expected Peak Hour Queues vs. Storage at Ramp Meters													
Intersection #	Ramp Location	2045 Peak Hours Vol (vph)		No. of Lanes		HOV				GP			
		AM	PM	HOV	GP	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)	Metering Rate Per Lane (vph)	Required Storage Per Lane (feet)	Available Storage Per Lane (feet)	Adequate Storage? (Yes or No)
	I-10 WB On-Ramp	1,110	600	1	2	400	90	394	Yes	550	360	395	Yes
3314	I-10 EB On-Ramp	590	1,370	1	2	400	120	1,070	Yes	720	540	920	Yes

Note: For a single ramp meter lane, the maximum discharge rate is 900 vph. For multiple lanes, the maximum discharge is 1,500 vph. The metering rate is the maximum of the AM and PM rates. The required storage is the maximum of the AM and PM queue per lane at the ramp meter.

-- = No ramp metering analysis is conducted because there is no HOV bypass lane on the on-ramp.

### 3.6.10 Wabash Avenue Interchange Analysis

Under Alternative 3 for year 2025, the study intersections are expected to operate at LOS B or better during the morning and evening peak hours. A summary of LOS, d/c and average vehicle delay for Alternative 3 conditions at the Wabash Avenue interchange study intersections is provided in **Table 3.6.37**.



Analysis for year 2045 is not conducted for the Wabash Avenue interchange due to studies currently being conducted to improve the interchange between years 2025 and 2045 under RTP# 4M01032. Those improvements are assumed to address year 2045 traffic at the interchange.

Table 3.6.37: Wabash Avenue Interchange Alternative 3 (Express) Intersection Levels of Service – AM/PM Peak Hours											
Intersection #	Location				Traffic Control	Year 2025 Level of Service					
	East/West Street		North/South Street			AM Peak Hour			PM Peak Hour		
						d/c	Avg. Delay (sec)	LOS	d/c	Avg. Delay (sec)	LOS
3431	I-10 WB Off-Ramp/Reservoir Rd		Wabash Ave		SC <sup>1</sup>	0.17	12.1	B	0.15	10.8	B
3432	I-10 EB On-Ramp		Wabash Ave		UC <sup>2</sup>	0.03	2.1	A	0.03	1.9	A

<sup>1</sup> For two-way stop control intersection, the average delay and LOS are for the worst stop-controlled approach; the d/c ratio is for the worst stop-controlled movement/approach.

<sup>2</sup> The d/c ratio, average delay and LOS for this intersection are for southbound left turn movement only which conflicts with the free northbound through movement.

The queuing analysis for the arterial intersection approaches and available storage for each movement for year 2025 under Alternative 3 conditions are presented in **Table 3.6.38**. In comparing the 95<sup>th</sup> percentile queues to the available storage, none of the queues are expected to exceed the available storage.

Peak hour vehicle queues for freeway off-ramps at the Wabash Avenue interchange for year 2025 under Alternative 3 conditions are summarized in **Table 3.6.39**. As shown in the table, none of the queues are expected to exceed the available storage.

Table 3.6.38: Wabash Avenue Interchange Alternative 3 (Express) Arterial Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions			
					AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3431	I-10 WB Off-Ramp/Reservoir Rd & Wabash Ave	SC	NBLT	590	25	Yes	25	Yes
			EBLTR	2,077 <sup>1</sup>	25	Yes	25	Yes
3432	I-10 EB On-Ramp & Wabash Ave	UC	SBLT	590	25	Yes	25	Yes

<sup>1</sup> Available storage is measured from the stop bar to the upstream intersection.

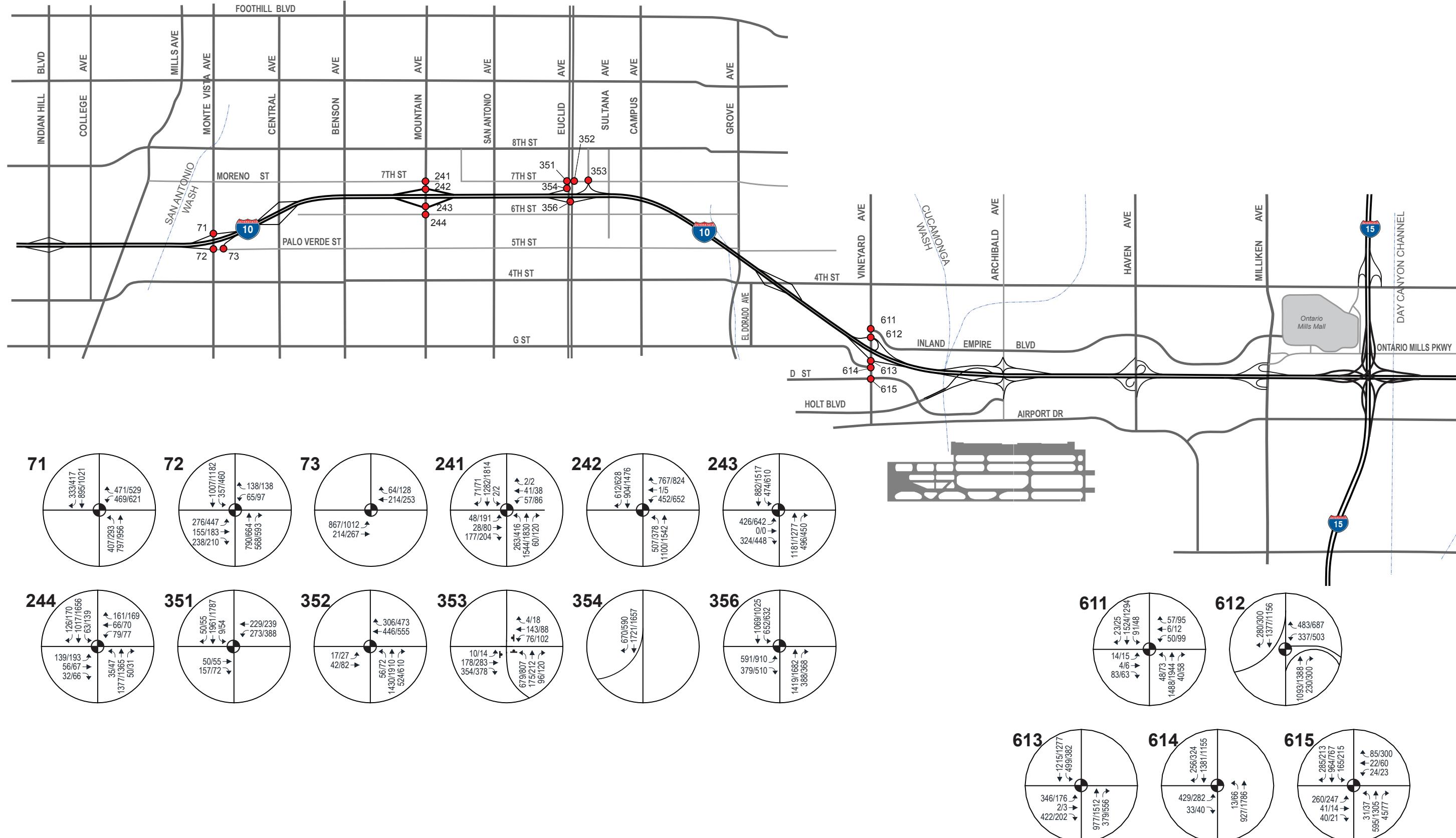
Table 3.6.39: Wabash Avenue Interchange Alternative 3 (Express) Off-Ramp Intersection Approaches Queues vs. Storage - AM/PM Peak Hours								
Intersection #	Location	Traffic Control	Movement	Available Storage (ft)	Year 2025 Conditions			
					AM Peak Hour		PM Peak Hour	
	E/W St & N/S St				95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)	95 <sup>th</sup> Percentile Queue (ft)	Adequate Storage? (Yes or No)
3431	I-10 WB Off-Ramp/Reservoir Rd & Wabash Ave	SC	WBLTR	1,050	25	Yes	25	Yes

### 3.6.11 Significant Impact Determination and Recommended Improvements

**Table 3.6.40** compares the expected LOS and d/c ratios for Alternative 3 (Express) and Alternative 1 (No Build) under years 2025 and 2045 for all study intersections. As shown in the table, none of the study intersections meet the significant impact criteria of an increase in intersection d/c of 0.10 or more with an LOS F in the build condition. Therefore, there are no significant traffic impacts at any of the study intersections.

