

FINAL TRAFFIC OPERATIONS REPORT

STATE ROUTE 55 (I-5 to I-405) PR/ED

EA 0J3400 / EFIS 1200020328



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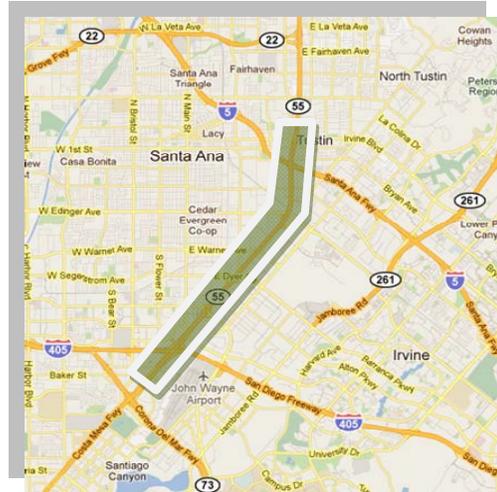
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EXECUTIVE SUMMARY

This executive summary is intended to provide a brief introduction of the proposed SR-55 Widening (I-5 to I-405) project and a summary of general findings of the traffic operational report.

Introduction

The Orange County Transportation Authority (OCTA), in cooperation with California Department of Transportation (Caltrans) District 12 and the Cities of Irvine, Santa Ana and Tustin, is leading the effort of preparation of the Project Report and Environmental Document (PR/ED) for proposed improvements to the State Route 55 Freeway (SR-55) between Interstate 405 (I-405) to the south and Interstate 5 (I-5) to the north in Orange County. Caltrans is the Lead Agency for California Environmental Quality Act (CEQA) compliance.



The purpose of the proposed project is to improve traffic mobility and reduce congestion along the SR-55 corridor between I-405 and I-5. The proposed improvements to SR-55 evaluated in the Traffic Operations Report include auxiliary lanes, general purpose lanes, and/or high occupancy vehicle (HOV) lanes.

Purpose and Need



SR-55 is one of the highly congested corridors in Orange County, and five bottlenecks of District 12 are located in the study area as identified in the 2012 Mobility Performance Report (MPR 2012). The five bottlenecks are northbound SR-55 near Dyer Road, Edinger Avenue, and McFadden Avenue interchanges and southbound SR-55 near I-5 and Edinger Avenue interchanges. Heavy congestion is experienced along SR-55 during peak periods, especially on southbound SR-55 north of Edinger Avenue in the AM peak period and northbound SR-55 throughout the study area in the PM peak period, which operate at LOS E or F conditions with an average travel speed of less than 20 mph during the peak hour. The operational deficiencies are resulted by a combination of capacity constraints on freeway mainline and closely spaced interchanges with inadequate weaving and merging distance.

Traffic patterns in Orange County are expected to have noticeable change by year 2040 with the Measure M2 freeway and arterial improvement projects in place. Traffic demand on the study SR-55 corridor is projected to continue increasing by eight percent in the future year 2040, which would exacerbate traffic



congestion and result in an increase in vehicle delay to the corridor. A majority of the SR-55 segments would operate at LOS E or F conditions during the peak hour by 2040.

The purpose of the proposed project is to reduce traffic congestion, improve mobility and traffic operations, and increase capacity in the study area. The project alternatives propose to accomplish this objective through operational improvements (i.e., auxiliary lanes) and/or capacity enhancement (i.e., GP lane) on the SR-55 study corridor.

Existing Conditions

During the AM peak hour, most of the study locations on northbound SR-55 operate at LOS D or better, except for the Paularino Avenue on-ramp and the weaving section from NB I-405 on-ramp to MacArthur Boulevard off-ramp, which operate at LOS E. In addition, LOS E or F conditions occur on northbound SR-55 between Edinger on-ramp and NB I-5 off-ramp. In the southbound direction, heavy congestion is experienced from Edinger on-ramp back to Irvine Boulevard and beyond, resulting in LOS F conditions. All other study locations south of Dyer Road operate at LOS D or better.

During the PM peak hour, all the study locations on northbound SR-55 experience severe congestion and operate at LOS F conditions. Vehicle queue on northbound extend from Irvine Boulevard/I-5 all the way back to south of Paularino Avenue. In the southbound direction, most of study locations operate at LOS D or better with the exception of the off-ramps to Grand Avenue and Dyer Road as well as the weaving section between MacArthur Boulevard and SB I-405.

All the study intersections operate at LOS D or better during both the AM and PM peak hours, except for the NB SR-55/Newport Avenue/ Del Amo intersection which operate at LOS E during the PM peak hour. .

Project Alternatives

The following five project alternatives have been identified for evaluation in the PR/ED stage by the Project Team including OCTA, Caltrans, Cities of Irvine, Santa Ana, and Tustin, and the HDR consulting team.

- ❖ No Build Alternative
- ❖ Build Alternative 1 (Additional Auxiliary Lanes)
- ❖ Build Alternative 2 (One New General Purpose Lane)
- ❖ Build Alternative 3 (One New General Purpose Lane and Additional Auxiliary Lanes)
- ❖ Build Alternative 4 (One New HOV Lane and Additional Auxiliary Lanes)

Operations Analysis Summary and Conclusions

Tables E-1 through E-4 compares the analysis results of the project alternatives under both opening year (2020) and design year (2040) conditions. The comparison was performed from the traffic operations point of view to identify either marginal or significant operational differences between the project alternatives.



Year 2020 – AM Peak Period

**TABLE E-1 – AM PEAK TRAFFIC OPERATIONS COMPARISON
– 2020 CONDITIONS**

	MOE	No Build	Alt 1	Alt 2	Alt 3	Alt 4
Number of Study Freeway Locations	Peak Hour LOS D or Better	24	22	22	27	27
	Peak Hour LOS E or F	12	14	14	9	9
Number of Study HOV Locations	Peak Hour LOS D or Better	8	8	8	8	10
	Peak Hour LOS E or F	2	2	2	2	0
Number of Study Intersections	Peak Hour LOS D or Better	14	14	14	14	14
	Peak Hour LOS E or F	0	0	0	0	0
NB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	-1%	-3%	-7%	-5%
SB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	-1%	-8%	-14%	-17%
Peak Period Number of People Served Changes (Compared to No Build Alternative)		--	+0%	+1%	+1%	+2%
Peak Period Vehicle Miles Traveled Changes (Compared to No Build Alternative)		--	+1%	+1%	+2%	+2%
Peak Period Vehicle Hours Delay Changes (Compared to No Build Alternative)		--	-18%	-34%	-51%	-53%

Note: Change in percentages compared to the No Build Alternative.
Source: Fehr & Peers, 2015



The 2020 AM peak period traffic operations benefits under each of the project alternatives are summarized below.

- Alternative 1 would have more freeway segments operating at LOS E or F due to the higher traffic demand served by Alternative 1. Specifically, the improvements under Alternative 1 would allow more traffic to travel to downstream locations along the corridor and consequently result in greater traffic volumes at those downstream locations. Compared to the No Build Alternative, Alternative 1 would slightly reduce SR-55 travel time and significantly reduce the network vehicle hours of delay by 18 percent while serving more people through the network.
- Alternative 2 would reduce northbound and southbound SR-55 travel time by 3 and 8 percent, and significantly reduce the network vehicle hours of delay by 34 percent while serving one percent more people through the network.
- Alternative 3 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 3 freeway mainline segments, reduce northbound and southbound SR-55 travel time by 7 and 14 percent, and significantly reduce the network vehicle hours of delay by 51 percent while serving one percent more people through the network.
- Alternative 4 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 2 HOV segments and 3 freeway mainline segments, reduce northbound and southbound SR-55 travel time by 5 and 17 percent, and significantly reduce the network vehicle hours of delay by 53 percent while serving two percent more people through the network.
- Overall, Alternative 4 would generate the most operational benefits with serving the most people with the least delay among the four project build alternatives during the AM peak period in 2020.



Year 2020 – PM Peak Period

**TABLE E-2 – PM PEAK TRAFFIC OPERATIONS COMPARISON
– 2020 CONDITIONS**

	MOE	No Build	Alt 1	Alt 2	Alt 3	Alt 4
Number of Study Freeway Locations	Peak Hour LOS D or Better	14	12	17	18	13
	Peak Hour LOS E or F	22	24	19	18	23
Number of Study HOV Locations	Peak Hour LOS D or Better	9	8	8	8	10
	Peak Hour LOS E or F	1	2	2	2	0
Number of Study Intersections	Peak Hour LOS D or Better	11	9	10	11	10
	Peak Hour LOS E or F	3	5	4	3	4
NB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	0%	-15%	-12%	-4%
SB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	0%	-15%	-16%	-1%
Peak Period Number of People Served Changes (Compared to No Build Alternative)		--	+0%	+1%	+1%	+1%
Peak Period Vehicle Mile Traveled Changes (Compared to No Build Alternative)		--	+0%	+1%	+1%	0%
Peak Period Vehicle Hours Delay Changes (Compared to No Build Alternative)		--	-7%	-17%	-28%	-21%

Note: Change in percentages compared to the No Build Alternative.

Source: Fehr & Peers, 2015



The 2020 PM peak period traffic operations benefits under each of the project alternatives are summarized below.

- Compared to the No Build Alternative, Alternative 1 would have two more freeway locations operating unacceptably at LOS E or F during the PM peak hour, due to a combination of the higher traffic demand served by Alternative 1 and alleviation of the bottlenecks at entry points (i.e., SR-55/I-5/McFadden in the southbound direction) resulting in greater traffic volumes at downstream locations. However, noticeable reduction in the network vehicle hours of delay by 7 percent would occur while serving more people through the network under Alternative 1.
- Alternative 2 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 3 freeway segments. Compared to the No Build Alternative, Alternative 2 would significantly reduce northbound and southbound SR-55 travel time by 15 percent, and significantly reduce the network vehicle hours of delay by 17 percent while serving one percent more people through the network.
- Alternative 3 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 4 freeway segments. Compared to the No Build Alternative, Alternative 3 would significantly reduce northbound and southbound SR-55 travel time by 12 and 16 percent, and significantly reduce the network vehicle hours of delay by 28 percent while serving one percent more people through the network.
- Alternative 4 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at two HOV segments. Compared to the No Build Alternative, Alternative 4 would reduce northbound SR-55 travel time by 4 percent, slightly reduce southbound SR-55 travel time, and significantly reduce the network vehicle hours of delay by 21 percent while serving one percent more people through the network.
- Overall, Alternative 3 would generate the most operational benefits with serving the most people with the least delay among the four project build alternatives during the PM peak period in 2020.



Year 2040 – AM Peak Period

**TABLE E-3 – AM PEAK TRAFFIC OPERATIONS COMPARISON
– 2040 CONDITIONS**

MOE		No Build	Alt 1	Alt 2	Alt 3	Alt 4
Number of Study Freeway Locations	Peak Hour LOS D or Better	22	20	22	27	18
	Peak Hour LOS E or F	14	16	14	9	18
Number of Study HOV Locations	Peak Hour LOS D or Better	9	8	8	8	10
	Peak Hour LOS E or F	1	2	2	2	0
Number of Study Intersections	Peak Hour LOS D or Better	13	13	13	13	13
	Peak Hour LOS E or F	1	1	1	1	1
NB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	+2%	+1%	-6%	-2%
SB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	+0%	-5%	-5%	-7%
Peak Period Number of People Served Changes (Compared to No Build Alternative)		--	+1%	+1%	+3%	+3%
Peak Period Vehicle Mile Traveled Changes (Compared to No Build Alternative)		--	+2%	+3%	+3%	+4%
Peak Period Vehicle Hours Delay Changes (Compared to No Build Alternative)		--	-20%	-25%	-31%	-33%

Note: "+" indicates an increase and "-" indicates a decrease.

Source: Fehr & Peers, 2015



The 2040 AM peak period traffic operations benefits under each of the project alternatives are summarized below.

- Under Alternative 1, two more freeway locations would operate unacceptably at LOS E or F during the AM peak hour compared to the No Build Alternative, due to a combination of the higher traffic demand served by Alternative 1 and alleviation of the bottlenecks at entry points (i.e., SR-55/I-5/McFadden in the southbound direction) resulting in greater traffic volumes at downstream locations. The northbound SR-55 corridor travel time would increase by 2 percent due to the higher traffic demand served by this alternative, while the southbound SR-55 corridor travel time would be similar to the No Build Alternative. In addition, Alternative 1 would significantly reduce the network vehicle hours of delay by 20 percent while serving one percent more people through the network.
- Under Alternative 2, the northbound SR-55 corridor travel time would increase by 5 percent compared to the No Build Alternative due to the higher traffic demand served by this alternative, while the southbound SR-55 travel time would reduce by 5 percent. In addition, Alternative 2 would significantly reduce the network vehicle hours of delay by 25 percent while serving one percent more people through the network.
- Alternative 3 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 5 freeway segments. Compared to the No Build Alternative, Alternative 3 would reduce northbound and southbound SR-55 travel time by 6 and 5 percent, and significantly reduce the network vehicle hours of delay by 31 percent while serving three percent more people through the network.
- Alternative 4 would improve and maintain all the study HOV segments operating at acceptable LOS D or better. Compared to the No Build Alternative, Alternative 4 would reduce northbound and southbound SR-55 travel time by 2 and 7 percent, and significantly reduce the network vehicle hours of delay by 33 percent while serving three percent more people through the network.
- Overall, Alternative 4 would generate the most operational benefits with serving the most people with the least delay among the four project alternatives during the AM peak period in 2040.



Year 2040 – PM Peak Period

**TABLE E-4 – PM PEAK TRAFFIC OPERATIONS COMPARISON
– 2040 CONDITIONS**

MOE		No Build	Alt 1	Alt 2	Alt 3	Alt 4
Number of Study Freeway Locations	Peak Hour LOS D or Better	4	4	8	8	5
	Peak Hour LOS E or F	32	32	28	28	31
Number of Study HOV Locations	Peak Hour LOS D or Better	9	8	8	8	10
	Peak Hour LOS E or F	1	2	2	2	0
Number of Study Intersections	Peak Hour LOS D or Better	7	7	8	9	9
	Peak Hour LOS E or F	7	7	6	5	5
NB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	+2%	-1%	+1%	-1%
SB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	+17%	-35%	-34%	+16%
Peak Period Number of People Served Changes (Compared to No Build Alternative)		--	+1%	+3%	+4%	+2%
Peak Period Vehicle Mile Traveled Changes (Compared to No Build Alternative)		--	+0%	+4%	+4%	+3%
Peak Period Vehicle Hours Delay Changes (Compared to No Build Alternative)		--	-17%	-20%	-40%	-32%

Note: "+" indicates an increase and "-" indicates a decrease.

Source: Fehr & Peers, 2015



The 2040 PM peak period traffic operations benefits under each of the project alternatives are summarized below.

- Under Alternative 1, the northbound SR-55 corridor peak hour travel time would be similar to the No Build Alternative, while the southbound SR-55 peak hour travel time would increase by 17 percent due to a combination of higher traffic demand under Alternative 1 and alleviation of the bottlenecks at entry points (i.e., SR-55/I-5/McFadden in the southbound direction) resulting in greater traffic volumes with greater congestion at downstream locations where no additional capacity is provided. However during the PM peak period, Alternative 1 would reduce the network vehicle hours of delay by 17 percent while serving one percent more people through the network.
- Alternative 2 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 4 freeway segments. The northbound SR-55 corridor peak hour travel time would be similar to the No Build Alternative, while the southbound SR-55 peak hour travel time would expect significant reduction by 35 percent. Alternative 2 would significantly reduce the network vehicle hours of delay by 20 percent while serving three percent more people through the network.
- Similar to Alternative 2, Alternative 3 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 4 freeway segments. The northbound SR-55 corridor peak hour travel time would be similar to the No Build Alternative, while the southbound SR-55 peak hour travel time would expect significant reduction by 34 percent. Alternative 3 would significantly reduce the network vehicle hours of delay by 40 percent while serving four percent more people through the network.
- Alternative 4 would improve and maintain all the study HOV segments operating at acceptable LOS D or better. The northbound SR-55 corridor peak hour travel time would be similar to the No Build Alternative, while the southbound SR-55 peak hour travel time would increase by 16 percent due to a combination of higher traffic demand under Alternative 4 and alleviation of the bottlenecks at entry points (i.e., SR-55/I-5/McFadden in the southbound direction) resulting in greater traffic volumes with greater congestion at downstream locations where no additional capacity is provided. However during the PM peak period, Alternative 4 would significantly reduce the network vehicle hours of delay by 32 percent while serving three percent more people through the network.
- Overall, Alternative 3 would generate the most operational benefits with serving the most people with the least delay among the four project alternatives during the PM peak period in 2040.



Findings

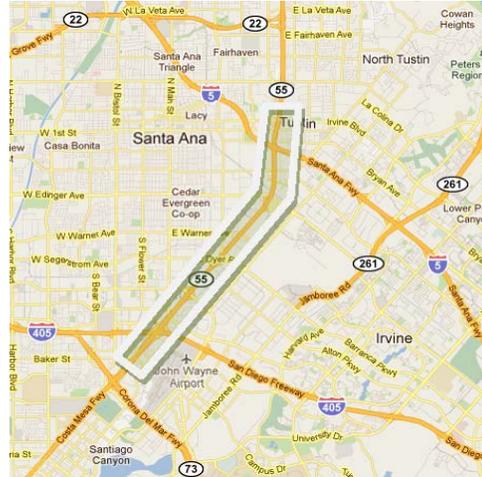
The findings of comparison analysis of the proposed project alternatives are summarized below.

- Alternative 1 would provide significant benefits on southbound SR-55 and marginal benefits on northbound SR-55. Compared to the No Build Alternative, Alternative 1 would serve 1,420 and 3,630 more people getting through the corridor during the peak periods (AM and PM combined) in 2020 and 2040, respectively.
- Alternative 2 would provide significant benefits on both southbound and northbound SR-55. Compared to the No Build Alternative, Alternative 2 would serve 2,580 and 9,040 more people getting through the corridor during the peak periods (AM and PM combined) in 2020 and 2040, respectively.
- Alternative 3 would provide significant benefits on both southbound and northbound SR-55. Compared to the No Build Alternative, Alternative 3 would serve 5,220 and 14,380 more people getting through the corridor during the peak periods (AM and PM combined) in 2020 and 2040, respectively.
- Alternative 4 would provide significant benefits on both northbound and southbound SR-55. Compared to the No Build Alternative, Alternative 4 would serve 4,990 and 12,750 more people getting through the corridor during the peak periods (AM and PM combined) in 2020 and 2040, respectively.
- In terms of Design Year 2040 peak hour travel time, Alternatives 2, 3, and 4 would result in similar travel time savings in the southbound direction during the AM peak hour, which is approximately half a minute or 6 percent less than the No Build Alternative and Alternative 1. During the PM peak hour, due to the projected peak hour traffic demand exceeding the capacity of the I-5/SR-55 bottleneck, the peak hour travel times are similar between alternatives with a variation of 3% or lower. Therefore, the performance matrices measured during the 4-hour peak periods are presented to provide a better understanding of operational benefits between project alternatives.
- From system-wide operational performance perspective, Alternative 3 would result in the most operational benefits by serving the most people traveling through the corridor with the least delay among the four project alternatives during the PM peak period under both 2020 and 2040 conditions. Alternative 4 would result in the most operational benefits by serving the most people traveling through the corridor with the least delay among the four project alternatives during the AM peak period under both 2020 and 2040 conditions. Combining the AM and PM peak periods, Alternative 3 would serve the most people with the least delay among the four project alternatives under both 2020 and 2040 conditions.
- Under Alternatives 3 and 4, one local intersection (Northbound I-5 On-ramp/Newport Avenue) has been identified to be significantly impacted by traffic diversion resulted from the limited access at McFadden Avenue on-ramp under 2020 and 2040 conditions. Mitigation measure of installation of a traffic signal is recommended at this intersection, which would adequately mitigate the traffic impacts within the existing ROW.

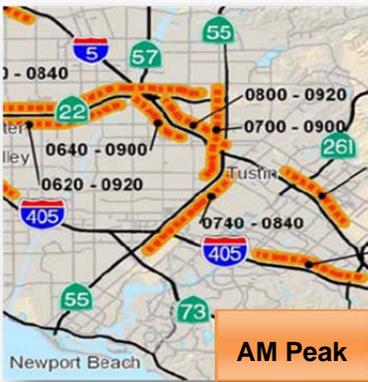
1. INTRODUCTION

The Orange County Transportation Authority (OCTA), in cooperation with California Department of Transportation (Caltrans) District 12 and the Cities of Irvine, Santa Ana and Tustin, is leading the effort of preparation of the Project Report and Environmental Document (PR/ED) for proposed improvements to the State Route 55 Freeway (SR-55) between Interstate 405 (I-405) to the south and Interstate 5 (I-5) to the north in Orange County. Caltrans is the Lead Agency for California Environmental Quality Act (CEQA) compliance.

The purpose of the proposed project is to improve traffic mobility and reduce congestion along the SR-55 corridor between I-405 and I-5. The proposed improvements to SR-55 evaluated in the Traffic Operations Report include auxiliary lanes, general purpose lanes, and/or high occupancy vehicle (HOV) lanes.



Background



SR-55, known as Costa Mesa Freeway, is an 18-mile north-south highway that connects central and south Orange County to Inland Empire. SR-55 also serves as the main corridor to the beach and tourist attractions in the county's coastal cities. SR-55 starts at the Finley Avenue south of Pacific Coast Highway in the south, travels northerly through the cities of Newport Beach, Costa Mesa, Santa Ana, Irvine, Tustin, Orange, and Anaheim in Orange County, and ends at the north terminus of the junction with the Riverside Freeway, State Route 91 (SR-91). Within the project study area (between I-405 and I-5), SR-55 has four general purpose (GP) lanes and a continuous high-occupancy vehicle (HOV) lane in each direction in most areas, except for southbound SR-55 at the I-405 interchange, which has a buffer-separated HOV lane.

SR-55, like many other freeways in Southern California, has reached the limit of its capacity in both the morning and afternoon peak periods. Further growth of population and jobs in Orange County and Inland Empire will further deteriorate the congestion condition. The 2008 State Highway Congestion Monitoring Program (2008 HICOMP) has identified that the congested segments along SR-55 are between south of Paularino Avenue and 4th Street in the northbound direction and between



SR-22 and MacArthur Boulevard in the southbound direction.

OCTA, Caltrans, and involved cities recognized the problem and initiated a number of studies to consider the capacity and operational improvements along this freeway. There has been a substantial amount of planning to identify needed improvements to the SR-55 corridor over the last 10 years, including within the project limits.

A *Transportation Concept Report* (TCR, formerly the Route Concept Report) for SR-55 was prepared and approved by the Department in 1996. The TCR recommends that the SR-55 segment between I-405 and I-5 consist of 8 GP lanes plus two HOV lanes with auxiliary lanes between on- and off-ramps, most of which has been completed as of 2012.

Since 2000, the following planning studies along SR-55 have been prepared and/or approved by lead agency including Caltrans, OCTA, and/or local cities.

- ❖ Auxiliary Lane on SB SR-55 from Dyer to MacArthur (EA 0E2500) – PID was prepared and approved by Caltrans in 2000, and the project is completed.
- ❖ Auxiliary Lane on SB SR-55 from Edinger to Dyer (EA 0G960K) – PID was prepared and approved by Caltrans in 2005, and the project is under construction.
- ❖ Auxiliary Lane on NB SR-55 from Dyer to Edinger (EA 0G950K) – PID was prepared and approved by Caltrans in 2005, and the project is not under construction yet.
- ❖ SR-55/I-5 Interchange Improvements (EA 0G260K) –PID was prepared by OCTA and approved by Caltrans in 2005. The project is now part of the SR-55 Widening Study (between I-5 and SR-22) that is being prepared by OCTA under Renewed Measure M program.
- ❖ Alton Avenue Overcrossing (EA 005500) – Project Report was prepared by the cities of Santa Ana and Irvine and approved by Caltrans in 2006. The project is anticipated to be constructed in the future by the cities of Santa Ana and Irvine in partnership with OCTA and Caltrans.
- ❖ SR-55 Continuous HOV Access between Paularino and Meats (EA 0J760K) – PID was prepared and approved by Caltrans in 2008, and the project is completed.
- ❖ SR-55/MacArthur Boulevard Interchange Ramp Improvements (EA 0H290K) – PID was prepared by the city of Santa Ana and approved by Caltrans in 2010, and the project is completed.
- ❖ SR-55 Access Study between 19th Street and Industry Way – PA/ED is being prepared by OCTA and anticipated to complete by 2013.
- ❖ SR-55 Widening Study between I-5 and SR-22 – PSR is being prepared by OCTA and anticipated to complete by 2013.

In addition, OCTA conducted a FreQ study on the SR-55 corridor in 2006 to evaluate the operational conditions and identify hotspots, bottlenecks, and geometric features along this corridor. The study identified the operational bottlenecks along SR-55 at the Dyer Road on-ramp and McFadden Avenue on-ramp in the northbound direction and I-5 southbound on-ramp and Edinger Avenue in the southbound direction.

A PSR for the proposed project was prepared by OCTA and approved by Caltrans in 2008. The PSR evaluated six project alternatives including existing conditions (no build), addition of auxiliary lane (Alternative 1), addition of new general purpose lane (Alternative 2), addition of auxiliary lane and general purpose lane (Alternative 3), addition of auxiliary lane, general purpose lane, and HOV lane (Alternative 4), and addition of auxiliary lane and HOV lane (Alternative 5). The PSR states that the PSR Alternative 2, 3, and 5 will enhance the capacity of the freeway as well as bring non-standard features of the freeway to HDM standards.

Purpose and Need



SR-55 is one of the highly congested corridors in Orange County, and five bottlenecks of District 12 are located in the study area as identified in the 2012 Mobility Performance Report (MPR 2012). The five bottlenecks are northbound SR-55 near Dyer Road, Edinger Avenue, and McFadden Avenue interchanges and southbound SR-55 near I-5 and Edinger Avenue interchanges. Heavy congestion is experienced along SR-55 during peak periods, especially on southbound SR-55 north of Edinger Avenue in the AM peak period and northbound SR-55 throughout the study area in the PM peak period, which operate at LOS E or F conditions with an average

travel speed of less than 20 mph during the peak hour. The operational deficiencies are resulted by a combination of capacity constraints on freeway mainline and closely spaced interchanges with inadequate weaving and merging distance.

Traffic patterns in Orange County are expected to have noticeable change by year 2040 with the Measure M2 freeway and arterial improvement projects in place. Traffic demand on the study SR-55 corridor is projected to continue increasing by eight percent in the future year 2040, which would exacerbate traffic congestion and result in an increase in vehicle delay to the corridor. A majority of the SR-55 segments would operate at LOS E or F conditions during the peak hour by 2040.

The purpose of the proposed project is to reduce traffic congestion, improve mobility and traffic operations, and increase capacity in the study area. The project alternatives propose to accomplish this objective through operational improvements (i.e., auxiliary lanes) and/or capacity enhancement (i.e., GP lane) on the SR-55 study corridor.

Study Area

The project limits are on SR-55 from north of I-405 (PM 6.29) to south of I-5 connectors (PM 10.32). However, in order to capture the effects of traffic flow downstream and upstream of the project limit, the study area for traffic operations analysis was extended beyond I-405 in the south to Paularino Avenue and beyond I-5 in the north to 4th Street/Irvine Boulevard.

The study locations for traffic operational analysis are listed below.



<u>Freeway Segments</u>	All the freeway HOV and general purpose lanes on SR-55 between Paularino Avenue and 4 th Street/Irvine Boulevard, including the freeway-to-freeway connectors from and to I-405 and I-5.
<u>Freeway Ramps</u>	All the on- and off- ramps (including the freeway-to-freeway connectors) at the study interchanges of Paularino Avenue, I-405, MacArthur Boulevard, Dyer Road, Edinger Avenue, McFadden Avenue, I-5, and 4 th Street/Irvine Boulevard.
<u>Ramp Intersections</u>	<ol style="list-style-type: none">1. NB SR-55 Ramps/Paularino Ave2. SB SR-55 Ramps/Paularino Ave3. NB SR-55 Ramps/MacArthur Blvd4. SB SR-55 Ramps/MacArthur Blvd5. NB SR-55 Ramps/Dyer Rd6. Grand Ave/Dyer Rd7. SB SR-55 Ramps/Dyer Rd8. SB SR-55 Off-ramp/Grand Ave9. NB SR-55 Ramps/Edinger Ave/Del Amo Ave10. SB SR-55 Ramps/Edinger Ave/Auto Mall11. NB SR-55 Ramps/McFadden Ave12. SB SR-55 Ramps/McFadden Ave13. NB SR-55 Ramps/4th St/Irvine Blvd14. SB SR-55 Ramps/4th St/Irvine Blvd

Study Scenarios

For the purpose of this project, five project alternatives were analyzed under both the Opening Year 2020 and Design Year 2040 conditions. The descriptions of the five project alternatives are provided in Chapter 4. The study scenarios for traffic operations analysis include the following:

- Existing Conditions (based on traffic data collected in 2011)
- Opening Year (2020) No Build Conditions
- Opening Year (2020) Project Alternative 1 Conditions
- Opening Year (2020) Project Alternative 2 Conditions
- Opening Year (2020) Project Alternative 3 Conditions
- Opening Year (2020) Project Alternative 4 Conditions



- Design Year (2040) No Build Conditions
- Design Year (2040) Project Alternative 1 Conditions
- Design Year (2040) Project Alternative 2 Conditions
- Design Year (2040) Project Alternative 3 Conditions
- Design Year (2040) Project Alternative 4 Conditions

Report Outline

The remainder of this report contains the following chapters.

- Chapter 2 – Traffic Analysis Methodology
- Chapter 3 – Existing Conditions
- Chapter 4 – Project Alternatives
- Chapter 5 – Opening Year (2020) Conditions
- Chapter 6 – Design Year (2040) Conditions
- Chapter 7 – Conclusions

Following this introduction, Chapter 2 summarizes the traffic operations analysis and travel demand forecasting methodologies applied for this traffic report. Chapter 3 describes traffic operational characteristics of existing conditions. Chapter 4 describes each of the project alternatives and their proposed improvements. Chapter 5 presents the Opening Year 2020 traffic analysis results for each of the project alternatives. The design year (2040) traffic operational results are presented in Chapter 6. Finally, Chapter 7 concludes the comparison results of the project alternatives.

2. TRAFFIC ANALYSIS METHODOLOGY

This chapter describes the methodologies used to develop traffic demand forecasts and analyze traffic operations as well as the evaluation criteria used to determine acceptable traffic operations conditions.

Traffic Demand Forecasting Methodology

The most current version of OCTAM (v3.3) was used to develop the future year traffic forecasts. Both the Base Year (2005) and Future Year (2035) models were reviewed and refined with the OCTA Modeling Section prior to development of the specific future year models for the SR-55 project. The key roadway improvements within the study area assumed in the 2035 OCTAM model include the Newport Avenue extension and the Alton Avenue overcrossing.



The Future Year (2035) model was then developed by the OCTA Modeling Section, in coordination with the Project Team, for each of the five project alternatives identified in Chapter 4 to forecast the ADT and AM/PM peak period traffic volumes. Based on the raw model volumes from the Base Year (2005) and Future Year (2035) models, the ADT and peak hour traffic volumes were developed using the difference method contained in the National Cooperation Highway Research Program (NCHRP) Report 255: *Highway Traffic Data for Urbanized Area Project Planning and Design* (Transportation Research Board, December 1982). Since the current OCTAM future model reflects Year 2035 conditions, the Opening Year 2020 and Design Year 2040 forecasts were developed using a calculated annual growth rate between existing and the 2035 traffic forecasts.

For the SR-55 mainline segments, the future year traffic demand was developed using the methodologies described above for the entering locations – south of Pularino Avenue in the northbound direction and north of 4th Street in the southbound direction. Then the traffic forecasts at the two locations were balanced downstream to develop the traffic volumes for other study freeway mainline segments.

Prior to the operational analysis, a traffic volume report was prepared by Fehr & Peers and approved by Caltrans, which summarizes the existing traffic volumes and future year (2020 and 2040) traffic forecasts of the study area, and more importantly is used to support development/refinement of the project alternatives. The traffic forecasts were developed for both freeway facilities and ramp intersections, which are presented in Chapters 5 and 6.

Operations Analysis Methodology

For the purpose of this study, a VISSIM traffic simulation model was developed to analyze freeway traffic operations for the study segment. Because all components of freeways operations (i.e. mainline, on-ramp merge, off-ramp diverge, and weaving sections) operate as a single integrated system with congestion and queues affecting both upstream and downstream traffic operations, VISSIM was used for this operations analysis to capture the effects between all the freeway components and the system-wide measures of effectiveness (MOE). The methodologies contained in VISSIM are consistent with the



procedures and methodologies in the *Highway Capacity Manual 2010* (HCM 2010), Transportation Research Board. This analysis approach was discussed and agreed by Caltrans, OCTA, and the Project Development Team (PDT) at the project team meeting in early 2012.

The level of service (LOS) was calculated for each study facility to evaluate traffic operations. LOS is a qualitative measure of traffic operating conditions whereby a letter grade, from A (the best) to F (the worst), is assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving. Table 1-A describes the LOS thresholds for freeway sections identified in the HCM.

TABLE 1-A
FREEWAY MAINLINE AND RAMP JUNCTION/WEAVE SECTION LOS THRESHOLDS

Level of Service	Description	Density (vplpm) ¹	
		Mainline (Basic)	Ramp / Weave
A	Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	≤ 11	≤ 10
B	Free-flow speeds are maintained. The ability to maneuver with the traffic stream is only slightly restricted.	> 11 to 18	> 10 to 20
C	Flow with speeds at or near free-flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver.	> 18 to 26	> 20 to 28
D	Speeds decline slightly with increasing flows. Freedom to maneuver with the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort.	> 26 to 35	> 28 to 35
E	Operation at capacity. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can be expected to produce a breakdown with queuing.	> 35 to 45	> 35 to 45 ²
F	Represents a breakdown in flow.	> 45	> 45 ²

Notes: 1. Density is reported in vehicles per lane per mile.
2. The maximum density for ramp junctions and weaving sections under LOS E is not defined in the HCM. The maximum density for basic segments of 45 vplpm was assumed to apply to ramp junctions and weaving sections.
Source: Highway Capacity Manual (Transportation Research Board, 2010)

The peak-hour density calculations provided in this report are consistent with the definitions from the HCM, which defines four freeway section types: merge, diverge, weave, and basic. Merge and diverge sections, which refer to the freeway ramp junctions, are defined as the section of the freeway 1,500 feet downstream of an on-ramp and upstream of an off-ramp, respectively. The density is measured over the two adjacent freeway through lanes plus any auxiliary lanes. A weaving section occurs between a successive on-ramp and off-ramp pair connected by an auxiliary lane, and the maximum weaving distance between the ramps is no longer a fixed distance but determined by the weaving/total volumes and number of weaving lanes in the HCM 2010. Basic freeway sections include all other freeway sections that



are not included in a merge, diverge, or weaving section. The densities at weaving and basic sections are measured across all mixed-flow freeway lanes (including both through lanes and auxiliary lanes).

In addition to freeway LOS thresholds, descriptions of the level of service (LOS) letter grades for signalized and unsignalized intersections are provided in Table 1B.

TABLE 1B INTERSECTION LOS THRESHOLDS			
Level of Service	Description	Signalized Delay (Seconds)	Unsignalized Delay (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 15.0	≤ 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 15.0 to 25.0	>10.0 to 15.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 25.0 to 35.0	>15.0 to 25.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35.0 to 55.0	>25.0 to 35.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	> 55.0 to 80.0	>35.0 to 50.0
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80.0	>50.0

Source: Highway Capacity Manual (Transportation Research Board, 2010).



Analysis Evaluation Criteria

The analysis evaluation criteria described below were used to determine acceptable traffic operating conditions and are based on the level of service policies identified by Caltrans.

Caltrans strives to have freeway facilities operate at a level of service between C and D. Therefore, LOS D was used as the threshold for freeway facilities analysis. Any future LOS on freeway facilities that are projected to operate at unacceptable LOS (worse than LOS D) needs to be mitigated. Per Caltrans guide, an impact to freeway facilities would be considered significant if either of the following occurs:

- Project would cause the LOS of the freeway facilities to degrade from LOS D to LOS E or F
- Project would add impact to a facility which is already operating at an unacceptable LOS E or F

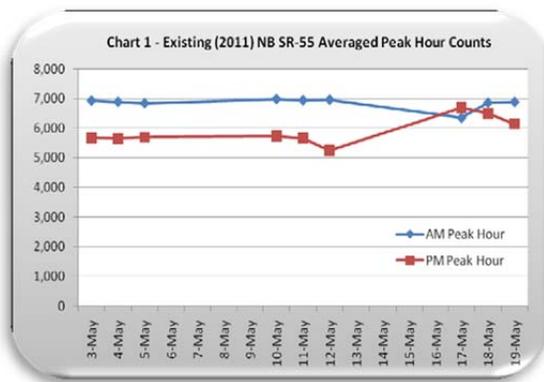
3. EXISTING CONDITIONS

This chapter describes the existing traffic volumes, the development of the traffic analysis simulation model, the existing traffic operations, and accident review.

Existing Traffic Volumes

Existing traffic volumes were collected in 2011 from various sources, including Caltrans, PeMS (Freeway Performance Measurement System), OCTA, and field data. The intersection turning movement counts were collected from the field in Spring 2011 when schools are in session.