Table 3.6.40: Years 2025 and 2045 Alternative 3 (Express) Peak Hour Intersection LOS Significant Impact Determination																																				
Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2012					Year 2025										Year 2045																
					Existing Traffic					Alternative 1 (No Build) Traffic on No Build Geometry					Alternative 3 (Express) Traffic on Build Geometry					Significant Impact?	Alternative 1 (No Build) Traffic on No Build Geometry					Alternative 3 (Express) Traffic on Build Geometry										
		AM Peak Hour			PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour			AM Peak Hour						PM Peak Hour		AM Peak Hour		PM Peak Hour										
		v/c	Avg Delay (sec)	LOS	v/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS		d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS							
Monte Vista Avenue	71	I-10 WB Ramp	Monte Vista Ave	Sig	0.83	25.3	C	0.77	22.3	C	0.90	28.6	C	1.02	38.2	D	0.54	22.3	C	0.58	21.0	C	N	0.99	39.6	D	1.19	57.7	E	0.68	21.3	C	0.67	24.7	C	N
	72	I-10 EB Off-Ramp/ Palo Verde St	Monte Vista Ave	Sig	0.83	31.7	C	1.00	45.8	D	0.93	36.1	D	1.18	57.4	E	0.76	31.9	C	0.79	39.1	D	N	1.01	46.1	D	1.29	74.6	E	0.85	39.5	D	1.00	46.7	D	N
	73	Palo Verde St	I-10 EB On-Ramp	Sig	0.36	10.7	B	0.37	13.0	B	0.38	9.8	A	0.41	11.6	B	0.41	12.1	B	0.49	14.3	B	N	0.43	10.3	B	0.46	13.1	B	0.47	12.1	B	0.55	16.3	B	N
Mountain Avenue	241	7 <sup>th</sup> St/Shopping Center	Mountain Ave	Sig	0.56	16.5	B	0.79	26.4	C	0.67	17.2	B	0.96	35.1	D	0.70	17.6	B	0.94	36.2	D	N	0.84	19.6	B	1.01	40.3	D	0.78	21.2	C	0.99	42.7	D	N
	242	I-10 WB On/Off Ramp	Mountain Ave	Sig	0.70	20.0	C	0.79	25.3	C	0.85	32.2	C	0.99	35.2	D	0.89	33.3	C	1.03	40.0	D	N	0.98	40.9	D	1.11	52.0	D	0.99	46.2	D	1.11	54.2	D	N
	243	I-10 EB On/Off Ramp	Mountain Ave	Sig	0.57	16.2	B	0.78	29.1	C	0.59	16.7	B	0.85	32.8	C	0.62	17.8	B	0.83	32.3	C	N	0.68	25.7	C	0.87	34.6	C	0.69	19.0	B	0.84	36.9	D	N
	244	6th St	Mountain Ave	Sig	0.65	18.7	B	0.71	21.7	C	0.48	16.7	B	0.74	22.8	C	0.48	16.9	B	0.74	23.0	C	N	0.57	18.5	B	0.77	23.3	C	0.55	19.2	B	0.74	24.2	C	N
Euclid Avenue	351	7 <sup>th</sup> St	SB Euclid Ave	Sig	0.74	18.1	B	0.73	20.6	C	0.79	22.8	C	0.78	21.8	C	0.82	16.5	B	0.86	18.8	C	N	0.95	32.8	C	0.89	29.6	C	0.97	29.0	C	0.92	31.5	C	N
	352	7 <sup>th</sup> St	NB Euclid Ave	Sig	0.52	10.3	B	0.66	13.8	B	0.60	12.9	B	0.83	17.8	B	0.66	8.2	A	0.88	13.9	B	N	0.69	13.6	B	0.95	20.4	C	0.72	14.6	B	0.94	18.1	B	N
	353	7 <sup>th</sup> St	I-10 WB Off-Ramp/ 2nd Ave	AWS	0.43	13.7	B	0.57	20.9	C	0.55	21.1	C	0.70	50.1	F	0.56	31.9	C	0.73	39.2	D	N	0.63	35.2	E	0.78	98.1	F	0.62	22.0	C	0.79	28.7	C	N
	354	I-10 WB On-Ramp	SB Euclid Ave	UC	0.43	--	--	0.37	--	--	0.45	--	--	0.39	--	--	0.45	--	--	0.39	--	--	N	0.50	--	--	0.43	--	--	0.50	--	--	0.43	--	--	--
	355	I-10 WB On-Ramp	NB Euclid Ave	UC	0.27	--	--	0.31	--	--	0.29	--	--	0.32	--	--	0.29	--	--	0.32	--	--	N	0.31	--	--	0.35	--	--	0.31	--	--	0.35	--	--	--
	356	I-10 EB Ramp	Euclid Ave	Sig	0.97	45.3	D	1.00	52.0	D	1.00	53.6	D	1.14	92.1	F	0.83	21.3	C	0.97	33.4	C	N	1.23	92.5	F	1.39	156.7	F	0.86	25.0	C	1.02	49.3	D	N
Vineyard Avenue	611	Inland Empire Blvd	Vineyard Ave	Sig	0.52	8.3	A	0.55	9.2	A	0.63	8.9	A	0.82	12.0	B	0.71	19.7	B	0.88	28.6	C	N	0.57	8.2	A	0.67	10.8	B	0.61	14.3	B	0.73	17.7	B	N
	612	I-10 WB Ramp	Vineyard Ave	Sig	0.59	10.0	A	0.64	11.9	B	0.83	14.5	B	1.05	36.8	D	0.71	10.8	B	0.81	15.3	B	N	0.87	20.8	C	1.10	44.3	D	0.76	14.4	B	0.76	16.3	B	N
	613	I-10 EB Ramp	Vineyard Ave	Sig	0.71	16.6	B	0.65	12.1	B	0.95	29.7	C	0.89	18.7	B	0.79	18.5	B	0.83	12.0	B	N	1.12	61.9	E	1.09	41.5	D	0.96	30.2	C	0.89	17.9	B	N
	614	E G St	Vineyard Ave	Sig	0.44	9.8	A	0.43	8.9	A	0.65	12.2	B	0.54	9.8	A	0.59	12.9	B	0.54	9.0	A	N	0.81	18.2	B	0.66	12.2	B	0.77	15.5	B	0.71	9.5	A	N
	615	E D St	Vineyard Ave	Sig	0.40	15.0	B	0.55	18.3	B	0.63	16.1	B	0.71	23.7	C	0.64	16.8	B	0.79	22.4	C	N	0.74	20.0	C	0.90	31.5	C	0.82	16.9	B	0.99	37.4	D	N
Etiwanda Ave/Commerce Dr	1111	Valley Blvd/ Ontario Mills Pkwy	Etiwanda Ave	Sig	0.38	16.5	B	0.47	20.3	C	0.44	18.7	B	0.56	22.6	C	0.45	17.7	B	0.67	23.5	C	N	0.45	18.6	B	0.63	26.2	C	0.46	17.0	B	0.63	21.6	C	N
	1112	Valley Blvd	Commerce Dr	Sig	0.36	31.6	C	0.44	32.5	C	0.30	34.0	C	0.39	31.7	C	0.32	35.2	D	0.38	33.5	C	N	0.36	33.6	C	0.48	36.2	D	0.34	34.7	C	0.45			

Table 3.6.40 continued: Years 2025 and 2045 Alternative 3 (Express) Peak Hour Intersection LOS Significant Impact Determination																																				
Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2012					Year 2025										Year 2045																
					Existing Traffic					Alternative 1 (No Build) Traffic on No Build Geometry					Alternative 3 (Express) Traffic on Build Geometry					Significant Impact?	Alternative 1 (No Build) Traffic on No Build Geometry					Alternative 3 (Express) Traffic on Build Geometry										
					AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour			AM Peak Hour		PM Peak Hour				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour									
		East/West Street	North/South Street		v/c	Avg Delay (sec)	LOS	v/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS		d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	d/c	Avg Delay (sec)	LOS	Significant Impact?						
Etiwanda Ave/Commerce Dr	1114	I-10 WB Off-Ramp	Etiwanda Ave	Sig	0.55	17.8	B	0.42	12.9	B	0.50	15.2	B	0.52	12.7	B	0.55	14.8	B	0.53	12.6	B	0.53	16.0	B	0.58	15.3	B	0.59	16.7	B	0.62	13.0	B	N	
	1115	I-10 WB On-Ramp	NB Etiwanda Ave	UC	0.23	--	--	0.38	--	--	0.23	--	--	0.40	--	--	0.29	--	--	0.46	--	--	0.26	--	--	0.44	--	--	0.26	--	--	0.47	--	--	--	
	1116	I-10 EB On-Ramp	SB Etiwanda Ave	UC	0.06	--	--	0.19	--	--	0.06	--	--	0.17	--	--	0.06	--	--	0.18	--	--	0.06	--	--	0.18	--	--	0.06	--	--	0.20	--	--	--	
	1117	I-10 EB Off-Ramp	Etiwanda Ave	Sig	0.77	24.5	C	0.44	13.3	B	0.62	17.4	B	0.46	10.4	B	0.63	17.6	B	0.49	10.3	B	0.68	18.6	B	0.51	12.1	B	0.72	19.6	B	0.57	12.4	B	N	
	1118	I-10 EB On-Ramp	NB Etiwanda Ave	UC	0.14	--	--	0.41	--	--	0.15	--	--	0.45	--	--	0.15	--	--	0.44	--	--	0.18	--	--	0.52	--	--	0.19	--	--	0.54	--	--	--	
Pepper Ave	2101	Valley Blvd	Pepper Ave	Sig	0.64	30.9	C	0.62	31.3	C	0.62	38.6	D	0.60	28.1	C	0.58	29.9	C	0.55	29.4	C	N	0.60	31.0	C	0.58	30.6	C	0.65	52.3	D	0.75	33.8	C	N
	2102	I-10 WB Ramp	Pepper Ave	Sig	0.65	24.3	C	0.52	14.9	B	0.50	24.9	C	0.42	21.3	C	0.51	19.0	B	0.43	17.4	B	N	0.64	28.8	C	0.61	23.2	C	0.79	32.4	C	0.63	22.9	C	N
	2103	I-10 EB Ramp	Pepper Ave	Sig	0.98	53.1	D	0.89	49.6	D	0.59	28.6	C	0.52	34.1	C	0.59	27.0	C	0.50	29.4	C	N	0.64	25.0	C	0.65	30.2	C	0.77	26.7	C	0.68	34.6	C	N
La Cadena Dr/9 <sup>th</sup> St	2261	I-10 WB On-Ramp	La Cadena Dr	UC	0.09	4.0	A	0.17	5.3	A	0.11	4.5	A	0.20	5.7	A	0.13	4.6	A	0.23	6.6	A	N	0.14	4.8	A	0.24	6.4	A	0.15	5.2	A	0.24	6.6	A	N
	2262	I-10 WB Off-Ramp	9th St	SC	0.49	12.9	B	0.46	12.9	B	0.43	12.5	B	0.65	16.9	C	0.41	11.7	B	0.70	19.0	C	N	0.49	13.3	B	0.80	24.8	C	0.53	14.6	B	0.80	26.4	D	N
	2263	I-10 EB Ramp	9th St	AWS	0.38	11.3	B	0.44	11.9	B	0.23	10.0	B	0.35	11.1	B	0.22	9.9	A	0.38	11.6	B	N	0.26	10.9	B	0.38	11.7	B	0.32	11.7	B	0.35	12.9	B	N
Alabama St	2931	I-10 WB Ramp	Alabama St	Sig	0.80	25.6	C	0.83	22.0	C	0.91	37.3	D	0.97	36.8	D	0.63	20.4	C	0.79	17.6	B	N	1.00	59.7	E	1.16	70.3	E	0.88	29.1	C	0.89	25.6	C	N
	2932	I-10 EB Ramp	Alabama St	Sig	0.50	15.2	B	0.85	26.8	C	0.61	20.5	C	1.01	49.1	D	0.45	14.1	B	0.81	20.0	C	N	0.63	26.8	C	1.21	96.9	F	0.55	15.7	B	1.00	38.9	C	N
Tennessee St	2981	I-10 WB Ramp	Tennessee St	Sig	0.74	20.5	C	0.57	16.9	B	0.61	18.0	B	0.51	19.8	B	0.46	15.9	B	0.49	13.0	B	N	0.62	15.9	B	0.70	18.0	B	0.47	14.6	B	0.56	14.9	B	N
	2982	I-10 EB Ramp	Tennessee St	Sig	0.52	14.7	B	0.90	37.2	D	0.55	15.8	B	0.98	52.9	D	0.45	14.1	B	0.75	24.0	C	N	0.68	23.8	C	1.07	81.0	F	0.55	15.4	B	0.84	29.1	C	N
Ford St	3311	Reservoir Rd/I-10 WB On-Ramp	Ford St	SC	<b>1.25</b>	<b>253.2</b>	F	0.60	45.6	E	0.89	32.9	C	0.75	20.6	C	0.73	23.2	C	0.64	14.1	B	N	0.55	20.9	C	0.50	22.0	C	0.51	10.2	B	0.50	9.6	A	N
	3312	I-10 EB Off-Ramp	Ford St	SC	0.50	13.9	B	0.86	29.5	D	0.71	19.1	C	<b>1.09</b>	<b>85.3</b>	F	0.59	19.3	C	0.93	34.8	D	N	0.72	17.4	C	<b>1.07</b>	<b>76.3</b>	F	0.58	15.7	C	0.90	33.2	D	N
	3313	Parkford Dr	Ford St	SC	0.40	21.9	C	0.65	31.8	D	0.47	27.9	D	0.79	48.8	E	0.49	28.9	D	0.76	44.6	E	N	0.45	24.9	C	<b>1.18</b>	<b>162.3</b>	F	0.47	25.9	D	<b>1.26</b>	<b>197.6</b>	F	N
	3314	Redlands Blvd/I-10 EB On-Ramp/WB Off-Ramp	Ford St	Sig	0.62	19.8	B	0.52	32.8	C	0.62	23.3	C	0.48	18.1	B	0.86	23.7	C	0.55	24.9	C	N	0.84	35.1	D	1.01	44.0	D	0.84	32.4	C	1.04	42.6	D	N
	3315	Oak St	Ford St	SC	0.27	19.2	C	0.10	12.5	B	0.25	19.1	C	0.12	14.0	B	0.25	19.4	C	0.12	14.5	B	N	0.27	20.6	C	0.12	14.6	B	0.27						