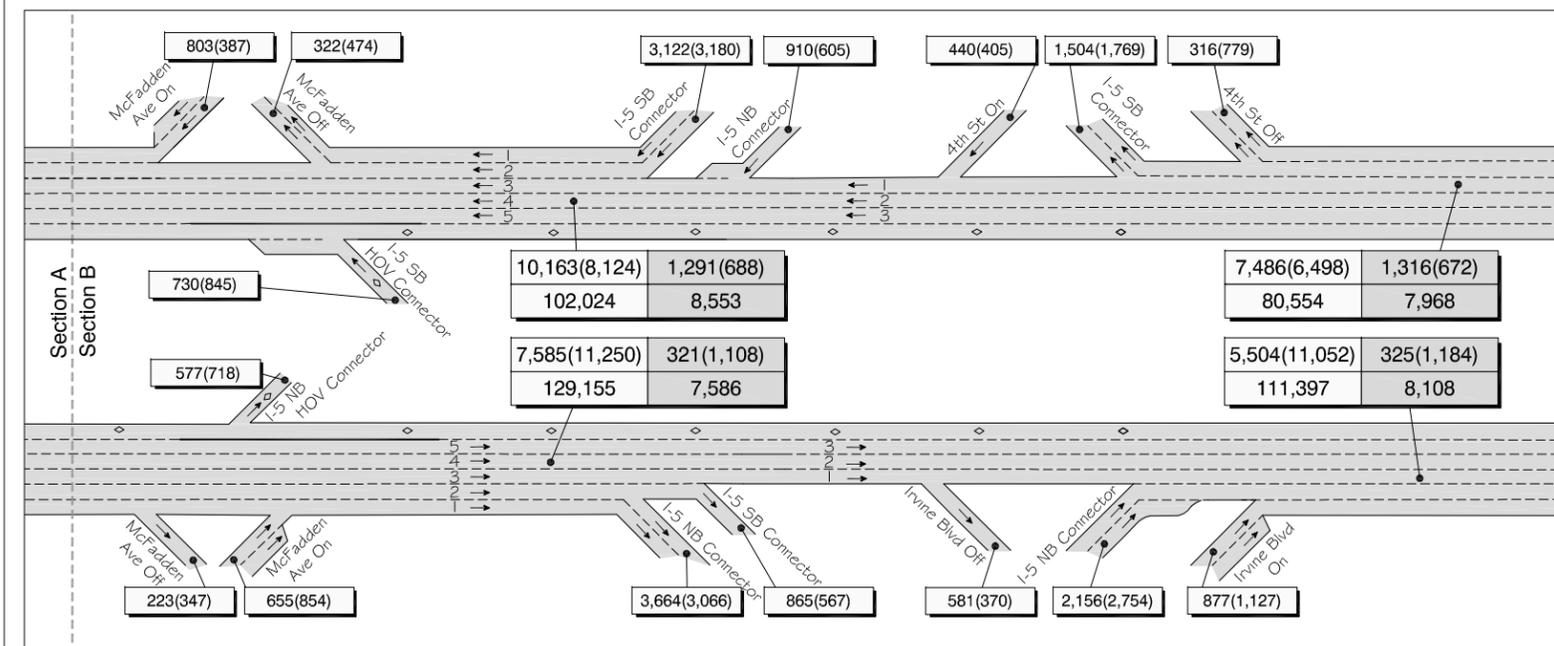
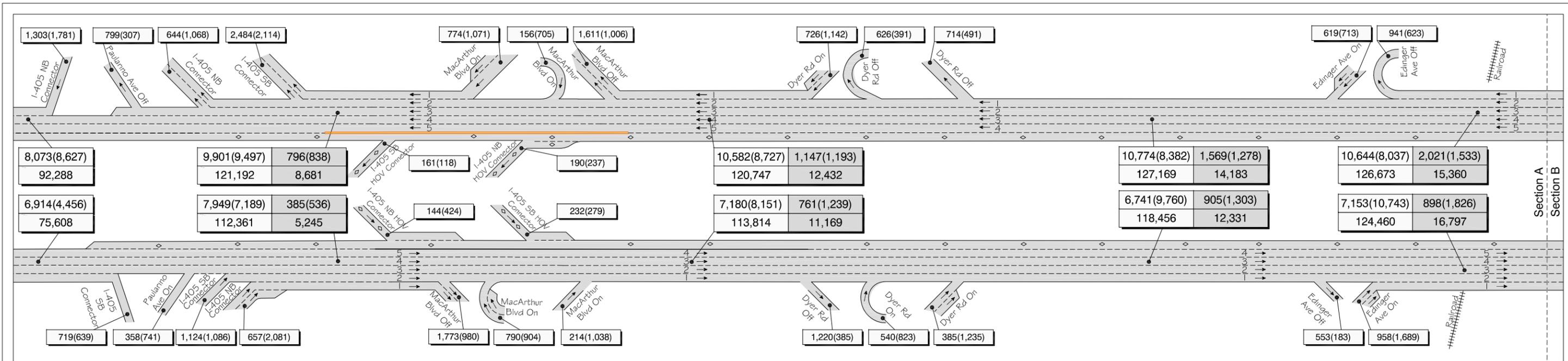
Freeway mainline and freeway-to-freeway ramp traffic volumes (i.e., AM/PM peak period traffic volumes and ADT) were collected from PeMS and Caltrans. SR-55 is one of the highly congested corridors in Orange County, and two of the top twenty bottlenecks of District 12 are located in the study area as identified in the 2009 Mobility Performance Report (MPR 2009). The over-saturation condition along SR-55 results in traffic fluctuation on a daily basis; therefore, in order to ensure the statistic significance of the freeway traffic data, multi-weekday freeway mainline traffic data were obtained from PeMS for extensive review prior to use for this traffic volume report.



A three-week (May 2 – May 20, 2011 with normal traffic pattern and schools in session) weekday (e.g., Tuesday, Wednesday, and Thursday) traffic data were collected from PeMS for all the freeway mainline segments on both directions of SR-55 between Paularino Avenue and 17th Street. The AM and PM peak hour traffic volumes were compared across the nine days at each freeway segment to identify any potential outliers that have abnormal traffic pattern. The detailed volume data is included in the Traffic Volume Report dated in May 2012.

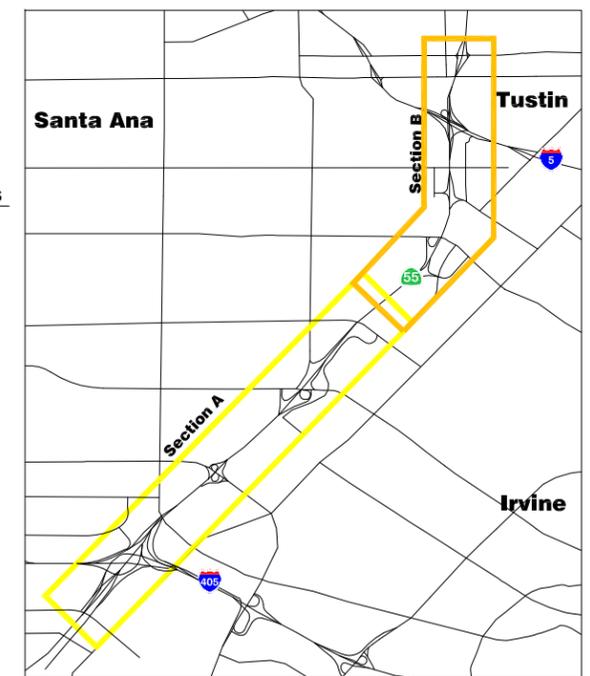
In many cases traffic counts refer to the constrained traffic volumes that get through transportation facilities such as freeways and arterials. Under over-saturated conditions, traffic demand would not be adequately accommodated by roadways, and the part of the traffic demand that could get through is typically referred as constrained volumes or traffic counts.

In order to determine the existing traffic demand along SR-55, the traffic counts at locations beyond the beginning of the congested segments were used to identify the traffic demand for both directions of SR-55. In another word, the freeway traffic counts on northbound SR-55 south of Paularino were used as entering traffic demand for the northbound direction, and the freeway counts on southbound SR-55 north of SR-22 were used as entering traffic demand for the southbound direction. The freeway traffic demand at the remaining segments was calculated using volume balancing from the entering traffic demand. Figure 1-A shows the existing (2011) peak hour and daily traffic volumes for freeway mainline segments and ramps. The ramp intersection peak hour turning movements are displayed in Figure 1-B.



LEGEND

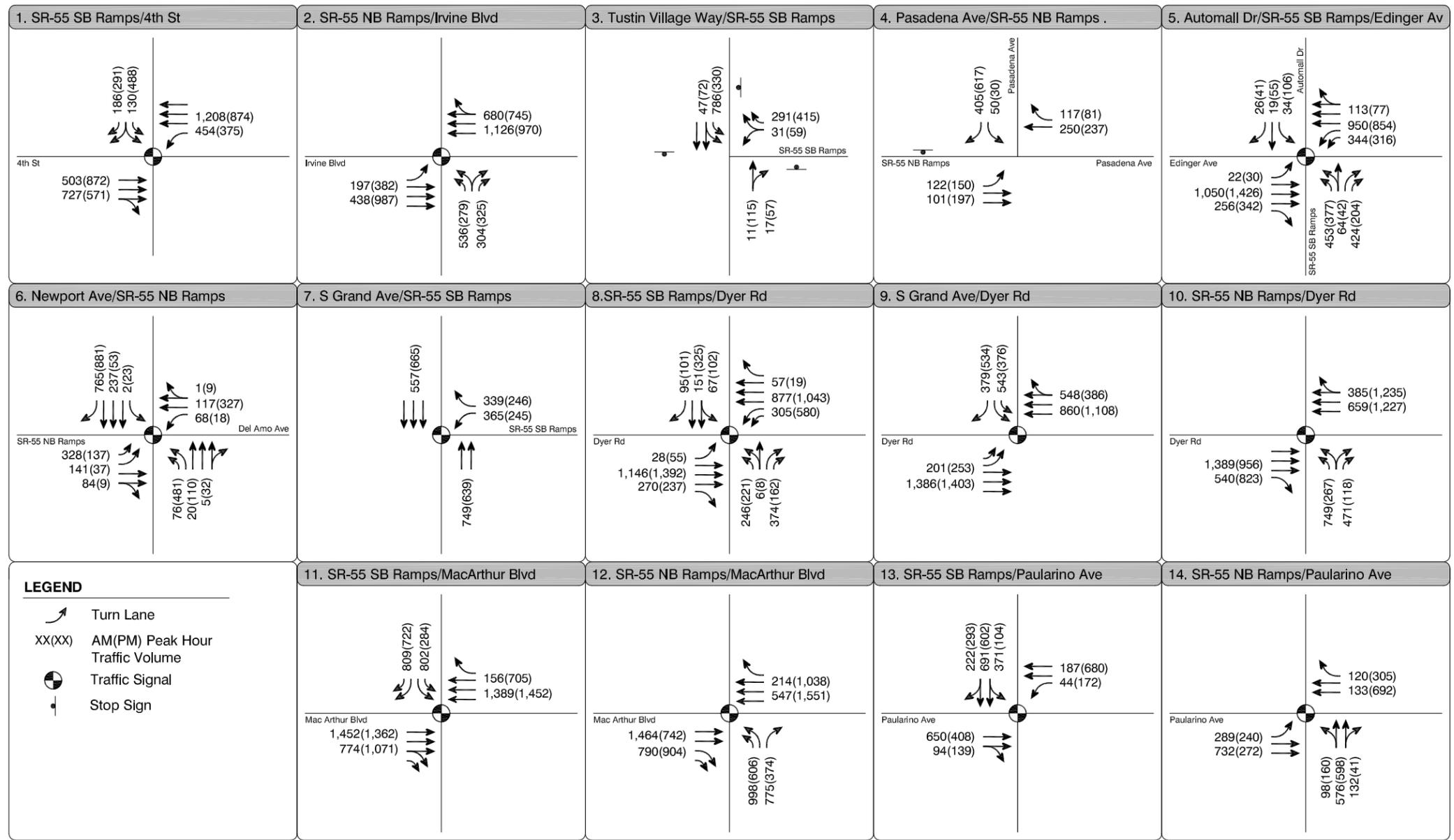
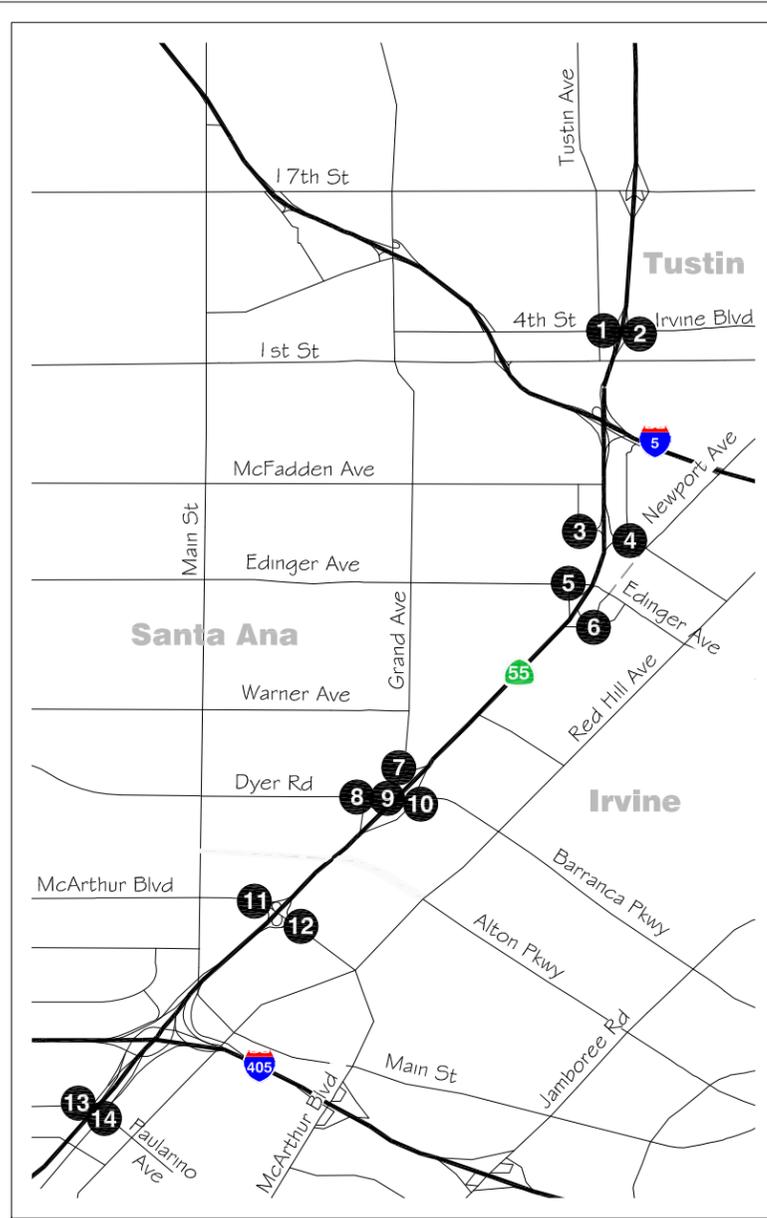
- - General Purpose Lane
- ◊ - HOV Lane
- XXX(XXX) - Ramp AM(PM) Peak Hour Traffic Volumes
- XXX(XXX) / XXX - Freeway Mainline AM(PM) Peak Hour Traffic Volumes / Freeway Mainline ADT Traffic Volumes
- XXX(XXX) / XXX - Freeway HOV AM(PM) Peak Hour Traffic Volumes / Freeway HOV ADT Traffic Volumes
- - HOV Limited Access



N

 NOT TO SCALE

REVISED
SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - EXISTING CONDITIONS (YEAR 2011)
FIGURE 1-A



N

NOT TO SCALE

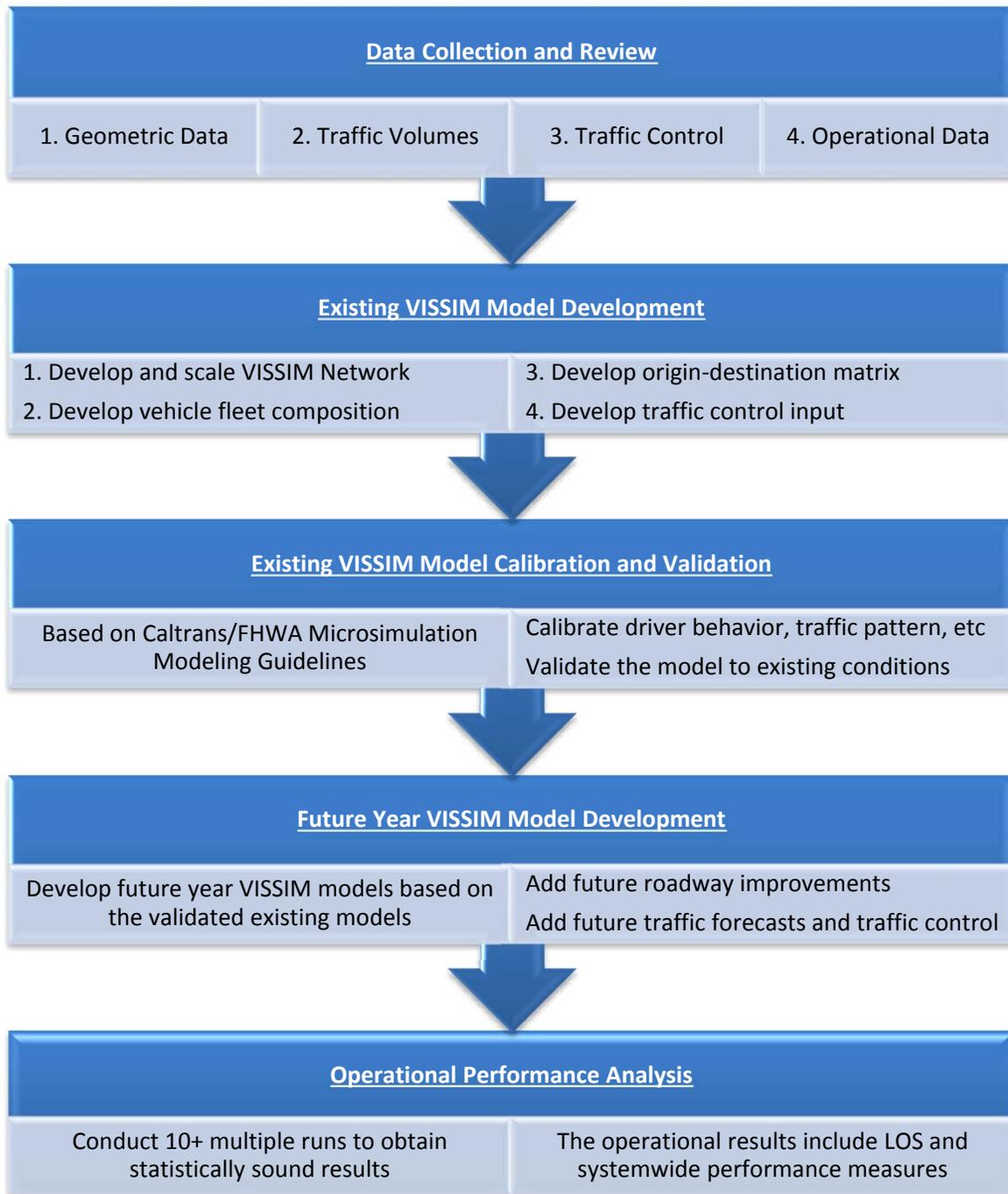
REVISED

SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - EXISTING CONDITIONS (YEAR 2011)

FIGURE 1-B

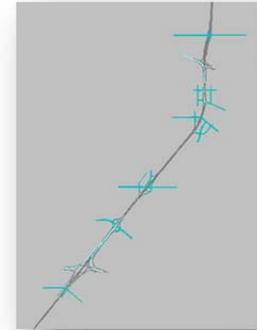
Traffic Model Development

In order to analyze the over-saturated conditions along SR-55, monitor the interactions between freeway mainline segments, HOV lanes, ramps, and arterials, and identify operational bottlenecks and their impacts, a VISSIM traffic simulation model was developed to analyze freeway traffic operations using the flow chart shown below.



Traffic Data and Assumptions

The VISSIM model covers all the study locations identified in Chapter 1, including all the mainline segments, HOV lanes, and ramp junctions on SR-55 between Irvine Boulevard and Paularino Avenue. The key traffic data and analysis assumptions required for model development are described below.



Geometric Data

Freeway and arterial geometric data were gathered using aerial photographs, design plans, and field observations. The recently completed improvements to the study roadways are included in the existing analysis, including the MacArthur Boulevard widening project at the SR-55 interchange, Dyer Road widening project near SR-55, and SR-55 Continuous HOV project which has converted the buffer-separated HOV lane to continuous HOV access at most locations along SR-55 in the study area, except for the I-5 and I-405 interchanges.

Traffic Flow Data

As described in Chapter 2, existing daily and peak period traffic volumes were collected in 2011 from various sources, including Caltrans, PeMS (Freeway Performance Measurement System), OCTA, and field data. The intersection turning movement counts were collected from the field in Spring 2011 when schools are in session,

Existing freeway HOV and truck data were also obtained from the 2011 PeMS data and Caltrans count book, and confirmed by the manual traffic counts collected from the field. For study intersections, the truck data was collected from the field in Spring 2011. The average HOV percentages on the study SR-55 corridor were 10 and 13 (AM and PM) percent on northbound SR-55 and 13 and 11 percent (AM and PM) on southbound SR-55, respectively. The peak hour heavy truck percentages were lower than the daily percentages and range from three to five percent for freeway mainline and one to three percent for ramps upon locations.

Traffic Control Data

Existing signal timing plans at study intersections were obtained from involved jurisdictions including Caltrans and the City of Santa Ana. In addition, the ramp meter information was gathered from Caltrans as well as the field data. The posted speed limits and actual free-flow speeds for the freeways and ramps were collected during field observations.

Origin-Destination Data

In addition to the traffic counts, an origin-destination (O-D) traffic flow matrix was created for use in the traffic operations analysis model, using a combination of the OCTAM Base Model provided by OCTA, collected traffic counts, and our knowledge of the traffic patterns in the study area.

Other Operational Data

Other operational data was also obtained from the field, including travel time surveys, travel speeds, lane change and gap acceptance behaviors, vehicle queues, and other operational characteristics.



Operations Model Calibration and Validation

The VISSIM model was calibrated and validated to existing conditions using the criteria suggested in *Guidelines for Applying Traffic Microsimulation Modeling Software* (California Department of Transportation, 2002) and additional criteria developed by Fehr & Peers. The default VISSIM input parameter values that did not represent the study-area conditions were adjusted to represent field observation and Fehr & Peers' experiences with similar projects elsewhere in Orange County and Southern California. For example, the default vehicle composition contains only standard sedans. However, a significant portion of vehicles in Orange County (and other Southern California areas) are large-size vehicles including SUVs and light trucks. As a result, the vehicle fleet composition in VISSIM has been revised to reflect the real condition.

Table 2 shows the validation criteria thresholds recommended in the FHWA and Caltrans guidelines (*Guidelines for Applying Traffic Microsimulation Modeling Software*, California Department of Transportation, 2002; *Volume III - Guidelines for Applying Traffic Microsimulation Modeling Software*, Federal Highway Administration, 2003) as well as the validation results for the AM and PM VISSIM models.

TABLE 2 – VALIDATION CRITERIA THRESHOLDS COMPARISON							
	Criteria	Criteria Threshold	% Met Target	AM Peak Period		PM Peak Period	
				% Met	Pass/Fail	% Met	Pass/Fail
Link Volumes	< 700 vph	100 vph	> 85%	100%	Pass	100%	Pass
	700 - 2,700 vph	15%	> 85%	98%	Pass	97%	Pass
	> 2,700 vph	400 vph	> 85%	97%	Pass	96%	Pass
	GEH Statistic	5	> 85%	98%	Pass	97%	Pass
Sum of Link Volumes	All Links	5%	-	1%	Pass	1.5%	Pass
	GEH Statistic	4	-	0.9	Pass	1.2	Pass
Volume at Interchanges		5%	100%	100%	Pass	100%	Pass
Travel Time		15% ¹	> 85%	100%	Pass	100%	Pass
Travel Speeds		match observations		-	Pass	-	Pass
Queuing		match observations		-	Pass	-	Pass

Notes: 1. For travel times, the criterion is to be within 15% or one minute, if higher.
Source: Fehr & Peers, 2012

The link volumes for over 96 percent of freeway sections meet the criteria threshold (better than the target acceptability of more than 85 percent of links). Aggregations of link volumes for the total network meet the 5 percent tolerance. Travel times for all selected routes meet the 15 percent tolerance (better than the target acceptability of more than 85 percent of routes). The speed-time relationship and queuing at bottlenecks were visually inspected and found to represent the existing conditions on the field. Therefore, both the AM and PM peak period models are considered to be validated for use in the existing conditions analysis.



Since micro-simulation models like VISSIM rely on the random arrival of vehicles, multiple runs are needed to provide a reasonable level of statistical accuracy and validity. Therefore, the results of 10 separate runs (each using a different random seed number) were averaged to determine the final results.

The calibrated and validated model was used to generate performance measures including the freeway facility LOS consistent with HCM 2010 and other system-wide MOEs including travel times, average speeds, vehicle-miles-traveled (VMT), and vehicle-hours-delay (VHD).

Freeway Operations

Tables 3-A and 3-B show the AM and PM peak hour density and LOS for the study freeway mainline segments and ramp junctions on northbound and southbound SR-55, respectively.

During the AM peak hour, most of the study locations on northbound SR-55 operate at LOS D or better, except for the Paularino Avenue on-ramp and the weaving section from NB I-405 on-ramp to MacArthur Boulevard off-ramp, which operate at LOS E. In addition, LOS E or F conditions occur on northbound SR-55 between Edinger on-ramp and NB I-5 off-ramp. In the southbound direction, heavy congestion is experienced from Edinger on-ramp back to Irvine Boulevard and beyond, resulting in LOS F conditions. All other study locations south of Dyer Road operate at LOS D or better.

During the PM peak hour, all the study locations on northbound SR-55 experience severe congestion and operate at LOS F conditions. Vehicle queue on northbound extend from Irvine Boulevard/I-5 all the way back to south of Paularino Avenue. In the southbound direction, most of study locations operate at LOS D or better with the exception of the off-ramps to Grand Avenue and Dyer Road as well as the weaving section between MacArthur Boulevard and SB I-405.

In addition to freeway operational analysis, a queuing analysis was also conducted at the on-ramps to identify if the on-ramp queue would extend back to local streets during the AM and PM peak hour, with results shown in Table 3-C. Under existing conditions, the storage at most of the on-ramps is adequate to accommodate vehicle queues during the peak hours, with the exception of three on-ramps along northbound SR-55 including westbound MacArthur Boulevard on-ramp, westbound Dyer Road on-ramp, and Edinger Avenue on-ramp during the PM peak hour.

HOV Lane Operations

In addition to the mainline segments and ramp junctions, the HOV lane operational conditions were also analyzed in VISSIM and the density and LOS results are summarized in Table 4-A.

During the AM peak hour, all the study HOV locations on northbound SR-55 operate at LOS B or better. The southbound SR-55 HOV lane between I-5 and Edinger Avenue operates at LOS E conditions, while other locations operate at LOS D or better.

During the PM peak hour, the northbound HOV lane between Dyer Road and McFadden Avenue operate at LOS F conditions, which all the southbound HOV locations operate at LOS C or better.



TABLE 3-A – NORTHBOUND SR-55 FREEWAY MAINLINE AND RAMPS OPERATIONS – EXISTING CONDITIONS					
Location	Type	AM		PM	
		Density	LOS	Density	LOS
Paularino Ave On-ramp	Merge	40.8	E	86.0	F
SB I-405 On-ramp	Merge	32.1	D	95.8	F
NB I-405 On-ramp	Weave	38.8	E	101.8	F
MacArthur Blvd Off-ramp	Weave	38.8	E	101.8	F
MacArthur Blvd On-ramp (EB)	Merge	28.8	D	106.1	F
MacArthur Blvd On-ramp (WB)	Merge	31.0	D	108.8	F
Dyer Rd Off-ramp	Diverge	30.7	D	112.5	F
Dyer Rd On-ramp (EB)	Merge	28.5	D	107.7	F
Dyer Rd On-ramp (WB)	Merge	29.5	D	98.8	F
Dyer Rd to Edinger Ave	Basic	27.0	D	96.5	F
Edinger Ave Off-ramp	Diverge	29.8	D	100.3	F
Edinger Ave On-ramp	Weave	43.0	E	101.9	F
McFadden Ave Off-ramp	Weave	43.0	E	101.9	F
McFadden Ave On-ramp	Weave	50.2	F	77.6	F
NB I-5 Off-ramp	Weave	50.2	F	77.6	F
SB I-5 Off-ramp	Diverge	15.8	B	97.1	F
Irvine Blvd Off-ramp	Diverge	16.0	B	82.8	F
NB I-5 On-ramp	Merge	17.6	B	90.6	F

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2015



TABLE 3-B – SOUTHBOUND SR-55 FREEWAY MAINLINE AND RAMPS OPERATIONS – EXISTING CONDITIONS					
Location	Type	AM		PM	
		Density	LOS	Density	LOS
SB I-5 Off-ramp	Diverge	93.6	F	22.7	C
4 th St On-ramp	Merge	115.0	F	24.0	C
NB I-5 On-ramp	Merge	108.0	F	28.9	D
SB I-5 On-ramp	Weave	87.0	F	30.4	D
McFadden Off-ramp	Weave	87.0	F	30.4	D
McFadden On-ramp	Weave	78.7	F	30.6	D
Edinger Off-ramp	Weave	78.7	F	30.6	D
Edinger On-ramp	Merge	51.5	F	34.4	D
Edinger Ave to Dyer Rd	Basic	34.1	D	34.9	D
Grand Ave Off-ramp	Diverge	37.4	E	45.7	F
Dyer Rd Off-ramp	Diverge	33.2	D	35.7	E
Dyer Rd On-Ramp	Weave	32.5	D	33.2	D
MacArthur Blvd Off-ramp	Weave	32.5	D	33.2	D
MacArthur Blvd On-ramp (WB)	Merge	30.2	D	35.0	D
MacArthur Blvd On-ramp (EB)	Weave	27.9	C	35.2	E
SB I-405 Off-ramp	Weave	27.9	C	35.2	E
NB I-405 Off-ramp	Diverge	26.7	C	35.0	D
Paularino Ave Off-ramp	Diverge	25.0	C	32.5	D

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2015



TABLE 3-C – ON-RAMP QUEUING ANALYSIS – EXISTING CONDITIONS				
Location	Number of Lanes	Storage per Lane (ft)	Queue (ft)	
			AM	PM
1. SR-55 NB: Paularino Ave On-ramp	1	1,700	--	900
2. SR-55 NB: EB MacArthur Blvd On-ramp	2	840	160	550
3. SR-55 NB: WB MacArthur Blvd On-ramp	1	940	--	<u>950</u>
4. SR-55 NB: EB Dyer Rd On-ramp	1	790	--	590
5. SR-55 NB: WB Dyer Rd On-ramp	2	720	90	<u>830</u>
6. SR-55 NB: Edinger Ave On-ramp	2	480	--	<u>510</u>
7. SR-55 NB: McFadden Ave On-ramp	2	320	60	80
8. SR-55 NB: Irvine Blvd On-ramp	2	500	--	100
9. SR-55 SB: 4 th St On-ramp	1	740	--	--
10. SR-55 SB: McFadden Ave On-ramp	2	390	240	90
11. SR-55 SB: Edinger Ave On-ramp	2	570	--	--
12. SR-55 SB: Dyer Rd On-ramp	2	540	160	380
13. SR-55 SB: WB MacArthur Blvd On-ramp	1	720	--	530
14. SR-55 SB: EB MacArthur Blvd On-ramp	2	600	--	--
Note: "--" indicates no vehicle queues observed at these on-ramps. Bold and underline indicates vehicle queue exceeds the available storage.				
Source: Fehr & Peers, 2015				



TABLE 4-A – FREEWAY HOV LANE OPERATIONS – EXISTING CONDITIONS					
Location	Type	AM		PM	
		Density	LOS	Density	LOS
Northbound					
NB 55: I-405 to MacArthur Blvd	HOV	5.9	A	7.6	A
NB 55: MacArthur Blvd to Dyer Rd	HOV	11.4	B	18.4	C
NB 55: Dyer Rd to Edinger Ave	HOV	11.1	B	50.5	F
NB 55: Edinger Ave to McFadden Ave	HOV	12.2	B	54.9	F
NB 55: McFadden Ave to I-5	HOV	4.2	A	15.5	B
Southbound					
SB 55: I-5 to McFadden Ave	HOV	35.7	E	9.9	A
SB 55: McFadden Ave to Edinger Ave	HOV	35.6	E	21.2	C
SB 55: Edinger Ave to Dyer Rd	HOV	28.2	D	21.1	C
SB 55: Dyer Rd to MacArthur Blvd	HOV	16.9	B	17.9	B
SB 55: MacArthur Blvd to I-405	HOV	13.3	B	13.9	B
Notes:	Bold font indicates unacceptable LOS E or F conditions.				
Source:	Fehr & Peers, 2015				



HOV Degradation Determination

In addition to the HOV density and LOS analysis described above, a Corridor HOV Lane Degradation Report (see Appendix for full report) for the SR-55 study area was also prepared per request from Caltrans in compliance with the requirements of SAFETYA-LU. According to SAFETEA-LU Section 1121 HOV Facilities (23 U.S.C. 166). The operations of an HOV facility are considered degraded if...

Vehicles operating on the facility are failing to maintain a minimum average operating speed 90 percent of the time over a consecutive 180-day period during morning or evening weekday peak hour periods (or both).

The “minimum average operating speed” is defined as...

- (i) 45 miles per hour, in the case of a HOV facility with a speed limit of 50 miles per hour or greater; and*
- (ii) not more than 10 miles per hour below the speed limit, in the case of a HOV facility with a speed limit of less than 50 miles per hour.*

What this basically means is that if the monitored speeds at HOV facilities during the AM or PM peak hour is less than 45 mph on 50 mph or greater facilities, and less than 10 mph below the posted speed limit on 50 mph or less facilities, for less than 90% of the time over a consecutive 180 days, then the HOV facility is determined to be operating deficiently.

Along the SR-55 study corridor, the minimum posted speed limit is 65 mph. Using the above criteria, the HOV facilities in the corridor would need to maintain a 45 mph speed limit or better for a minimum of 90% of weekdays out of the consecutive 180-day period. For the purpose of this analysis, January 2011 to June 2011 was used as the timeframe for the HOV degradation report, which consists of 129 weekdays. The HOV facilities would need to maintain a 45 mph speed limit or better for a minimum of 117 days to be performing at non-degraded operations. HOV segments along the SR-55 corridor not meeting this criterion are considered degraded.

Per direction provided by Caltrans, the methodologies used for the SR-55 corridor HOV degradation analysis are consistent with those contained in the *2010 California Highway Occupancy Vehicle Lane Federal Degradation Determination Report* prepared by Caltrans, November 16, 2011. The SR-55 HOV speed data used for this report were obtained from the Caltrans Performance Measurement System (PeMS) database and provided by Caltrans. The peak hours assessed for this analysis are from 8:00 AM to 9:00 AM during the morning peak period, and from 5:00 PM to 6:00 PM during the evening peak period according to the *2010 California Highway Occupancy Vehicle Lane Federal Degradation Determination Report*. For the purpose of this study, the HOV lane was evaluated segment by segment between interchanges as well as for the entire study corridor.

Tables 4-B and 4-C summarize the average travel speed, percentage of days operating under degraded conditions, and determination of degradation for each HOV study segment for SR-55 Northbound and SR-55 Southbound, respectively. The average traveling speed on the HOV lane of SR-55 study corridor is 62 mph in the northbound direction during the AM peak hour, 48 mph in the northbound direction during



the PM peak hour, 58 mph in the southbound direction during the AM peak hour, and 61 mph in the southbound direction during the PM peak hour.

**TABLE 4-B – SR-55 HOV LANE AVERAGE SPEED AND DEGRADATION DETERMINATION
– SR-55 NORTHBOUND**

HOV Segment	AM Peak Hour			PM Peak Hour		
	Average Speed (mph)	% of Days Under 45 mph	Degraded?	Average Speed (mph)	% of Days Under 45 mph	Degraded?
Paularino to I-405	65.2	0.0%	No	64.7	0.0%	No
I-405 to MacArthur	64.5	0.0%	No	56.5	0.0%	No
MacArthur to Dyer	60.0	0.0%	No	32.4	82.2%	Yes
Dyer to Edinger	59.6	0.0%	No	37.8	84.5%	Yes
Edinger to McFadden	60.7	0.0%	No	38.8	88.4%	Yes
McFadden to I-5	61.1	0.0%	No	41.4	72.9%	Yes
I-5 to Irvine	63.4	0.0%	No	43.7	60.5%	Yes
Irvine to 17 th	62.6	0.0%	No	52.1	0.8%	No
NB 55 Entire Segment	61.8	0.0%	No	47.8	27.9%	Yes

Notes: ***Bold-italic*** text indicates degraded HOV facility.
Source: *Fehr & Peers, 2013.*

**TABLE 4-C – SR-55 HOV LANE AVERAGE SPEED AND DEGRADATION DETERMINATION
– SR-55 SOUTHBOUND**

HOV Segment	AM Peak Hour			PM Peak Hour		
	Average Speed (mph)	% of Days Under 45 mph	Degraded?	Average Speed (mph)	% of Days Under 45 mph	Degraded?
17 th to Irvine	53.7	1.6%	No	66.4	0.8%	No
Irvine to I-5	42.6	62.0%	Yes	53.9	10.9%	Yes
I-5 to McFadden	48.9	40.3%	Yes	55.1	10.9%	Yes
McFadden to Edinger	49.0	16.3%	Yes	54.1	8.5%	No
Edinger to Dyer	60.0	0.0%	No	59.7	0.0%	No
Dyer to MacArthur	67.9	0.8%	No	67.7	0.0%	No
MacArthur to I-405	66.7	0.8%	No	66.6	0.0%	No
SB 55 Entire Segment	57.9	1.6%	No	61.4	0.0%	No

Notes: ***Bold-italic*** text indicates degraded HOV facility.
Source: *Fehr & Peers, 2013.*



The following HOV facilities are operating under degraded conditions based on the 180-day data between January and June 2011.

SR-55 Northbound:

From MacArthur to Dyer (PM Peak Hour)
From Dyer to Edinger (PM Peak Hour)
From Edinger to McFadden (PM Peak Hour)
From McFadden to I-5 (PM Peak Hour)
From I-5 to Irvine (PM Peak Hour)

SR-55 Southbound:

From Irvine to I-5 (AM and PM Peak Hour)
From I-5 to McFadden (AM and Peak Hour)
From McFadden to Edinger (AM Peak Hour)

Intersection Operations

Table 5-A shows the AM and PM peak hour delay and LOS for the study ramp terminal intersections. As shown, all the study intersections operate at LOS D or better during both the AM and PM peak hours, except for the NB SR-55/Newport Avenue/Del Amo intersection which operate at LOS E during the PM peak hour. Although other intersections as a whole operate at LOS D or better, there are certain movements experiencing significant delay and queuing problem in the PM peak hour, including the westbound approach at the NB SR-55/Dyer Road and NB SR-55/MacArthur Boulevard intersections.

The intersection turning movement vehicle queues at study locations under existing conditions are summarized in Table 5-B. During the AM peak hour, most of locations have adequate storage to accommodate vehicle queues except for a couple of turning movements at the westbound left turn at the Southbound SR-55/4th Street intersection, eastbound left-turn at the Grand Avenue/Dyer Road intersection, and the eastbound left-turn at the NB SR-55/Paularino Avenue intersection. More locations with vehicle queue exceeding storage length occur during the PM peak hour, with significant queuing on southbound Newport Avenue at the NB SR-55/Newport Avenue intersection, westbound Dyer Road at the NB SR-55/Dyer Road intersection, and westbound MacArthur Boulevard at the NB SR-55/MacArthur Boulevard intersection, which result from a combination of high traffic demand and vehicle queue spillback from the downstream NB SR-55 on-ramps at those locations.



TABLE 5-A – INTERSECTION OPERATIONS – EXISTING CONDITIONS					
Location	Control Type	AM		PM	
		Delay ²	LOS	Delay ²	LOS
1. SR-55 SB/4 th St	Signal	25.3	C	19.4	B
2. SR-55 NB/Irvine Blvd	Signal	21.3	C	17.3	B
3. SR-55 SB/Village Way	AWSC ¹	13.8	B	9.3	A
4. SR-55 NB/Pasadena Ave	SSSC ¹	8.4	A	8.7	A
5. SR-55 SB/Edinger Ave	Signal	22.7	C	24.6	C
6. SR-55 NB/Newport Ave	Signal	18.0	B	61.4	E
7. SR-55 SB/ Grand Ave	Signal	10.9	B	7.5	A
8. SR-55 SB/Dyer Ave	Signal	22.7	C	30.7	C
9. Grand Ave/Dyer Rd	Signal	18.3	B	18.3	B
10. SR-55 NB/Dyer Rd	Signal	10.9	B	25.6	C
11. SR-55 SB/MacArthur Blvd	Signal	11.8	B	34.4	C
12. SR-55 NB/MacArthur Blvd	Signal	11.1	B	27.2	C
13. SR-55 SB/Paularino Ave	Signal	20.1	C	18.1	B
14. SR-55 NB/Paularino Ave	Signal	19.3	B	22.6	C
Notes:	1. AWSC = All way stop control, SSSC = Side street stop-control. 2. Average delay reported for ASWC and signalized intersections and worst-approach delay reported for SSSC intersections. Bold font indicates unacceptable LOS E or F conditions.				
Source:	Fehr & Peers, 2015				

TABLE 5-B – INTERSECTION VEHICLE QUEUING ANALYSIS – EXISTING CONDITIONS				
Intersection	Movement	Storage (ft)	Queue (ft)	
			AM	PM
1. SR-55 SB/4 th St	SB – off-ramp	1,430	155	220
	WB – left turn	310	415	350
	WB – through	310	85	120
2. SR-55 NB/Irvine Blvd	NB – off-ramp	2,030	235	155
	EB – left turn	310	245	370
	EB – through	310	105	120
3. SR-55 SB/Village Way	SB – left turn	820	165	85
	WB – off-ramp	900	85	95
4. SR-55 NB/Pasadena Ave	SB – left turn	1,170	50	80
	SB – right turn	1,170	10	90
	EB – off-ramp	875	55	45
	WB – through	375	10	20
5. SR-55 SB/Edinger Ave	NB – off-ramp	995	355	310
	EB – left turn	180	75	85
	EB – through	1,285	250	335
	WB – left turn	255	220	190
	WB – through	1,055	225	180
6. SR-55 NB/Newport Ave	NB - Left	330	75	250
	SB – through	1,180	305	1,010



	SB – right turn	600	310	<u>1,010</u>
	EB – off-ramp	1,080	135	70
	WB – through	1,210	80	190
7. SR-55 SB/ Grand Ave	NB – through	1,070	215	115
	WB – off-ramp	930	300	195
8. SR-55 SB/Dyer Ave	NB – off-ramp	1,145	180	170
	EB – through	430	275	25
	WB – left turn	250	220	115
	WB – through	470	145	45
9. Grand Ave/Dyer Rd	SB – left turn	1,090	300	290
	SB – right-turn	1,090	300	290
	EB – left turn	100	<u>260</u>	<u>270</u>
	EB – through	460	260	420
	WB – through	500	370	385
10. SR-55 NB/Dyer Rd	NB – off-ramp	1,710	255	115
	EB – through	500	230	115
	EB – right turn	400	0	<u>415</u>
	WB – through	560	130	<u>1,265</u>
11. SR-55 SB/MacArthur Blvd	SB – off-ramp	1,425	260	170
	EB – through	815	265	200
	EB – right turn	815	0	0
	WB – through	885	270	<u>980</u>
	WB – right turn	350	0	<u>450</u>
12. SR-55 NB/MacArthur Blvd	NB – off-ramp	1,195	345	285



	EB – through	885	400	145
	EB – right turn	530	0	430
	WB – through	705	140	<u>1305</u>
	WB – right turn	705	0	<u>850</u>
13. SR-55 SB/Paularino Ave	SB – off-ramp	2,135	435	285
	WB – left turn	190	90	175
	WB – through	345	80	155
14. SR-55 NB/Paularino Ave	NB – through	845	280	240
	EB – left turn	130	<u>330</u>	<u>215</u>
	EB – through	345	230	85
Note: Bold and underline indicates vehicle queue exceeds the available storage.				
Source: Fehr & Peers, 2015				



Systemwide Performance

While LOS is a good indicator of transportation facility performance, the systemwide performance measures become effective factors especially when dealing with over-saturated conditions. The systemwide performance measures applied to this project include travel time, travel speeds, vehicle-miles-traveled, and vehicle-hours-delay. Table 6 shows the AM and PM peak hour segment by segment travel time and speeds for the SR-55 corridor. The AM and PM peak hour travel speeds along the study corridor are illustrated in Figures 1-C-AM and 1-C-PM, respectively.

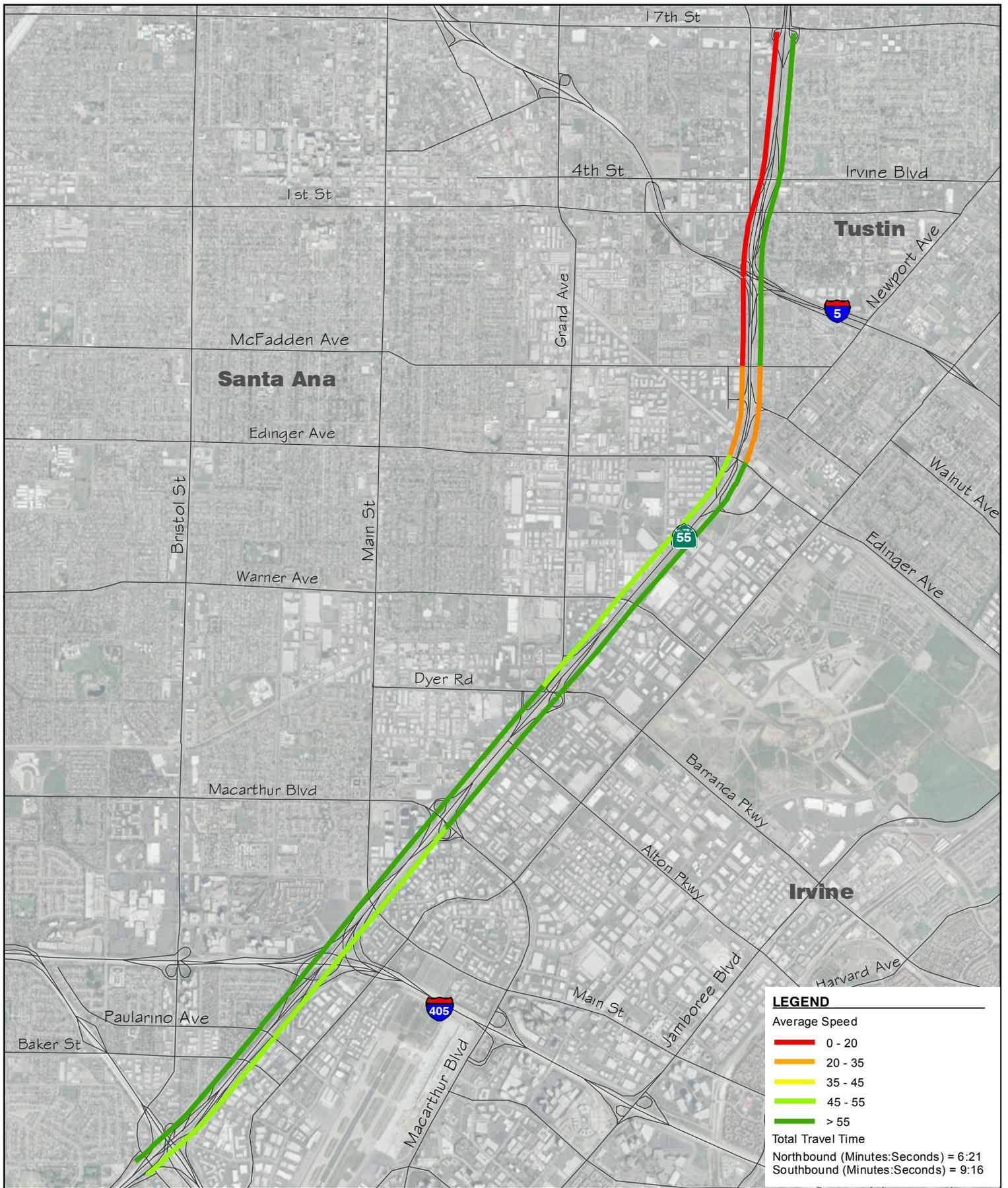
During the AM peak hour, the northbound vehicles travel at approximately 50 mph between Paularino Avenue and MacArthur Boulevard, pick up the speeds and travel at 60 mph through Dyer Road and Edinger Avenue, and then slow down significantly between Edinger Avenue and McFadden Avenue due to the bottleneck at the McFadden on-ramp. After the McFadden on-ramp, vehicles travel at free-flow speeds through the study area. In the southbound direction, heavy congestion between 4th Street and Edinger Avenue result in an average speed of less than 25 mph. After Edinger Avenue on-ramp, the travel speed increases to 40-50 mph through Dyer Road and to 60-65 mph after Dyer Road. The total travel time for northbound SR-55 is 6-7 minutes with the average speed of 51 mph, while the total travel time for southbound SR-55 is 9-10 minutes with the average speed of 35 mph.

During the PM peak hour, significant congestion along the northbound SR-55 result in an average speed of less than 30 mph through the study corridor with 15-20 mph south of McFadden Avenue and 20-30 mph north of McFadden Avenue. The southbound traffic flows much better with a free-flow speed at most of locations except for some slow-down at Dyer Road and MacArthur Boulevard ramps. The total travel time for northbound SR-55 is 17-18 minutes with the average speed of 19 mph, while the total travel time for southbound SR-55 is 5-6 minutes with the average speed of 60 mph.

The systemwide performance was evaluated for the AM and PM peak periods extended from peak hours to provide a better understanding of network performance. Table 7 shows the network-wide summary of the total vehicle-miles-traveled and vehicle-hours-delay during the AM and PM peak periods. In addition, the number of people served by the corridor is another important performance measure and included in Table 7. The results reflect the higher traffic demand and higher observed level of congestion in the PM peak period, which translates to more people getting through the corridor and higher vehicle delay per mile.

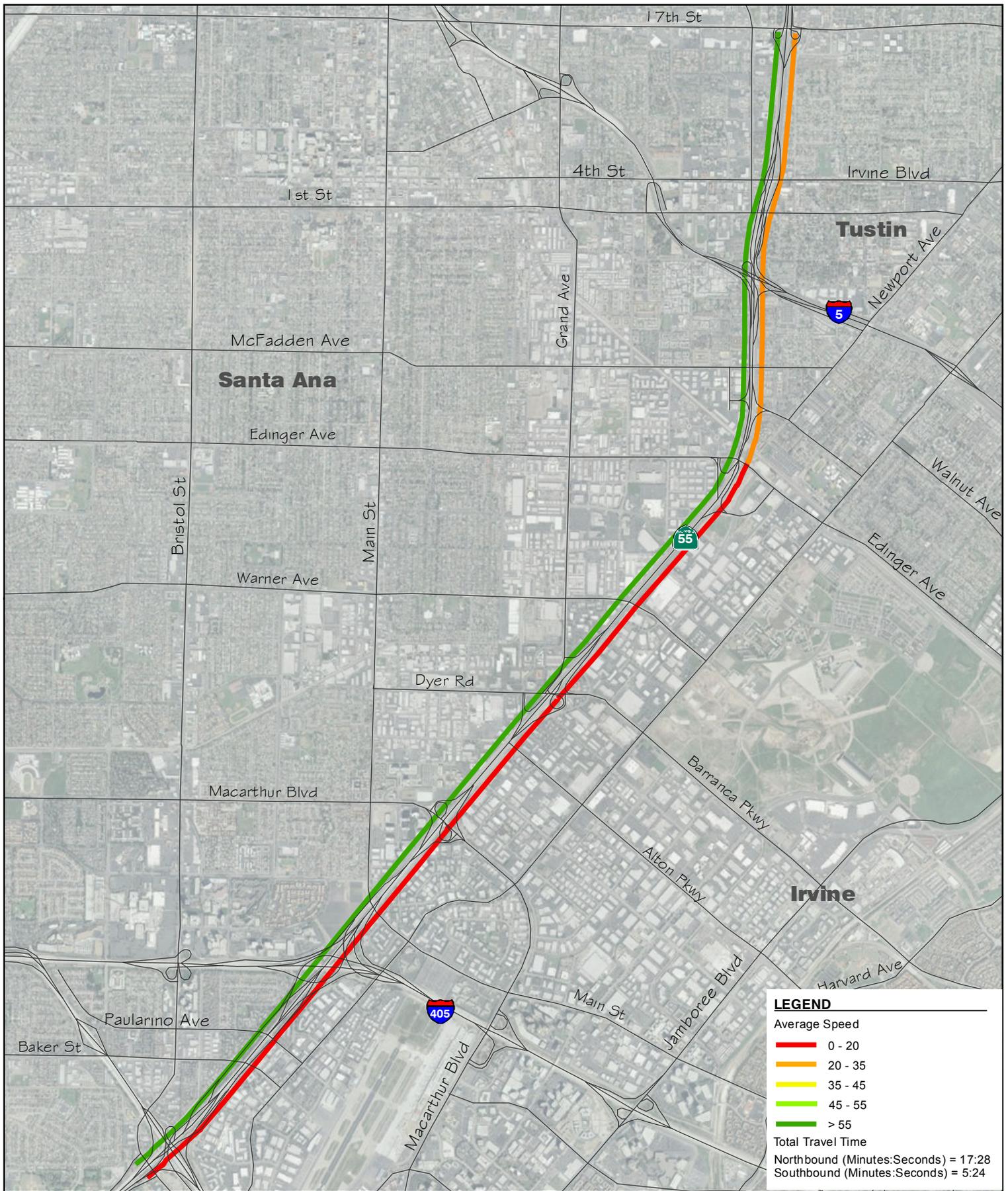


TABLE 6 – SR-55 TRAVEL TIME AND SPEEDS – EXISTING CONDITIONS					
Location	Mile	AM		PM	
		Travel Time (min:sec)	Travel Speed (mph)	Travel Time (min:sec)	Travel Speed (mph)
Northbound					
NB 55: Paularino Ave to I-405	0.5	00:33	51.3	01:36	17.6
NB 55: I-405 to MacArthur Blvd	1.0	01:12	49.3	03:40	16.1
NB 55: MacArthur Blvd to Dyer Rd	0.9	00:52	61.4	03:09	16.9
NB 55: Dyer Rd to Edinger Ave	1.6	01:33	61.1	04:58	19.1
NB 55: Edinger Ave to McFadden Ave	0.5	01:17	23.7	01:29	20.5
NB 55: McFadden Ave to I-5	0.5	00:26	64.7	01:16	22.1
NB 55: I-5 to Irvine Blvd	0.5	00:28	68.5	01:20	24.0
<u>NB 55 - Total</u>	<u>5.4</u>	<u>06:21</u>	<u>51.3</u>	<u>17:28</u>	<u>18.6</u>
Southbound					
SB 55: 4 th St to I-5	0.5	02:20	13.7	00:29	66.1
SB 55: I-5 to McFadden Ave	0.5	01:28	19.1	00:28	60.1
SB 55: McFadden Ave to Edinger Ave	0.5	01:14	24.6	00:29	62.8
SB 55: Edinger Ave to Dyer Rd	1.6	02:00	47.4	01:39	57.4
SB 55: Dyer Rd to MacArthur Blvd	0.9	00:52	61.4	00:51	62.6
SB 55: MacArthur Blvd to I-405	1.0	00:57	62.2	01:01	58.1
SB 55: I-405 to Paularino	0.5	00:25	67.7	00:27	62.7
<u>SB 55 - Total</u>	<u>5.4</u>	<u>09:16</u>	<u>35.1</u>	<u>05:24</u>	<u>60.3</u>
Source: Fehr & Peers, 2012					



N

NOT TO SCALE



N

NOT TO SCALE



TABLE 7 – SR-55 SYSTEMWIDE PEAK PERIOD PERFORMANCE – EXISTING CONDITIONS		
Performance Measure	AM	PM
People Served	176,890	205,350
VMT (veh-mi)	792,130	661,820
VHD (veh-hr)	5,020	9,640
Delay per Mile (sec/mi)	23	52
Source: Fehr & Peers, 2012		

Traffic Safety Review

Accident data was reviewed for SR-55 mainline segments and ramps within the project limit (Post Mile R5.990-10.450). This evaluation consisted of collecting and reviewing SR-55 accident data contained in TASAS Table B and C provided by Caltrans. For the purpose of this project, a three-year accident history was provided for April 2007 through March 2010. Table 8-A shows the number of total accidents, fatalities, and injuries for both freeway mainline and ramps, as well as the actual three-year accident rates with a comparison to the statewide average accident rates on familiar facilities. Figure 1-D categories the number of accidents by location along the study SR-55 corridor.



**TABLE 8-A – SR-55 ACCIDENT HISTORY
(APRIL 2007 THROUGH MARCH 2010)**

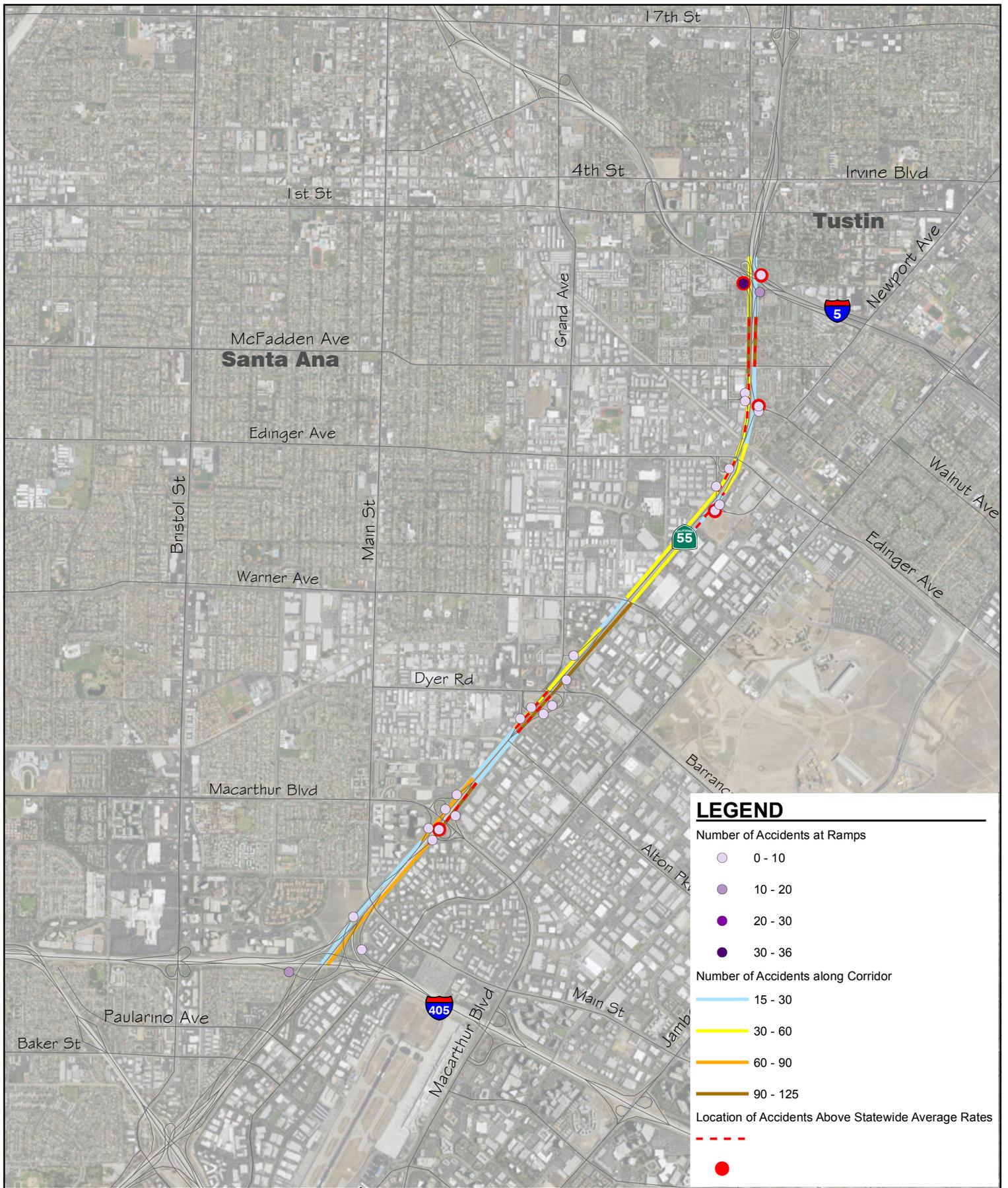
Location	Post Mile	Number of Accidents			Actual Accident Rates			Average Accident Rates		
		Total Accidents	Fatal	Injury	Fatal	Fatal + Injury	Total	Fatal	Fatal + Injury	Total
NB SR-55 On Ramp from SB I-405	9.005	20	0	4	0.000	0.12	0.59	0.005	0.20	0.60
NB SR-55 between 405 Underpass and NB Off Ramp to MacArthur Blvd	R5.990-R6.770	72	0	20	0.000	0.21	0.76	0.010	0.31	1.01
NB SR-55 between NB On Ramp from SB I-405 and NB On Ramp from Westbound MacArthur Blvd	R6.770-R7.180	125	0	30	0.000	0.59	2.45	0.010	0.31	1.02
NB SR-55 On Ramp from NB I-405	R6.391	4	0	0	0.000	0.00	0.20	0.003	0.11	0.35
NB SR-55 Off Ramp to MacArthur Blvd	R6.805	10	0	3	0.000	0.15	0.51	0.004	0.42	1.20
NB SR-55 On Ramp from Eastbound MacArthur Blvd	R6.939	7	0	4	0.000	0.43	0.75	0.004	0.20	0.70
NB SR-55 between NB On Ramp from Westbound MacArthur Blvd and NB Off Ramp to Dyer Rd	R7.180-R7.590	19	0	9	0.000	0.17	0.36	0.011	0.32	1.05
NB SR-55 between NB Off Ramp to Dyer Rd and NB On Ramp from Westbound Grand/Dyer Road	R7.590-8.180	120	0	32	0.000	0.41	1.52	0.011	0.35	1.15
NB SR-55 On Ramp from Westbound MacArthur Blvd	R7.158	3	0	1	0.000	0.07	0.20	0.003	0.20	0.65
NB SR-55 Off Ramp to Dyer Rd	R7.630	6	0	2	0.000	0.17	0.50	0.004	0.42	1.20
NB SR-55 On Ramp from Eastbound Dyer Rd	R7.851	1	0	0	0.000	0.00	0.08	0.004	0.20	0.70
NB SR-55 between NB On Ramp from Grand/Dyer Rd and Warner Ave Underpass	R8.180-R8.480	36	0	10	0.000	0.24	0.87	0.011	0.34	1.10
NB SR-55 between Warner Ave Underpass and NB Off Ramp to Edinger Ave	R8.480-R9.000	44	0	15	0.000	0.21	0.61	0.011	0.34	1.11
NB SR-55 On Ramp from Westbound Dyer Rd	R8.080	6	0	3	0.000	0.22	0.45	0.003	0.20	0.65
NB SR-55 between NB Off Ramp to Edinger Ave and NB On Ramp from Edinger Ave	R9.000-R9.320	15	0	6	0.000	0.14	0.34	0.011	0.34	1.10



NB SR-55 between NB On Ramp from Edinger Ave and NB Off Ramp to McFadden Ave	R9.320-R9.610	44	0	14	0.000	0.34	1.07	0.010	0.30	1.04
NB SR-55 between NB Off Ramp to McFadden Ave and NB On Ramp from McFadden Ave	R9.610-R9.850	30	0	6	0.000	0.17	0.86	0.010	0.29	1.01
NB SR-55 between NB On Ramp from McFadden Ave and NB Off Ramp to I-5	R9.850-R10.060	92	0	30	0.000	1.01	3.09	0.010	0.29	1.00
NB SR-55 Off Ramp to Edinger Ave	R9.206	8	0	3	0.000	0.47	1.26	0.004	0.42	1.20
NB SR-55 On Ramp from Edinger Ave	R9.411	9	0	3	0.000	0.18	0.55	0.002	0.80	0.80
NB SR-55 Off Ramp to McFadden Ave	R9.660	3	0	1	0.000	0.14	0.43	0.004	0.26	0.85
NB SR-55 On Ramp from McFadden Ave	R9.780	10	0	3	0.000	0.27	0.91	0.002	0.14	0.45
NB SR-55 between NB Off Ramp to NB I-5 and NB Off Ramp to SB I-5	R10.060-10.450	30	0	11	0.000	0.21	0.58	0.011	0.33	1.11
NB SR-55 Off Ramp to NB I-5	10.153	15	0	1	0.000	0.02	0.28	0.005	0.20	0.60
NB SR-55 Off Ramp to SB I-5	10.302	8	0	1	0.000	0.07	0.55	0.005	0.15	0.45
Total NB SR-55 between SB Off Ramp to John Wayne Airport and NB Off Ramp to NB Off Ramp to SB I-5	R5.990-10.450	627	0	183	0.000	0.26	1.06	0.011	0.32	1.07
SB SR-55 On Ramp from SB I-5	30.403	36	0	10	0.000	0.16	0.58	0.005	0.15	0.45
SB SR-55 between I-5 On Ramp and NB Off Ramp from I-5	10.450-10.230	34	0	7	0.000	0.23	1.12	0.012	0.36	1.18
SB SR-55 between SB On Ramp from I-5 and SB Off Ramp to McFadden Ave	10.230-R9.880	124	0	35	0.000	0.75	2.67	0.010	0.29	1.00
SB SR-55 Off Ramp from McFadden Ave	R9.860	5	0	2	0.000	0.23	0.59	0.004	0.28	0.95
SB SR-55 On Ramp from McFadden Ave	R9.750	3	0	1	0.000	0.13	0.39	0.002	0.16	0.55
SB SR-55 Off Ramp to Edinger Ave	R9.421	7	0	2	0.000	0.13	0.45	0.002	0.36	1.10
SB SR-55 On Ramp from Edinger Ave	R9.194	5	0	1	0.000	0.12	0.62	0.002	0.26	0.75
SB SR-55 between SB Off Ramp to McFadden Ave and SB On Ramp from McFadden Ave	R9.880-R9.710	32	0	6	0.000	0.24	1.30	0.010	0.29	1.01
SB SR-55 between SB On Ramp from Mc Fadden Ave and SB Off Ramp to Edinger Ave	R9.710-R9.450	36	0	5	0.000	0.13	0.95	0.010	0.29	1.01
SB SR-55 between SB Off Ramp to Edinger Ave and SB On Ramp from	R9.450-R9.110	54	0	9	0.000	0.19	1.15	0.011	0.33	1.09



Edinger Ave											
SB SR-55 between SB On Ramp from Edinger Ave and the Warner Ave Overpass	R9.110-R8.500	45	0	11	0.000	0.13	0.54	0.011	0.34	1.11	
SB SR-55 Off Ramp to Westbound Grand/Dyer Rd	R8.175	0	0	0	0.000	0.00	0.00	0.004	0.42	1.20	
SB SR-55 between Warner Ave Overpass and SB Off Ramp to Westbound Grand/Dyer Ave	R8.500-R8.220	29	0	10	0.000	0.26	0.75	0.011	0.34	1.10	
SB SR-55 between SB Off Ramp to Westbound Grand/Dyer Ave and SB Off Ramp to Dyer Rd	R8.220-R7.840	55	0	16	0.000	0.31	1.05	0.011	0.34	1.11	
SB Off Ramp to Eastbound Dyer Rd	R7.822	4	0	3	0.000	0.36	0.48	0.006	0.34	1.20	
SB SR-55 On Ramp from Dyer Rd	R7.619	3	0	1	0.000	0.07	0.22	0.002	0.26	0.75	
SB SR-55 Off Ramp to MacArthur Blvd	R7.203	8	0	2	0.000	0.11	0.43	0.004	0.42	1.20	
SB SR-55 between SB Off Ramp to Dyer Rd and On Ramp from Dyer Rd	R7.840-R7.570	52	0	14	0.000	0.41	1.51	0.012	0.37	1.19	
SB SR-55 between SB On Ramp from Dyer Rd and SB Off Ramp to MacArthur Blvd	R7.570-R7.210	16	0	4	0.000	0.09	0.35	0.011	0.32	1.05	
SB SR-55 On Ramp from Westbound MacArthur Blvd	R7.033	3	0	2	0.000	0.32	0.48	0.004	0.20	0.70	
SB SR-55 between SB Off Ramp to MacArthur Blvd and SB On Ramp from Westbound MacArthur Blvd	R7.210-R6.820	75	0	18	0.000	0.37	1.54	0.010	0.32	1.04	
SB SR-55 On Ramp from Eastbound MacArthur Blvd	R6.886	3	0	1	0.000	0.07	0.22	0.003	0.20	0.65	
SB SR-55 Off Ramp to SB I-405	R6.459	8	0	4	0.000	0.20	0.40	0.005	0.20	0.60	
SB SR-55 between SB On Ramp from Westbound MacArthur Blvd and SB On Ramp to SB I-405	R6.820-R6.450	30	0	10	0.000	0.22	0.67	0.009	0.28	0.94	
SB SR-55 between SB Off Ramp to SB I-405 and NB On Ramp from NB I-405	R6.450-R6.260	15	0	5	0.000	0.22	0.65	0.010	0.32	1.03	
SB SR-55 between NB On Ramp from NB I-405 and I-405 Overpass	R6.260-R5.990	28	0	4	0.000	0.12	0.85	0.011	0.34	1.08	
Total SB SR-55 between NB Off Ramp to SB I-5 and SB Off Ramp to John Wayne Airport	10.450-R5.990	625	0	154	0.000	0.26	1.06	0.011	0.32	1.07	
Notes: ¹ For mainline sections, the accident rate is the number of accidents per million vehicle-miles. For ramps, the accident rate is the number of accidents per million vehicles. Bold & underline indicates an actual accident rate that is higher than the average accident rate.											
Source: Caltrans District 12 TASAS Table B.											



NOT TO SCALE



As shown in Table 8-A, a total of 1447 accidents occurred in the study area between April 2007 and March 2010. A majority of the accidents (i.e., 87 percent) occurred on the SR-55 mainline, while the remaining 15 percent at the on- and off-ramps. Approximately 45 percent of the accidents occurred during the PM peak period (15:00-19:00). Accident rates at seventeen out of fifty one analyzed locations are higher than the statewide average for similar facilities:

- Northbound SR-55 between northbound on-ramp from southbound I-405 and northbound on-ramp from westbound MacArthur Boulevard (about 143% higher for total accident rate and about 28% higher for total fatalities and injuries accident rate)
- Northbound SR-55 on-ramp from eastbound MacArthur Boulevard (about 5% higher in total accident rate and about 23% higher for total fatalities and injuries accident rate)
- Northbound SR-55 between northbound off-ramp to Dyer Road and northbound on-ramp from westbound Grand/Dyer Road (about 37% higher for total accident rate and about 6% higher for total fatalities and injuries accident rate)
- Northbound SR-55 on-ramp from westbound Dyer Road (about 2% higher for total fatalities and injuries accident rate)
- Northbound SR-55 between northbound on-ramp from Edinger Avenue and northbound off-ramp to McFadden Avenue (about 3% higher for total accident rate and about 4% higher for total fatalities and injuries accident rate)
- Northbound SR-55 between northbound on-ramp from McFadden Avenue and northbound off-ramp to I-5 (about 209% higher for total accident rate and about 248% higher for total fatalities and injuries accident rate)
- Northbound SR-55 off-ramp to Edinger Avenue (about 6% higher for total accident rate and about 5% higher for total fatalities and injuries accident rate)
- Northbound SR-55 on-ramp from McFadden Avenue (about 46% higher for total accident rate and about 13% higher for total fatalities and injuries accident rate)
- Northbound SR-55 off-ramp to southbound I-5 (about 10% higher for total accident rate)
- Southbound SR-55 on-ramp from southbound I-5 (about 13% higher for total accident rate and about 1% higher for total fatalities and injuries accident rate)
- Southbound SR-55 between on-ramp from I-5 and southbound off-ramp to McFadden Avenue (about 167% higher for total accident rate and about 46% higher for total fatalities and injuries accident rate)
- Southbound SR-55 between southbound off-ramp to McFadden Avenue and southbound on-ramp from McFadden Avenue (about 29% higher for total accident rate)
- Southbound SR-55 between southbound off-ramp to Edinger Avenue and southbound on-ramp from Edinger Avenue (about 6% higher for total accident rate)



- Southbound SR-55 off-ramp to eastbound Dyer Road (about 2% higher for total fatalities and injuries accident rate)
- Southbound SR-55 between southbound off-ramp to Dyer Road and on-ramp from Dyer Road (about 32% higher for total accident rate and about 4% higher for total fatalities and injuries accident rate)
- Southbound SR-55 on-ramp from westbound MacArthur Boulevard (about 12% higher for total fatalities and injuries accident rate)
- Southbound SR-55 between southbound off-ramp to MacArthur Boulevard and southbound on-ramp from westbound MacArthur Boulevard (about 50% higher for total accident rate and about 5% higher for total fatalities and injuries accident rate)

Table 8-B also summarizes the number of accidents by accident type for those occurred on SR-55. As shown, approximately 60% the accidents were rear-end collisions on the SR-55, and other key accident types were sideswipe and hit-object. Rear-end collisions are typically related to traffic congestion.

TABLE 8-B – SR-55 ACCIDENT HISTORY BY ACCIDENT TYPE (APRIL 2007 THROUGH MARCH 2010)					
Location	Total Accidents	Rear End	Sideswipe	Hit Object	Others ¹
Northbound SR-55 On Ramp from Southbound I-405 (Post Mile 009.005)	20	11 (55%)	6 (30%)	2 (10%)	1 (5%)
Northbound SR-55 between 405 Underpass and Off Ramp to MacArthur Blvd (Post Mile R005.990-R006.770)	72	43 (60%)	16 (22%)	11 (15%)	2 (3%)
Northbound SR-55 between Northbound On Ramp from Southbound I-405 and Northbound On Ramp from Westbound MacArthur Blvd (Post Mile R006.770-R007.180)	125	83 (66%)	29 (23%)	8 (6%)	5 (4%)
Northbound SR-55 On Ramp from Northbound I-405 (Post Mile R006.391)	4	1 (25%)	1 (25%)	1 (25%)	1 (25%)
Northbound SR-55 Off Ramp to MacArthur Blvd (Post Mile R006.805)	10	0 (0%)	1 (10%)	4 (40%)	5 (50%)
Northbound SR-55 On Ramp from Eastbound MacArthur Blvd (Post Mile R006.939)	7	5 (72%)	0 (0%)	1 (14%)	1 (14%)
Northbound SR-55 between Northbound On Ramp from Westbound MacArthur Blvd and Northbound Off Ramp to Dyer Rd (Post Mile R007.180-R007.590)	19	15 (79%)	1 (5%)	2 (11%)	1 (5%)
Northbound SR-55 between Northbound Off Ramp to Dyer Rd and Northbound On Ramp from Westbound Grand/Dyer Road(Post Mile R007.590-R008.180)	120	83 (69%)	20 (17%)	10 (8%)	7 (6%)



Northbound SR-55 On Ramp from Westbound MacArthur Blvd (Post Mile R007.158)	3	3 (100%)	0 (0%)	0 (0%)	0 (0%)
Northbound SR-55 Off Ramp to Dyer Rd (Post Mile R007.630)	6	2 (33%)	1 (17%)	1 (17%)	2 (33%)
Northbound SR-55 On Ramp from Eastbound Dyer Rd (Post Mile R007.851)	1	1 (100%)	0 (0%)	0 (0%)	0 (0%)
Northbound SR-55 between Northbound On Ramp from Grand/Dyer Rd and Warner Ave Underpass (Post Mile R008.18-R008.480)	36	22 (61%)	7 (19%)	6 (17%)	1 (3%)
Northbound SR-55 between Warner Ave Underpass and Northbound Off Ramp to Edinger Ave (Post Mile R008.480-R009.000)	44	27 (61%)	8 (18%)	7 (16%)	2 (5%)
Northbound SR-55 On Ramp from Westbound Dyer Rd (Post Mile R008.080)	6	3 (50%)	2 (33%)	0 (0%)	1 (17%)
Northbound SR-55 between Northbound Off Ramp to Edinger Ave and Northbound On Ramp from Edinger Ave (Post Mile R009.000-R009.320)	15	13 (87%)	0 (0%)	2 (13%)	0 (0%)
Northbound SR-55 between Northbound On Ramp from Edinger Ave and Northbound Off Ramp to McFadden Ave (Post Mile R009.320-R009.610)	44	30 (68%)	8 (18%)	6 (14%)	0 (0%)
Northbound SR-55 between Northbound Off Ramp to McFadden Ave and Northbound On Ramp from McFadden Ave (Post Mile R009.610-R009.850)	30	10 (33%)	8 (27%)	5 (17%)	7 (23%)
Northbound SR-55 between Northbound On Ramp from McFadden Ave and Northbound Off Ramp to I-5 (Post Mile R009.850-R010.060)	92	63 (68%)	21 (23%)	8 (9%)	0 (0%)
Northbound SR-55 Off Ramp to Edinger Ave (Post Mile R009.206)	8	2 (25%)	0 (0%)	4 (50%)	2 (25%)
Northbound SR-55 On Ramp from Edinger Ave (Post Mile R009.411)	9	1 (11%)	7 (78%)	1 (11%)	0 (0%)
Northbound SR-55 Off Ramp to McFadden Ave (Post Mile R009.660)	3	0 (0%)	0 (0%)	1 (33%)	2 (67%)
Northbound SR-55 On Ramp from McFadden Ave (Post Mile R009.780)	10	0 (0%)	5 (50%)	1 (10%)	4 (40%)
Northbound SR-55 between Northbound Off Ramp to Northbound I-5 and Northbound Off Ramp to Southbound I-5 (Post Mile R010.060-010.450)	30	19 (63%)	6 (20%)	5 (17%)	0 (0%)
Northbound SR-55 Off Ramp to Northbound I-5	15	8	4	2	1

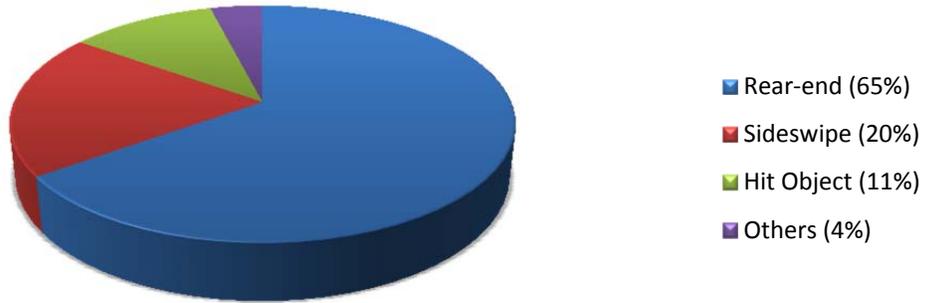


(Post Mile 010.153)		(53%)	(27%)	(13%)	(7%)
Northbound SR-55 Off Ramp to Southbound I-5 (Post Mile 010.302)	8	0 (0%)	0 (0%)	8 (100%)	0 (0%)
Total Northbound SR-55 between Southbound Off Ramp to John Wayne Airport and Northbound Off Ramp to Northbound Off Ramp to Southbound I-5 (Post Mile R005.990-010.450)	627	408 (65%)	124 (20%)	70 (11%)	25 (4%)
Southbound SR-55 On Ramp from Southbound I-5 (Post Mile 030.403)	36	17 (47%)	5 (14%)	12 (33%)	2 (6%)
Southbound SR-55 between I-5 On Ramp and Off Ramp from I-5 (Post Mile 010.450-010.230)	34	20 (59%)	14 (41%)	0 (0%)	0 (0%)
Southbound SR-55 between On Ramp from I-5 and Southbound Off Ramp to McFadden Ave (Post Mile 010.230- R009.880)	124	94 (75%)	17 (14%)	12 (10%)	1 (1%)
Southbound SR-55 Off Ramp from McFadden Ave (Post Mile R009.860)	5	2 (40%)	0 (0%)	2 (40%)	1 (20%)
Southbound SR-55 On Ramp from McFadden Ave (Post Mile R009.750)	3	2 (67%)	1 (33%)	0 (0%)	0 (0%)
Southbound SR-55 Off Ramp to Edinger Ave (Post Mile R009.421)	7	0 (0%)	1 (14%)	4 (57%)	2 (29%)
Southbound SR-55 On Ramp from Edinger Ave (Post Mile R009.194)	5	3 (60%)	0 (0%)	1 (20%)	1 (20%)
Southbound SR-55 between Southbound Off Ramp to McFadden Ave and Southbound On Ramp from McFadden Ave (Post Mile R009.880-R009.710)	32	21 (65%)	6 (19%)	1 (3%)	4 (13%)
Southbound SR-55 between Southbound On Ramp from Mc Fadden Ave and Southbound Off Ramp to Edinger Ave (Post Mile R009.710-R009.450)	36	27 (75%)	8 (22%)	0 (0%)	1 (3%)
Southbound SR-55 between Southbound Off Ramp to Edinger Ave and Southbound On Ramp from Edinger Ave (Post Mile R009.450-R009.110)	54	36 (66%)	8 (15%)	8 (15%)	2 (4%)
Southbound SR-55 between Southbound On Ramp from Edinger Ave and the Warner Ave Overpass (Post Mile R009.110-R008.500)	45	30 (66%)	7 (16%)	7 (16%)	1 (2%)
Southbound SR-55 Off Ramp to Westbound Grand/Dyer Rd (Post Mile R008.175)	0	-	-	-	-
Southbound SR-55 between Warner Ave Overpass and Southbound Off Ramp to Westbound Grand/Dyer Ave (Post Mile R008.500-R008.220)	29	22 (76%)	6 (21%)	0 (0%)	1 (3%)

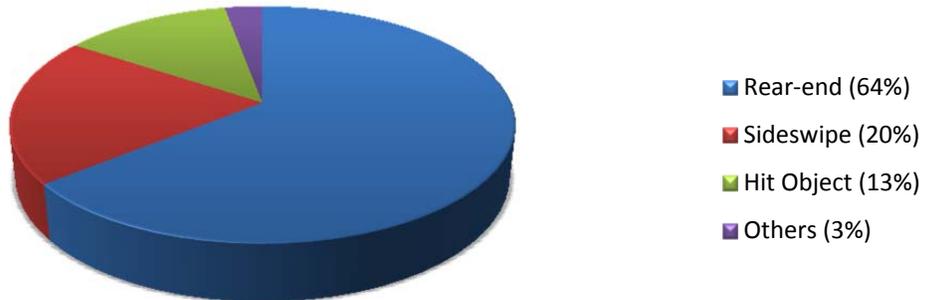


Southbound SR-55 between Southbound Off Ramp to Westbound Grand/Dyer Ave and Southbound Off Ramp to Dyer Rd (Post Mile R008.220-R007.840)	55	37 (68%)	9 (16%)	9 (16%)	0 (0%)
Southbound Off Ramp to Eastbound Dyer Rd (Post Mile R007.822)	4	1 (25%)	1 (25%)	1 (25%)	1 (25%)
Southbound SR-55 On Ramp from Dyer Rd (Post Mile R007.619)	3	1 (33%)	1 (33%)	0 (0%)	1 (33%)
Southbound SR-55 Off Ramp to MacArthur Blvd (Post Mile R007.203)	8	3 (38%)	1 (12%)	4 (50%)	0 (0%)
Southbound SR-55 between Southbound Off Ramp to Dyer Rd and On Ramp from Dyer Rd (Post Mile R007.840-R007.570)	52	28 (54%)	12 (23%)	11 (21%)	1 (2%)
Southbound SR-55 between Southbound On Ramp from Dyer Rd and Southbound Off Ramp to MacArthur Blvd (Post Mile R007.5700-R007.210)	16	11 (68%)	2 (13%)	1 (6%)	2 (13%)
Southbound SR-55 On Ramp from Westbound MacArthur Blvd (Post Mile R007.033)	3	1 (33%)	1 (33%)	1 (33%)	0 (0%)
Southbound SR-55 between Southbound Off Ramp to MacArthur Blvd and Southbound On Ramp from Westbound MacArthur Blvd (Post Mile R007.210-R006.820)	75	42 (56%)	17 (23%)	16 (21%)	0 (0%)
Southbound SR-55 On Ramp from Eastbound MacArthur Blvd (Post Mile R006.886)	3	1 (33%)	0 (0%)	2 (67%)	0 (0%)
Southbound SR-55 Off Ramp to Southbound I-405 (Post Mile R006.459)	8	0 (0%)	2 (25%)	5 (62%)	1 (13%)
Southbound SR-55 between Southbound On Ramp from Westbound MacArthur Blvd and Southbound On Ramp to Southbound I-405 (Post Mile R006.820-R006.450)	30	18 (60%)	4 (13%)	5 (17%)	3 (10%)
Southbound SR-55 between Southbound Off Ramp to Southbound I-405 and Northbound On Ramp from Northbound I-405 (Post Mile R006.450-R006.260)	15	8 (53%)	4 (27%)	2 (13%)	1 (7%)
Southbound SR-55 between Northbound On Ramp from Northbound I-405 and I-405 Overpass (Post Mile R006.260-R005.990)	28	7 (25%)	12 (43%)	8 (29%)	1 (3%)
Total Southbound SR-55 between Northbound Off Ramp to Southbound I-5 and Southbound Off Ramp to John Wayne Airport (Post Mile 010.450- R005.990)	625	401 (64%)	126 (20%)	80 (13%)	18 (3%)
Notes: ¹ Other accident types include head-on, broadside, overturn, auto-pedestrian, and other collisions.					
Source: Caltrans District 12 TASAS Table B					

NB 55 Accidents by Type



SB 55 Accidents by Type





4. PROJECT ALTERNATIVES

A total of five alternatives are under consideration. A Preferred Alternative will be selected by the Project Development Team (PDT) after the public meeting and public circulation period of the Draft Environmental Document is complete. A brief description of each alternative is provided below. The project alternatives are also illustrated in Exhibits A through E.