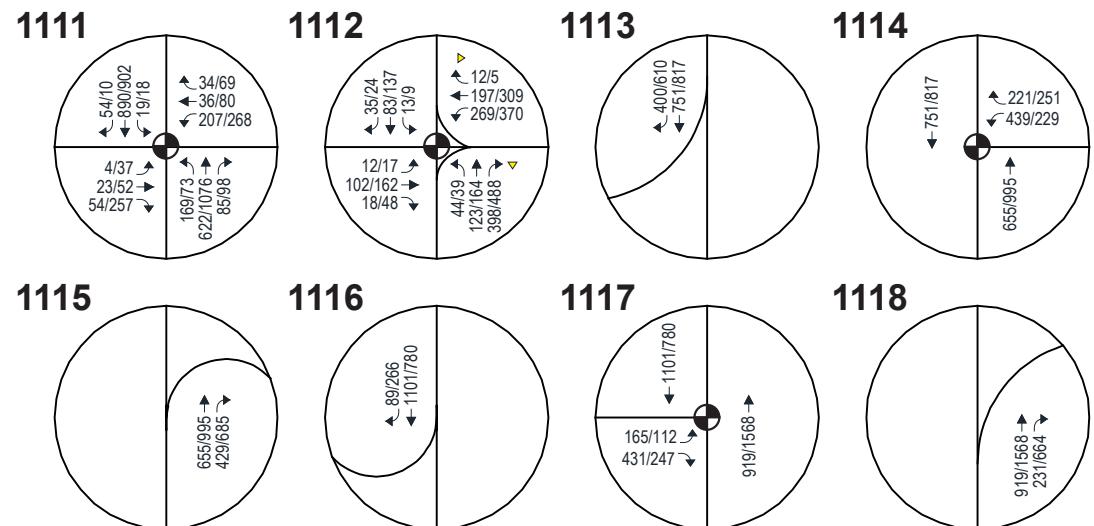
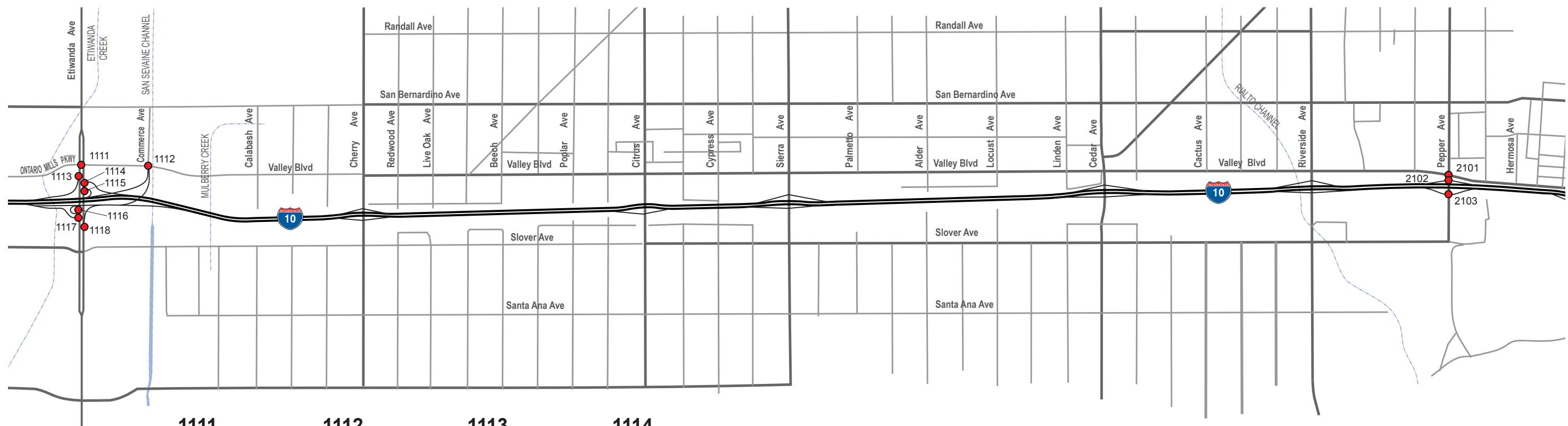


#### LEGEND

- |                            |                               |
|----------------------------|-------------------------------|
| ● Traffic Signal           | ↗ Turning Movement            |
| ■ Stop Sign                | → Through Movement            |
| ▼ Yield Sign               |                               |
| 1234 ● Intersection Number | XX/XX AM/PM Peak Hour Volumes |

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

SHEET 1 OF 3

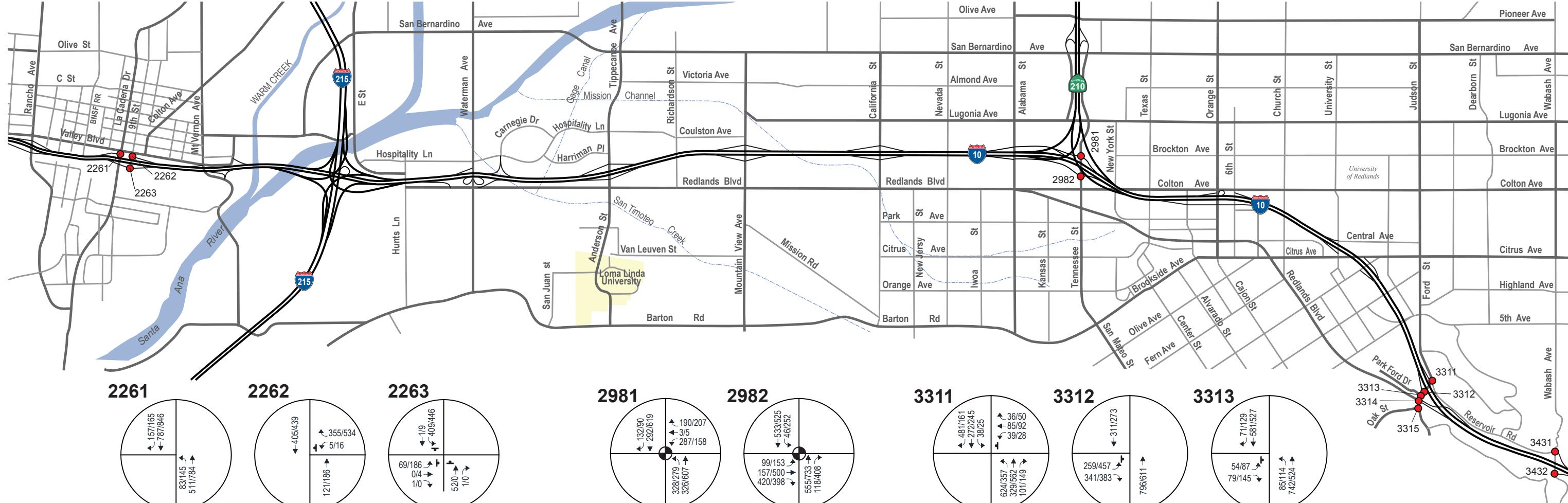


#### LEGEND

- Traffic Signal      ↗ Turning Movement      1234 ● Intersection Number
- Stop Sign      → Through Movement      XX/XX AM/PM Peak Hour Volumes
- ▼ Yield Sign



**FIGURE 3.6.1**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES



#### LEGEND

- |                  |                               |
|------------------|-------------------------------|
| ● Traffic Signal | ↗ Turning Movement            |
| ■ Stop Sign      | → Through Movement            |
| ▼ Yield Sign     | XX/XX AM/PM Peak Hour Volumes |

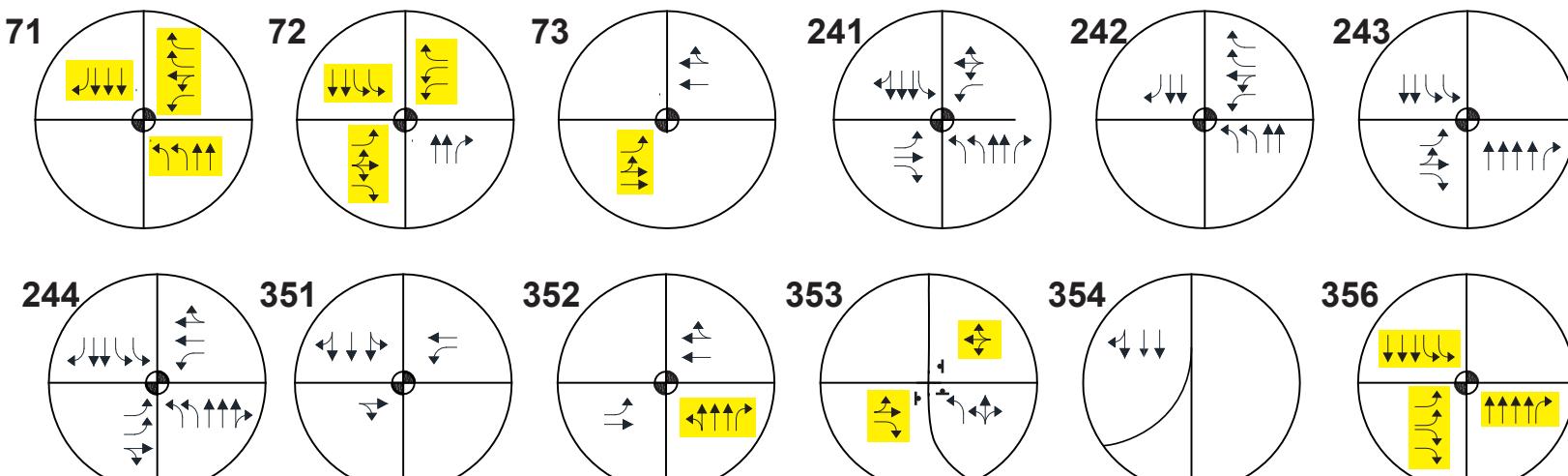
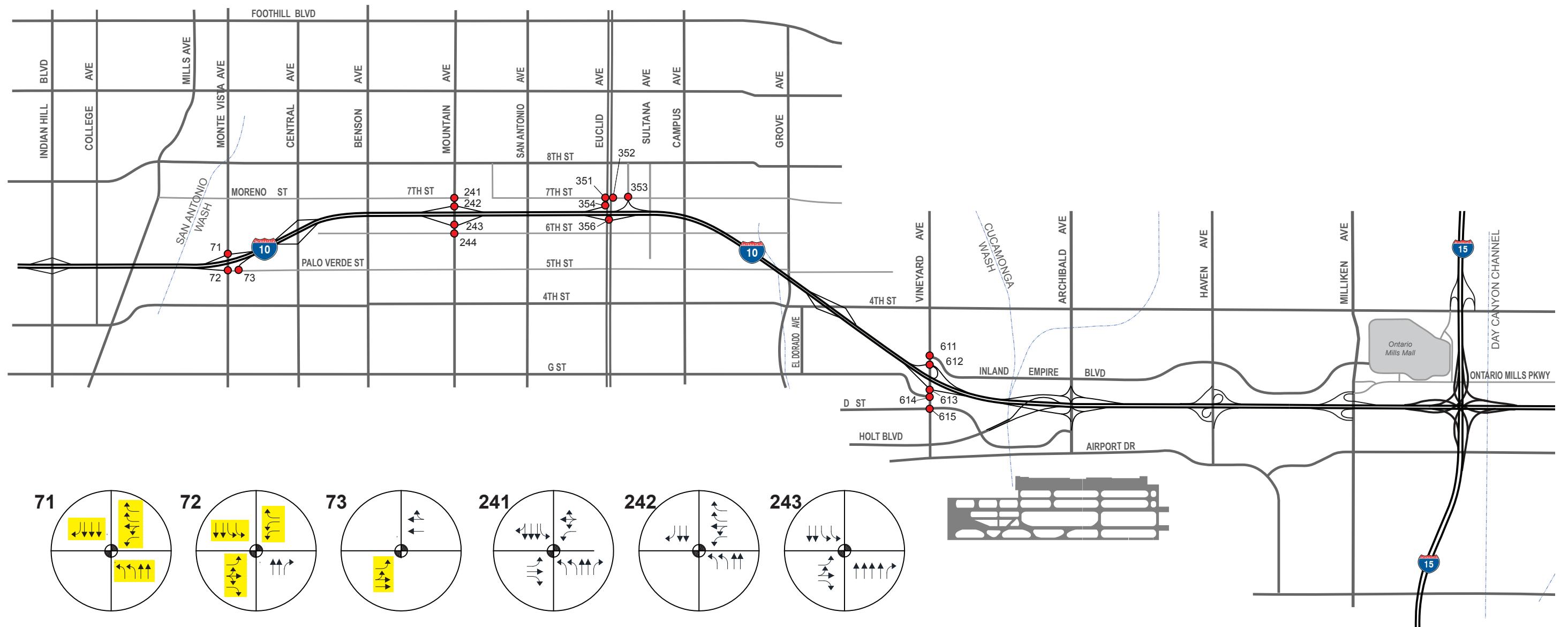
1234 ● Intersection Number



FIGURE 3.6.1

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

SHEET 3 OF 3

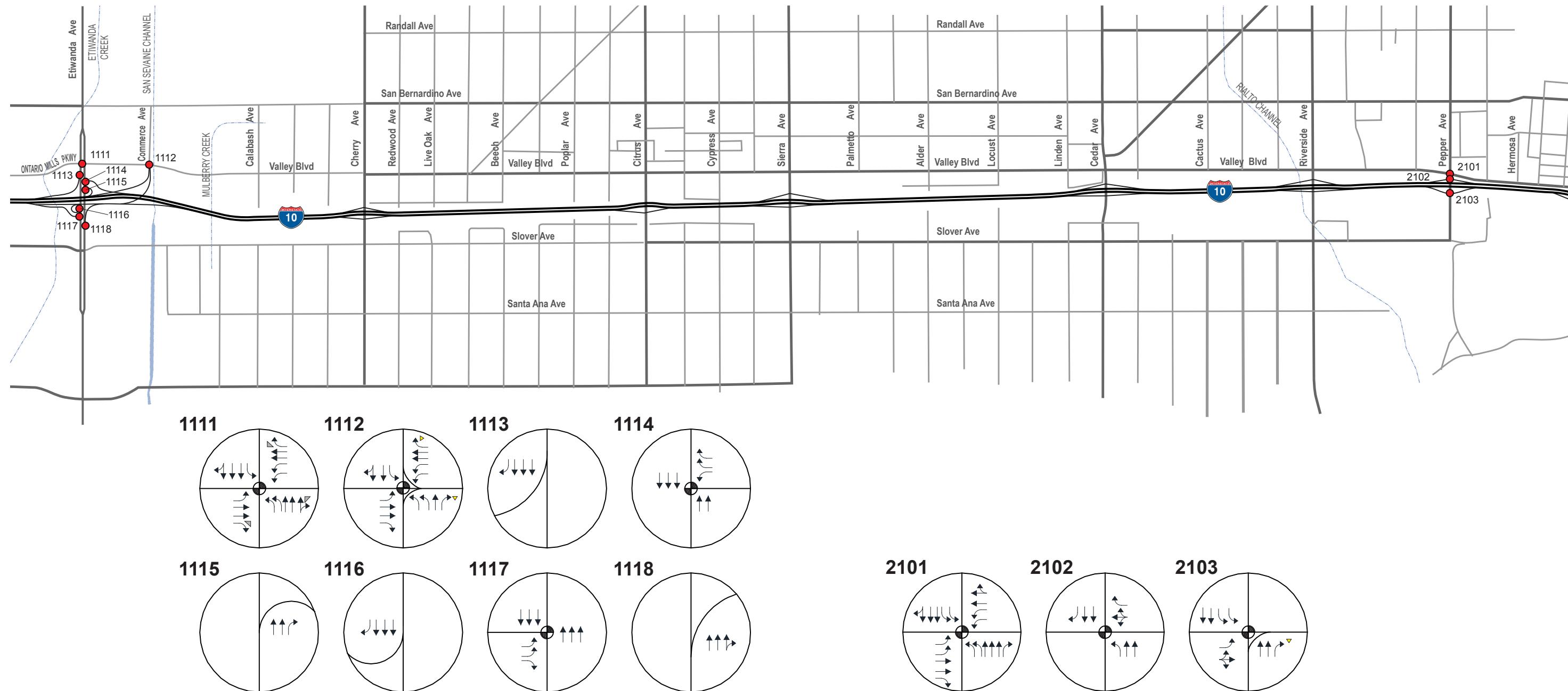


#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	1234 ● Intersection Number
▼ Yield Sign	↗ Turning Lanes	Lane Configuration Based on Project Improvements (compared to 2025 Alt 1-No Build)



**FIGURE 3.6.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 1 OF 3

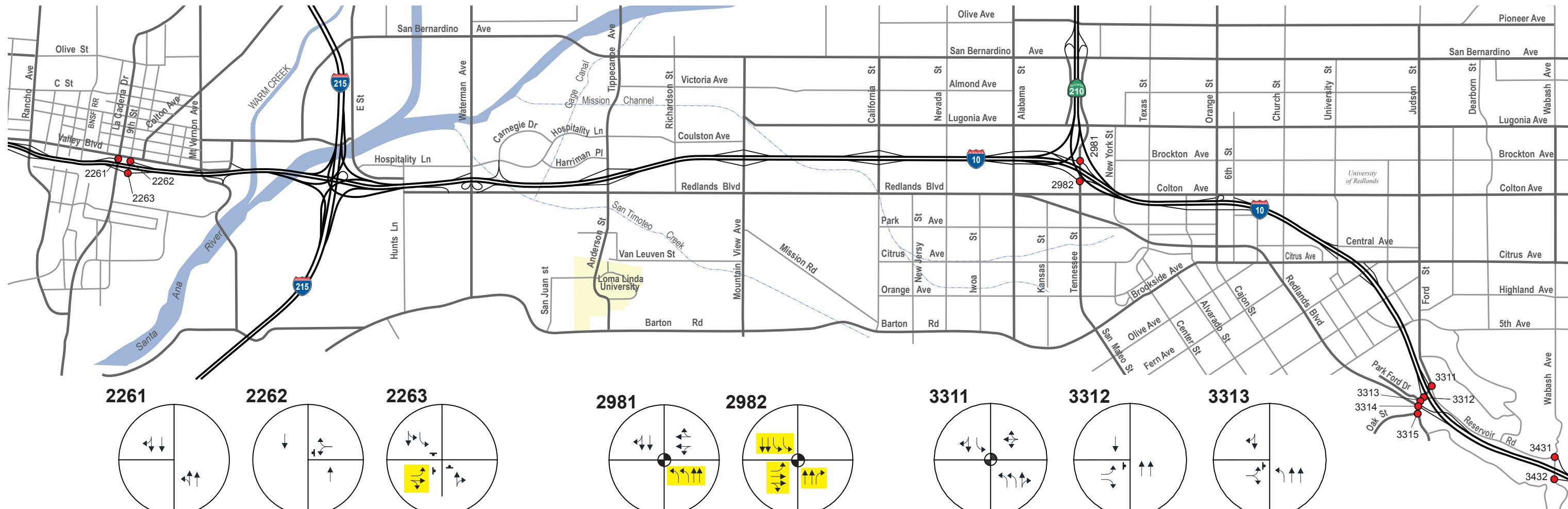


#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def → Defacto Right Turn	1234 ● Intersection Number
▼ Yield Sign	↗ Turning Lanes	Lane Configuration Based on Project Improvements (compared to 2025 Alt 1-No Build)