No Build Alternative

This alternative maintains existing conditions and proposes no changes or improvements to SR-55 between the project limits.

The layout of the No Build Alternative is shown in [Exhibit A](#).

Alternative 1 (Additional Auxiliary Lanes)

Alternative 1 proposes a new auxiliary lane in the northbound direction at two locations:

- between the MacArthur Boulevard and Dyer Road interchanges
- between the Dyer Road and Edinger Avenue interchanges

In the southbound direction, a general-purpose lane would be created between the southbound I-5 connector and the east Dyer Road off-ramp, and the existing auxiliary lane between the McFadden Avenue and Edinger Avenue interchanges would be restored. Additionally, the transition length for merging between the existing southbound HOV lane on SR-55 and the southbound I-5/SR-55 Connector HOV lane would be extended past Edinger Avenue.

The layout of Alternative 1 is shown in [Exhibit B](#).

Alternative 2 (One New General Purpose Lane)

Alternative 2 proposes to create one general-purpose lane in the northbound and southbound directions.

In the northbound direction, two existing auxiliary lanes would be restored between the northbound I-405 connector and the MacArthur Boulevard interchange, and between the Edinger Avenue and McFadden Avenue interchanges.

In the southbound direction, the existing auxiliary lane between the McFadden Avenue and Edinger Avenue interchanges would be restored. Additionally, the transition length for merging between the existing southbound HOV lane on SR-55 and the southbound I-5/SR-55 Connector HOV lane would be extended past Edinger Avenue.

The layout of Alternative 2 is shown in [Exhibit C](#).



Alternative 3 (One New General Purpose Lane and Additional Auxiliary Lanes)

Alternative 3 proposes to add one general-purpose lane in the northbound and southbound directions and restore existing auxiliary lanes.

Additionally, in the northbound direction, new auxiliary lanes would be constructed at two locations:

- between the MacArthur Boulevard and Dyer Road interchanges
- between the Dyer Road and Edinger Avenue interchanges

The restored auxiliary lane between the Edinger Avenue and McFadden Avenue interchanges would be extended to the northbound I-5 connector and the northbound McFadden on-ramp would be restricted to the northbound I-5 connector only. As a result, access from the McFadden on-ramp to northbound SR-55 and southbound I-5 would be eliminated.

In the southbound direction, the transition length for merging between the existing southbound SR-55 HOV lane and the southbound I-5/SR-55 HOV connector would be extended past Edinger Avenue.

The layout of Alternative 3 is shown in [Exhibit D](#).

Alternative 4 (One New HOV Lane and Additional Auxiliary Lanes)

Alternative 4 proposes to add a second HOV lane in each direction between the I-405 and I-5 HOV direct connectors.

Additionally, in the northbound direction, a new auxiliary lane would be constructed at three locations:

- between the MacArthur Boulevard and Dyer Road interchanges
- between the Dyer Road and Edinger Avenue interchanges
- from just south of the Tustin Overhead to the northbound I-5 connector

The northbound McFadden on-ramp would be restricted to the northbound I-5 connector only. As a result, access from the McFadden on-ramp to northbound SR-55 and southbound I-5 would be eliminated.

In the southbound direction, a general-purpose lane would be created between the southbound I-5 connector and east Dyer Road off-ramp. The existing auxiliary lane between the McFadden Avenue and Edinger Avenue interchanges would be restored.

The layout of Alternative 4 is shown in [Exhibit E](#).

Alternative Assumptions

This section compares the geometric assumptions in the Project Report for each of the project alternatives, in comparison with those contained in the Project Study Report (dated September 2008). The comparison is listed below with underline font indicating the difference in geometric assumptions between the Project Report and Project Study Report.



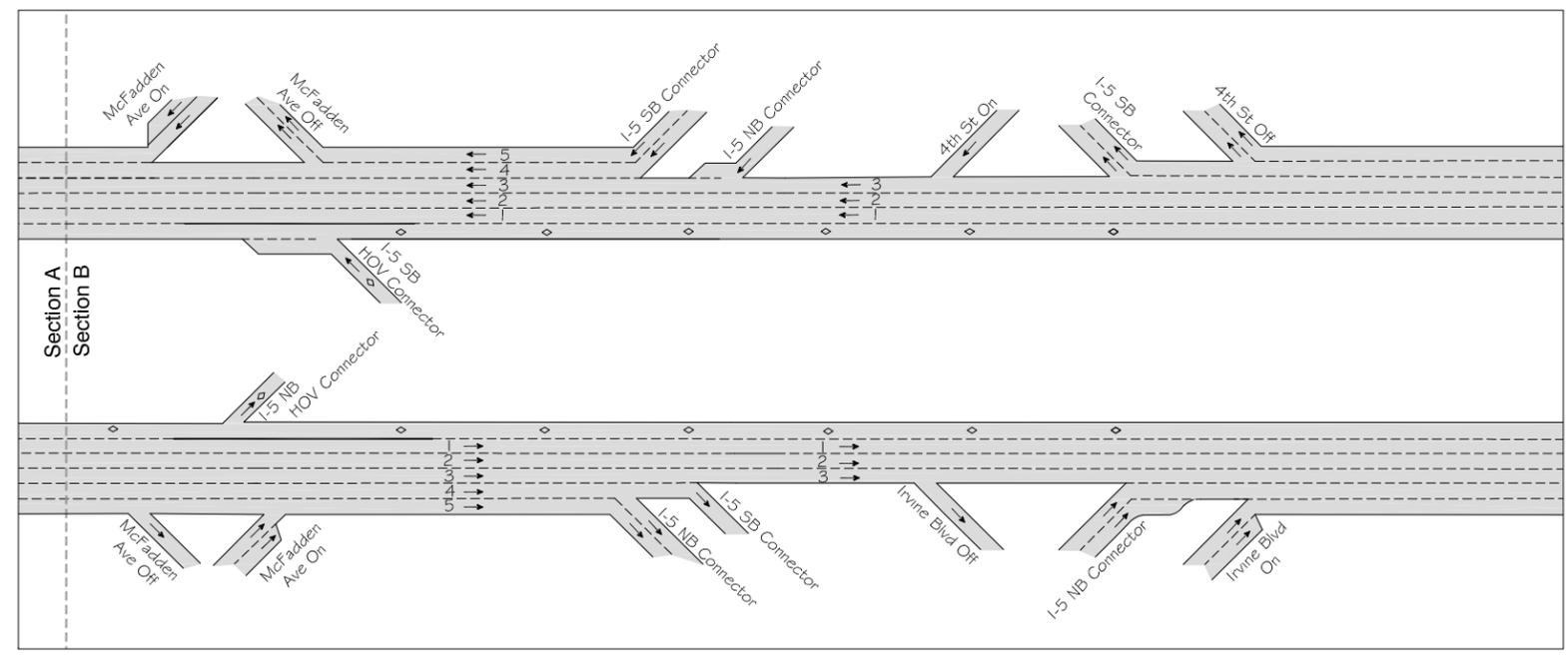
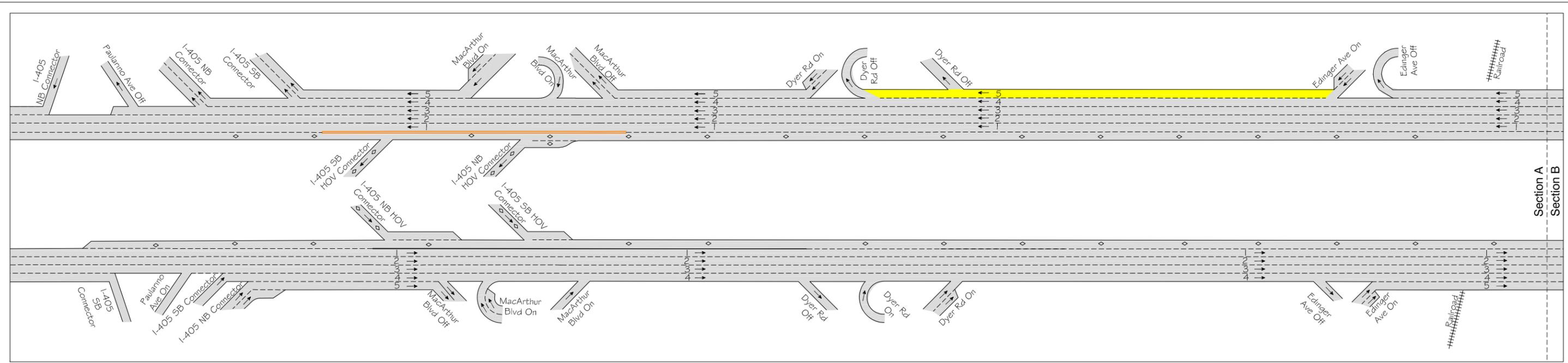
Alternative	Improvements assumed in Project Report	Improvements assumed in Project Study Report
No Build	<ol style="list-style-type: none"> 1. Southbound auxiliary lane from Edinger Avenue to Dyer Road (EA 12-0G960K) 2. Southbound auxiliary lane from Dyer Road to MacArthur Boulevard (EA-0E2500) 3. SR-55 continuous HOV access from Paularino Avenue to Meats Avenue (EA 12-0J760K) 	<ol style="list-style-type: none"> 1. Southbound auxiliary lane from Edinger Avenue to Dyer Road (EA 12-0G960K) 2. Southbound auxiliary lane from Dyer Road to MacArthur Boulevard (EA-0E2500) 3. SR-55 continuous HOV access from Paularino Avenue to Meats Avenue (EA 12-0J760K) 4. <u>Alton Avenue Overcrossing HOV drop ramp and northbound auxiliary lane from MacArthur Boulevard to Dyer Road (EA 12-005500)</u>
Alternative 1	<ol style="list-style-type: none"> 1. Northbound auxiliary lane between MacArthur Boulevard and Dyer Road (<u>project feature</u>) 2. Northbound auxiliary lane between Dyer Road and Edinger Avenue 3. One additional general purpose lane southbound between McFadden Avenue and Dyer Road 4. Southbound auxiliary lane between McFadden Avenue and Edinger Avenue 5. <u>Extension of the southbound I-5 HOV connector lane to Edinger Avenue</u> 	<ol style="list-style-type: none"> 1. Northbound auxiliary lane between MacArthur Boulevard and Dyer Road (<u>EA 12-005500</u>) 2. Northbound auxiliary lane between Dyer Road and Edinger Avenue 3. One additional general purpose lane southbound between McFadden Avenue and Dyer Road 4. Southbound auxiliary lane between McFadden Avenue and Edinger Avenue
Alternative 2	<ol style="list-style-type: none"> 1. One additional general purpose lane northbound and southbound between McFadden Avenue and McArthur Boulevard/I-405 2. Existing auxiliary lanes converted to the added general purpose lane including Southbound between Edinger Avenue and 	<ol style="list-style-type: none"> 1. One additional general purpose lane northbound and southbound between McFadden Avenue and McArthur Boulevard/I-405 2. Existing auxiliary lanes converted to the added general purpose lane including Southbound between Edinger Avenue and Dyer and southbound between



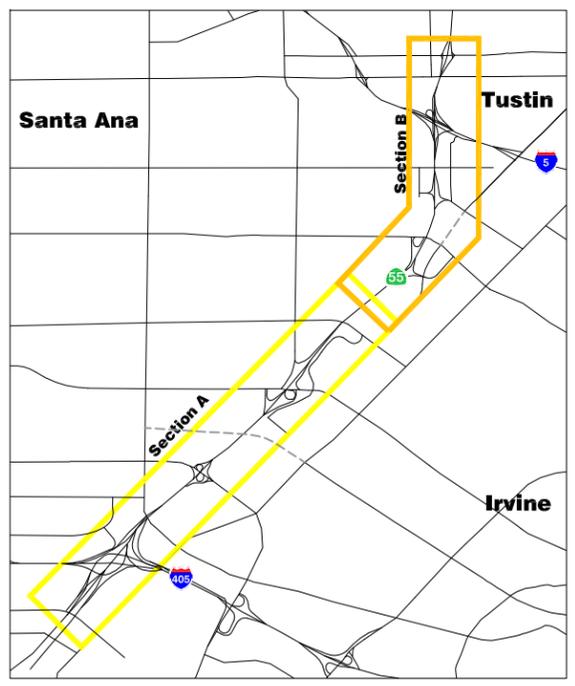
	<p>Dyer and southbound between Dyer Road and MacArthur Boulevard</p> <ol style="list-style-type: none"> 3. Northbound auxiliary lane between I-405 NB on-ramp and MacArthur Boulevard 4. Northbound auxiliary lane at Edinger Avenue on-ramp 5. Southbound auxiliary lane between McFadden Avenue and Edinger Avenue 6. <u>Existing southbound auxiliary between MacArthur Boulevard and the I-405 connector converted into general purpose lane</u> 7. <u>Extension of the southbound I-5 HOV connector lane to Edinger Avenue</u> 	<p>Dyer Road and MacArthur Boulevard</p> <ol style="list-style-type: none"> 3. Northbound auxiliary lane between I-405 NB on-ramp and MacArthur Boulevard 4. Northbound auxiliary lane at Edinger Avenue on-ramp 5. Southbound auxiliary lane between McFadden Avenue and Edinger Avenue 6. <u>Southbound auxiliary lane between MacArthur Boulevard and I-405 connector</u>
<p>Alternative 3</p>	<ol style="list-style-type: none"> 1. One additional general purpose lane northbound and southbound between McFadden Avenue and MacArthur Boulevard/I-405 2. Northbound auxiliary lane between I-405 NB on-ramp and MacArthur Boulevard 3. Northbound auxiliary lane between MacArthur Boulevard and Dyer Road 4. Northbound auxiliary lane between Dyer Road and Edinger Avenue 5. Northbound auxiliary lane at Edinger Avenue on-ramp 6. Southbound auxiliary lane between McFadden Avenue and Edinger Avenue 7. Southbound auxiliary lane between Edinger Avenue and Dyer Road 8. Southbound auxiliary lane between Dyer Road and MacArthur Boulevard 	<ol style="list-style-type: none"> 1. One additional general purpose lane northbound and southbound between McFadden Avenue and MacArthur Boulevard/I-405 2. Northbound auxiliary lane between I-405 NB on-ramp and MacArthur Boulevard 3. Northbound auxiliary lane between MacArthur Boulevard and Dyer Road 4. Northbound auxiliary lane between Dyer Road and Edinger Avenue 5. Northbound auxiliary lane at Edinger Avenue on-ramp 6. Southbound auxiliary lane between McFadden Avenue and Edinger Avenue 7. Southbound auxiliary lane between Edinger Avenue and Dyer Road 8. Southbound auxiliary lane between Dyer Road and MacArthur Boulevard 9. <u>Southbound auxiliary lane</u>



	<ol style="list-style-type: none"> 9. <u>Existing southbound auxiliary between MacArthur Boulevard and the I-405 connector converted into general purpose lane</u> 10. <u>Extension of the southbound I-5 HOV connector lane to Edinger Avenue</u> 11. <u>Extension of the restored auxiliary lane between the Edinger Avenue and McFadden Avenue interchanges to the northbound I-5 connector and the northbound McFadden on-ramp would be restricted to the northbound I-5 connector only</u> 	<p><u>between MacArthur Boulevard and I-405 connector</u></p>
<p>Alternative 4 (PSR Alt 5)</p>	<ol style="list-style-type: none"> 1. One additional HOV lane northbound and southbound between the I-405 HOV connector and the I-5 HOV connector 2. Northbound auxiliary lane between MacArthur Boulevard and Dyer Road (<u>project feature</u>) 3. Northbound auxiliary lane between Dyer Road and Edinger Avenue 4. One additional general purpose lane southbound between McFadden Avenue and Dyer Road 5. Southbound auxiliary lane between McFadden Avenue and Edinger Avenue 6. <u>The northbound McFadden on-ramp would be restricted to the northbound I-5 connector only</u> 	<ol style="list-style-type: none"> 1. One additional HOV lane northbound and southbound between the I-405 HOV connector and the I-5 HOV connector 2. Northbound auxiliary lane between MacArthur Boulevard and Dyer Road (<u>EA 12-005500</u>) 3. Northbound auxiliary lane between Dyer Road and Edinger Avenue 4. One additional general purpose lane southbound between McFadden Avenue and Dyer Road 5. Southbound auxiliary lane between McFadden Avenue and Edinger Avenue
<p>PSR Alt 4</p>	<p>Not analyzed per approved PSR due to extensive right-of-way impact.</p>	<p>A combination of PSR Alternatives 1, 2, and 5</p>

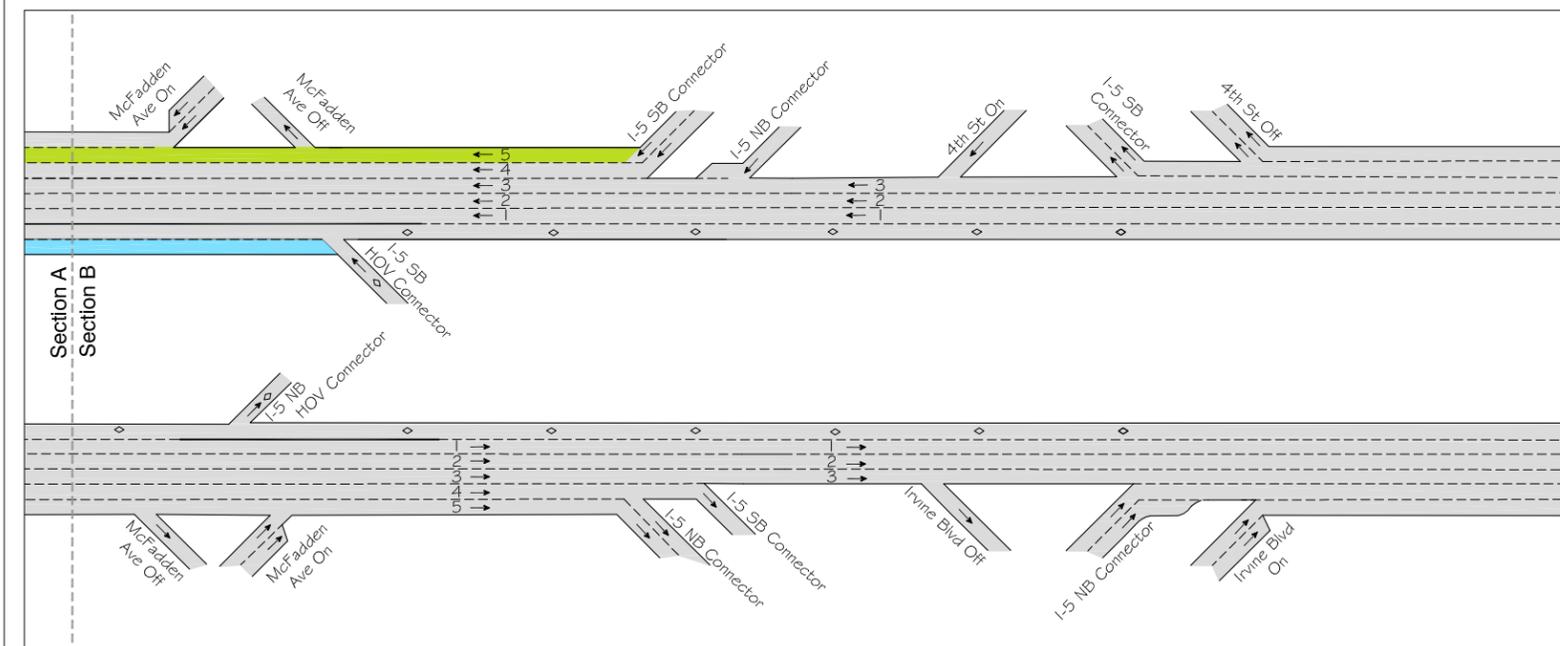
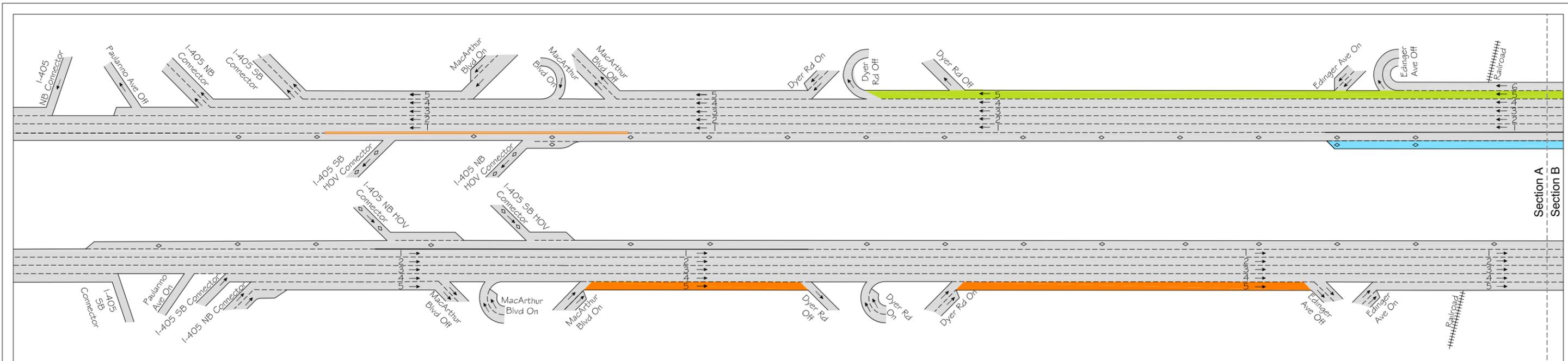


- LEGEND**
- - General Purpose Lane
 - ◇ - HOV Lane
 - (Yellow) — - Improvements by Other Project Completed in 2012
 - (Orange) — - HOV Limited Access

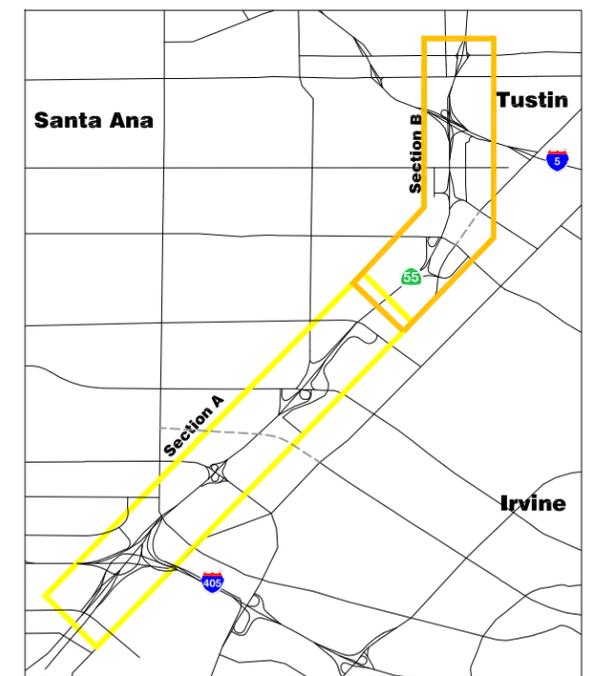


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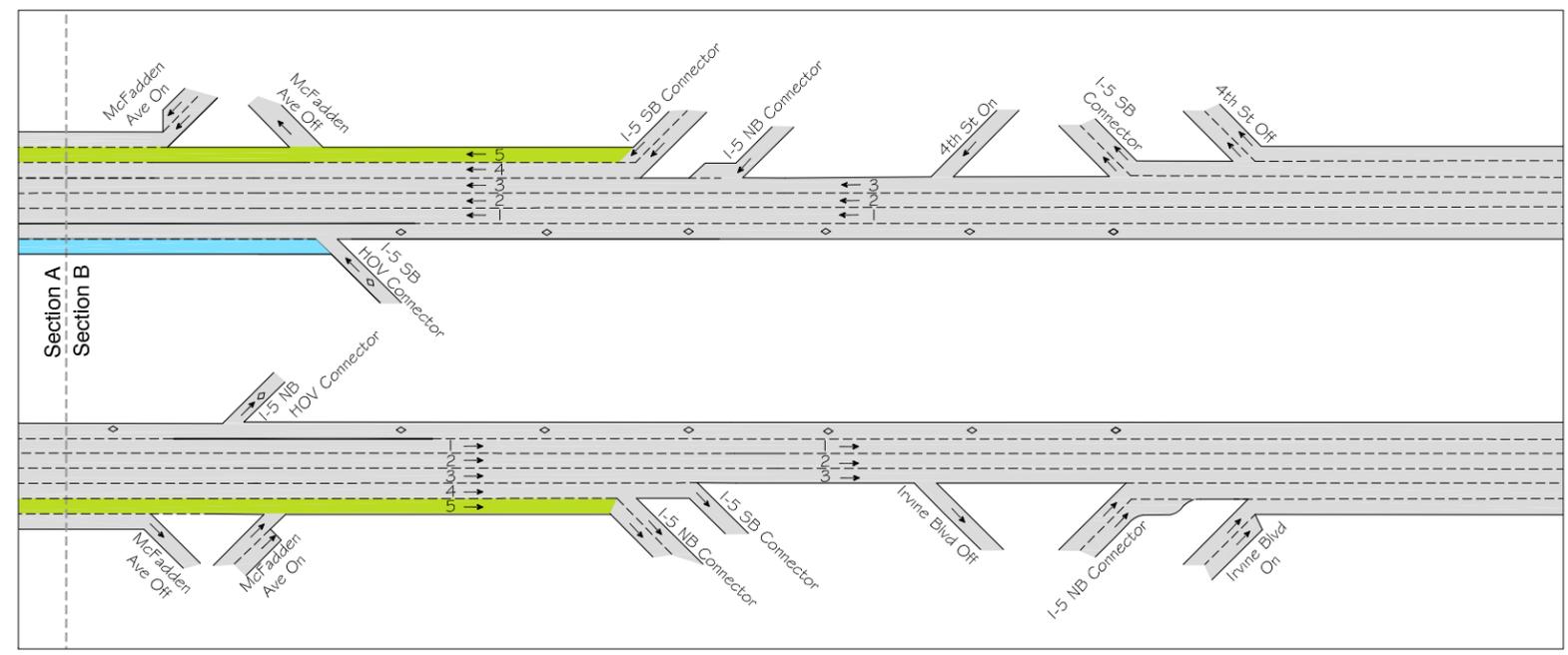
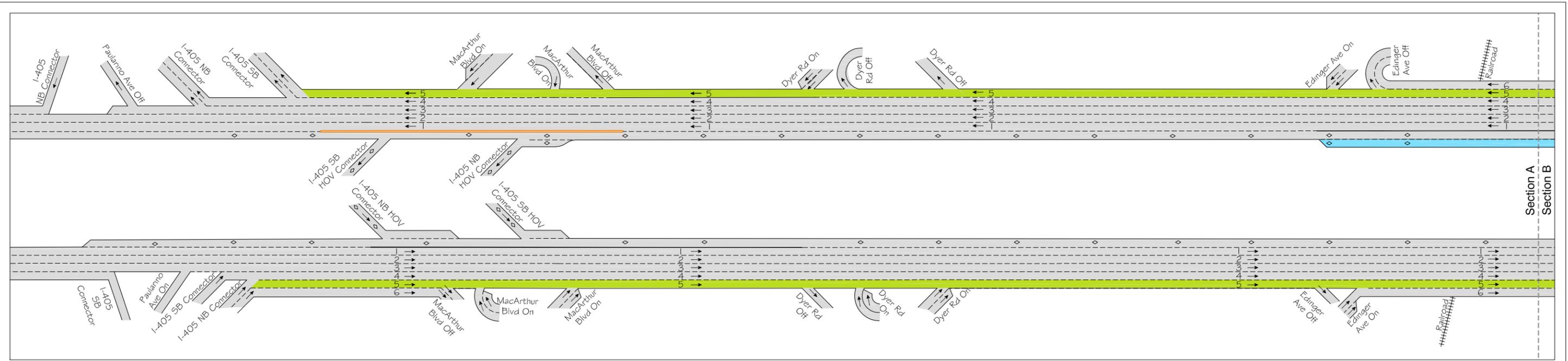
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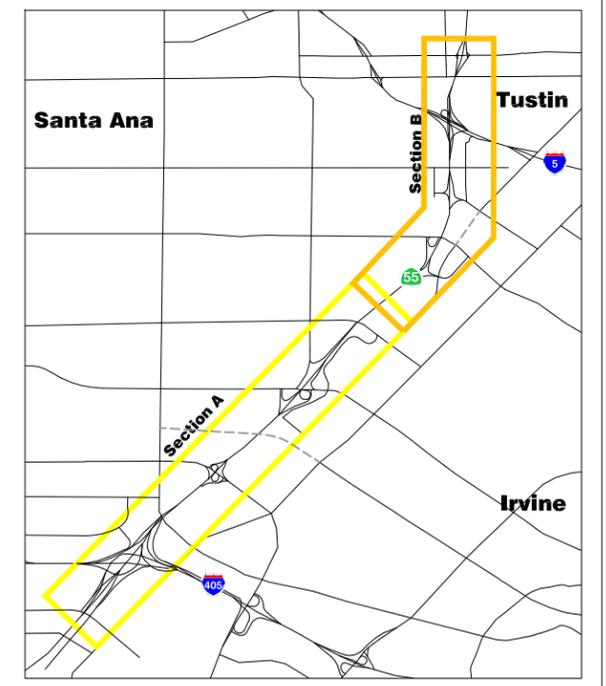
- LEGEND**
- - General Purpose Lane
 - ◇ - HOV Lane
 - (Green) - Proposed General Purpose Lane
 - (Orange) - Proposed Auxiliary Lane
 - (Blue) - Proposed HOV Lane
 - (Orange) - HOV Limited Access



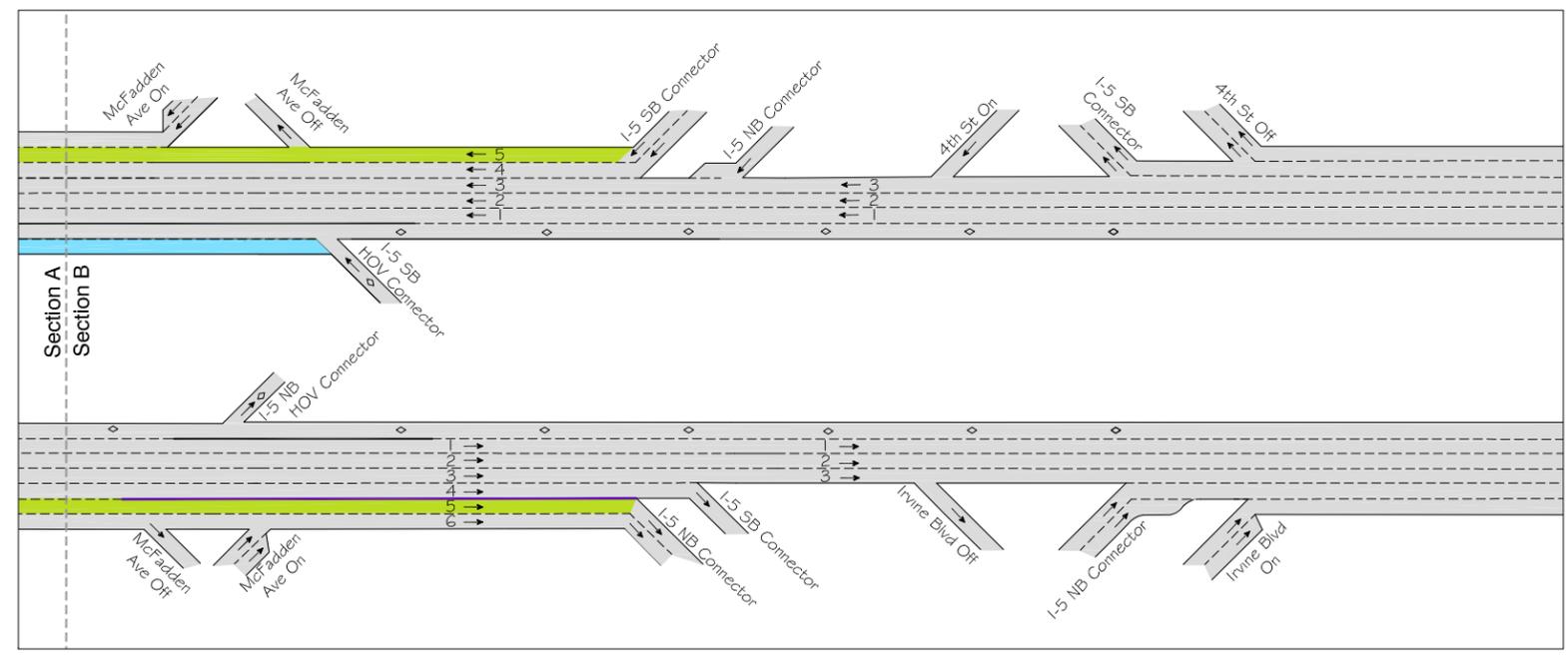
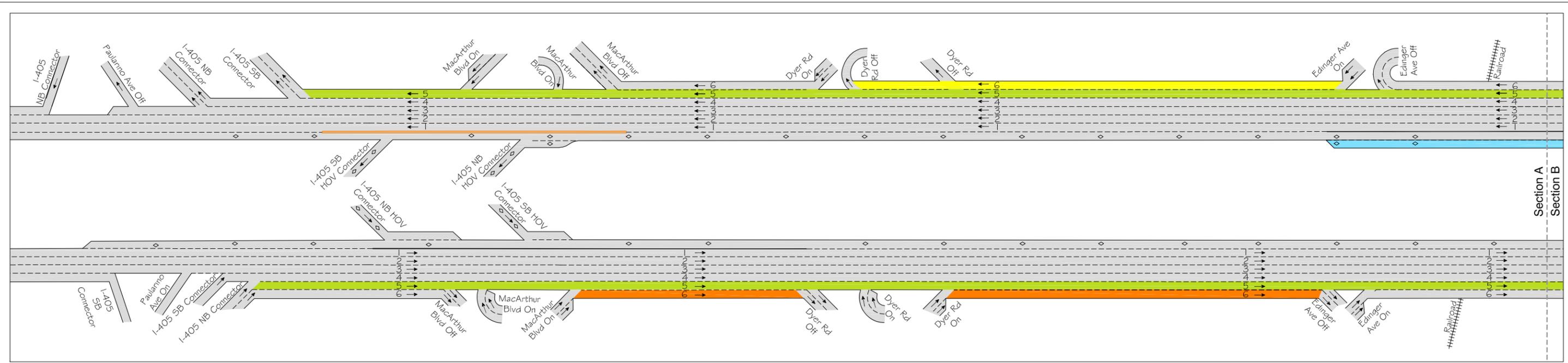
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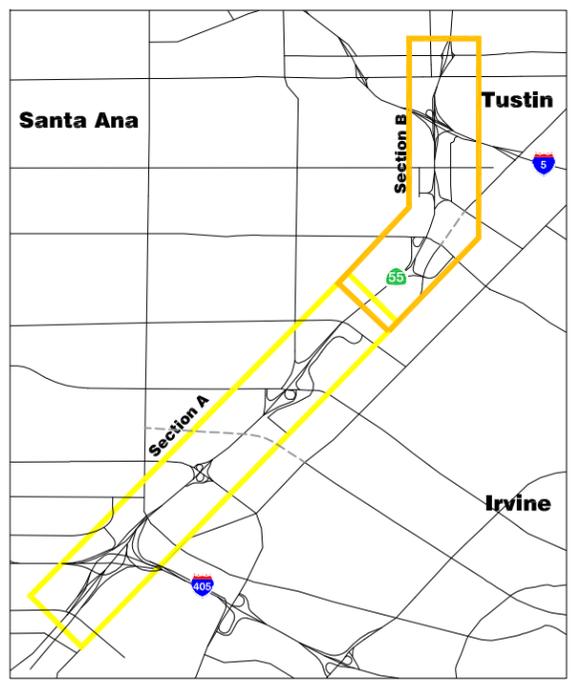
- LEGEND**
- - General Purpose Lane
 - ◇ - HOV Lane
 - (Green Line) - Proposed General Purpose Lane
 - (Blue Line) - Proposed HOV Lane
 - (Orange Line) - HOV Limited Access



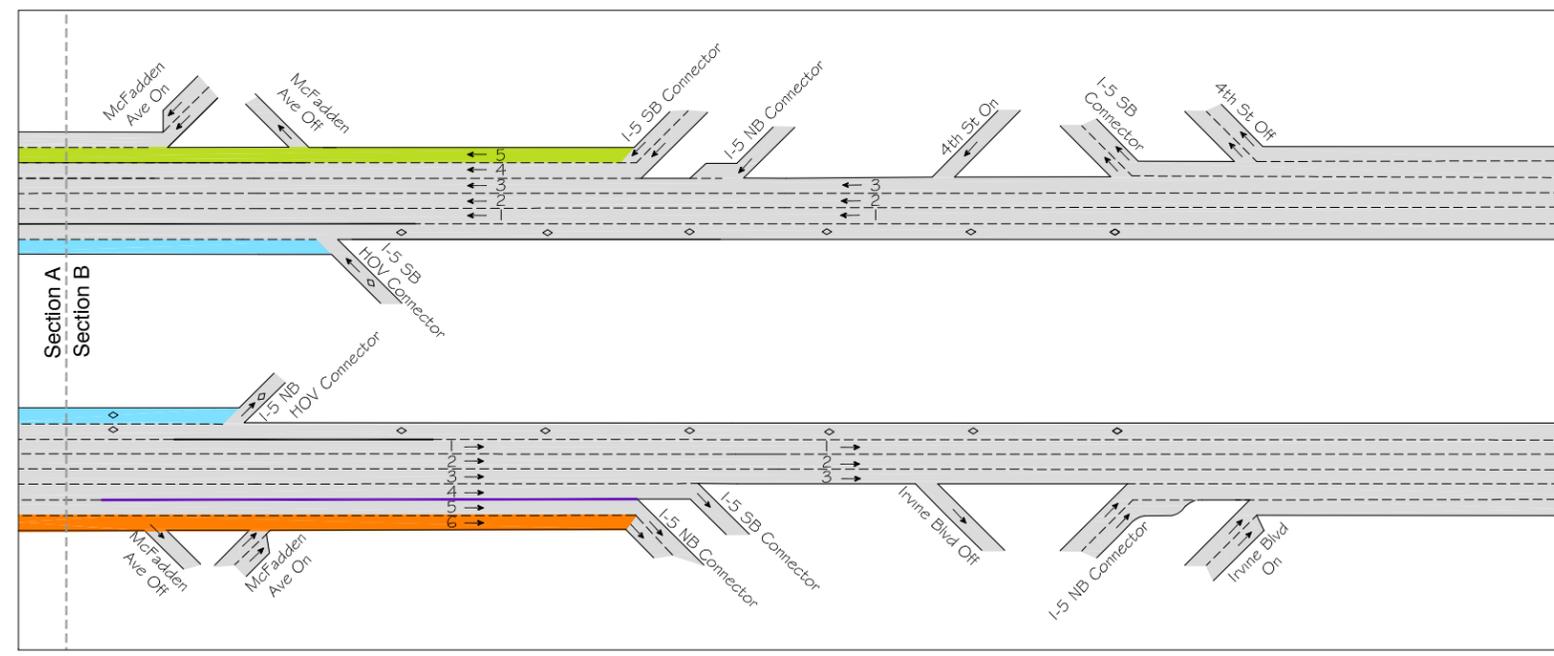
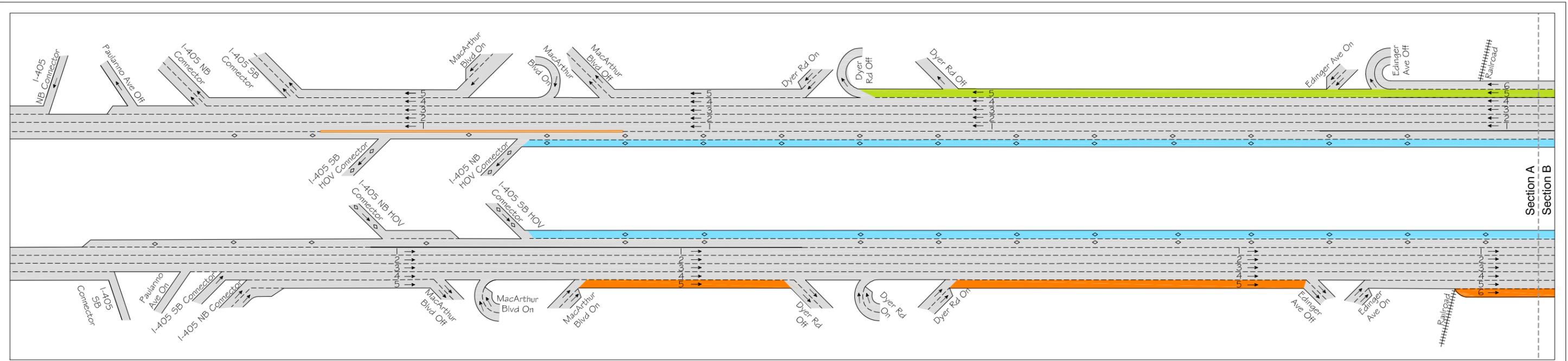

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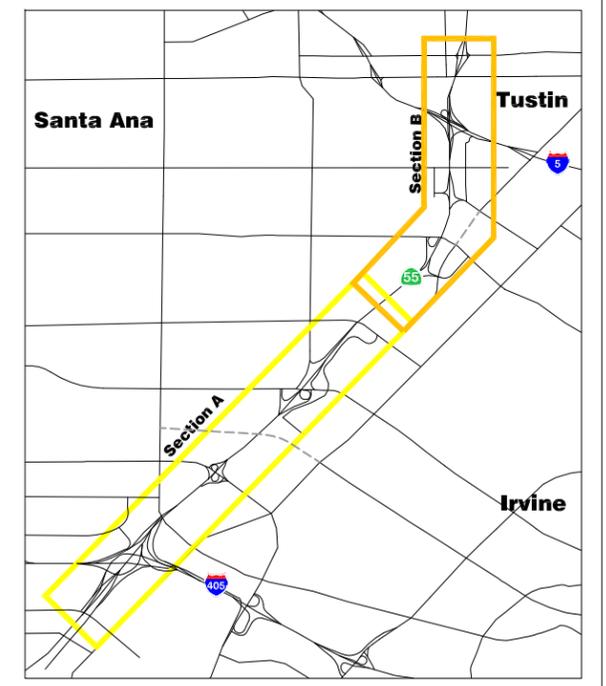
- LEGEND**
- - General Purpose Lane
 - ◇ - HOV Lane
 - (Green) - Proposed General Purpose Lane
 - (Orange) - Proposed Auxiliary Lane
 - (Blue) - Proposed HOV Lane
 - (Purple) - Separator
 - (Yellow) - Improvements by Other Project Completed in 2012
 - (Orange) - HOV Limited Access



NOT TO SCALE



- LEGEND**
- - General Purpose Lane
 - ◇ - HOV Lane
 - (Green) - Proposed General Purpose Lane
 - (Orange) - Proposed Auxiliary Lane
 - (Blue) - Proposed HOV Lane
 - (Purple) - Separator
 - (Orange) - HOV Limited Access



NOT TO SCALE



5. OPENING YEAR 2020 CONDITIONS

This chapter presents the analysis results of the project alternatives under opening year (2020) conditions. The purpose of the opening year analysis is to evaluate short-term traffic operations on SR-55 with and without the improvements alternatives. For each alternative, traffic operations are evaluated using peak-hour density, LOS, speed, travel time, and other system-wide MOE's.

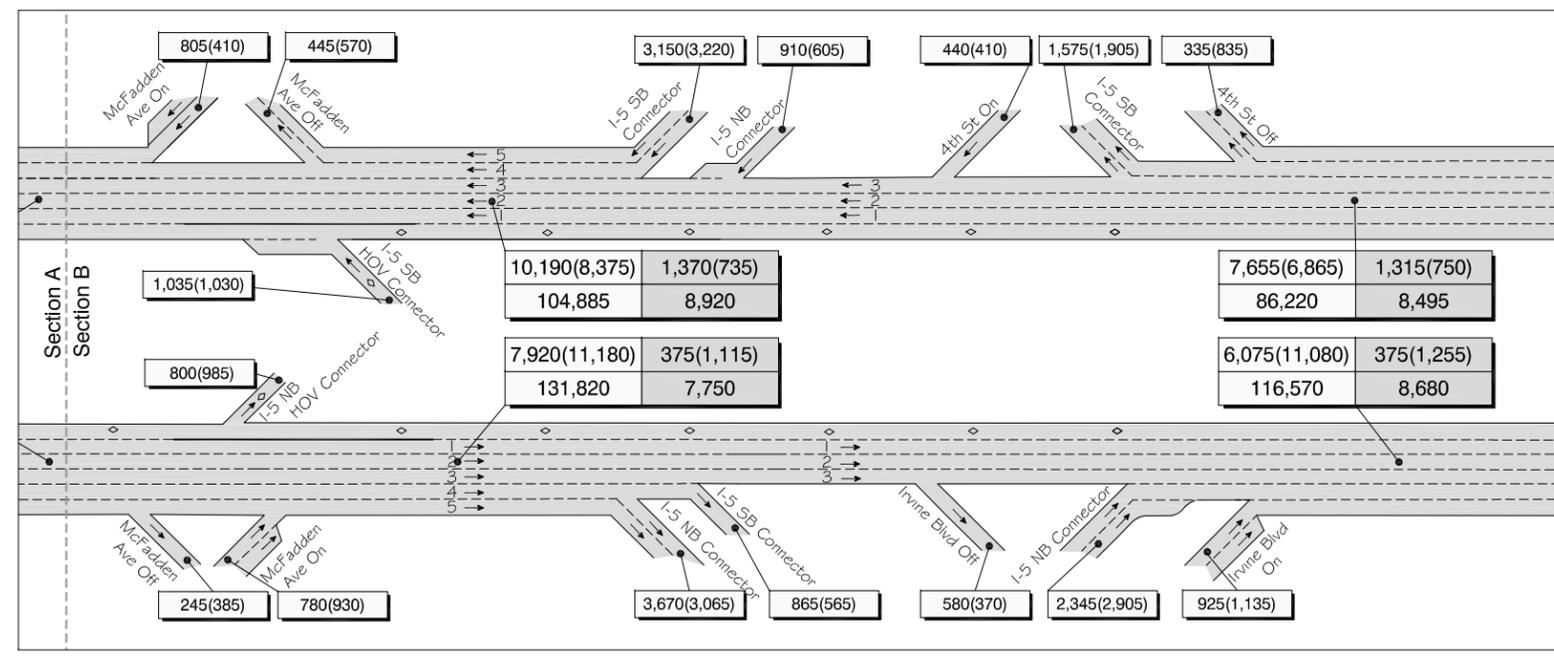
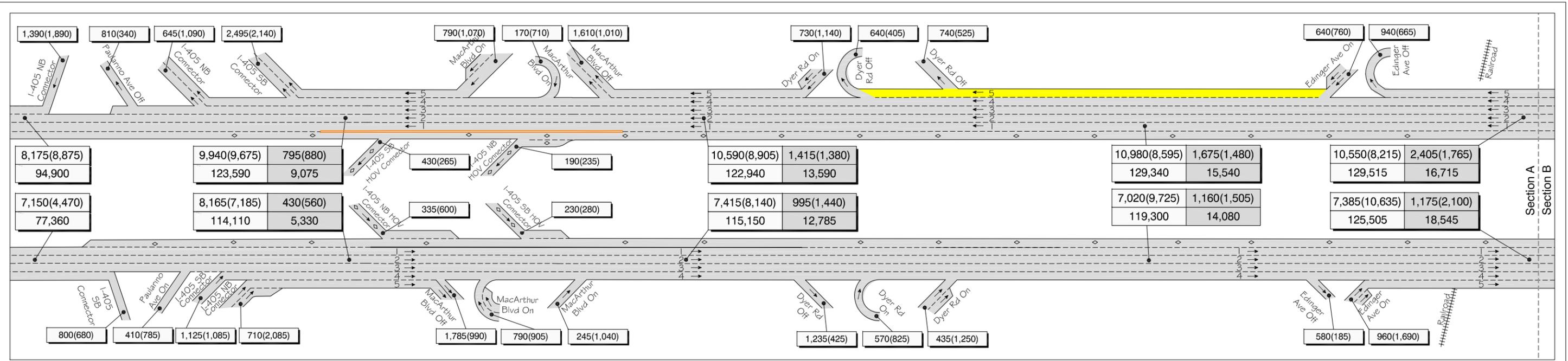
Analysis Scenarios

Traffic forecasts were developed and traffic operations were evaluated for each of the following project alternatives under opening year (2020) conditions.

- No Build Alternative
- Build Alternative 1 – Additional Auxiliary Lanes
- Build Alternative 2 – One New General Purpose Lane
- Build Alternative 3 – One New General Purpose Lane and Additional Auxiliary Lanes
- Build Alternative 4 – One New HOV Lane and Additional Auxiliary Lanes

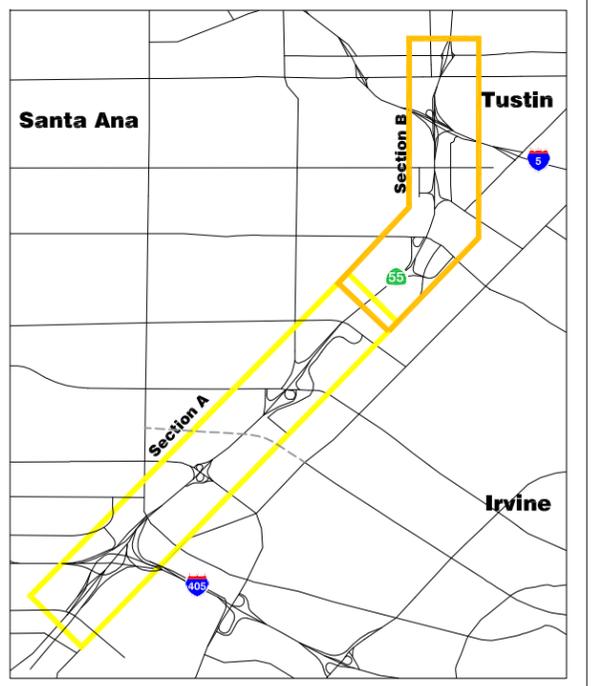
The detailed traffic forecasting methodology is contained in the Final Traffic Volume Report dated August 2015 (see Appendix), and the Year 2020 traffic forecasts have been approved by Caltrans prior to the operations analysis. For the purpose of this analysis, it is assumed that the Newport Avenue Extension and Alton Road Overcrossing will not be constructed by 2020 per discussion and concurrence made by the PDT.

Figures 2-A and 2-B displays the AM and PM peak hour traffic forecasts for freeway mainline segments, HOV lane, freeway ramps, and ramp terminal intersections for each of the project alternatives under 2020 conditions.



LEGEND

- - General Purpose Lane
- ◇ - HOV Lane
- XXX(XXX) - Ramp AM(PM) Peak Hour Traffic Volumes
- XXX(XXX) / XXX - Freeway Mainline AM(PM) Peak Hour Traffic Volumes / Freeway Mainline ADT Traffic Volumes
- XXX(XXX) / XXX - Freeway HOV AM(PM) Peak Hour Traffic Volumes / Freeway HOV ADT Traffic Volumes
- Yellow line - Proposed Future Improvements by Other Projects
- Orange line - HOV Limited Access



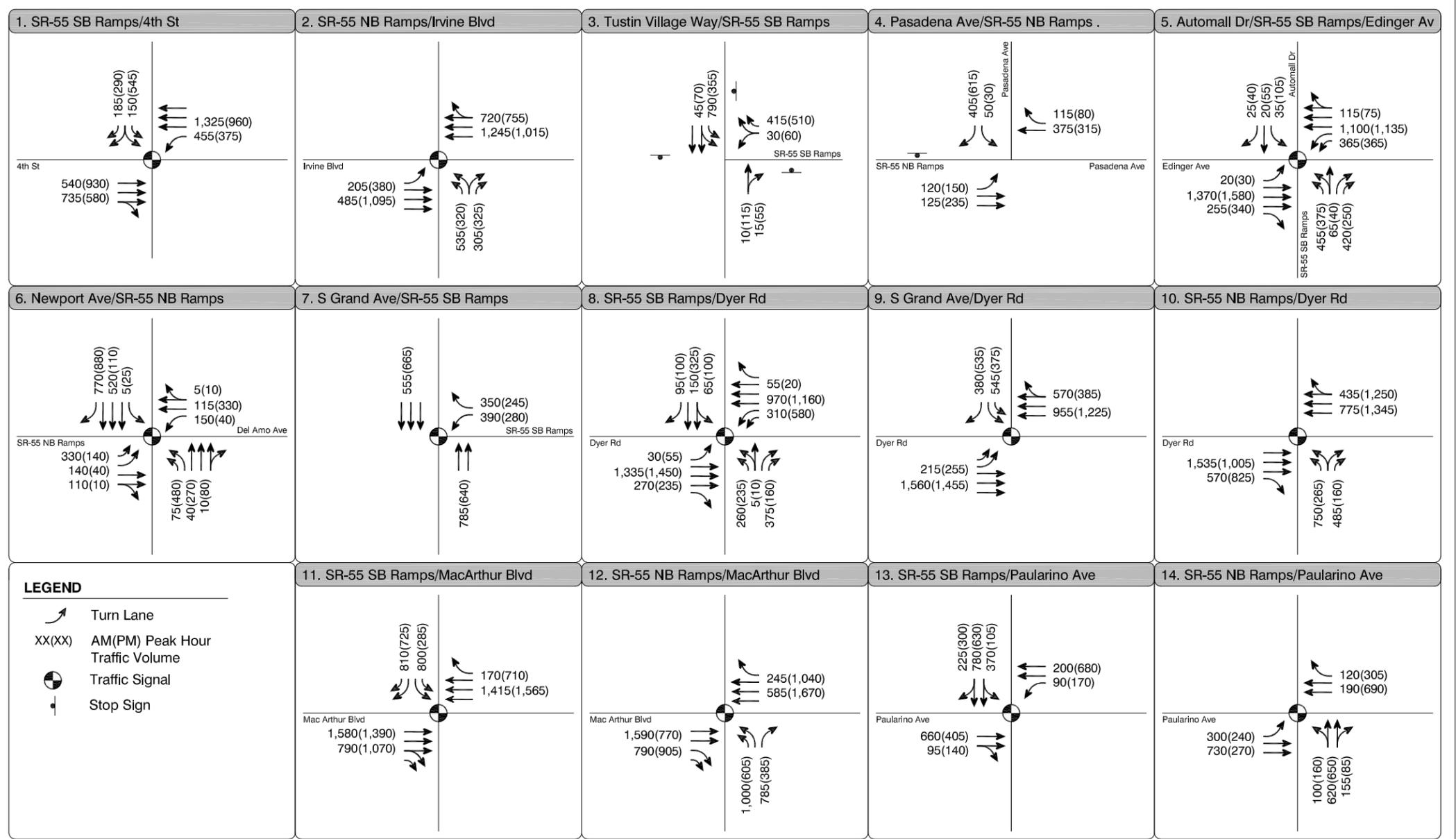
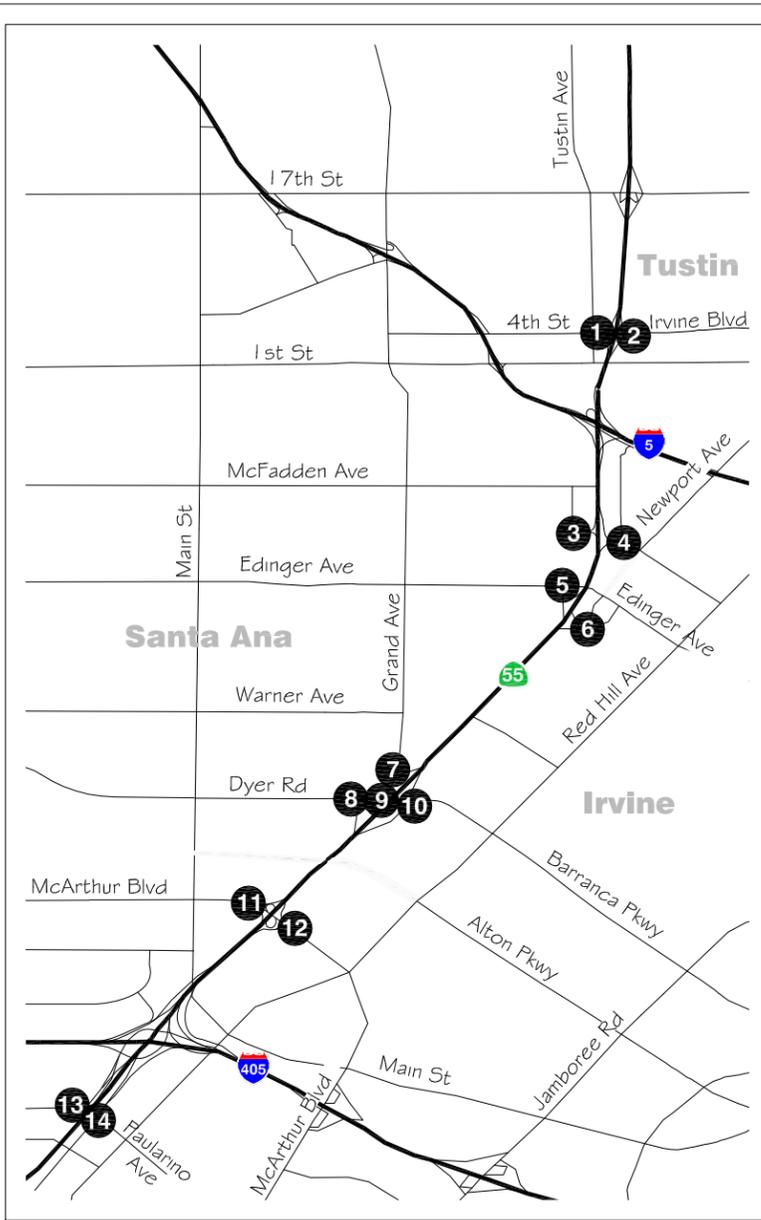
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REVISED

SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - OPENING YEAR 2020 - NO BUILD ALTERNATIVE

FIGURE 2-A-NO BUILD

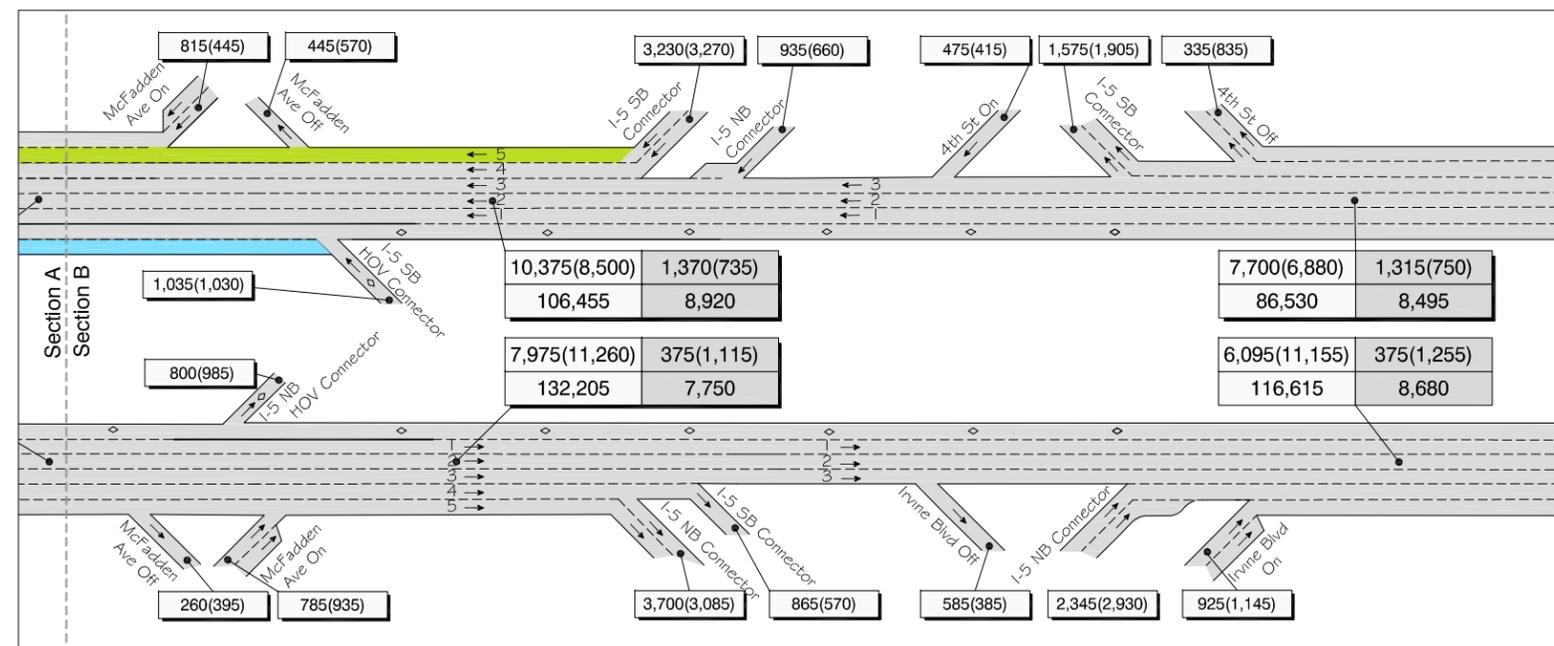
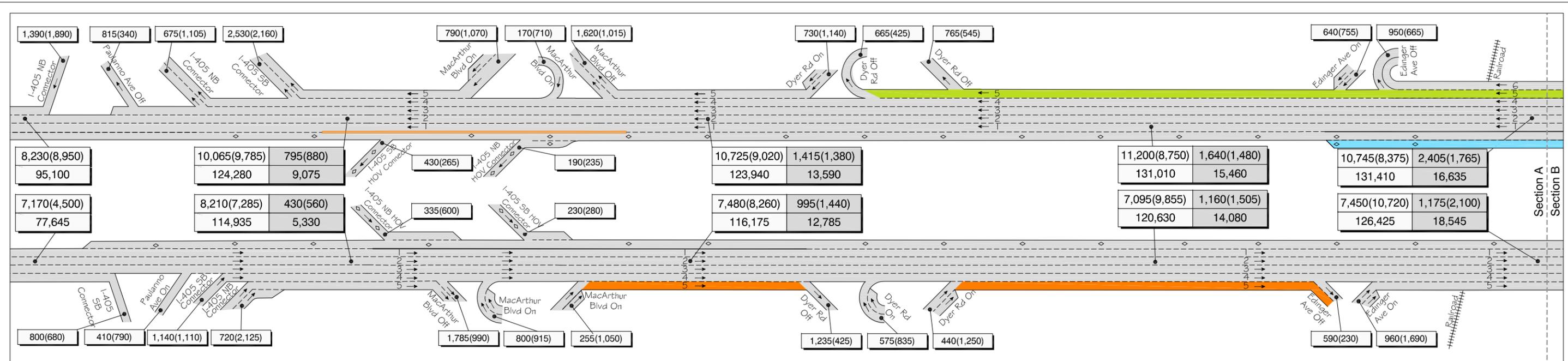


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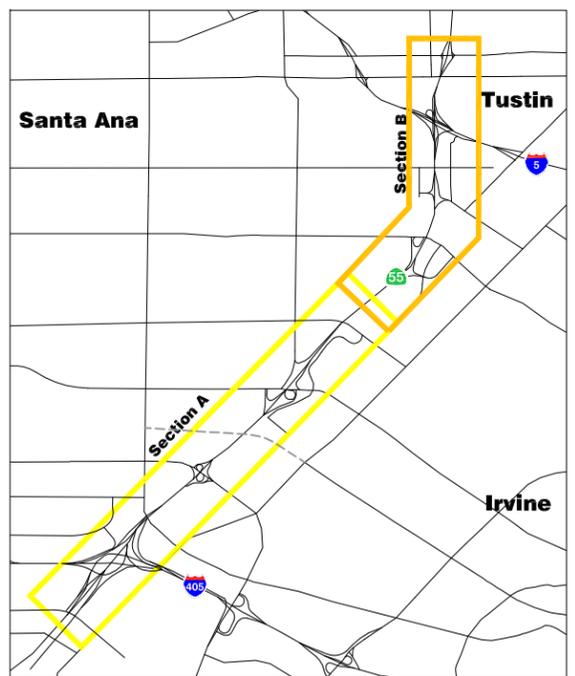
SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - OPENING YEAR 2020 - NO BUILD ALTERNATIVE

FIGURE 2-B-NO BUILD



LEGEND

- - General Purpose Lane
- ◇ - HOV Lane
- XXX(XXX) - Ramp AM(PM) Peak Hour Traffic Volumes
- XXX(XXX) - Freeway Mainline AM(PM) Peak Hour Traffic Volumes
- XXX - Freeway Mainline ADT Traffic Volumes
- XXX(XXX) - Freeway HOV AM(PM) Peak Hour Traffic Volumes
- XXX - Freeway HOV ADT Traffic Volumes
- (Green) - Proposed General Purpose Lane
- (Orange) - Proposed Auxiliary Lane
- (Blue) - Proposed HOV Lane
- (Light Blue) - HOV Limited Access



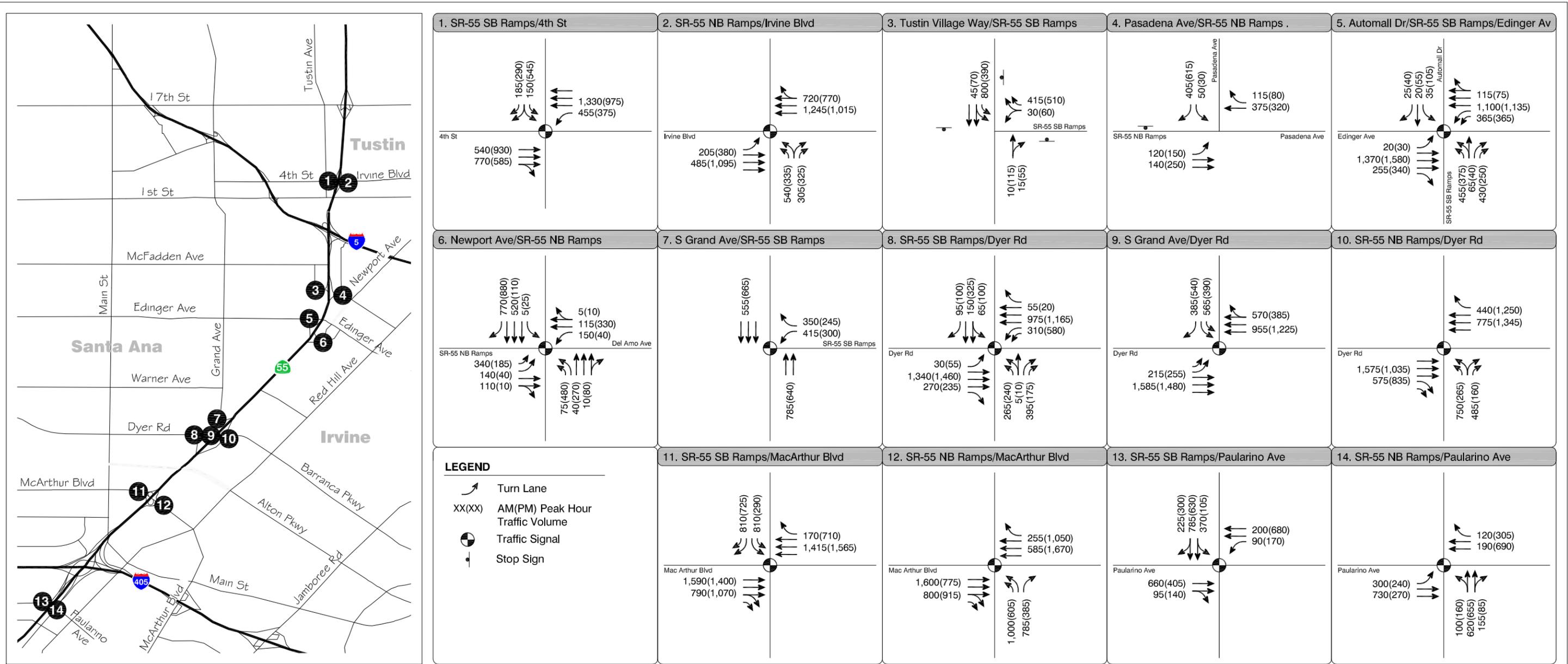
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SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - OPENING YEAR 2020 - BUILD ALTERNATIVE 1

FIGURE 2-A-ALT 1



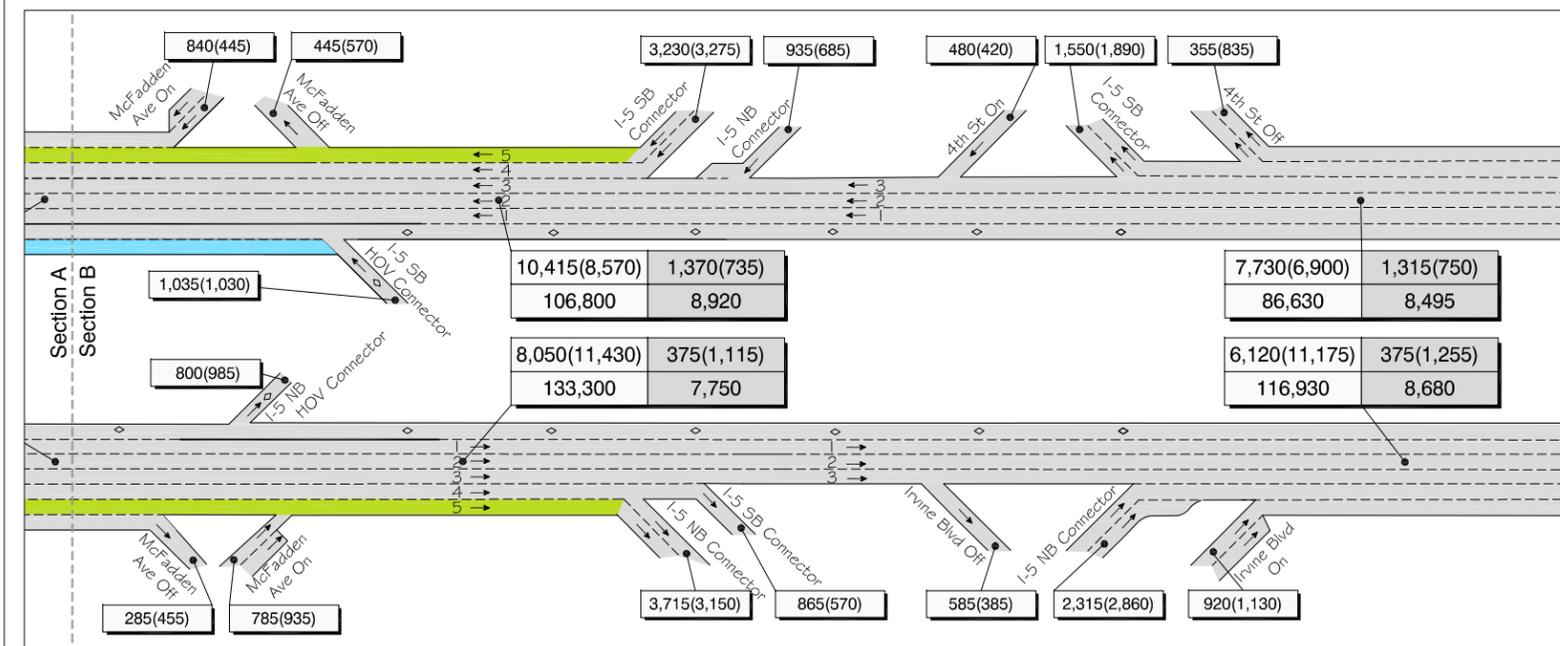
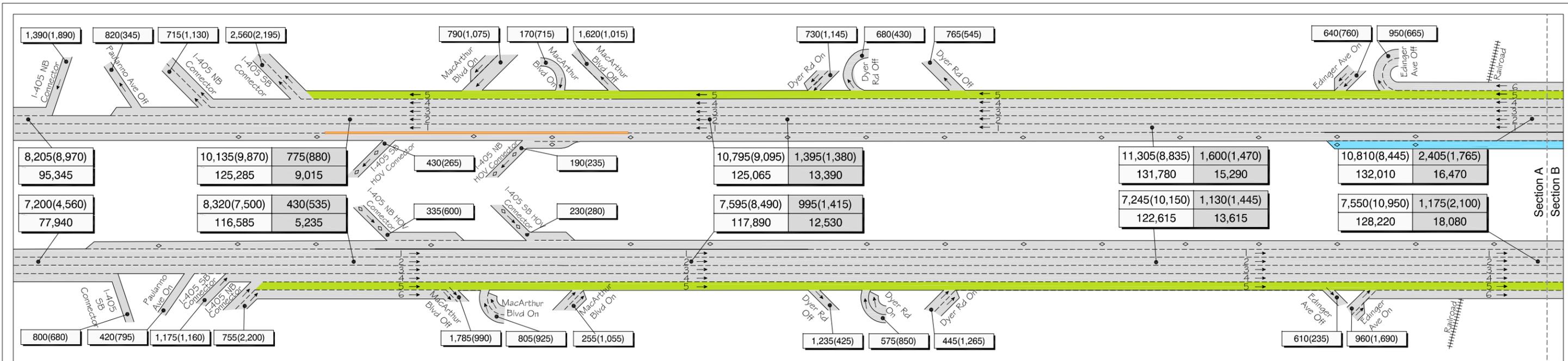
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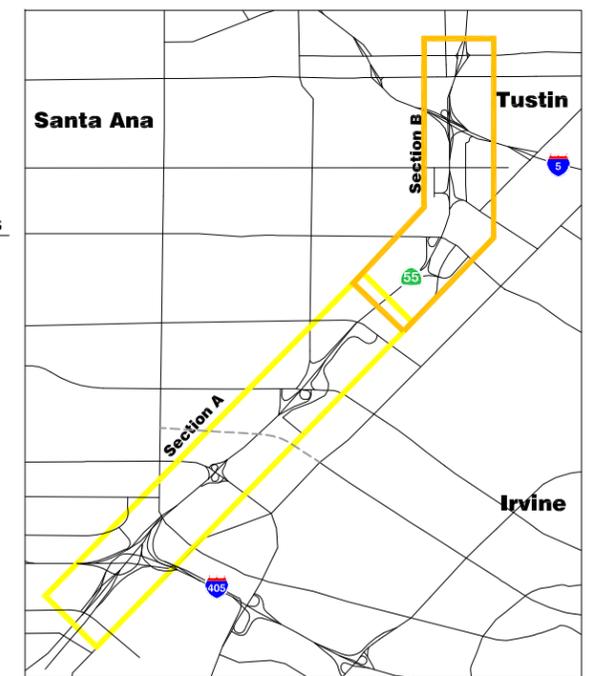
SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - OPENING YEAR 2020 - BUILD ALTERNATIVE 1