**FIGURE 3.6.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 2 OF 3

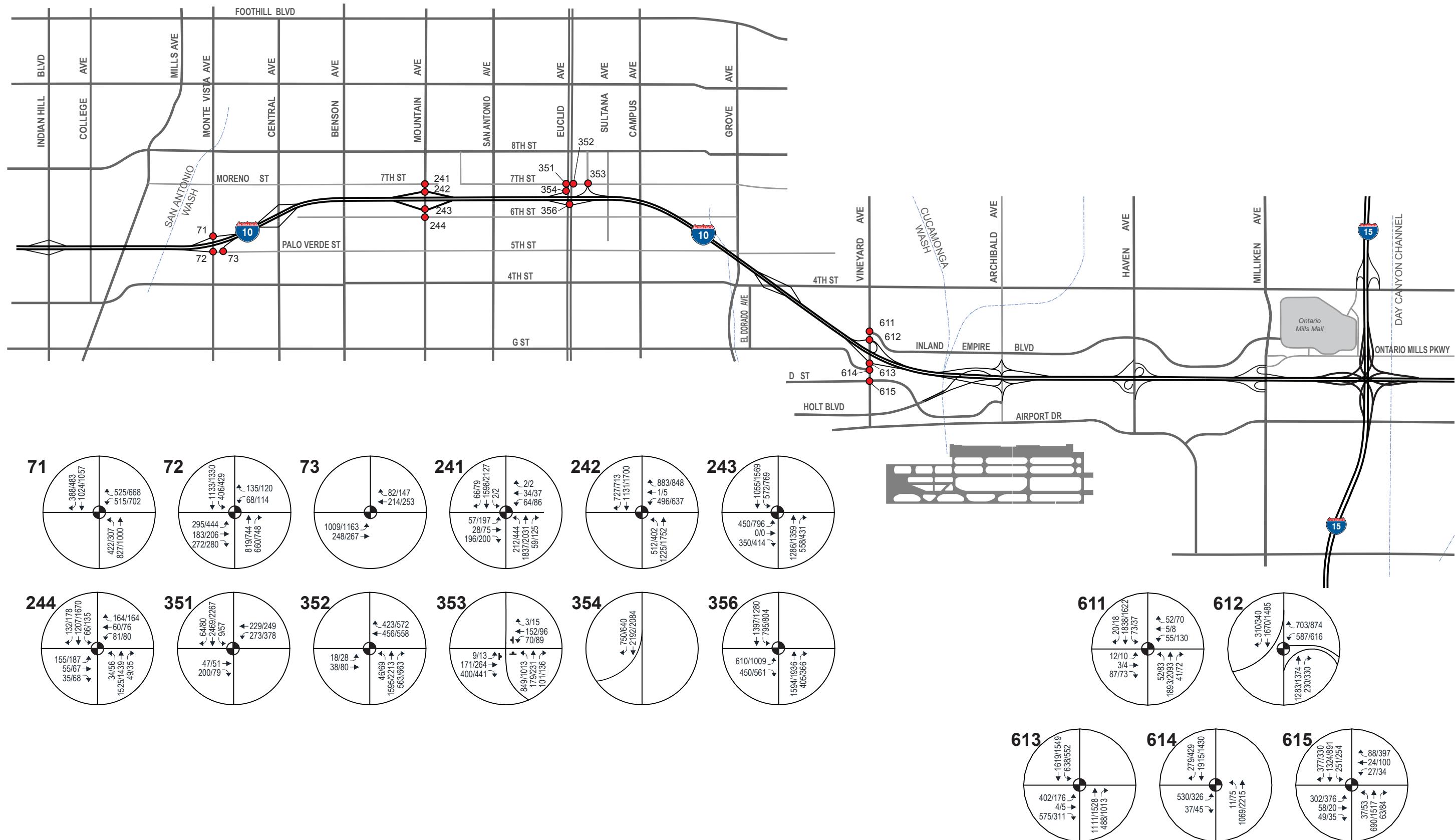


#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	1234 ● Intersection Number
▼ Yield Sign	↗ Turning Lanes	Lane Configuration Based on Project Improvements (compared to 2025 Alt 1-No Build)



**FIGURE 3.6.2**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2025) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 3 OF 3

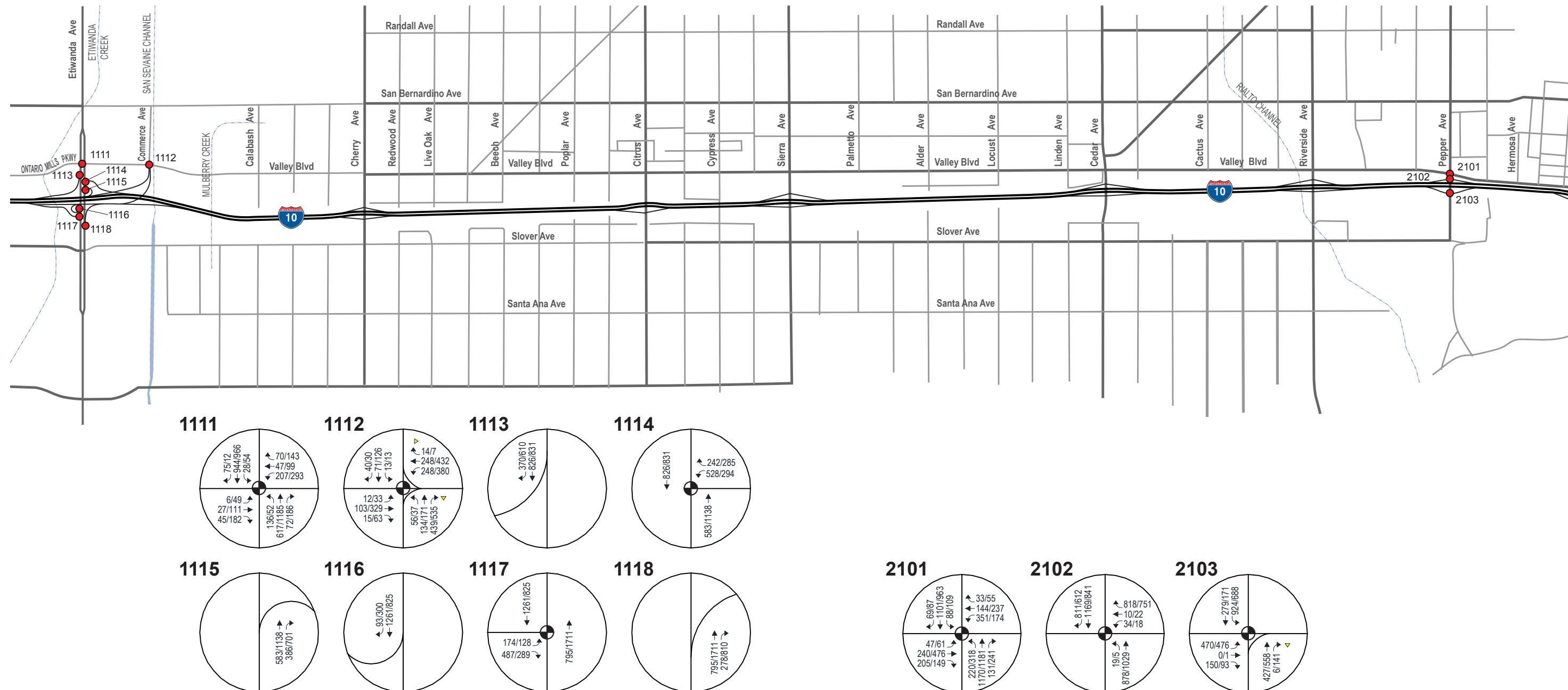


#### LEGEND

- Traffic Signal      ↗ Turning Movement      1234 ● Intersection Number
- Stop Sign      → Through Movement      XX/XX AM/PM Peak Hour Volumes
- ▼ Yield Sign

**FIGURE 3.6.3**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

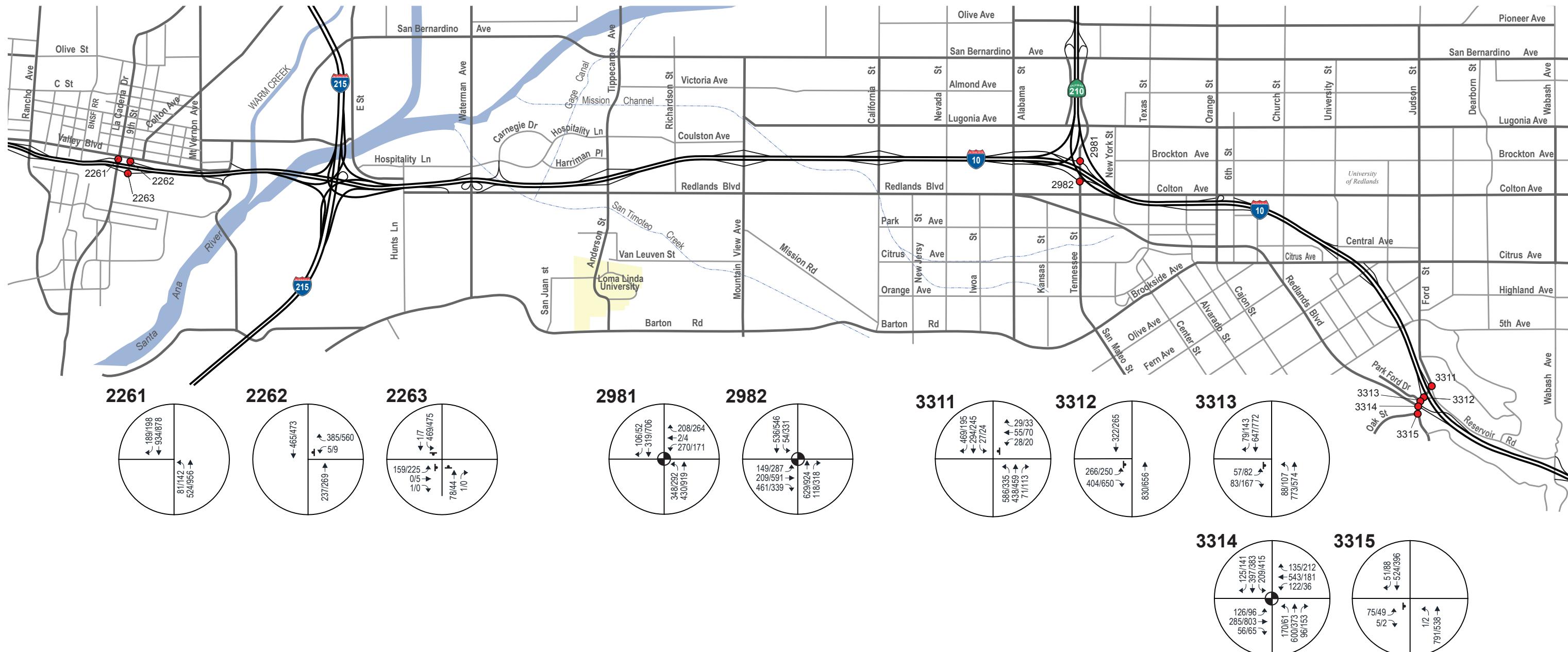




#### LEGEND

- |                  |                               |
|------------------|-------------------------------|
| ● Traffic Signal | ↗ Turning Movement            |
| ■ Stop Sign      | → Through Movement            |
| ▼ Yield Sign     | XX/XX AM/PM Peak Hour Volumes |