FIGURE 2-B-ALT 1



LEGEND

- - General Purpose Lane
- ◇ - HOV Lane
- XXX(XXX) - Ramp AM(PM) Peak Hour Traffic Volumes
- XXX(XXX) - Freeway Mainline AM(PM) Peak Hour Traffic Volumes
- XXX - Freeway Mainline ADT Traffic Volumes
- XXX(XXX) - Freeway HOV AM(PM) Peak Hour Traffic Volumes
- XXX - Freeway HOV ADT Traffic Volumes
- (Green) - Proposed General Purpose Lane
- (Blue) - Proposed HOV Lane
- (Orange) - HOV Limited Access



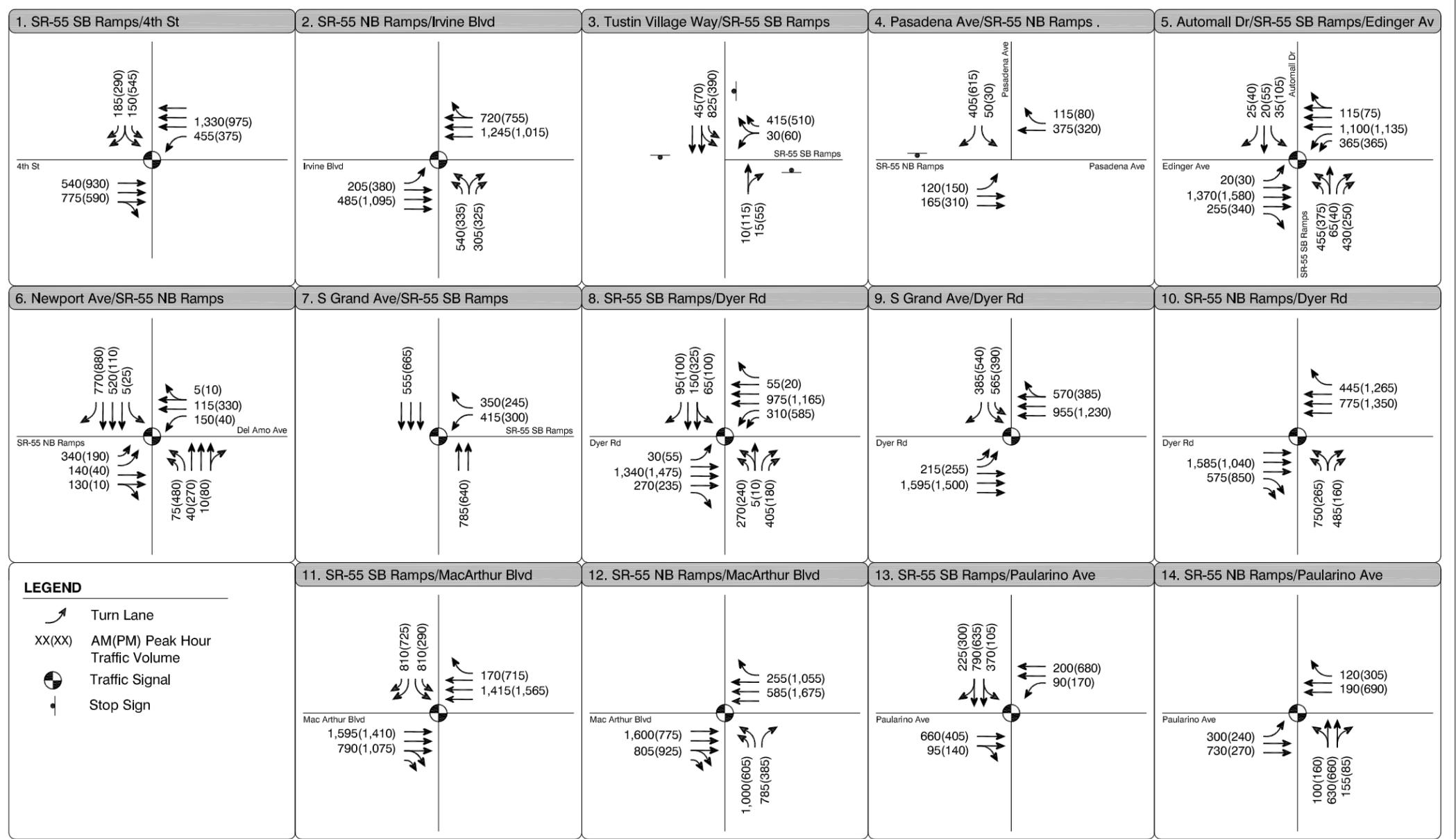
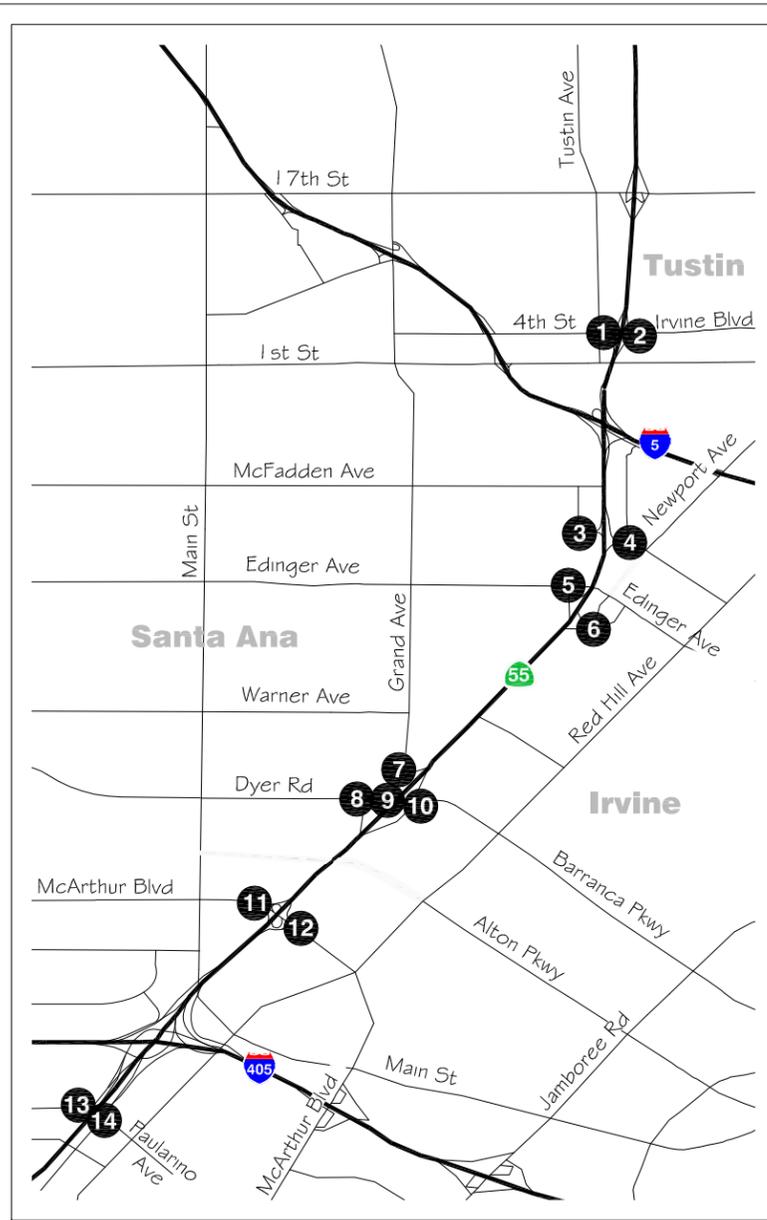
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REVISED

SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - OPENING YEAR 2020 - BUILD ALTERNATIVE 2

FIGURE 2-A-ALT 2



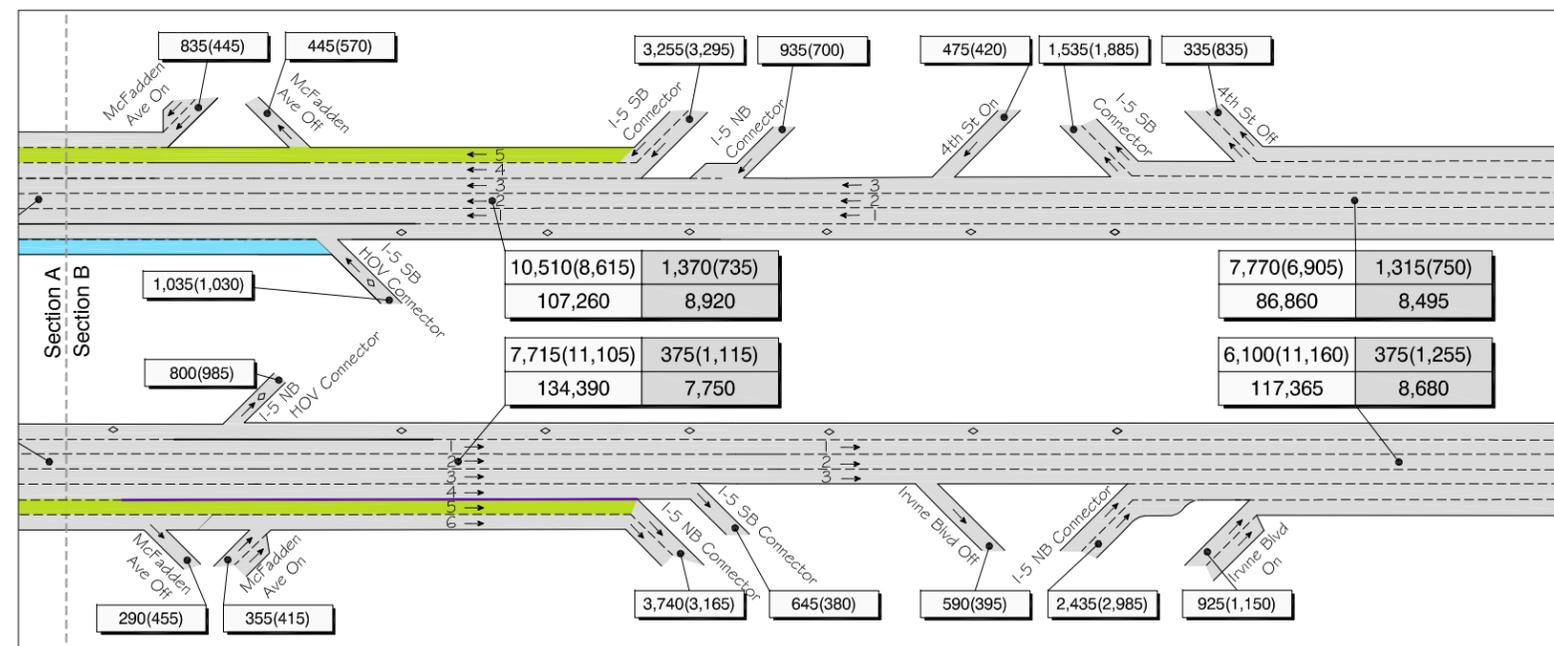
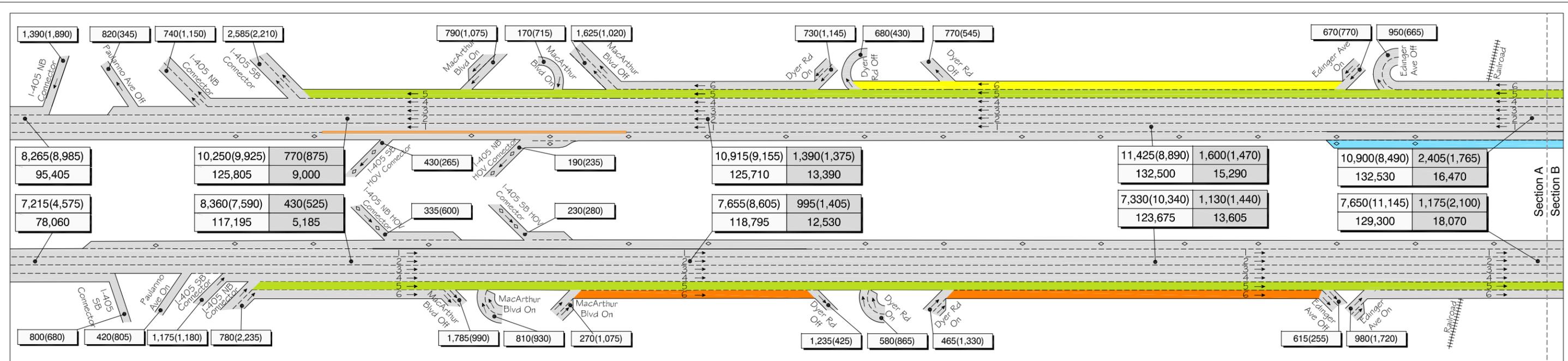
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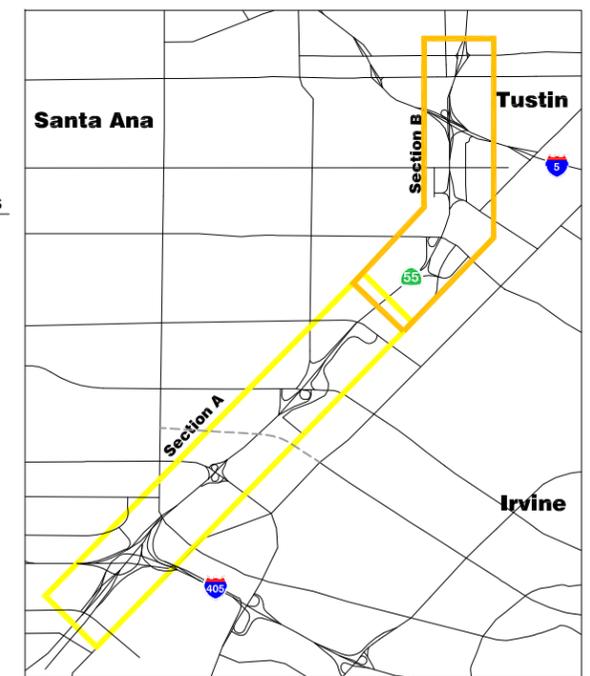
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SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - OPENING YEAR 2020 - BUILD ALTERNATIVE 2

FIGURE 2-B-ALT 2



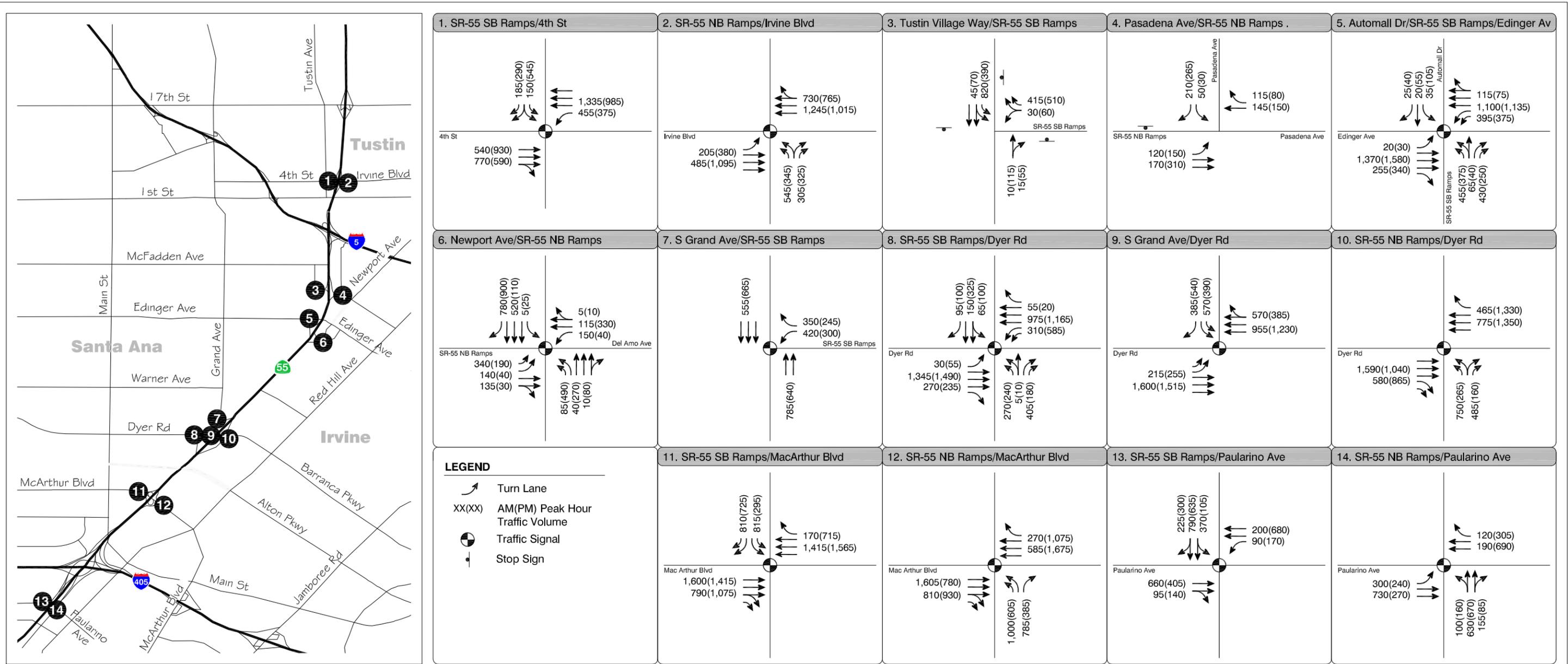
- LEGEND**
- - General Purpose Lane
 - ◇ - HOV Lane
 - XXX(XXX) - Ramp AM(PM) Peak Hour Traffic Volumes
 - XXX(XXX) / XXX - Freeway Mainline AM(PM) Peak Hour Traffic Volumes / Freeway Mainline ADT Traffic Volumes
 - XXX(XXX) / XXX - Freeway HOV AM(PM) Peak Hour Traffic Volumes / Freeway HOV ADT Traffic Volumes
 - (Green) - Proposed General Purpose Lane
 - (Orange) - Proposed Auxiliary Lane
 - (Blue) - Proposed HOV Lane
 - (Purple) - Separator
 - (Yellow) - Improvements by Other Project Completed in 2012
 - (Red) - HOV Limited Access



NOT TO SCALE

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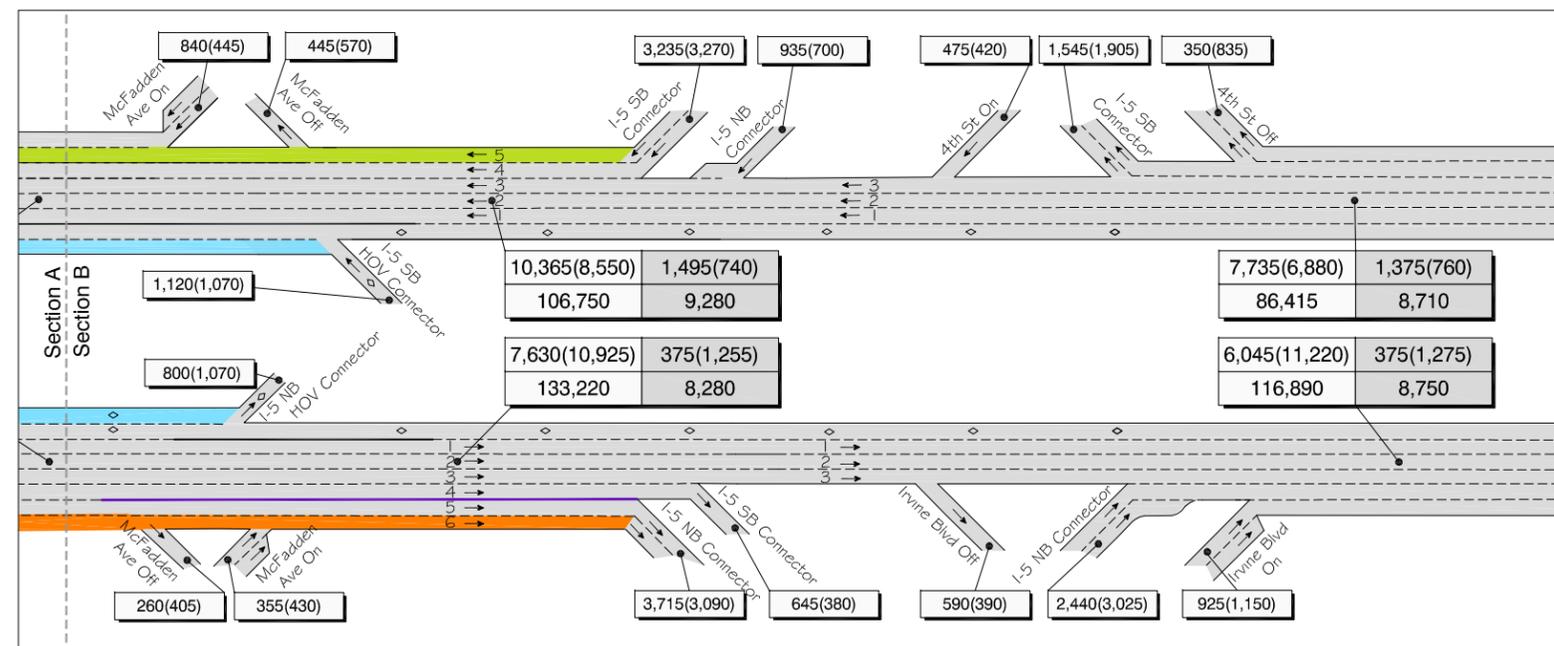
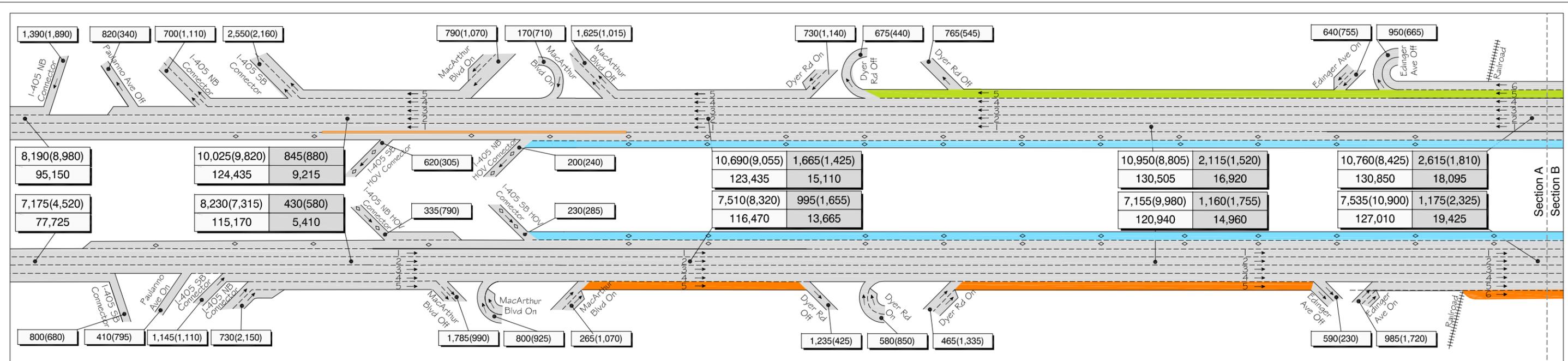
SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - OPENING YEAR 2020 - BUILD ALTERNATIVE 3
FIGURE 2-A-ALT 3



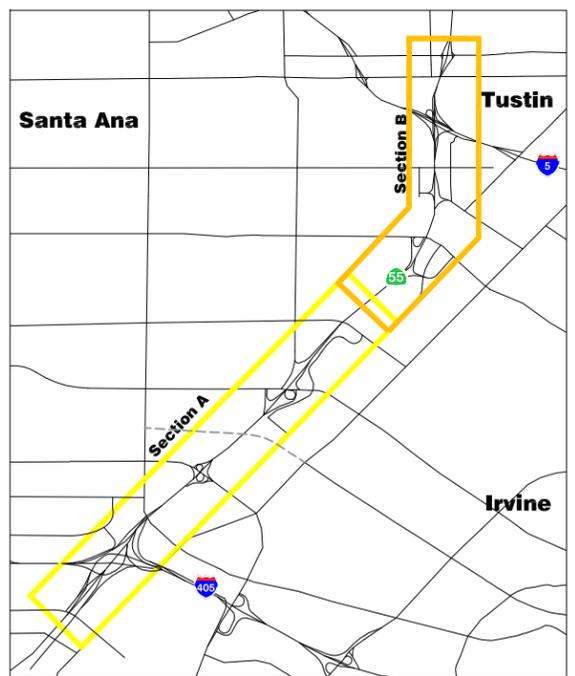
REVISED

SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - OPENING YEAR 2020 - BUILD ALTERNATIVE 3

FIGURE 2-B-ALT 3



- LEGEND**
- - General Purpose Lane
 - ◇ - HOV Lane
 - XXX(XXX) - Ramp AM(PM) Peak Hour Traffic Volumes
 - XXX(XXX) - Freeway Mainline AM(PM) Peak Hour Traffic Volumes
 - XXX - Freeway Mainline ADT Traffic Volumes
 - XXX(XXX) - Freeway HOV AM(PM) Peak Hour Traffic Volumes
 - XXX - Freeway HOV ADT Traffic Volumes
 - (Green) - Proposed General Purpose Lane
 - (Orange) - Proposed Auxiliary Lane
 - (Blue) - Proposed HOV Lane
 - (Purple) - Separator
 - (Red) - HOV Limited Access

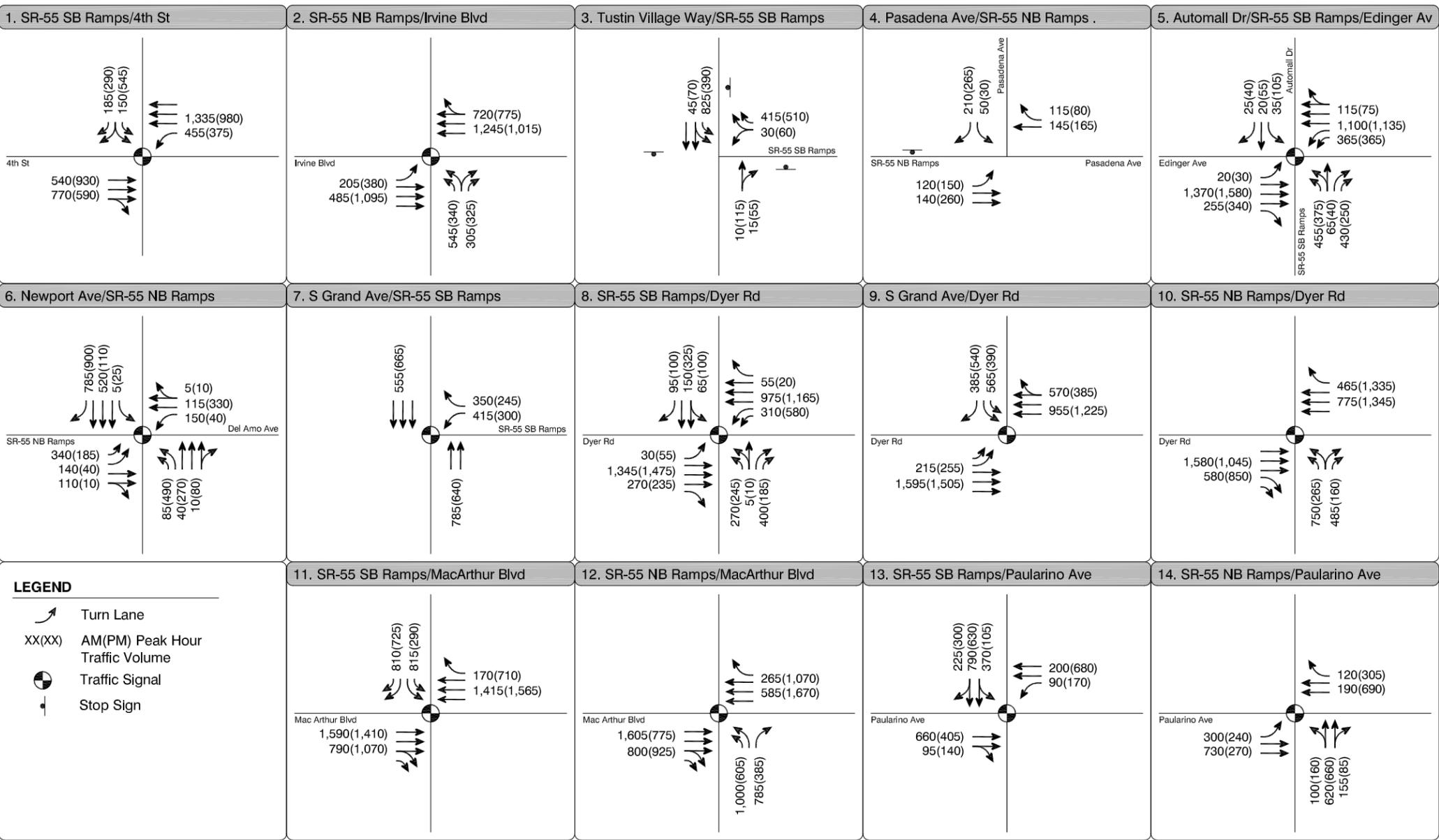
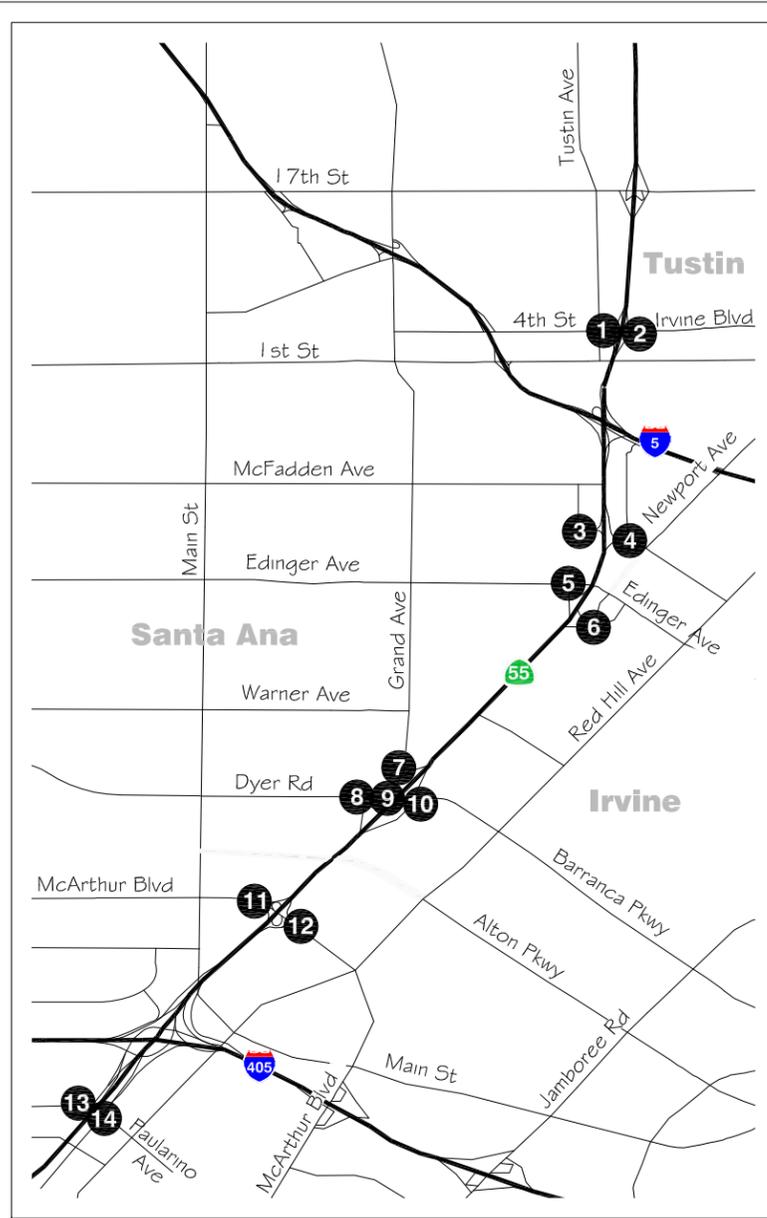


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SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - OPENING YEAR 2020 - BUILD ALTERNATIVE 4

FIGURE 2-A-ALT 4



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REVISED

SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - OPENING YEAR 2020 - BUILD ALTERNATIVE 4



Freeway Operations

Mainline Segments and Ramps Operations Analysis

Tables 9-A and 9-B show the AM peak hour density and LOS for the study freeway mainline segments and ramp junctions on northbound and southbound SR-55 under 2020 conditions, respectively. The PM peak hour results are shown in Tables 9-C and 9-D.

AM Peak Hour

Northbound SR-55

Northbound 55 would operate at similar characteristics under all the alternatives during the AM peak hour. Northbound SR-55 would operate at LOS F conditions at the Paularino Avenue on-ramp and traffic congestion at the entry point would meter traffic getting downstream, resulting in LOS D or better conditions on northbound SR-55 north of I-405 in the AM peak hour. The only exception is that the weaving segment between McFadden Avenue on-ramp and NB I-5 Off-ramp would operate at LOS E conditions under the No Build Alternative, Alternative 1, and Alternative 2. The limited access at the McFadden Avenue on-ramp proposed under Alternatives 3 and 4 would eliminate the weaving deficiencies and improve the McFadden Avenue on-ramp to LOS C conditions.

Southbound SR-55

In the southbound direction, heavy congestion would extend from Edinger on-ramp back to Irvine Boulevard and beyond, resulting in LOS F conditions under the No Build Alternative. In addition, other segments including Dyer Road off-ramp and westbound MacArthur Boulevard on-ramp would operate at LOS E/F conditions.

Under Alternatives 1 and 4, the proposed southbound general purpose lane from McFadden Avenue to Dyer Road would improve southbound SR-55 between southbound I-5 on-ramp and Edinger Avenue from LOS F to E or D conditions. However with more traffic able to travel downstream but no capacity or operational improvements at downstream locations, southbound SR-55 between Dyer Road and MacArthur Boulevard would operate with higher density/delay under Alternatives 1 and 4, compared to the No Build Alternative.

Under Alternative 2, the extended general purpose lane would also improve southbound SR-55 between southbound I-5 on-ramp and Edinger Avenue from LOS F to LOS E or D conditions. The operations at the Dyer Road on- and off-ramps would also improve due to additional capacity from the extended general purpose lane compared to Alternative 1. However, southbound SR-55 between MacArthur Boulevard and I-405 would experience higher density/delay than the No Build Alternative due to a combination of higher traffic demand and lack of an auxiliary lane from MacArthur Boulevard on-ramp to I-405 off-ramp.

Under Alternative 3, all the segments along southbound SR-55 between southbound I-5 and MacArthur Boulevard off-ramp would improve compared to the No Build Alternative. The addition of auxiliary lanes proposed in Alternative 3 would improve the LOS at several locations between Edinger Avenue on-ramp and MacArthur Boulevard off-ramp compared to Alternative 2. Alternative 3 shows higher density/congestion on southbound SR-55 between MacArthur Boulevard on-ramp and the Paularino Avenue off-ramp than the No Build Alternative due to higher traffic demand able to get to these locations.