**FIGURE 3.6.3**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES



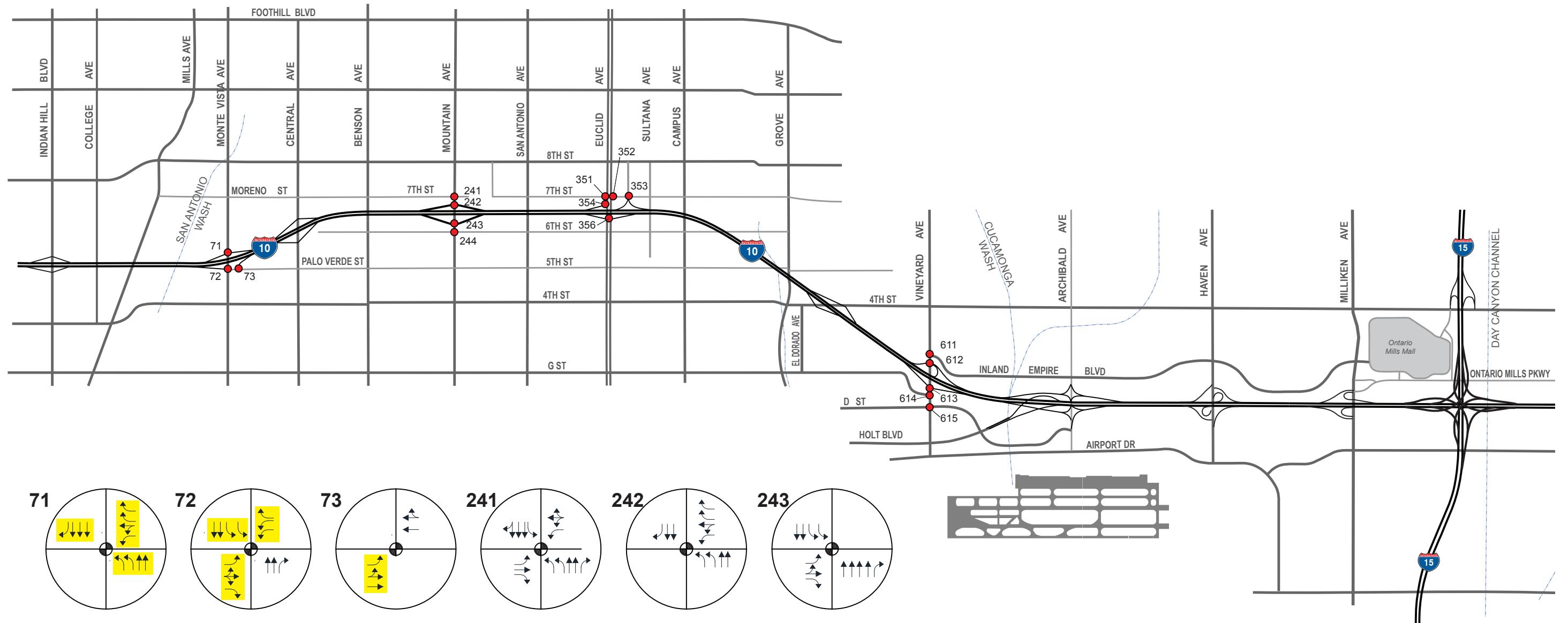
#### LEGEND

- Traffic Signal      ↗ Turning Movement
- Stop Sign      → Through Movement
- ▼ Yield Sign      XX/XX AM/PM Peak Hour Volumes
- 1234 ● Intersection Number



**FIGURE 3.6.3**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC VOLUMES

SHEET 3 OF 3



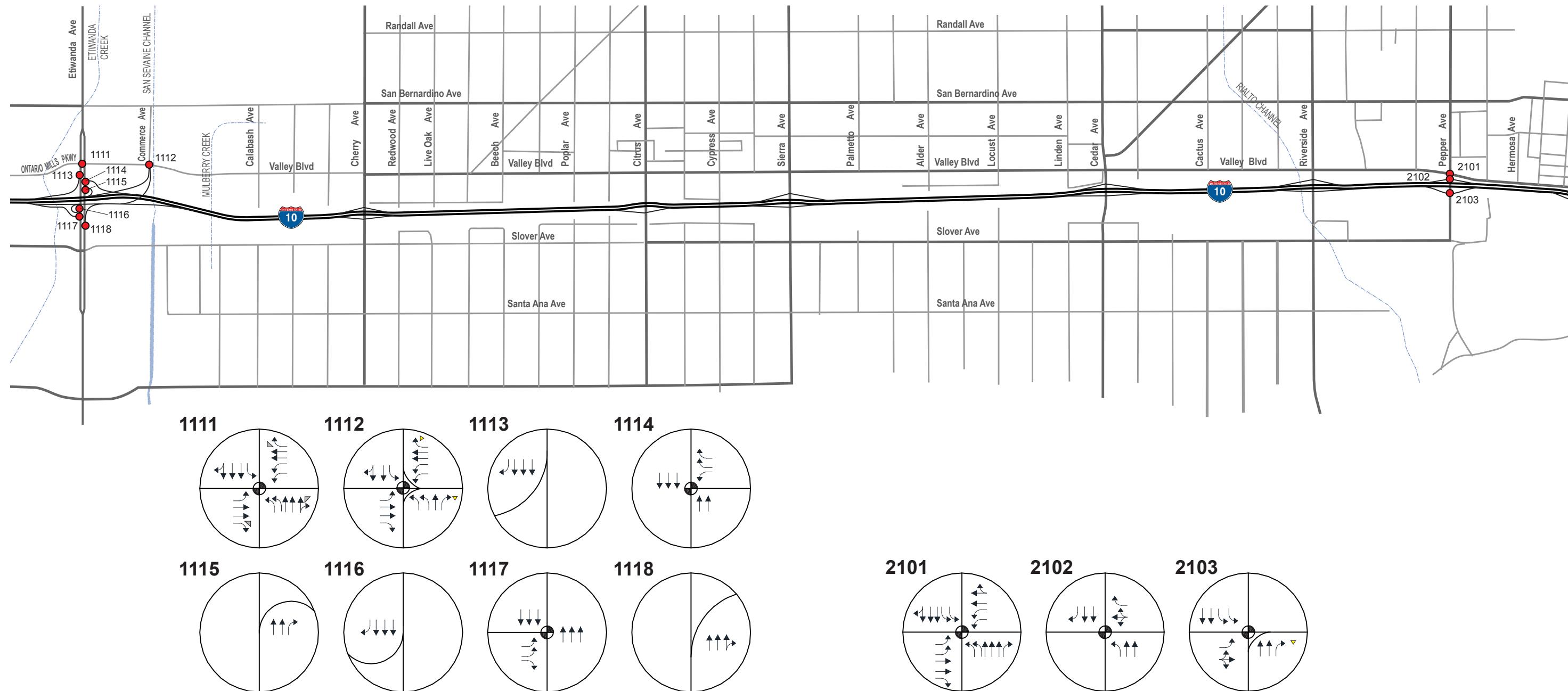
#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	↔ Turning Lanes
▼ Yield Sign	1234 ● Intersection Number	Lane Configuration Based on Project Improvements (compared to 2045 Alt 1-No Build)
		↑↑↑↑



FIGURE 3.6.4

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION



#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	↓ Turning Lanes
▼ Yield Sign	1234 ● Intersection Number	Lane Configuration Based on Project Improvements (compared to 2045 Alt 1-No Build)
		↑↑↑↑



**FIGURE 3.6.4**  
I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION  
SHEET 2 OF 3



#### LEGEND

● Traffic Signal	↗ Free-Right Turn	→ Through Lanes
■ Stop Sign	def ↗ Defacto Right Turn	↓ Through Lanes
▼ Yield Sign	↗ Turning Lanes	↑ Through Lanes

1234 ● Intersection Number  
Lane Configuration Based on Project Improvements (compared to 2045 Alt 1-No Build)



FIGURE 3.6.4

I-10 CORRIDOR STUDY PA/ED  
ALTERNATIVE 3 - EXPRESS (YEAR 2045) CONDITIONS  
INTERSECTION TRAFFIC CONTROL & LANE CONFIGURATION

## 4 COMPARISON OF ALTERNATIVES

This section of the report provides a comparison of the freeway alternatives under year 2045 traffic conditions; Alternative 2 (HOV) is compared to Alternative 1 (No Build) and Alternative 3 (Express) is compared to Alternative 1 (No Build). Each alternative is described in the previous sections. Because neither of the build alternatives is intended to provide an improvement that would completely address traffic demand and provide an overall peak hour mainline LOS better than E/F under 2045 traffic conditions, analysis methodologies and performance measures were utilized to illustrate differences in performance measures among the alternatives. The measures used in comparing the alternatives were forecast peak hour traffic volumes, demand volume-to-capacity ratio (d/c), level of service (LOS), speed, and vehicle miles travelled (VMT).

To simplify the comparison of future conditions and alternatives, the entire study area has been divided into three segments: Los Angeles/San Bernardino (LA/SB) County Line to Haven Avenue, Haven Avenue to California Street, and California Street to Ford Street. This segmentation is generally based on the similarity of cross sectional features by segment. **Figure 1.4.1** illustrates the typical half section for each of the segments. It should be noted that, for each segment, the worst (highest) link's d/c ratio within a segment is used to represent the d/c ratio of the entire segment. The LOS and peak hour volumes reported for each segment are the correlating LOS and peak hour volume to the worst d/c ratio.

### 4.1 Comparison of Alternative 2 (HOV) and Alternative 1 (No Build)

Under Alternative 2 (HOV) on I-10 between the LA/SB County Line and Haven Avenue the daily forecasted VMT is 3,163,000 (in both directions combined) in 2045 compared to 3,067,000 under Alternative 1 (No Build). The forecasted VMT for the I-10 segment between Haven Avenue and California Street is 5,424,000 for Alternative 2 (HOV) in 2045 compared to 5,303,000 for Alternative 1 (No Build). For the I-10 segment between California Street and Ford Street, the forecasted VMT is 1,426,000 for Alternative 2 (HOV) in 2045 compared to 1,376,000 for Alternative 1 (No Build). As shown in **Table 4.1.1**, the forecasted VMT shows an increase under Alternative 2 (HOV). The percent increase ranges between 2 and 4 percent. This small percent increase in daily VMT compared to the percent increase in capacity is attributable to two factors. First, the additional capacity is not along the entire corridor but only east of Haven Avenue. Second, the table shows daily VMT. Differences in VMT would be prevalent during a limited number of hours of the day in periods of congestion when some motorists would divert to a different path to avoid congestion. During off-peak hours when there is very little congestion, such diversion is minimal.

Table 4.1.1 I-10 Freeway Mainline Year 2045 Average Daily Vehicle Miles Travelled (VMT) for Alternative 2 (HOV) and Alternative 1 (No Build)			
I-10 Segment	Alt 1	Alt 2	% Increase
LA/SB County Line to Haven Ave	3,067,000	3,163,000	3
Haven Ave to California St	5,303,000	5,424,000	2
California St to Ford St	1,376,000	1,426,000	4

As shown in **Table 4.1.2**, the total (GP+HOV) peak hour volumes forecasted for Alternative 2 (HOV) on I-10 between the LA/SB County line and Ford Street in 2045 are higher than under Alternative 1 (No Build). This is consistent with the addition of capacity east of Haven Avenue. Total volumes increase

west of Haven Avenue to the LA/SB County line despite the lack of additional capacity under Alternative 2 (HOV). The additional capacity east of Haven Avenue makes I-10 more favorable overall and attracts additional traffic beyond the reach of the additional capacity.