**TABLE 9-A – NORTHBOUND SR-55 FREEWAY MAINLINE AND RAMPS OPERATIONS
– YEAR 2020 CONDITIONS (AM PEAK HOUR)**

Location	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS
Paularino Ave On-ramp	Merge	51.8	F	Merge	51.7	F	Merge	52.7	F	Merge	50.5	F	Merge	48.2	F
SB I-405 On-ramp	Merge	30.0	D	Merge	31.5	D	Merge	31.0	D	Merge	31.4	D	Merge	32.4	D
NB I-405 On-ramp	Weave	26.8	C	Weave	28.3	D	Weave	23.6	C	Weave	24.2	C	Weave	31.6	D
MacArthur Blvd Off-ramp	Weave	26.8	C	Weave	28.3	D	Weave	23.6	C	Weave	24.2	C	Weave	31.6	D
MacArthur Blvd On-ramp (EB)	Merge	28.1	D	Merge	31.4	D	Merge	21.6	C	Merge	25.4	C	Merge	35.0	D
MacArthur Blvd On-ramp (WB)	Merge	32.0	D	Weave	24.4	C	Merge	23.4	C	Weave	20.4	C	Weave	26.4	C
Dyer Rd Off-ramp	Diverge	28.4	D	Weave	24.4	C	Diverge	22.9	C	Weave	20.4	C	Weave	26.4	C
Dyer Rd On-ramp (EB)	Merge	27.2	C	Merge	29.7	D	Merge	21.7	C	Merge	22.0	C	Merge	31.5	D
Dyer Rd On-ramp (WB)	Merge	31.0	D	Weave	25.6	C	Merge	23.9	C	Weave	20.0	C	Weave	23.8	C
Dyer Rd to Edinger Ave	Basic	29.1	D	Weave	25.6	C	Basic	22.6	C	Weave	20.0	C	Weave	23.8	C
Edinger Ave Off-ramp	Diverge	34.0	D	Weave	25.6	C	Diverge	24.3	C	Weave	20.0	C	Weave	23.8	C
Edinger Ave On-ramp	Weave	31.2	D	Weave	32.3	D	Weave	34.5	D	Weave	21.3	C	Weave	23.3	C
McFadden Ave Off-ramp	Weave	31.2	D	Weave	32.3	D	Weave	34.5	D	Weave	21.3	C	Weave	23.3	C
McFadden Ave On-ramp	Weave	36.6	E	Weave	37.0	E	Weave	37.9	E	Merge	25.3	C	Merge	25.3	C
NB I-5 Off-ramp	Weave	36.6	E	Weave	37.0	E	Weave	37.9	E	Diverge	21.7	C	Diverge	23.5	C
SB I-5 Off-ramp	Diverge	16.6	B	Diverge	16.6	B	Diverge	17.0	B	Diverge	16.1	B	Diverge	15.9	B
Irvine Blvd Off-ramp	Diverge	17.1	B	Diverge	17.2	B	Diverge	17.6	B	Diverge	17.5	B	Diverge	17.3	B
NB I-5 On-ramp	Merge	19.3	B	Merge	19.3	B	Merge	19.4	B	Merge	19.6	B	Merge	19.5	B

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2015



**TABLE 9-B – SOUTHBOUND SR-55 FREEWAY MAINLINE AND RAMPS OPERATIONS
– YEAR 2020 CONDITIONS (AM PEAK HOUR)**

Location	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS
SB I-5 Off-ramp	Diverge	108.8	F	Diverge	77.6	F	Diverge	74.3	F	Diverge	78.2	F	Diverge	56.0	F
4 th St On-ramp	Merge	115.5	F	Merge	105.2	F	Merge	102.4	F	Merge	101.0	F	Merge	80.9	F
NB I-5 On-ramp	Merge	95.9	F	Merge	83.2	F	Merge	83.3	F	Merge	78.5	F	Merge	67.8	F
SB I-5 On-ramp	Weave	59.0	F	Weave	41.8	E	Weave	39.3	E	Weave	42.1	E	Weave	34.0	D
McFadden Off-ramp	Weave	59.0	F	Weave	41.8	E	Weave	39.3	E	Weave	42.1	E	Weave	34.0	D
McFadden On-ramp	Weave	46.6	F	Weave	29.5	D	Weave	32.3	D	Weave	28.2	D	Weave	28.7	D
Edinger Off-ramp	Weave	46.6	F	Weave	29.5	D	Weave	32.3	D	Weave	28.2	D	Weave	28.7	D
Edinger On-ramp	Weave	30.5	D	Merge	41.8	E	Merge	49.0	F	Weave	27.2	C	Merge	42.5	E
Edinger Ave to Dyer Rd	Weave	30.5	D	Basic	34.3	D	Basic	33.7	D	Weave	27.2	C	Basic	32.3	D
Grand Ave Off-ramp	Weave	30.5	D	Diverge	49.3	F	Diverge	34.1	D	Weave	27.2	C	Diverge	33.5	D
Dyer Rd Off-ramp	Diverge	44.8	F	Diverge	84.9	F	Diverge	52.1	F	Diverge	29.5	D	Diverge	39.2	E
Dyer Rd On-Ramp	Weave	32.7	D	Weave	41.5	E	Merge	40.5	E	Weave	32.1	D	Weave	43.6	F
MacArthur Blvd Off-ramp	Weave	32.7	D	Weave	41.5	E	Diverge	37.6	E	Weave	32.1	D	Weave	43.6	F
MacArthur Blvd On-ramp (WB)	Merge	37.8	E	Merge	41.8	E	Merge	29.9	D	Merge	56.0	F	Merge	43.8	F
MacArthur Blvd On-ramp (EB)	Weave	28.9	D	Weave	30.6	D	Weave	38.9	E	Weave	44.4	F	Weave	31.8	D
SB I-405 Off-ramp	Weave	28.9	D	Weave	30.6	D	Weave	38.9	E	Weave	44.4	F	Weave	31.8	D
NB I-405 Off-ramp	Diverge	29.6	D	Diverge	31.1	D	Diverge	31.9	D	Diverge	32.9	D	Diverge	32.0	D
Paularino Ave Off-ramp	Diverge	28.9	D	Diverge	30.4	D	Diverge	31.1	D	Diverge	30.8	D	Diverge	31.0	D

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2015



**TABLE 9-C – NORTHBOUND SR-55 FREEWAY MAINLINE AND RAMPS OPERATIONS
– YEAR 2020 CONDITIONS (PM PEAK HOUR)**

Location	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS
Paularino Ave On-ramp	Merge	115.0	F	Merge	137.7	F	Merge	23.6	C	Merge	31.8	D	Merge	102.7	F
SB I-405 On-ramp	Merge	132.3	F	Merge	133.4	F	Merge	21.3	C	Merge	32.5	D	Merge	119.0	F
NB I-405 On-ramp	Weave	129.5	F	Weave	130.6	F	Weave	41.7	E	Weave	64.8	F	Weave	129.7	F
MacArthur Blvd Off-ramp	Weave	129.5	F	Weave	130.6	F	Weave	41.7	E	Weave	64.8	F	Weave	129.7	F
MacArthur Blvd On-ramp (EB)	Merge	125.8	F	Merge	124.9	F	Merge	109.6	F	Merge	128.5	F	Merge	115.4	F
MacArthur Blvd On-ramp (WB)	Weave	119.4	F	Weave	123.9	F	Merge	132.9	F	Weave	129.9	F	Weave	118.3	F
Dyer Rd Off-ramp	Weave	119.4	F	Weave	123.9	F	Diverge	148.6	F	Weave	129.9	F	Weave	118.3	F
Dyer Rd On-ramp (EB)	Merge	109.5	F	Merge	108.3	F	Merge	119.1	F	Merge	115.2	F	Merge	94.5	F
Dyer Rd On-ramp (WB)	Merge	101.2	F	Weave	114.2	F	Merge	124.7	F	Weave	125.7	F	Weave	113.7	F
Dyer Rd to Edinger Ave	Basic	92.9	F	Weave	114.2	F	Basic	122.8	F	Weave	125.7	F	Weave	113.7	F
Edinger Ave Off-ramp	Diverge	75.0	F	Weave	114.2	F	Diverge	96.7	F	Weave	125.7	F	Weave	113.7	F
Edinger Ave On-ramp	Weave	65.5	F	Weave	59.8	F	Weave	89.0	F	Weave	85.2	F	Weave	74.1	F
McFadden Ave Off-ramp	Weave	65.5	F	Weave	59.8	F	Weave	89.0	F	Weave	85.2	F	Weave	74.1	F
McFadden Ave On-ramp	Weave	66.6	F	Weave	68.5	F	Weave	54.9	F	Merge	24.5	C	Merge	24.6	C
NB I-5 Off-ramp	Weave	66.6	F	Weave	68.5	F	Weave	54.9	F	Diverge	79.6	F	Diverge	70.9	F
SB I-5 Off-ramp	Diverge	84.8	F	Diverge	83.9	F	Diverge	62.1	F	Diverge	64.9	F	Diverge	35.6	E
Irvine Blvd Off-ramp	Diverge	75.9	F	Diverge	73.1	F	Diverge	60.0	F	Diverge	58.3	F	Diverge	40.7	E
NB I-5 On-ramp	Merge	87.7	F	Merge	89.8	F	Merge	87.8	F	Merge	90.7	F	Merge	91.8	F

Notes: Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



**TABLE 9-D – SOUTHBOUND SR-55 FREEWAY MAINLINE AND RAMPS OPERATIONS
– YEAR 2020 CONDITIONS (PM PEAK HOUR)**

Location	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS
SB I-5 Off-ramp	Diverge	24.4	C	Diverge	24.5	C	Diverge	24.5	C	Diverge	24.5	C	Diverge	24.4	C
4 th St On-ramp	Merge	26.0	C	Merge	26.1	C	Merge	26.5	C	Merge	26.8	C	Merge	26.3	C
NB I-5 On-ramp	Merge	32.3	D	Merge	33.7	D	Merge	34.9	D	Merge	34.8	D	Merge	34.6	D
SB I-5 On-ramp	Weave	35.4	D	Weave	28.6	D	Weave	28.8	D	Weave	29.1	D	Weave	28.9	D
McFadden Off-ramp	Weave	35.4	D	Weave	28.6	D	Weave	28.8	D	Weave	29.1	D	Weave	28.9	D
McFadden On-ramp	Weave	29.1	C	Weave	24.0	C	Weave	24.2	C	Weave	24.3	C	Weave	25.9	C
Edinger Off-ramp	Weave	29.1	C	Weave	24.0	C	Weave	24.2	C	Weave	24.3	C	Weave	25.9	C
Edinger On-ramp	Weave	30.6	D	Merge	34.0	D	Merge	26.5	C	Weave	23.3	C	Merge	31.8	D
Edinger Ave to Dyer Rd	Weave	30.6	D	Basic	47.1	F	Basic	27.7	D	Weave	23.3	C	Basic	42.1	E
Grand Ave Off-ramp	Weave	30.6	D	Diverge	58.1	F	Diverge	28.2	D	Weave	23.3	C	Diverge	55.5	F
Dyer Rd Off-ramp	Diverge	54.4	F	Diverge	78.0	F	Diverge	27.1	C	Diverge	25.0	C	Diverge	65.9	F
Dyer Rd On-Ramp	Weave	58.4	F	Weave	67.2	F	Merge	47.8	F	Weave	26.9	C	Weave	68.7	F
MacArthur Blvd Off-ramp	Weave	58.4	F	Weave	67.2	F	Diverge	34.1	D	Weave	26.9	C	Weave	68.7	F
MacArthur Blvd On-ramp (WB)	Merge	49.3	F	Merge	52.4	F	Merge	33.6	D	Merge	53.0	F	Merge	52.6	F
MacArthur Blvd On-ramp (EB)	Weave	32.4	D	Weave	32.3	D	Weave	42.7	E	Weave	49.3	F	Weave	32.6	D
SB I-405 Off-ramp	Weave	32.4	D	Weave	32.3	D	Weave	42.7	E	Weave	49.3	F	Weave	32.6	D
NB I-405 Off-ramp	Diverge	30.9	D	Diverge	30.8	D	Diverge	31.9	D	Diverge	33.0	D	Diverge	31.4	D
Paularino Ave Off-ramp	Diverge	32.9	D	Diverge	32.7	D	Diverge	33.4	D	Diverge	33.2	D	Diverge	32.3	D

Notes: Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



PM Peak Hour

Northbound SR-55

Significant traffic congestion with LOS F conditions would occur at all the study locations along northbound SR-55 during the PM peak hour under the No Build Alternative. Vehicle queue on northbound SR-55 would extend from Irvine Boulevard/I-5 all the way back to south of Paularino Avenue. According to the 2020 analysis results, the two bottlenecks identified in northbound SR-55 would be Dyer Road on-ramp and McFadden on-ramp.

Other Alternatives would expect similar traffic operations conditions during the peak hour with the following exceptions.

- Under Alternatives 2 and 3, the proposed general purpose lane would allow more freeway through traffic get to downstream locations, resulting in reduced vehicle queues on northbound SR-55 from south of Paularino Avenue to the I-405 area. The corresponding LOS at the Paularino Avenue on-ramp and southbound I-405 on-ramp would improve from LOS F to LOS D or better.
- Under Alternatives 3 and 4, elimination of the weaving between McFadden Avenue on-ramp and NB I-5 off-ramp would provide great benefit to the McFadden Avenue on-ramp, resulting in LOS C at this on-ramp.

Southbound SR-55

In the southbound direction under the No Build Alternative, the segments between Dyer Road and MacArthur Boulevard would operate at LOS F, while other southbound 55 segments north of Dyer Road would operate at LOS D or better.

Under Alternatives 1 and 4, the additional general purpose lane on southbound SR-55 between McFadden Avenue and Dyer Road would improve traffic throughput. With more traffic able to travel downstream, southbound SR-55 between Edinger Avenue and MacArthur Boulevard would expect a higher density than the No Build Alternative.

Under Alternative 2, the extended general purpose lane would improve southbound SR-55 between Edinger Avenue and MacArthur Boulevard with better LOS or lower density conditions compared to Alternative 1 or 4. However, due to lack of the auxiliary lane, southbound SR-55 between MacArthur Boulevard on-ramp and I-405 off-ramp would operate at LOS E conditions.

Alternative 3 shows the similar operations on southbound SR-55 as Alternative 2. The addition of auxiliary lanes proposed in Alternative 3 would improve the LOS at several locations between Edinger Avenue on-ramp and MacArthur Boulevard off-ramp from LOS F or D to C. In addition, Alternative 3 shows higher density/congestion between MacArthur Boulevard on-ramp and Paularino Avenue off-ramp than Alternative 2 due to higher traffic demand able to get to these locations.

On-ramp Queuing Analysis

In addition to freeway operational analysis, a queuing analysis was also conducted for all the project alternatives at the on-ramps to identify if the on-ramp queue would extend back to local streets during the AM and PM peak hour under Year 2020 conditions, and the queuing results are shown in Tables 9-E



and 9-F. During the AM peak hour, the storage at all the on-ramps is adequate to accommodate vehicle queues. In the PM peak hour, three on-ramps along northbound SR-55 would have vehicle queues exceeding the storage length under the No Build Alternative and Alternative 2, including westbound MacArthur Boulevard on-ramp, westbound Dyer Road on-ramp, and Edinger Avenue on-ramp. Alternatives 1, 3 and 4 would eliminate the queuing problems at both the westbound MacArthur Boulevard and westbound Dyer Road on-ramps to NB SR-55 contributed by addition of the northbound auxiliary lanes.

HOV Lane Operations Analysis

In addition to the mainline segments and ramp junctions, the HOV lane were also evaluated under 2020 conditions, and the AM and PM peak hour density, average speed, and LOS results are summarized in Table 10-A and 10-B, respectively.

AM Peak Hour

During the AM peak hour, all the study HOV locations on northbound SR-55 would operate at LOS B or better with an average speed of approximately 65 mph for each of the project alternatives under 2020 conditions.

In the southbound direction, SR-55 HOV lane between I-5 and McFadden Avenue would operate at LOS F and less than 10 mph due to the short-distance merging from the southbound I-5 HOV on-ramp under the No Build Alternative. Although Build Alternatives 1-3 would extend the 2nd HOV lane from the existing terminus to Edinger Avenue, the high HOV demand would result in merging issues at Edinger Avenue terminus and cause LOS F and an average speed of less than 30 mph in the HOV lanes between I-5 and Edinger Avenue. Under Build Alternative 4, all the southbound HOV lanes would operate at LOS D or better with an average speed of higher than 50 mph during the AM peak hour.

PM Peak Hour

During the PM peak hour, the northbound HOV lane between Dyer Road and McFadden Avenue would operate at LOS E or F with an average speed of less than 45 mph under the No Build Alternative and Alternatives 1-3, due to HOV capacity constraints and the interactions between HOV and general purpose lane traffic. With the additional capacity provided by the 2nd HOV lane, Alternative 4 would improve the northbound SR-55 HOV lane operations from LOS E/F to D or better and increase the average speed for HOV traffic. However, the HOV lane between Dyer Road and McFadden Avenue would operate at an average speed of right below 45 mph under Alternative 4 due to congestion on the general purpose lane interacting with the HOV traffic.

In the southbound direction, all the study HOV locations on southbound SR-55 operate at LOS C or better for each of the project alternatives under 2020 conditions. With the extended 2nd HOV lane on southbound SR-55, the HOV lane between McFadden Avenue and Edinger Avenue would improve from LOS C to B under Build Alternatives 1-3. Under Build Alternative 4, all the southbound HOV lanes would operate at LOS B or better during the PM peak hour. All the southbound HOV locations would operate at an average speed of higher than 55 mph under each of the project alternatives during the PM peak hour.



TABLE 9-E – ON-RAMP QUEUING ANALYSIS
– YEAR 2020 CONDITIONS (AM PEAK HOUR)

Location	Number of Lanes	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Storage (ft)	Queue (ft)								
1. SR-55 NB: Poularino Ave On-ramp	1	1,700	290	1,700	290	1,700	260	1,700	270	1,700	255
2. SR-55 NB: EB MacArthur Blvd On-ramp	2	840	235	840	245	840	325	840	245	840	245
3. SR-55 NB: WB MacArthur Blvd On-ramp ¹	1	940	100	940	65	940	90	940	80	940	65
4. SR-55 NB: EB Dyer Rd On-ramp ¹	1	790	350	790	330	790	255	790	310	790	375
5. SR-55 NB: WB Dyer Rd On-ramp	2	720	95	720	70	720	95	720	70	720	70
6. SR-55 NB: Edinger Ave On-ramp	2	480	85	480	80	480	80	480	325	480	75
7. SR-55 NB: McFadden Ave On-ramp	2	320	115	320	110	320	115	320	65	320	65
8. SR-55 NB: Irvine Blvd On-ramp	2	500	85	500	85	500	80	500	85	500	85
9. SR-55 SB: 4 th St On-ramp	1	740	175	740	205	740	160	740	155	740	535
10. SR-55 SB: McFadden Ave On-ramp	2	390	245	390	250	390	260	390	255	390	260
11. SR-55 SB: Edinger Ave On-ramp	2	570	120	570	130	570	125	570	120	570	120
12. SR-55 SB: Dyer Rd On-ramp	2	540	130	540	120	540	125	540	105	540	115
13. SR-55 SB: WB MacArthur Blvd On-ramp	1	720	125	720	125	720	115	720	105	720	110
14. SR-55 SB: EB MacArthur Blvd On-ramp	2	600	80	600	75	600	350	600	80	600	70

Note: 1. The on-ramps would be widened to have 2 metered lanes under Project Alternatives 1, 2, 3, and 4.

Bold and underline indicates vehicle queue exceeds the available storage.

Source: Fehr & Peers, 2015



TABLE 9-F – ON-RAMP QUEUING ANALYSIS
– YEAR 2020 CONDITIONS (PM PEAK HOUR)

Location	Number of Lanes	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Storage (ft)	Queue (ft)								
1. SR-55 NB: Paularino Ave On-ramp	1	1,700	1610	1,700	1690	1,700	1160	1,700	1410	1,700	1650
2. SR-55 NB: EB MacArthur Blvd On-ramp	2	840	515	840	445	840	305	840	400	840	375
3. SR-55 NB: WB MacArthur Blvd On-ramp ¹	1	940	<u>965</u>	940	290	940	<u>950</u>	940	675	940	360
4. SR-55 NB: EB Dyer Rd On-ramp ¹	1	790	695	790	180	790	190	790	165	790	165
5. SR-55 NB: WB Dyer Rd On-ramp	2	720	<u>815</u>	720	360	720	<u>825</u>	720	695	720	665
6. SR-55 NB: Edinger Ave On-ramp	2	480	<u>520</u>	480	<u>520</u>	480	<u>625</u>	480	<u>520</u>	480	<u>550</u>
7. SR-55 NB: McFadden Ave On-ramp	2	320	175	320	180	320	180	320	65	320	55
8. SR-55 NB: Irvine Blvd On-ramp	2	500	85	500	95	500	100	500	90	500	110
9. SR-55 SB: 4 th St On-ramp	1	740	185	740	195	740	210	740	190	740	200
10. SR-55 SB: McFadden Ave On-ramp	2	390	90	390	110	390	110	390	115	390	110
11. SR-55 SB: Edinger Ave On-ramp	2	570	170	570	175	570	175	570	190	570	210
12. SR-55 SB: Dyer Rd On-ramp	2	540	335	540	320	540	480	540	295	540	305
13. SR-55 SB: WB MacArthur Blvd On-ramp	1	720	635	720	595	720	570	720	615	720	610
14. SR-55 SB: EB MacArthur Blvd On-ramp	2	600	130	600	130	600	135	600	130	600	125

Note: 1. The on-ramps would be widened to have 2 metered lanes under Project Alternatives 1, 2, 3, and 4.

Bold and underline indicates vehicle queue exceeds the available storage.

Source: Fehr & Peers, 2015



**TABLE 10-A – FREEWAY HOV LANE OPERATIONS
– YEAR 2020 CONDITIONS (AM PEAK HOUR)**

Location	Type	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
		Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS	Density	Speed	LOS
Northbound																
NB 55: I-405 to MacArthur Blvd	HOV	5.8	64	A	5.8	63	A	5.7	64	A	5.6	65	A	6.0	64	A
NB 55: MacArthur Blvd to Dyer Rd	HOV	14.3	67	B	14.2	67	B	14.2	67	B	14.1	67	B	8.0	68	A
NB 55: Dyer Rd to Edinger Ave	HOV	12.4	66	B	11.7	66	B	11.2	67	B	11.1	67	B	7.5	67	A
NB 55: Edinger Ave to McFadden Ave	HOV	15.1	66	B	15.2	66	B	14.5	66	B	14.4	66	B	7.7	65	A
NB 55: McFadden Ave to I-5	HOV	4.9	67	A	5.0	68	A	5.0	68	A	4.9	68	A	5.0	68	A
Southbound																
SB 55: I-5 to McFadden Ave	HOV	168.3	8	F	109.1	12	F	55.6	26	F	101.5	12	F	28.8	52	D
SB 55: McFadden Ave to Edinger Ave	HOV	31.5	60	D	152.3	8	F	123.6	11	F	149.7	8	F	22.5	66	C
SB 55: Edinger Ave to Dyer Rd	HOV	26.6	63	D	22.1	63	C	22.4	63	C	18.1	66	C	20.6	66	C
SB 55: Dyer Rd to MacArthur Blvd	HOV	19.7	63	C	19.3	61	C	19.5	61	C	14.2	66	B	15.4	65	B
SB 55: MacArthur Blvd to I-405	HOV	16.0	67	B	15.2	67	B	15.0	67	B	11.6	67	B	23.3	66	C
Source: Fehr & Peers, 2015																



**TABLE 10-B – FREEWAY HOV LANE OPERATIONS
– YEAR 2020 CONDITIONS (PM PEAK HOUR)**

Location	Type	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
		Density	Speed	LOS	Density	Speed	LOS									
Northbound																
NB 55: I-405 to MacArthur Blvd	HOV	8.4	60	A	8.0	60	A	7.9	65	A	8.1	61	A	8.4	61	A
NB 55: MacArthur Blvd to Dyer Rd	HOV	21.2	63	C	20.8	63	C	21.2	64	C	20.9	64	C	13.6	66	B
NB 55: Dyer Rd to Edinger Ave	HOV	36.7	41	E	42.7	37	E	43.0	34	E	56.7	24	F	26.2	44	D
NB 55: Edinger Ave to McFadden Ave	HOV	36.3	42	E	39.1	40	E	45.0	32	E	48.3	30	F	26.6	44	D
NB 55: McFadden Ave to I-5	HOV	14.0	66	B	13.6	66	B	12.9	66	B	13.8	66	B	15.2	66	B
Southbound																
SB 55: I-5 to McFadden Ave	HOV	10.8	66	A	10.8	66	A	10.9	66	A	10.9	66	A	11.0	66	A
SB 55: McFadden Ave to Edinger Ave	HOV	23.6	57	C	13.3	66	B	13.3	66	B	13.3	66	B	13.6	66	B
SB 55: Edinger Ave to Dyer Rd	HOV	21.7	63	C	21.4	57	C	20.9	64	C	20.1	66	C	12.9	63	B
SB 55: Dyer Rd to MacArthur Blvd	HOV	23.6	60	C	25.4	56	C	21.1	64	C	18.9	65	C	14.2	63	B
SB 55: MacArthur Blvd to I-405	HOV	16.4	66	B	16.4	66	B	16.5	66	B	16.5	66	B	16.9	66	B
Source: Fehr & Peers, 2015																



Intersection Operations

Intersection Operations Analysis

Tables 11-A and 11-B show the AM and PM peak hour delay and LOS for the study ramp terminal intersections for each of the project alternatives under 2020 conditions.

AM Peak Hour

During the AM peak hour, all the study intersections would operate at LOS D or better for each of the project alternatives.

PM Peak Hour

During the PM peak hour, most of the study intersections would operate at LOS C or better under the No Build Alternative except for three intersections of Northbound SR-55/Newport Avenue/Del Amo, Northbound SR-55/MacArthur Boulevard, and Southbound SR-55/MacArthur Boulevard, which would operate at LOS E or F under 2020 conditions. Under Build Alternatives 1 and 4, the proposed 2nd lane on the westbound MacArthur Boulevard on-ramp to northbound SR-55 would improve traffic operations at the Northbound SR-55/MacArthur Boulevard intersection from LOS F to D/E under 2020 conditions. However, the Paularino Avenue on-ramp to northbound SR-55 would expect vehicle queue spillback resulting in traffic congestion and LOS E/F conditions at Paularino Avenue ramp intersections under Alternatives 1 and 4.

Under Build Alternative 2, the Northbound SR-55/Dyer Road intersection would also operate at LOS F conditions due to on-ramp queue spillback resulted from lacking of the auxiliary lane. With the proposed auxiliary lane under Alternative 3 and 4, this intersection would improve from LOS F to D or better conditions during the PM peak hour.

Intersection Turning Movement Queuing Analysis

The intersection turning movement vehicle queues at study locations under each of the project alternatives are summarized in Tables 11-C and 11-D. During the AM peak hour, most of locations have adequate storage to accommodate vehicle queues except for three turning movements including the westbound left turn at the Southbound SR-55/4th Street intersection, eastbound left-turn at the Grand Avenue/Dyer Road intersection, and the eastbound left-turn at the Northbound SR-55/Paularino Avenue intersection, where the vehicle queues would exceed storage lengths under all project alternatives.



TABLE 11-A – INTERSECTION OPERATIONS
– YEAR 2020 CONDITIONS (AM PEAK HOUR)

Location	Control Type	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Delay ²	LOS								
1. SR-55 SB/4 th St	Signal	21.3	C	34.1	C	40.4	D	35.3	D	46.4	D
2. SR-55 NB/Irvine Blvd	Signal	23.9	C	24.6	C	23.7	C	25.5	C	24.5	C
3. SR-55 SB/Village Way	AWSC ¹	15.2	C	14.9	B	16.8	C	16.7	C	16.6	C
4. SR-55 NB/Pasadena Ave	SSSC ¹	9.3	A	9.1	A	8.9	A	8.4	A	8.3	A
5. SR-55 SB/Edinger Ave	Signal	24.4	C	24.6	C	25.0	C	25.0	C	24.9	C
6. SR-55 NB/Newport Ave	Signal	21.9	C	22.2	C	21.3	C	22.1	C	23.1	C
7. SR-55 SB/ Grand Ave	Signal	8.9	A	10.1	B	9.8	A	9.8	A	9.6	A
8. SR-55 SB/Dyer Ave	Signal	20.1	C	20.2	C	19.7	B	20.1	C	19.8	B
9. Grand Ave/Dyer Rd	Signal	16.0	B	16.6	B	17.4	B	18.6	B	17.5	B
10. SR-55 NB/Dyer Rd	Signal	12.2	B	12.3	B	12.2	B	11.7	B	12.2	B
11. SR-55 SB/MacArthur Blvd	Signal	10.2	B	10.1	B	15.3	B	10.4	B	10.5	B
12. SR-55 NB/MacArthur Blvd	Signal	13.5	B	15.4	B	13.4	B	11.0	B	17.3	B
13. SR-55 SB/Paularino Ave	Signal	24.8	C	25.1	C	25.5	C	26.4	C	27.1	C
14. SR-55 NB/Paularino Ave	Signal	22.8	C	22.4	C	22.3	C	22.7	C	22.0	C

Notes: 1. AWSC = All way stop control, SSSC = Side street stop-control.
2. Average delay reported for ASWC and signalized intersections and worst-approach delay reported for SSSC intersections.
Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



TABLE 11-B – INTERSECTION OPERATIONS
– YEAR 2020 CONDITIONS (PM PEAK HOUR)

Location	Control Type	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Delay ²	LOS								
1. SR-55 SB/4 th St	Signal	19.1	B	19.2	B	18.7	B	19.0	B	19.1	B
2. SR-55 NB/Irvine Blvd	Signal	17.5	B	17.6	B	17.8	B	17.7	B	18.0	B
3. SR-55 SB/Village Way	AWSC ¹	10.5	B	10.5	B	10.3	B	10.3	B	10.3	B
4. SR-55 NB/Pasadena Ave	SSSC ¹	8.6	A	8.8	A	8.7	A	8.0	A	7.9	A
5. SR-55 SB/Edinger Ave	Signal	26.2	C	26.9	C	27.0	C	26.3	C	26.4	C
6. SR-55 NB/Newport Ave	Signal	>80	F								
7. SR-55 SB/ Grand Ave	Signal	9.4	A	9.6	A	10.2	B	10.0	A	9.9	A
8. SR-55 SB/Dyer Ave	Signal	29.0	C	28.2	C	28.9	C	28.2	C	28.8	C
9. Grand Ave/Dyer Rd	Signal	14.3	B	14.5	B	17.1	B	16.1	B	14.4	B
10. SR-55 NB/Dyer Rd	Signal	11.5	B	4.6	A	>80	F	39.5	D	20.3	C
11. SR-55 SB/MacArthur Blvd	Signal	79.2	E	68.0	E	>80	F	>80	F	72.0	E
12. SR-55 NB/MacArthur Blvd	Signal	>80	F	56.8	E	>80	F	>80	F	56.3	E
13. SR-55 SB/Paularino Ave	Signal	22.8	C	63.3	E	23.0	C	23.5	C	24.3	C
14. SR-55 NB/Paularino Ave	Signal	53.9	D	>80	F	31.6	C	32.2	C	75.3	E

Notes: 1. AWSC = All way stop control, SSSC = Side street stop-control.
2. Average delay reported for ASWC and signalized intersections and worst-approach delay reported for SSSC intersections.
Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015

TABLE 11-C – INTERSECTION VEHICLE QUEUING ANALYSIS
– YEAR 2020 CONDITIONS (AM PEAK HOUR)

Intersection	Movement	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Storage (ft)	Queue (ft)								
1. SR-55 SB/4 th St	SB – off-ramp	1,430	135	1,430	125	1,430	140	1,430	135	1,430	120
	WB – left turn	310	350	310	345	310	350	310	365	310	360
	WB – through	310	135	310	140	310	140	310	145	310	135
2. SR-55 NB/Irvine Blvd	NB – off-ramp	2,030	235	2,030	245	2,030	250	2,030	250	2,030	255
	EB – left turn	310	200	310	200	310	215	310	195	310	200
	EB – through	310	80	310	75	310	75	310	70	310	70
3. SR-55 SB/Village Way	SB – left turn	820	150	820	195	820	140	820	170	820	160
	WB – off-ramp	900	75	900	70	900	65	900	65	900	70
4. SR-55 NB/Pasadena Ave	SB – left turn	1,170	45	1,170	40	1,170	35	1,170	45	1,170	45
	SB – right turn	1,170	10	1,170	5	1,170	10	1,170	5	1,170	5
	EB – off-ramp	875	50	875	40	875	45	875	35	875	35
	WB – through	375	25	375	25	375	25	375	5	375	5
5. SR-55 SB/Edinger Ave	NB – off-ramp	995	345	995	335	995	320	995	340	995	350
	EB – left turn	180	50	180	55	180	55	180	50	180	50
	EB – through	1,285	320	1,285	325	1,285	340	1,285	340	1,285	340
	WB – left turn	255	205	255	205	255	210	255	225	255	210
	WB – through	1,055	230	1,055	230	1,055	235	1,055	210	1,055	215
6. SR-55 NB/Newport Ave	NB - Left	330	65	330	70	330	65	330	80	330	70
	SB – through	1,180	240	1,180	245	1,180	240	1,180	275	1,180	280



	SB – right turn	600	240	600	350	600	240	600	275	600	280
	EB – off-ramp	1,080	155	1,080	150	1,080	145	1,080	140	1,080	145
	WB – through	1,210	75	1,210	75	1,210	70	1,210	70	1,210	75
7. SR-55 SB/ Grand Ave	NB – through	1,070	120	1,070	130	1,070	130	1,070	150	1,070	150
	WB – off-ramp	930	200	930	235	930	235	930	245	930	250
8. SR-55 SB/Dyer Ave	NB – off-ramp	1,145	145	1,145	150	1,145	145	1,145	145	1,145	145
	EB – through	430	270	430	280	430	280	430	270	430	270
	WB – left turn	250	215	250	180	250	180	250	180	250	180
	WB – through	470	95	470	90	470	80	470	85	470	95
9. Grand Ave/Dyer Rd	SB – left turn	1,090	270	1,090	270	1,090	270	1,090	290	1,090	285
	SB – right-turn	1,090	270	1,090	270	1,090	270	1,090	290	1,090	285
	EB – left turn	100	180	100	185	100	172	100	180	100	165
	EB – through	460	195	460	215	460	210	460	195	460	170
	WB – through	500	320	500	345	500	390	500	415	500	355
10. SR-55 NB/Dyer Rd	NB – off-ramp	1,710	320	1,710	345	1,710	335	1,710	315	1,710	330
	EB – through	500	200	500	220	500	215	500	215	500	230
	EB – right turn	400	0	400	0	400	0	400	0	400	10
	WB – through	560	170	560	145	560	135	560	155	560	155
	WB – right turn	--	--	330	55	330	60	330	55	330	55
11. SR-55 SB/MacArthur Blvd	SB – off-ramp	1,425	255	1,425	290	1,425	270	1,425	255	1,425	275
	EB – through	815	220	815	215	815	300	815	255	815	245
	EB – right turn	815	0	815	0	815	160	815	0	815	0
	WB – through	885	85	885	90	885	92	885	85	885	80
	WB – right turn	350	0	350	0	350	0	350	0	350	0



12. SR-55 NB/MacArthur Blvd	NB – off-ramp	1,195	365	1,195	430	1,195	360	1,195	360	1,195	510
	EB – through	885	445	885	245	885	225	885	135	885	260
	EB – right turn	530	0	530	0	530	0	530	0	530	0
	WB – through	705	125	705	130	705	125	705	120	705	120
	WB – right turn	705	0	705	0	705	0	705	0	705	0
13. SR-55 SB/Paularino Ave	SB – off-ramp	2,135	435	2,135	470	2,135	465	2,135	485	2,135	520
	WB – left turn	190	140	190	145	190	150	190	145	190	145
	WB – through	345	65	345	70	345	65	345	75	345	75
14. SR-55 NB/Paularino Ave	NB – through	845	370	845	360	845	370	845	375	845	350
	EB – left turn	130	<u>265</u>	130	<u>285</u>	130	<u>255</u>	130	<u>280</u>	130	<u>280</u>
	EB – through	345	212	345	190	345	210	345	190	345	215

Note: Bold and underline indicates vehicle queue exceeds the available storage.

Source: Fehr & Peers, 2015



TABLE 11-D – INTERSECTION VEHICLE QUEUING ANALYSIS
– YEAR 2020 CONDITIONS (PM PEAK HOUR)

Intersection	Movement	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Storage (ft)	Queue (ft)	Storage (ft)	Queue (ft)	Storage (ft)	Queue (ft)	Storage (ft)	Queue (ft)	Storage (ft)	Queue (ft)
1. SR-55 SB/4 th St	SB – off-ramp	1,430	220	1,430	220	1,430	220	1,430	210	1,430	220
	WB – left turn	310	275	310	280	310	290	310	280	310	245
	WB – through	310	90	310	90	310	85	310	90	310	85
2. SR-55 NB/Irvine Blvd	NB – off-ramp	2,030	165	2,030	155	2,030	165	2,030	165	2,030	165
	EB – left turn	310	285	310	305	310	280	310	295	310	290
	EB – through	310	125	310	125	310	120	310	115	310	120
3. SR-55 SB/Village Way	SB – left turn	820	80	820	85	820	80	820	90	820	85
	WB – off-ramp	900	95	900	85	900	90	900	80	900	0
4. SR-55 NB/Pasadena Ave	SB – left turn	1,170	35	1,170	35	1,170	35	1,170	35	1,170	35
	SB – right turn	1,170	20	1,170	20	1,170	20	1,170	10	1,170	10
	EB – off-ramp	875	35	875	25	875	30	875	30	875	30
	WB – through	375	10	375	5	375	5	375	5	375	5
5. SR-55 SB/Edinger Ave	NB – off-ramp	995	305	995	315	995	315	995	320	995	325
	EB – left turn	180	65	180	60	180	65	180	60	180	60
	EB – through	1,285	350	1,285	345	1,285	355	1,285	350	1,285	330
	WB – left turn	255	200	255	205	255	210	255	210	255	215
	WB – through	1,055	205	1,055	220	1,055	230	1,055	200	1,055	210
6. SR-55 NB/Newport Ave	NB - Left	330	155	330	160	330	200	330	215	330	195
	SB – through	1,180	1055	1,180	1055	1,180	1335	1,180	1035	1,180	1025



	SB – right turn	600	1055	600	1160	600	1335	600	1340	600	1325
	EB – off-ramp	1,080	65	1,080	80	1,080	90	1,080	90	1,080	90
	WB – through	1,210	125	1,210	120	1,210	130	1,210	135	1,210	135
7. SR-55 SB/ Grand Ave	NB – through	1,070	90	1,070	90	1,070	75	1,070	105	1,070	85
	WB – off-ramp	930	240	930	265	930	295	930	285	930	275
8. SR-55 SB/Dyer Ave	NB – off-ramp	1,145	130	1,145	145	1,145	130	1,145	130	1,145	135
	EB – through	430	380	430	370	430	375	430	380	430	380
	WB – left turn	250	240	250	250	250	265	250	250	250	270
	WB – through	470	230	470	225	470	275	470	210	470	245
9. Grand Ave/Dyer Rd	SB – left turn	1,090	270	1,090	265	1,090	295	1,090	315	1,090	285
	SB – right-turn	1,090	270	1,090	265	1,090	295	1,090	315	1,090	285
	EB – left turn	100	200	100	150	100	175	100	190	100	155
	EB – through	460	420	460	440	460	455	460	430	460	390
	WB – through	500	230	500	215	500	265	500	300	500	240
10. SR-55 NB/Dyer Rd	NB – off-ramp	1,710	135	1,710	125	1,710	140	1,710	135	1,710	125
	EB – through	500	105	500	100	500	105	500	100	500	95
	EB – right turn	400	300	400	0	400	0	400	0	400	0
	WB – through	560	1700	560	120	560	1700	560	1100	560	620
	WB – right turn	--	--	330	90	330	1700	330	1100	330	550
11. SR-55 SB/MacArthur Blvd	SB – off-ramp	1,425	195	1,425	180	1,425	155	1,425	150	1,425	215
	EB – through	815	185	815	145	815	185	815	190	815	175
	EB – right turn	815	0	815	0	815	0	815	0	815	0
	WB – through	885	990	885	935	885	990	885	985	885	955
	WB – right turn	350	765	350	675	350	645	350	700	350	720



12. SR-55 NB/MacArthur Blvd	NB – off-ramp	1,195	225	1,195	200	1,195	685	1,195	435	1,195	235
	EB – through	885	155	885	100	885	105	885	110	885	100
	EB – right turn	530	265	530	215	530	0	530	60	530	60
	WB – through	705	<u>1690</u>	705	<u>880</u>	705	<u>1700</u>	705	<u>1540</u>	705	<u>1055</u>
	WB – right turn	705	<u>1690</u>	705	0	705	<u>1700</u>	705	580	705	140
13. SR-55 SB/Paularino Ave	SB – off-ramp	2,135	350	2,135	355	2,135	350	2,135	345	2,135	345
	WB – left turn	190	130	190	135	190	140	190	135	190	140
	WB – through	345	140	345	140	345	150	345	140	345	150
14. SR-55 NB/Paularino Ave	NB – through	845	525	845	<u>865</u>	845	340	845	350	845	620
	EB – left turn	130	<u>290</u>	130	<u>445</u>	130	<u>260</u>	130	<u>250</u>	130	<u>315</u>
	EB – through	345	120	345	225	345	70	345	140	345	140

Note: Bold and underline indicates vehicle queue exceeds the available storage.

Source: Fehr & Peers, 2015



During the PM peak hour, more locations with vehicle queue exceeding storage length would occur under all the project alternatives. Under the No Build Alternative, significant queuing are expected on southbound Newport Avenue right-turn movement at the Northbound SR-55/Newport Avenue intersection, westbound Dyer Road at the Northbound SR-55/Dyer Road intersection, and westbound MacArthur Boulevard at the Northbound SR-55/MacArthur Boulevard intersection, which are resulted from a combination of high traffic demand and vehicle queue spillback from the northbound SR-55 on-ramps at those locations. Alternatives 1 and 4 would significantly reduce the queue along Dyer Road and MacArthur Boulevard with addition of the northbound SR-55 auxiliary lanes; however, the queue on southbound Newport Avenue would be longer compare to the No Build Alternative due to more freeway traffic on NB SR-55 able to travel downstream to Edinger Avenue and cause queue spillback from the on-ramp to Newport Avenue. Under Alternative 2, vehicle queues would increase noticeably (compared to the No Build Alternative) along southbound Newport Avenue, eastbound and westbound Dyer Road, as well as MacArthur Boulevard, due to a combination of higher traffic volumes on northbound SR-55 and higher delay at the on-ramp merging sections causing queue spillback to arterials. Alternative 3 would significantly improve queuing along Dyer Road and MacArthur Boulevard compared to Alternative 2, due to the addition of auxiliary lanes on northbound SR-55.

Systemwide Performance

The systemwide performance measures applied to this project include travel time, travel speeds, vehicle-miles-traveled, vehicle-hours-delay, and number of people served by the corridor.

Travel Time and Speeds

Tables 12-A and 12-B compare the AM and PM peak hour segment by segment travel time and speeds along the SR-55 corridor for all the project alternatives under 2020 conditions. The Year 2020 AM and PM peak hour travel speeds along the study corridor under each project alternative are illustrated in Figures 2-C-Alt-AM and 2-C-Alt-PM, respectively.

AM Peak Hour

Similar travel times and speeds would occur on northbound SR-55 during the AM peak hour under all the project alternatives. Northbound SR-55 traffic starts at a speed of lower than 35 mph between Paularino Avenue and MacArthur Boulevard due to the bottleneck at the I-405/MacArthur area. This bottleneck would meter through traffic getting downstream, and therefore northbound traffic would flow well at/near free-flow speed north of MacArthur Boulevard. The total travel time for northbound SR-55 under all the alternative would be approximately 6 minutes with an average speed of 55-59 mph under 2020 conditions.