Table 4.1.2 I-10 Freeway Mainline Year 2045 Peak Hour Traffic Volumes for Alternative 2 (HOV) and Alternative 1 (No Build)												
I-10 Segments	Alternative 1						Alternative 2					
	HOV		GP		Total (HOV+GP)		HOV		GP		Total (HOV+GP)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Eastbound												
LA/SB County Line to Haven Ave	1,520	1,790	8,680	8,040	10,200	9,830	1,920	1,890	9,270	8,570	11,190	10,460
Haven Ave to California St	--	--	11,530	10,430	11,530	10,430	1,387	1,930	10,270	10,350	11,657	12,280
California St to Ford St	--	--	6,590	10,510	6,590	10,510	1,290	2,000	6,140	9,260	7,430	11,260
Westbound												
Ford St and California St	--	--	11,430	6,750	11,430	6,750	2,330	1,550	10,160	5,700	12,490	7,250
California St to Haven Ave	--	--	13,280	12,900	13,280	12,900	2,470	2,460	9,710	9,490	12,180	11,950
Haven Ave to LA/SB County Line	1,630	2,330	10,350	11,020	11,980	13,350	2,170	2,480	10,500	11,350	12,670	13,830

Note: "--" = No HOV lane between Haven Avenue to Ford Street under Alternative 1 (No Build).

The expected LOS on the I-10 freeway mainline in 2045 for both Alternative 1 (No Build) and Alternative 2 (HOV) is summarized in **Table 4.1.3**. Under Alternative 1 (No Build) on I-10 between the LA/SB County line and Ford Street in 2045, LOS F conditions are anticipated during the peak hours in the GP lanes, except for LOS D in the eastbound direction between California Street and Ford Street during the morning peak hour and westbound during the evening peak hour. Under Alternative 2 (HOV), the GP lanes between the LA/SB County line and California Street are expected to operate at the same LOS as Alternative 1 (No Build), except for the westbound segment between California Street and Ford Street. In the westbound direction between California Street and Ford Street under Alternative 2 (HOV), LOS F and C conditions are expected during the morning and evening peak hours, respectively, compared to LOS F and D during the morning and evening peak hours, respectively, under Alternative 1 (No Build).

Under Alternative 1 (No Build), there is no HOV lane between Haven Avenue and Ford Street. As shown in **Table 4.1.3**, the HOV lane on eastbound I-10 between the LA/SB County line and Haven Avenue is expected to operate at LOS E and F during the morning and evening peak hours, respectively, compared to LOS F in both peak hours under Alternative 2 (HOV). In the westbound direction, the HOV lane is expected to operate at LOS F during the morning and evening peak hours under both Alternative 1 (No Build) and Alternative 2 (HOV).

Under Alternative 2 (HOV), the project would extend the current HOV lane in each direction from Haven Avenue to Ford Street. Under Alternative 1 (No Build) HOV traffic would be served by the existing GP lanes east of Haven Avenue. As shown in **Table 4.1.3**, the eastbound HOV lane in Alternative 2 (HOV) is expected to operate at LOS D between Haven Avenue and Ford Street during the morning peak hour compared to LOS F in the GP lanes from Haven Avenue to California Street and LOS D from California Street to Ford Street. In the eastbound direction during the evening peak hour, LOS F conditions are expected in the HOV lane under Alternative 2 (HOV) and the GP lanes under Alternative 1 (No Build) from Haven Avenue to Ford Street. In the westbound direction, the HOV lane in Alternative 2 (HOV) is

expected to operate at LOS F from Ford Street to Haven Avenue during the morning and evening peak hours, except for LOS E during the evening peak hour on the segment between Ford Street and California Street; the westbound GP lanes in Alternative 1 (No Build) are anticipated to operate at LOS F during both peak hours.

Table 4.1.3 I-10 Freeway Mainline Year 2045 Peak Hour Demand Volume-to-Capacity (d/c) Ratio and Level of Service (LOS) for Alternative 2 (HOV) and Alternative 1 (No Build)																
I-10 Segments	Alternative 1								Alternative 2							
	HOV				GP				HOV				GP			
	AM		PM		AM		PM		AM		PM		AM		PM	
	d/c	LOS	d/c	LOS	d/c	LOS	d/c	LOS	d/c	LOS	d/c	LOS	d/c	LOS	d/c	LOS
Eastbound																
LA/SB County Line to Haven Ave	0.95	E	1.12	F	1.17	F	1.09	F	1.20	F	1.18	F	1.25	F	1.16	F
Haven Ave to California St	--	--	--	--	1.37	F	1.41	F	0.87	D	1.21	F	1.39	F	1.40	F
California St to Ford St	--	--	--	--	0.78	D	1.42	F	0.81	D	1.25	F	0.73	D	1.25	F
Westbound																
Ford St and California St	--	--	--	--	1.54	F	0.91	D	1.46	F	0.97	E	1.37	F	0.77	C
California St to Haven Ave	--	--	--	--	1.44	F	1.39	F	1.54	F	1.54	F	1.31	F	1.28	F
Haven Ave to LA/SB County Line	1.02	F	1.46	F	1.23	F	1.49	F	1.36	F	1.55	F	1.25	F	1.53	F

Note: “--” = No HOV lane between Haven Avenue to Ford Street under Alternative 1 (No Build).

Overall, **Table 4.1.3** shows that LOS under Alternative 1 (No Build) and Alternative 2 (HOV) is very similar, with eastbound HOV lanes west of Haven Avenue operating better in the morning peak hour than the GP lanes in Alternative 1 (No Build). West of Haven Avenue, the eastbound LOS in the HOV lanes during the morning peak hour is worse under Alternative 2 (HOV) than under Alternative 1 (No Build); **Table 4.1.2** shows that the eastbound HOV volume is substantially greater under Alternative 2 (HOV), which is due to the extension of the HOV lane to the east under Alternative 2 (HOV).

**Table 4.1.3** summarizes the expected d/c ratios for the I-10 freeway mainline for Alternative 1 (No Build) and Alternative 2 (HOV) in 2045. Under Alternative 1 (No Build) in 2045, d/c ratios in the GP lanes range from 0.78 to 1.54 during peak hours. For Alternative 2 (HOV) in 2045, d/c ratios in the GP lanes range from 0.73 to 1.53 during peak hours. The difference in the d/c ratios between Alternative 1 (No Build) and Alternative 2 (HOV) ranges from Alternative 2 (HOV) being lower than Alternative 1 (No Build) by 0.17 to Alternative 2 (HOV) being higher by 0.08.

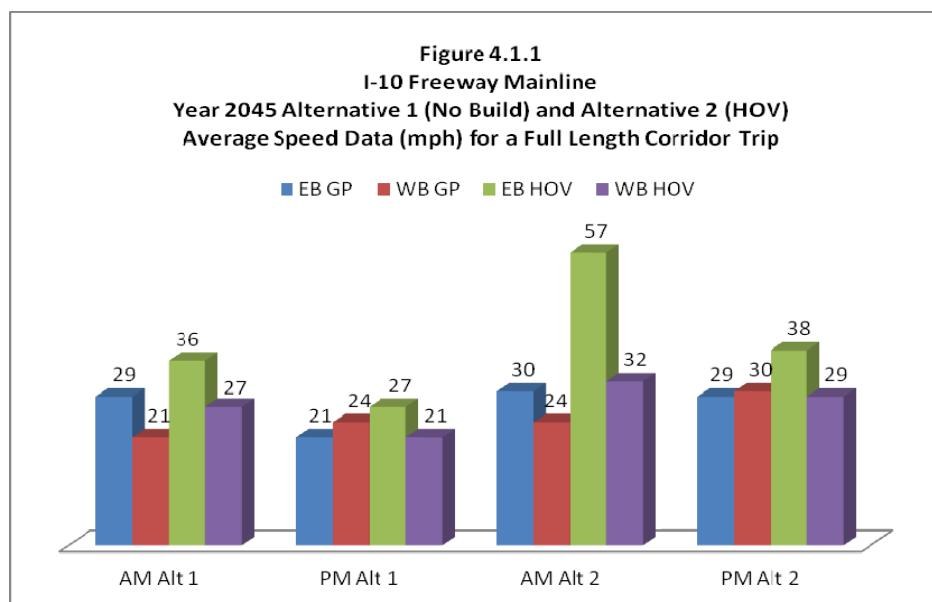
Overall, under Alternative 2 (HOV) the segment between the LA/SB County line and Haven Avenue, in both directions, is expected to have higher d/c ratios than Alternative 1 (No Build) due to the higher peak hour traffic volumes forecasted for Alternative 2 (HOV). The additional lane (the HOV lane) east of Haven Avenue under Alternative 2 (HOV) compared to Alternative 1 (No Build), results in Alternative 2 (HOV) having higher traffic volumes than Alternative 1 (No Build) west of Haven Avenue, as shown in **Table 4.1.2**.

Overall, under Alternative 2 (HOV) the segments east of Haven Avenue have lower d/c ratios than Alternative 1 (No Build), except for the eastbound GP lanes during the morning peak hour from Haven Avenue to California Street. In general, the additional lane (HOV lane) east of Haven Avenue under Alternative 2 (HOV) compared to Alternative 1 (No Build) results in Alternative 2 (HOV) having higher

total (HOV+GP) traffic volumes. However, the d/c ratios are generally lower in Alternative 2 (HOV) because the increase in capacity is greater than the increase in volume. In the case of the eastbound GP lanes from Haven Avenue to California Street during the morning peak hour, there is no additional lane under Alternative 2 (HOV) compared to Alternative 1 (No Build) at the location of the d/c ratio. That location is between Milliken Avenue and I-15 in the area immediately east of the HOV lane termination and still in the HOV/GP transition, which has 5 GP lanes compared to the 4 GP and 1 HOV lanes in Alternative 2 (HOV). Reference to **Table 2.4.4** and **Table 2.5.4** shows that east of this transition area d/c ratios are generally lower under Alternative 2 (HOV) than under Alternative 1 (No Build).

**Figure 4.1.1** illustrates expected speeds for the GP lanes and HOV lanes under Alternative 1 (No Build) and Alternative 2 (HOV) in 2045. The figure shows that speeds under Alternative 2 (HOV) are anticipated to be generally higher than under Alternative 1 (No Build). The increased speeds range from 1 mph faster in the eastbound GP lanes during the morning peak hour to 21 mph faster in the eastbound HOV lanes during the morning peak hour.

A comparison of arterial operations is provided in **Table 3.5.40** (see Section 3.0). Based on the table, no adverse effects are anticipated to arterial operations under Alternative 2 (HOV) compared to Alternative 1 (No Build) when the interchange improvements proposed under Alternative 2 (HOV) are included in the comparison. Consequently, no major differences in arterial operations are anticipated under Alternative 2 (HOV) compared to Alternative 1 (No Build).



## 4.2 Comparison of Alternative 3 (Express) and Alternative 1 (No Build)

Under Alternative 3 (Express) on I-10 between the LA/SB County Line and Haven Avenue the forecasted VMT is 3,402,000 (in both directions combined) in 2045 compared to 3,067,000 under Alternative 1 (No Build). The forecasted VMT for the I-10 segment between Haven Avenue and California Street is 5,793,000 for Alternative 3 (Express) in 2045 compared to 5,303,000 for Alternative 1 (No Build). For

the I-10 segment between California Street and Ford Street, the forecasted VMT is 1,541,000 for Alternative 3 (Express) in 2045 compared to 1,376,000 for Alternative 1 (No Build). As shown in **Table 4.2.1**, the forecasted VMT shows an increase under Alternative 3 (Express). The percent increase ranges between 9 and 12 percent. This smaller percent increase in daily VMT compared to the percent increase in capacity is attributable to two factors. First, west of Haven Avenue the additional capacity is only a single lane. Second, the table shows daily VMT. Differences in VMT would be prevalent during a limited number of hours of the day in periods of congestion when some motorists would divert to a different path to avoid congestion. During off-peak hours when there is very little congestion, such diversion is minimal.

Table 4.2.1 I-10 Freeway Mainline Year 2045 Average Daily Vehicle Miles Travelled (VMT) for Alternative 3 (Express) and Alternative 1 (No Build)			
I-10 Segment	Alt 1	Alt 3	% Increase
LA/SB County Line to Haven Ave	3,067,000	3,402,000	11
Haven Ave to California St	5,303,000	5,793,000	9
California St to Ford St	1,376,000	1,541,000	12

As shown in **Table 4.2.2**, the total (GP+HOV) peak hour volumes forecasted for Alternative 3 (Express) on I-10 between the LA/SB County line and Ford Street in 2045 are higher than under Alternative 1 (No Build), except between California Street and Haven Avenue westbound in the afternoon peak hour. Higher volumes under Alternative 3 (Express) are consistent with the addition of capacity on the entire corridor from the LA/SB County line to Ford Street. The exception to higher volumes for Alternative 3 (Express) between California Street and Haven Avenue westbound in the afternoon peak hour shows a volume under Alternative 3 (Express) less than 1 percent less than under Alternative 1 (No Build) and is in the non-peak direction.

Table 4.2.2 I-10 Freeway Mainline Year 2045 Peak Hour Traffic Volumes for Alternative 3 (Express) and Alternative 1 (No Build)												
I-10 Segments	Alternative 1						Alternative 3					
	HOV		GP		Total		Express		GP		Total	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
<b>Eastbound</b>												
LA/SB County Line to Haven Ave	1,520	1,790	8,680	8,040	10,200	9,830	3,140	3,200	8,820	8,910	11,960	12,110
Haven Ave to California St	--	--	11,530	10,430	11,530	10,430	3,410	3,260	10,150	10,010	13,560	13,270
California St to Ford St	--	--	6,590	10,510	6,590	10,510	520	1,690	7,130	9,970	7,650	11,660
<b>Westbound</b>												
Ford St and California St	--	--	11,430	6,750	11,430	6,750	1,720	760	11,000	6,870	12,720	7,630
California St to Haven Ave	--	--	13,280	12,900	13,280	12,900	3,390	3,400	11,710	9,390	15,100	12,790
Haven Ave to LA/SB County Line	1,630	2,330	10,350	11,020	11,980	13,350	3,400	3,400	10,210	11,780	13,610	15,180

Note: “—” = No HOV lane between Haven Avenue to Ford Street under Alternative 1 (No Build).

Under Alternative 3 (Express), the project would provide two Express Lanes in each direction from the LA/SB County line to California Street and one Express Lane in each direction from California Street to Ford Street. As shown in **Table 4.2.3**, the HOV lane on eastbound I-10 between the LA/SB County line

and Haven Avenue under Alternative 1 (No Build) is expected to operate at LOS E and F during the morning and evening peak hours, respectively, compared to LOS C and D during the morning and evening peak hours, respectively, for the Express Lanes in Alternative 3 (Express). In the westbound direction, the HOV lane is expected to operate at LOS F during the morning and evening peak hours under Alternative 1 (No Build), compared to LOS D in both peak hours for the Express Lanes in Alternative 3 (Express).

Under Alternative 1 (No Build), there is no HOV or Express Lane between Haven Avenue and Ford Street. HOV traffic would be served by the existing GP lanes east of Haven Avenue. As shown in **Table 4.2.3**, the Express Lanes in both directions under Alternative 3 (Express) are expected to operate at LOS D during both peak hours between Haven Avenue and California Street compared to LOS F in the GP lanes during both peak hours under Alternative 1 (No Build). The eastbound Express lane between California Street and Ford Street under Alternative 3 (Express) are expected to operate at LOS A and D during the morning and evening peak hours, respectively, compared to LOS D and F during the morning and evening peak hours, respectively, in the GP lanes under Alternative 1 (No Build). The westbound Express lane between Ford Street and California Street under Alternative 3 (Express) is expected to operate at LOS D and A during the morning and evening peak hours, respectively, compared to LOS F and D during the morning and evening peak hours, respectively, in the GP lanes under Alternative 1 (No Build).

Table 4.2.3 I-10 Freeway Mainline Year 2045 Peak Hour Demand Volume-to-Capacity (d/c) Ratio and Level of Service (LOS) for Alternative 3 (Express) and Alternative 1 (No Build)																
I-10 Segments	Alternative 1								Alternative 3							
	HOV				GP				Express				GP			
	AM		PM		AM		PM		AM		PM		AM		PM	
	d/c	LOS	d/c	LOS	d/c	LOS	d/c	LOS	d/c	LOS	d/c	LOS	d/c	LOS	d/c	LOS
Eastbound																
LA/SB County Line to Haven Ave	0.95	E	1.12	F	1.17	F	1.09	F	0.79	C	0.80	D	1.19	F	1.20	F
Haven Ave to California St	--	--	--	--	1.37	F	1.41	F	0.85	D	0.82	D	1.21	F	1.35	F
California St to Ford St	--	--	--	--	0.78	D	1.42	F	0.26	A	0.85	D	0.85	D	1.35	F
Westbound																
Ford St and California St	--	--	--	--	1.54	F	0.91	D	0.86	D	0.38	A	1.49	F	0.93	D
California St to Haven Ave	--	--	--	--	1.44	F	1.39	F	0.85	D	0.85	D	1.27	F	1.27	F
Haven Ave to LA/SB County Line	1.02	F	1.46	F	1.23	F	1.49	F	0.85	D	0.85	D	1.22	F	1.59	F

Note: “—” = No HOV lane between Haven Avenue to Ford Street under Alternative 1 (No Build).

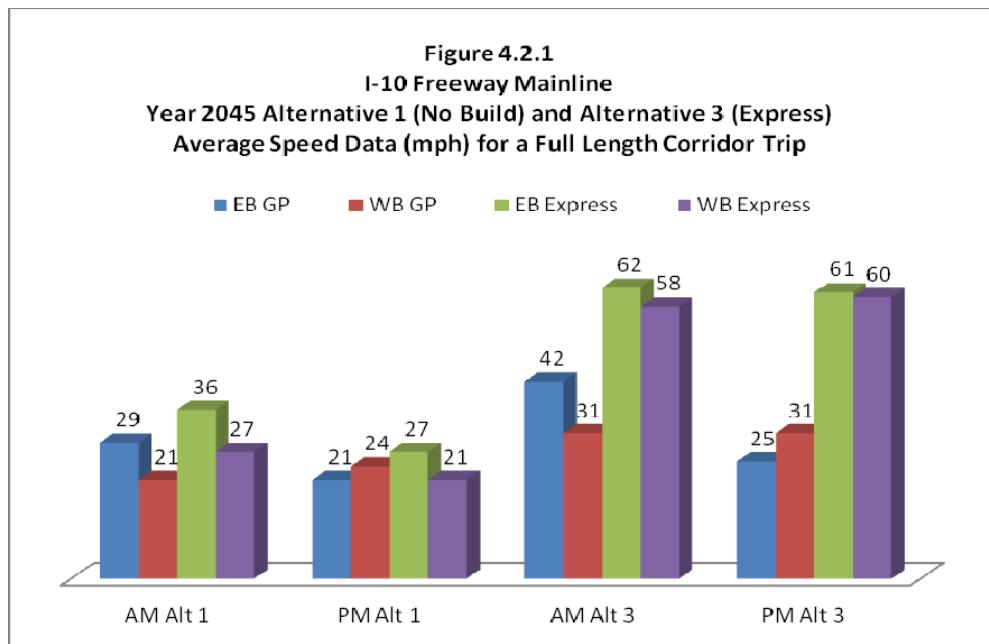
Overall, LOS in the GP lanes is F under both Alternative 1 (No Build) and Alternative 3 (Express), except for the eastbound direction in the morning peak hour and the westbound direction in the evening peak hour from California Street to Ford Street, which is LOS D under both alternatives. The HOV lanes west of Haven Avenue in Alternative 1 (No Build) are anticipated to operate at LOS E or F. The Express Lanes in Alternative 3 are anticipated to operate at LOS D or better.

**Table 4.2.3** also summarizes the expected d/c ratios for the I-10 freeway mainline for Alternative 1 (No Build) and Alternative 3 (Express) in 2045. Under Alternative 3 (Express) in 2045, d/c ratios in the GP lanes range from 0.91 to 1.59 during peak hours. The difference in the d/c ratios between Alternative 1 (No Build) and Alternative 3 (Express) ranges from Alternative 3 (Express) being lower than Alternative 1 (No Build) by 0.52 to Alternative 3 (Express) being higher by 0.11. The Express Lanes under Alternative 3

(Express) in 2045 are expected to operate with d/c ratios ranging from 0.26 to 0.86 compared to the expected range of d/c ratios of 0.95 to 1.46 in the HOV lanes west of Haven Avenue under Alternative 1 (No Build).

Overall, d/c ratios are generally lower under Alternative 3 (Express) than under Alternative 1 (No Build). Exceptions occur in two cases where the d/c ratios are lower than 1.00 under both alternatives indicating operations without severe congestion. Exceptions also occur in the GP lanes from the LA/SB County Line to Haven Avenue; the additional two lanes (Express Lanes) east of Haven Avenue under Alternative 3 (Express) compared to Alternative 1 (No Build) results in traffic volume increases west of Haven Avenue. Those increases are greater than the capacity added by the addition of a single lane in each direction west of Haven Avenue.

**Figure 4.2.1** illustrates expected speeds for the GP lanes and Express Lanes under Alternative 1 (No Build) and Alternative 3 (Express) in 2045. The figure shows that speeds under Alternative 3 (Express) are anticipated to be generally higher than under Alternative 1 (No Build). The increased speeds range from 4 mph faster in the eastbound GP lanes during the evening peak hour to 39 mph faster in the eastbound Express Lanes during the evening peak hour under Alternative 3 (Express) than for HOVs under Alternative 1 (No Build).



Note: Alternative 1 (No Build) HOV speeds are a combination of HOV lane speeds west of Haven Avenue and GP lane speed east of Haven Avenue weighted for the distance of each.

A comparison of arterial operations is provided in **Table 3.6.44** (See Section 3.0). Based on the table, no adverse effects are anticipated to arterial operations under Alternative 3 (Express) compared to Alternative 1 (No Build) when the interchange improvements proposed under Alternative 3 (Express) are included in the comparison. Consequently, no major differences in arterial operations are anticipated under Alternative 3 (Express) compared to Alternative 1 (No Build).

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