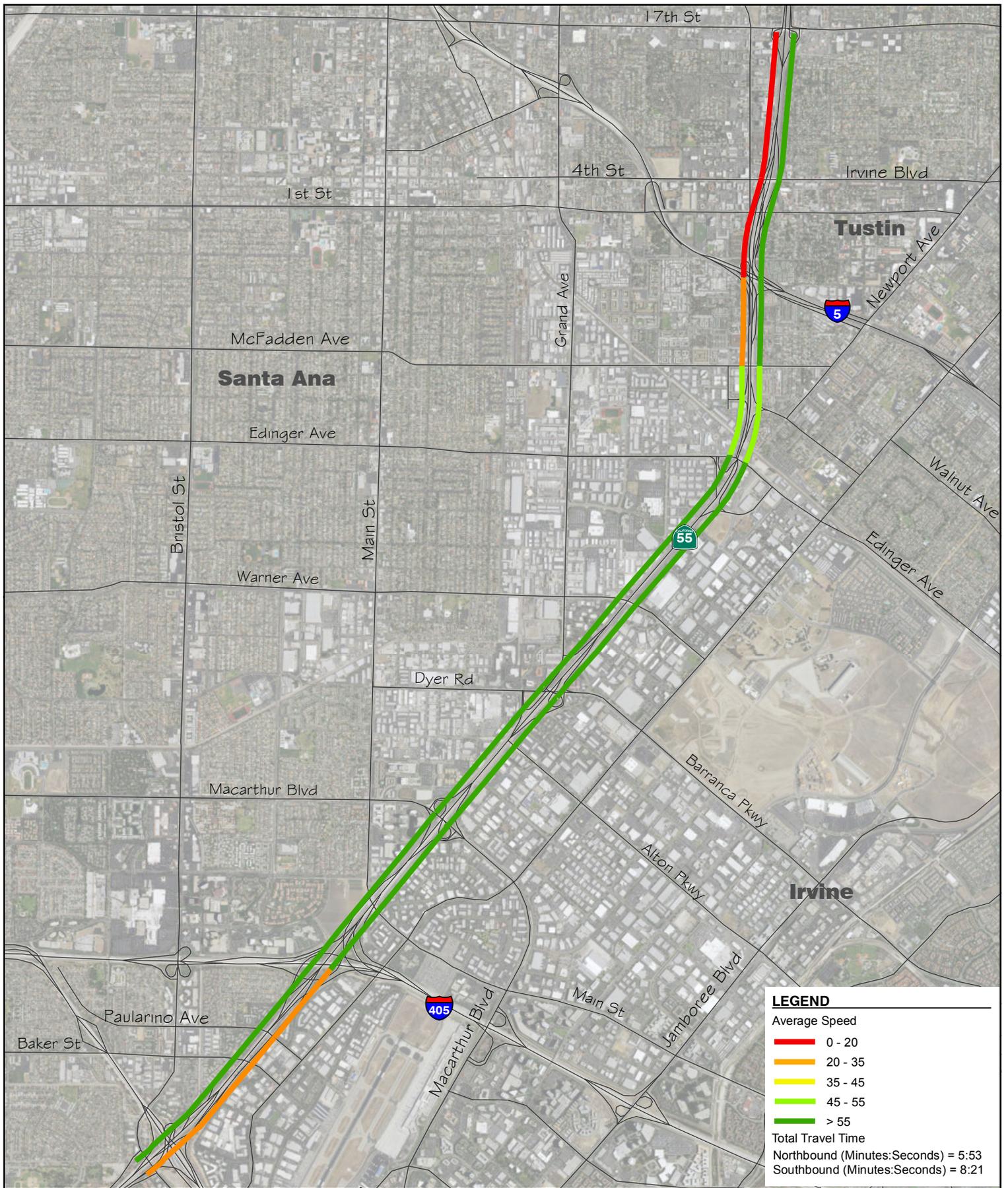
**TABLE 12-A – SR-55 AM PEAK HOUR TRAVEL TIME AND SPEEDS
– YEAR 2020 CONDITIONS**

Location	Mile	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Travel Time (min:sec)	Travel Speed (mph)								
Northbound											
NB 55: Paularino Ave to I-405	0.5	00:54	31.3	00:53	31.9	00:56	30.2	00:56	30.2	00:50	33.8
NB 55: I-405 to MacArthur Blvd	1.0	01:01	58.1	01:03	56.3	00:58	61.2	00:58	61.2	01:03	56.3
NB 55: MacArthur Blvd to Dyer Rd	0.9	00:50	63.8	00:48	66.5	00:48	66.5	00:48	66.5	00:50	63.8
NB 55: Dyer Rd to Edinger Ave	1.6	01:36	59.2	01:34	60.5	01:24	67.7	01:24	67.7	01:28	64.6
NB 55: Edinger Ave to McFadden Ave	0.5	00:39	46.7	00:40	45.5	00:45	40.5	00:30	60.7	00:30	60.7
NB 55: McFadden Ave to I-5	0.5	00:25	67.3	00:25	67.3	00:25	67.3	00:25	67.3	00:25	67.3
NB 55: I-5 to Irvine Blvd	0.5	00:28	68.5	00:28	68.5	00:28	68.5	00:28	68.5	00:28	68.5
<u>NB 55 - Total</u>	<u>5.4</u>	<u>05:53</u>	<u>55.3</u>	<u>05:51</u>	<u>55.7</u>	<u>05:44</u>	<u>56.8</u>	<u>05:29</u>	<u>59.4</u>	<u>05:34</u>	<u>58.5</u>
Southbound											
SB 55: 4 th St to I-5	0.5	02:31	12.7	01:58	16.2	01:50	17.4	01:50	17.4	01:30	21.3
SB 55: I-5 to McFadden Ave	0.5	01:12	23.4	00:55	30.6	00:50	33.7	00:52	32.4	00:42	40.1
SB 55: McFadden Ave to Edinger Ave	0.5	00:39	46.7	00:29	62.8	00:30	60.7	00:28	65.0	00:27	67.5
SB 55: Edinger Ave to Dyer Rd	1.6	01:41	56.3	02:22	40.0	01:57	48.6	01:28	64.6	01:40	56.8
SB 55: Dyer Rd to MacArthur Blvd	0.9	00:58	55.0	01:09	46.3	01:12	44.3	01:00	53.2	01:09	46.3
SB 55: MacArthur Blvd to I-405	1.0	00:55	64.5	00:56	63.3	00:57	62.2	01:06	53.7	01:04	55.4
SB 55: I-405 to Paularino	0.5	00:25	67.7	00:26	65.1	00:26	65.1	00:26	65.1	00:26	65.1
<u>SB 55 - Total</u>	<u>5.4</u>	<u>08:21</u>	<u>39.0</u>	<u>08:15</u>	<u>39.5</u>	<u>07:42</u>	<u>42.3</u>	<u>07:10</u>	<u>45.4</u>	<u>06:58</u>	<u>46.7</u>
Source: Fehr & Peers, 2015											



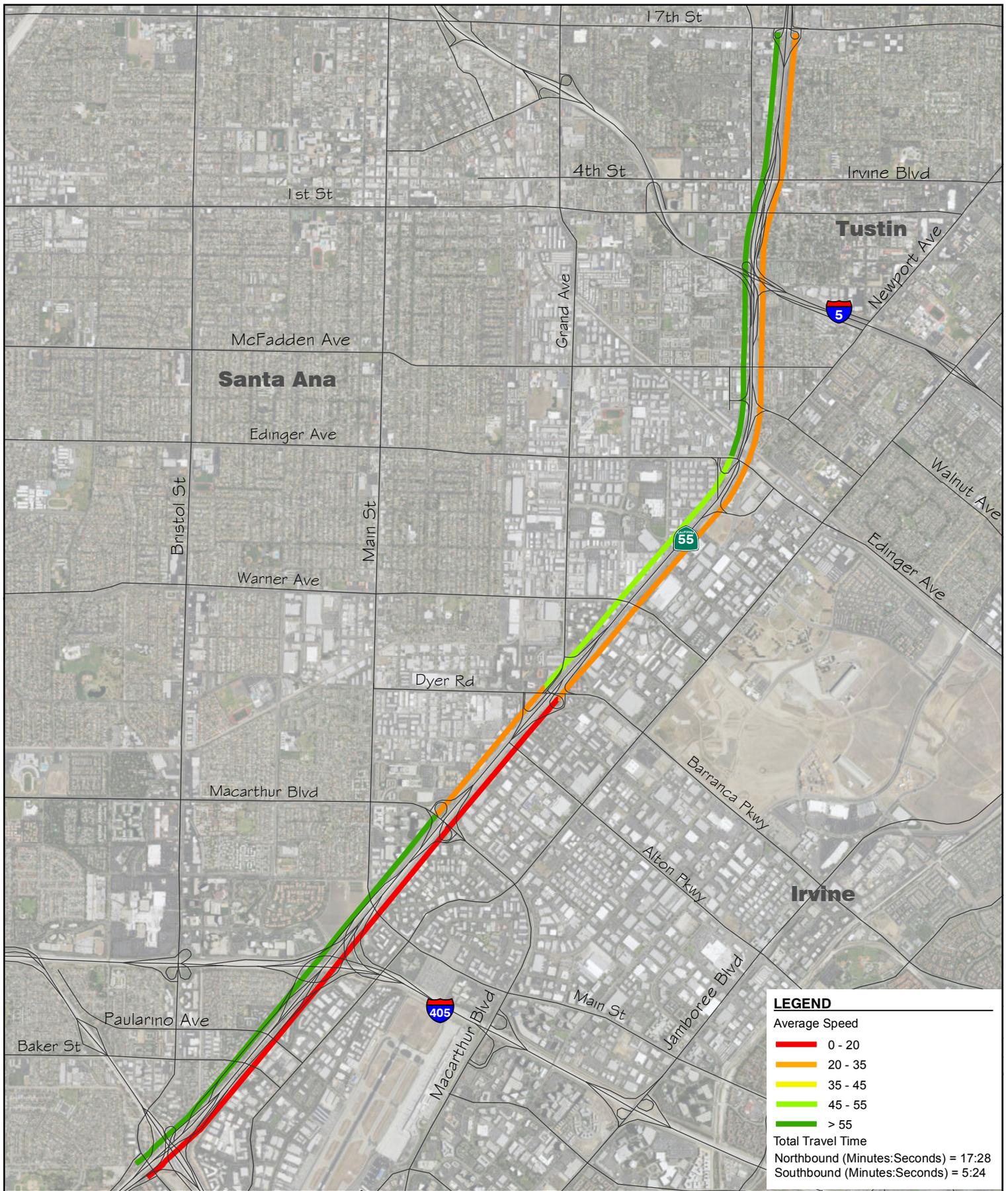
**TABLE 12-B – SR-55 PM PEAK HOUR TRAVEL TIME AND SPEEDS
– YEAR 2020 CONDITIONS**

Location	Mile	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Travel Time (min:sec)	Travel Speed (mph)								
Northbound											
NB 55: Paularino Ave to I-405	0.5	02:16	12.4	02:26	11.6	00:27	62.7	00:26	65.1	02:03	10.8
NB 55: I-405 to MacArthur Blvd	1.0	05:23	11.0	05:24	10.9	02:03	28.8	02:26	24.3	04:45	10.9
NB 55: MacArthur Blvd to Dyer Rd	0.9	03:58	13.4	03:53	13.7	04:35	11.6	04:43	11.3	03:43	13.4
NB 55: Dyer Rd to Edinger Ave	1.6	04:04	23.3	04:20	21.9	05:51	16.2	06:01	15.7	05:35	21.9
NB 55: Edinger Ave to McFadden Ave	0.5	01:14	24.6	01:07	27.2	01:31	20.0	01:30	20.2	01:09	27.2
NB 55: McFadden Ave to I-5	0.5	01:14	22.7	01:05	25.9	00:59	28.5	00:56	30.0	00:32	25.9
NB 55: I-5 to Irvine Blvd	0.5	01:18	24.6	01:11	27.0	01:10	27.4	01:00	32.0	00:49	27.0
<u>NB 55 - Total</u>	<u>5.4</u>	<u>19:27</u>	<u>16.7</u>	<u>19:26</u>	<u>16.8</u>	<u>16:36</u>	<u>19.6</u>	<u>17:02</u>	<u>19.1</u>	<u>18:36</u>	<u>17.5</u>
Southbound											
SB 55: 4 th St to I-5	0.5	00:30	63.9	00:30	63.9	00:30	63.9	00:30	63.9	00:30	63.9
SB 55: I-5 to McFadden Ave	0.5	00:29	58.0	00:28	60.1	00:29	58.0	00:29	58.0	00:29	58.0
SB 55: McFadden Ave to Edinger Ave	0.5	00:30	60.7	00:28	65.0	00:28	65.0	00:28	65.0	00:28	65.0
SB 55: Edinger Ave to Dyer Rd	1.6	01:54	49.9	01:50	51.7	01:27	65.3	01:27	65.3	01:47	53.1
SB 55: Dyer Rd to MacArthur Blvd	0.9	01:35	33.6	01:42	31.3	01:02	51.5	00:54	59.1	01:38	32.6
SB 55: MacArthur Blvd to I-405	1.0	01:00	59.1	01:00	59.1	01:04	55.4	01:09	51.4	01:01	58.1
SB 55: I-405 to Paularino	0.5	00:27	62.7	00:26	65.1	00:29	58.3	00:27	62.7	00:27	62.7
<u>SB 55 - Total</u>	<u>5.4</u>	<u>06:25</u>	<u>50.7</u>	<u>06:24</u>	<u>50.9</u>	<u>05:29</u>	<u>59.4</u>	<u>05:24</u>	<u>60.3</u>	<u>06:20</u>	<u>51.4</u>
Source: Fehr & Peers, 2015											



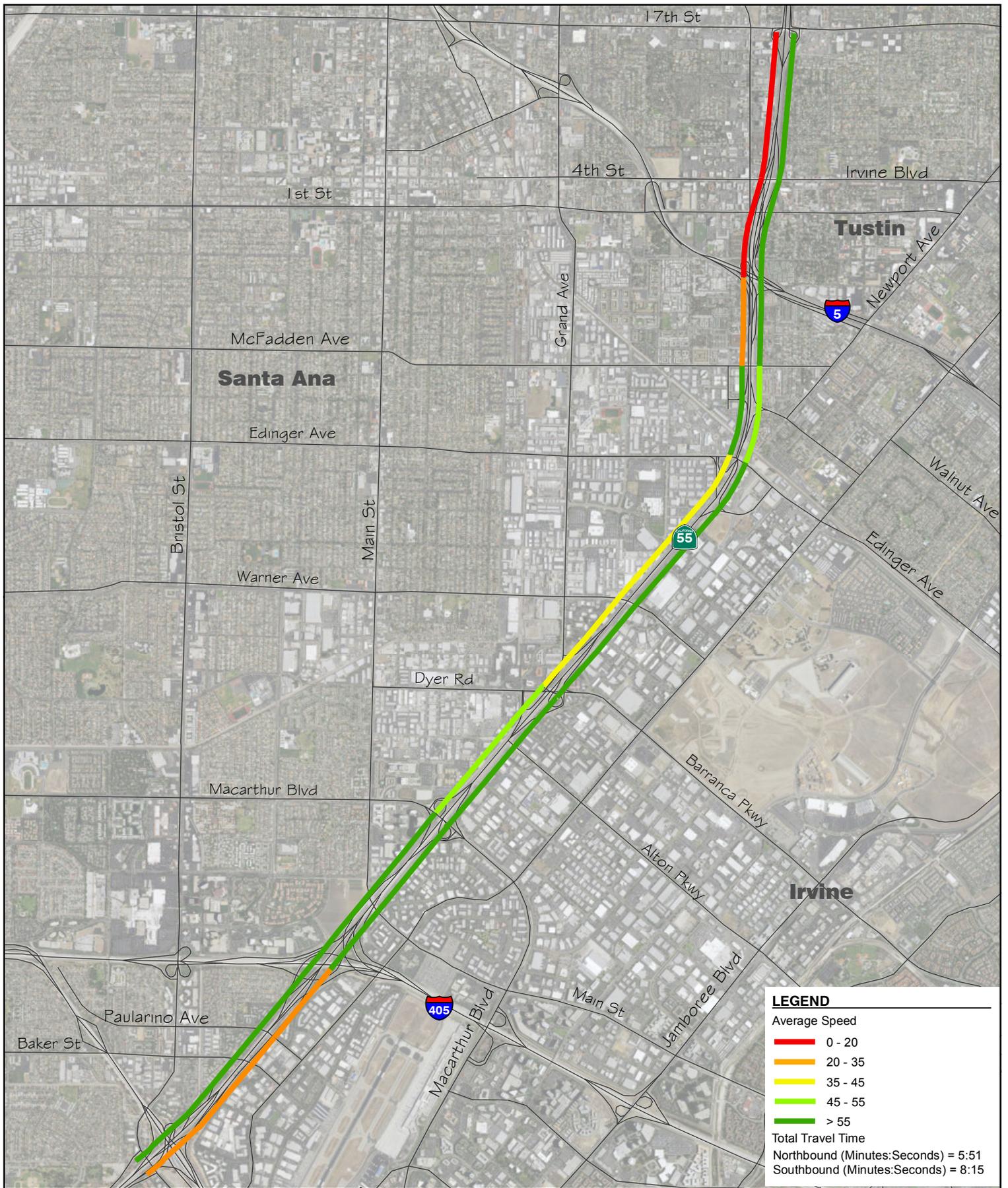
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LEGEND

Average Speed

- █ 0 - 20
- █ 20 - 35
- █ 35 - 45
- █ 45 - 55
- █ > 55

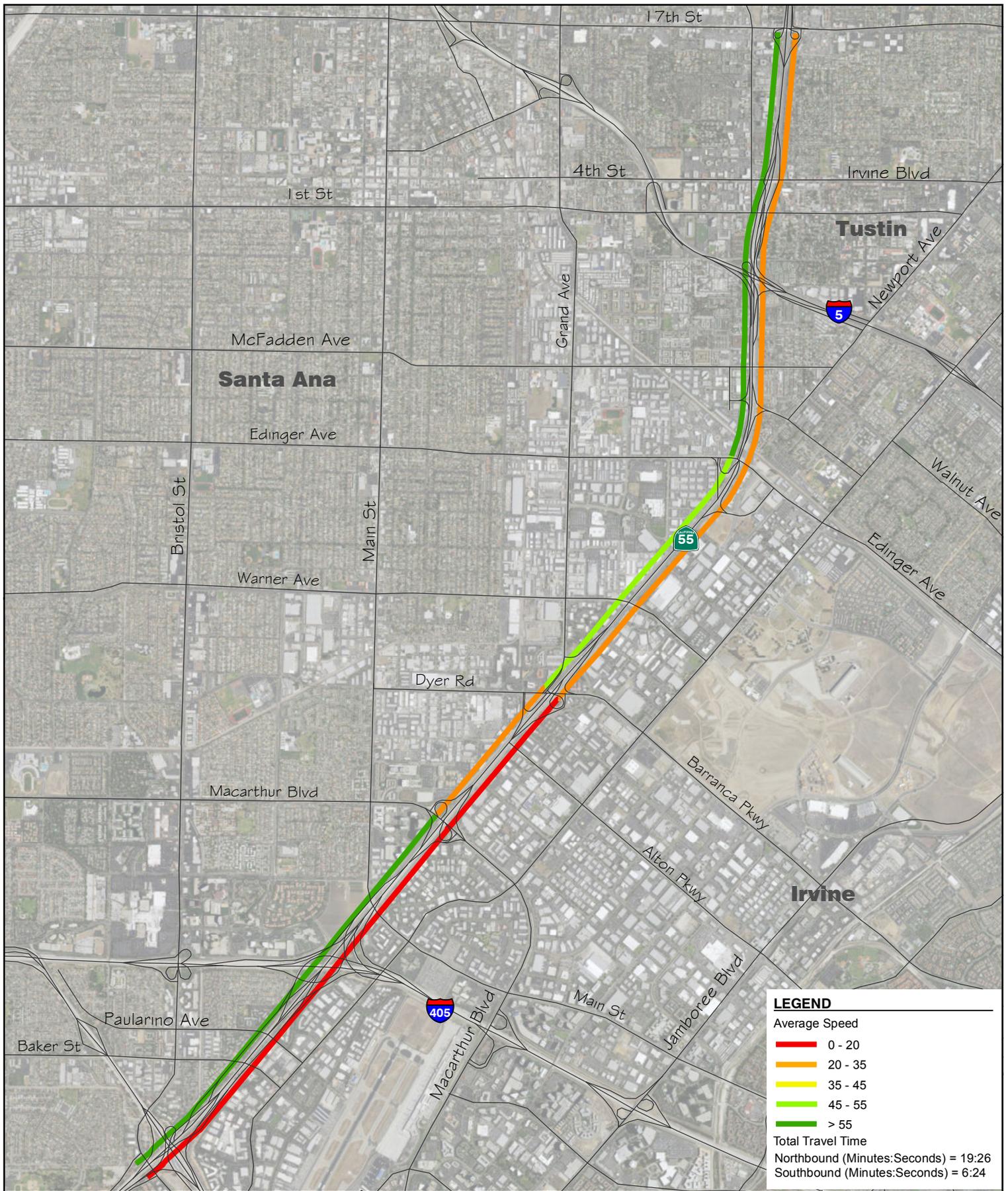
Total Travel Time

Northbound (Minutes:Seconds) = 5:51

Southbound (Minutes:Seconds) = 8:15

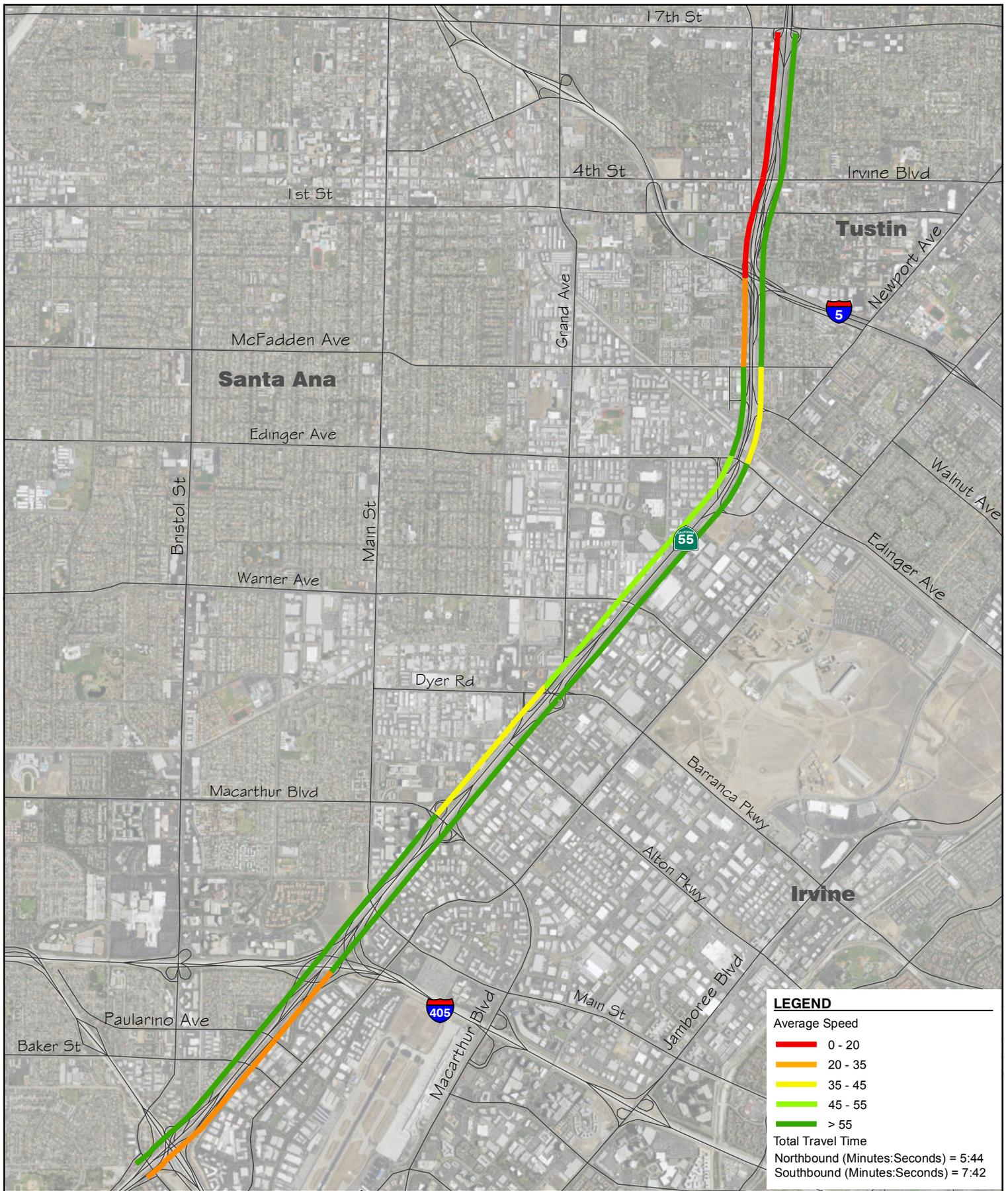


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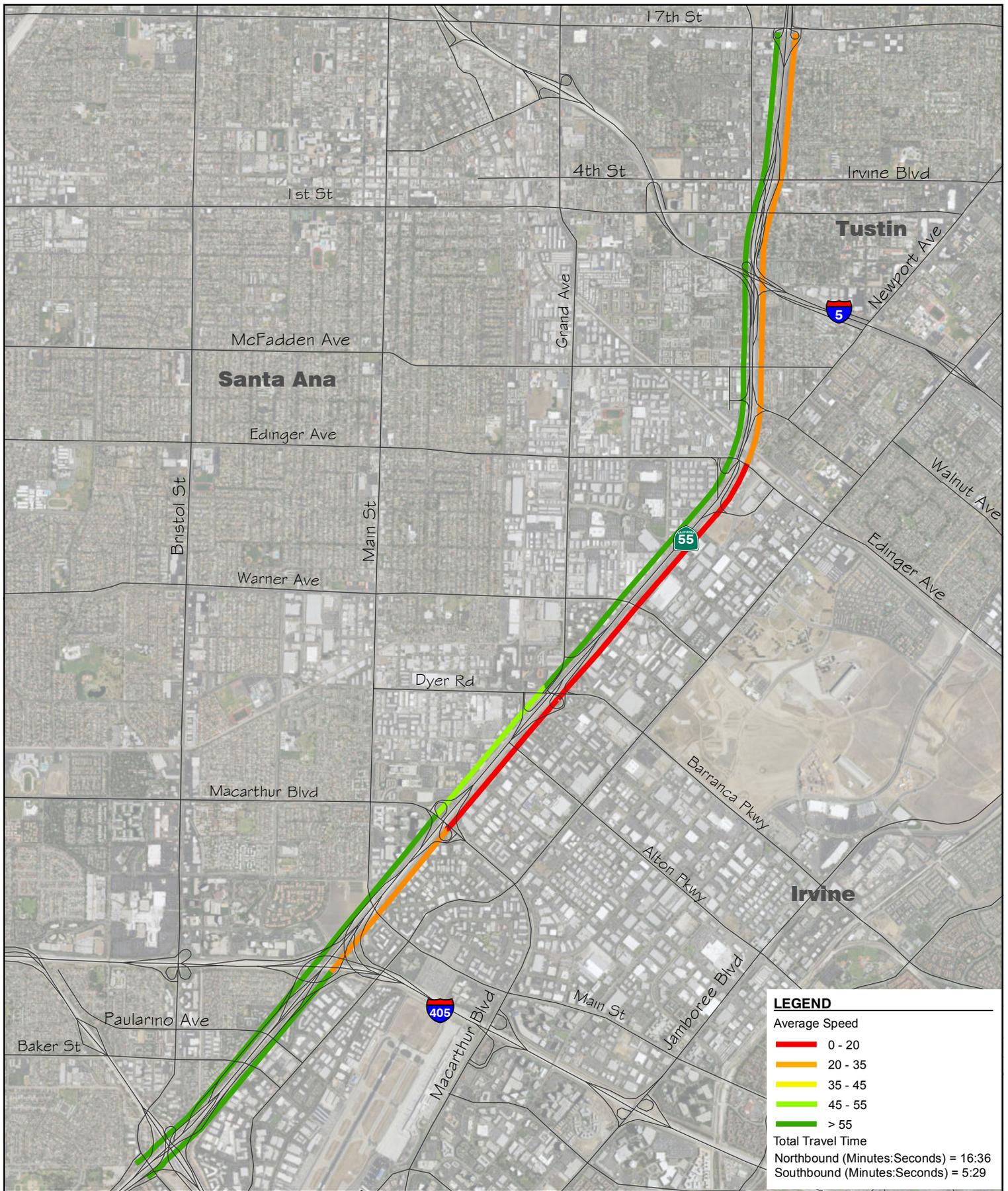
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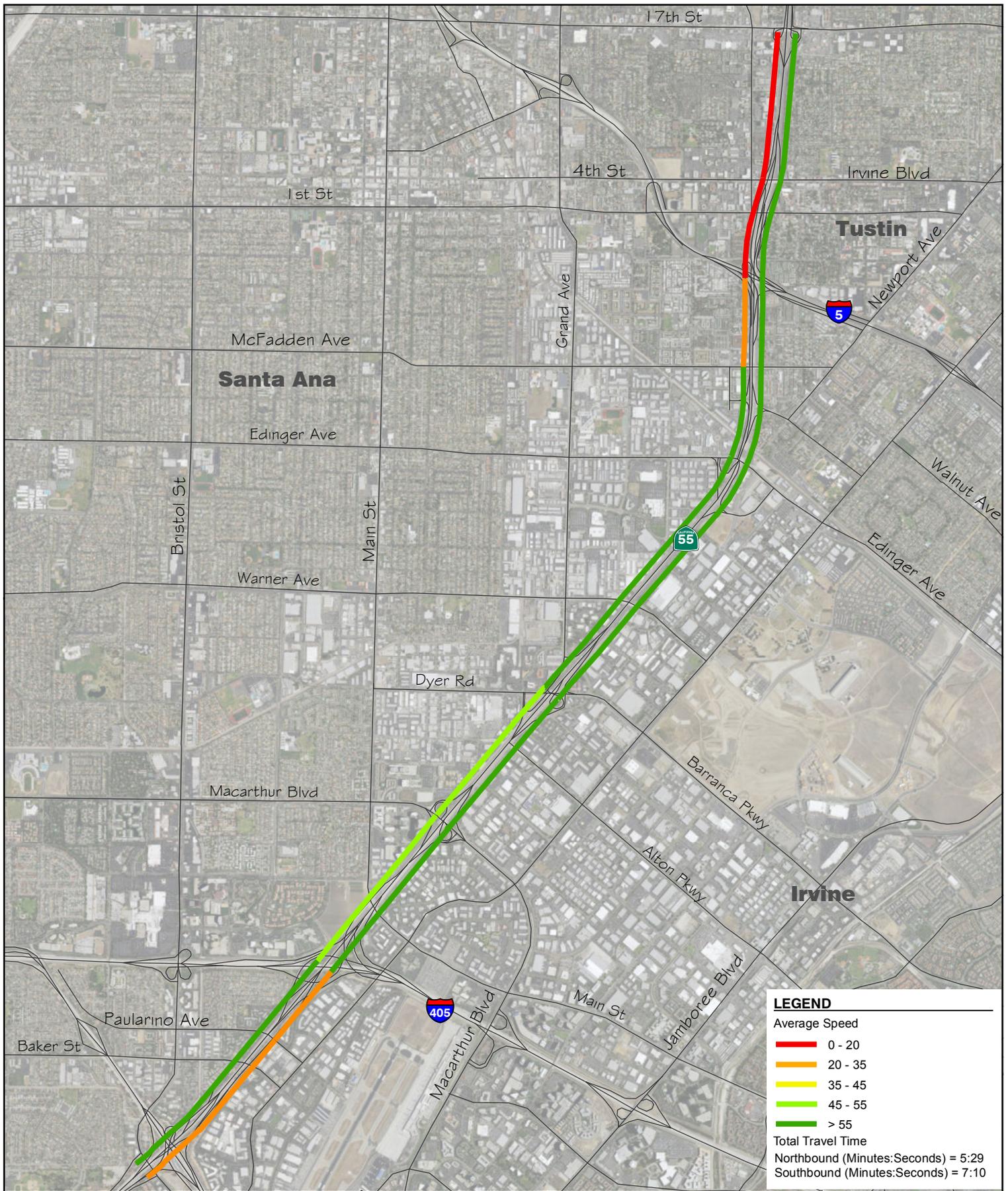
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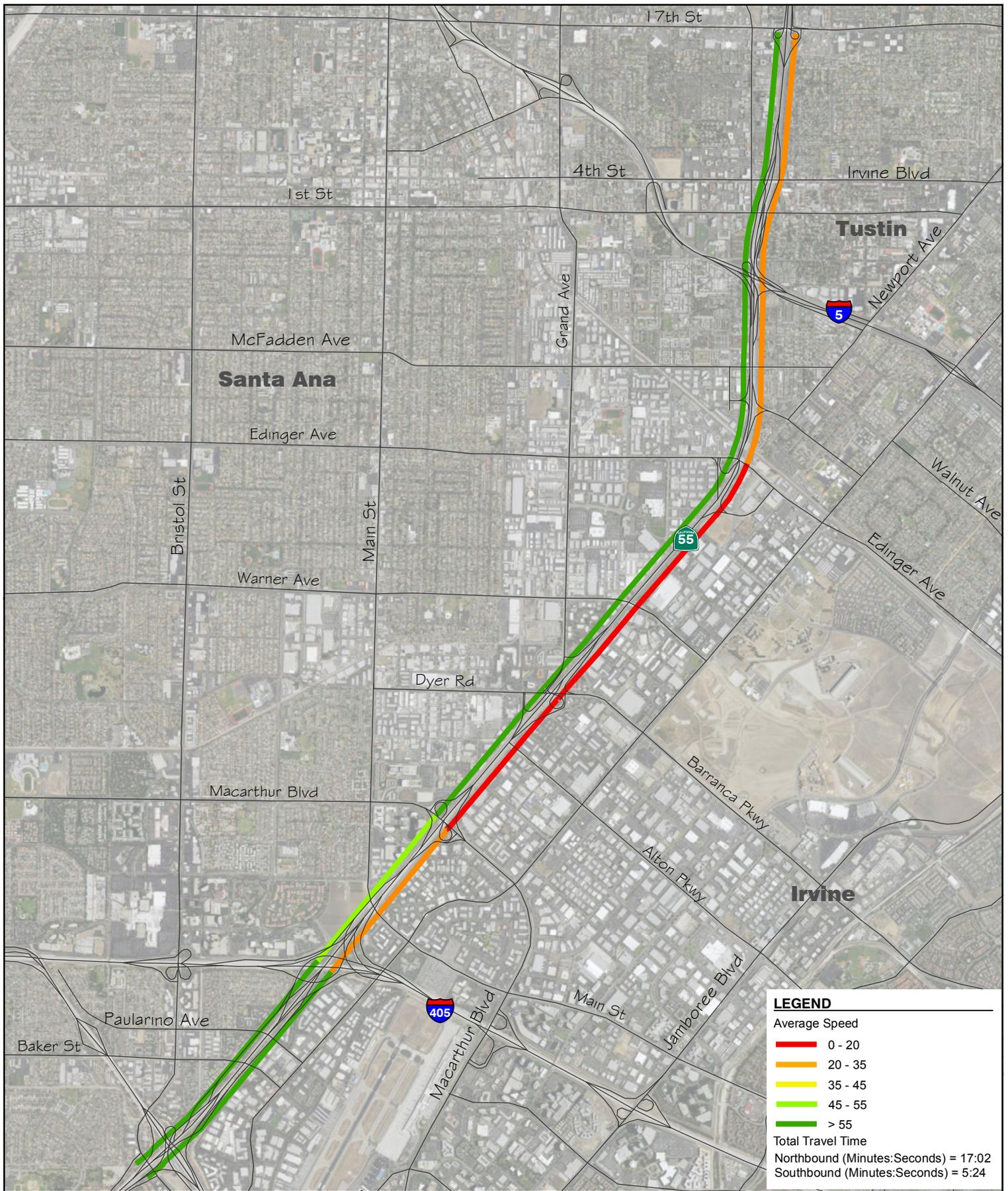


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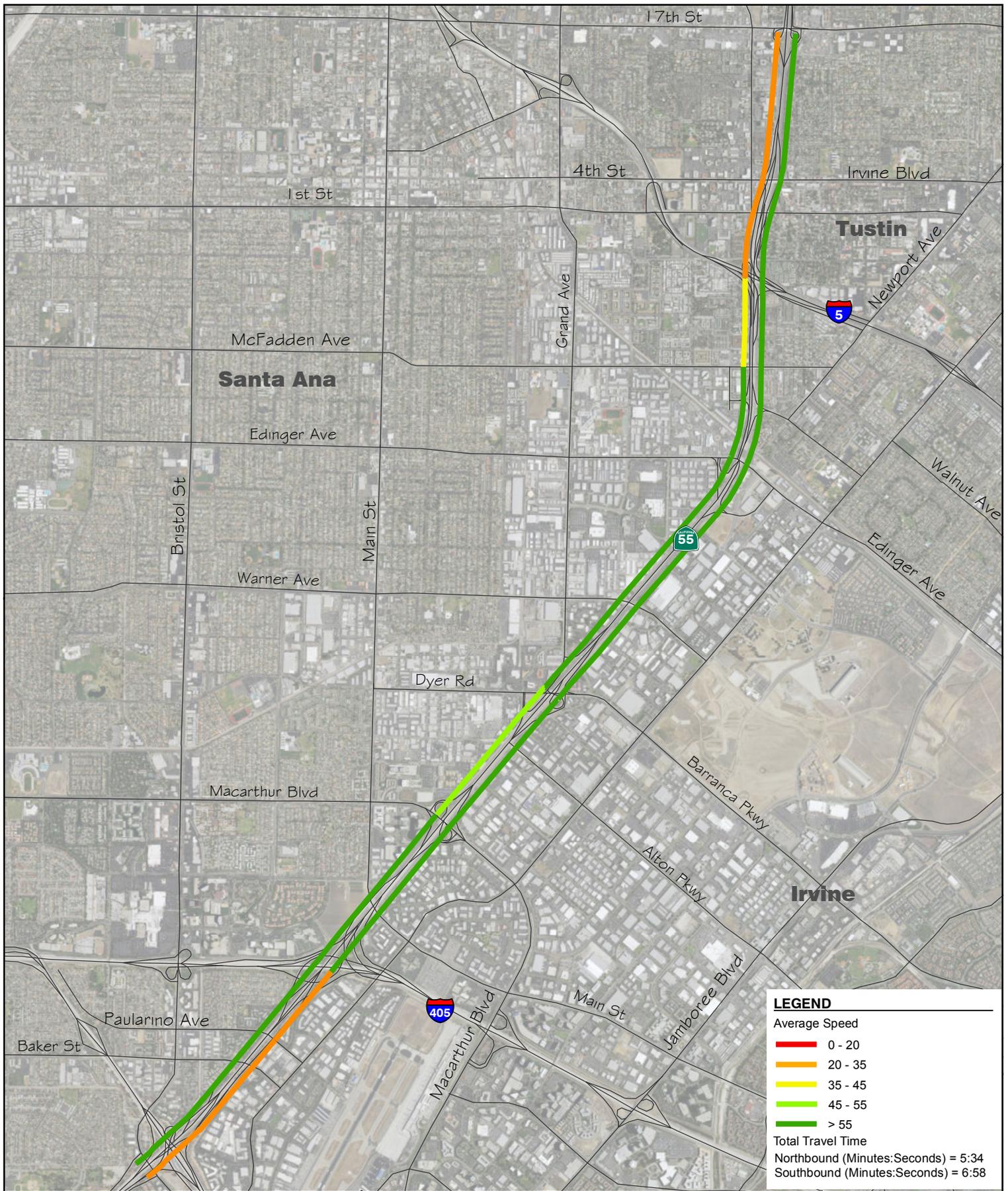


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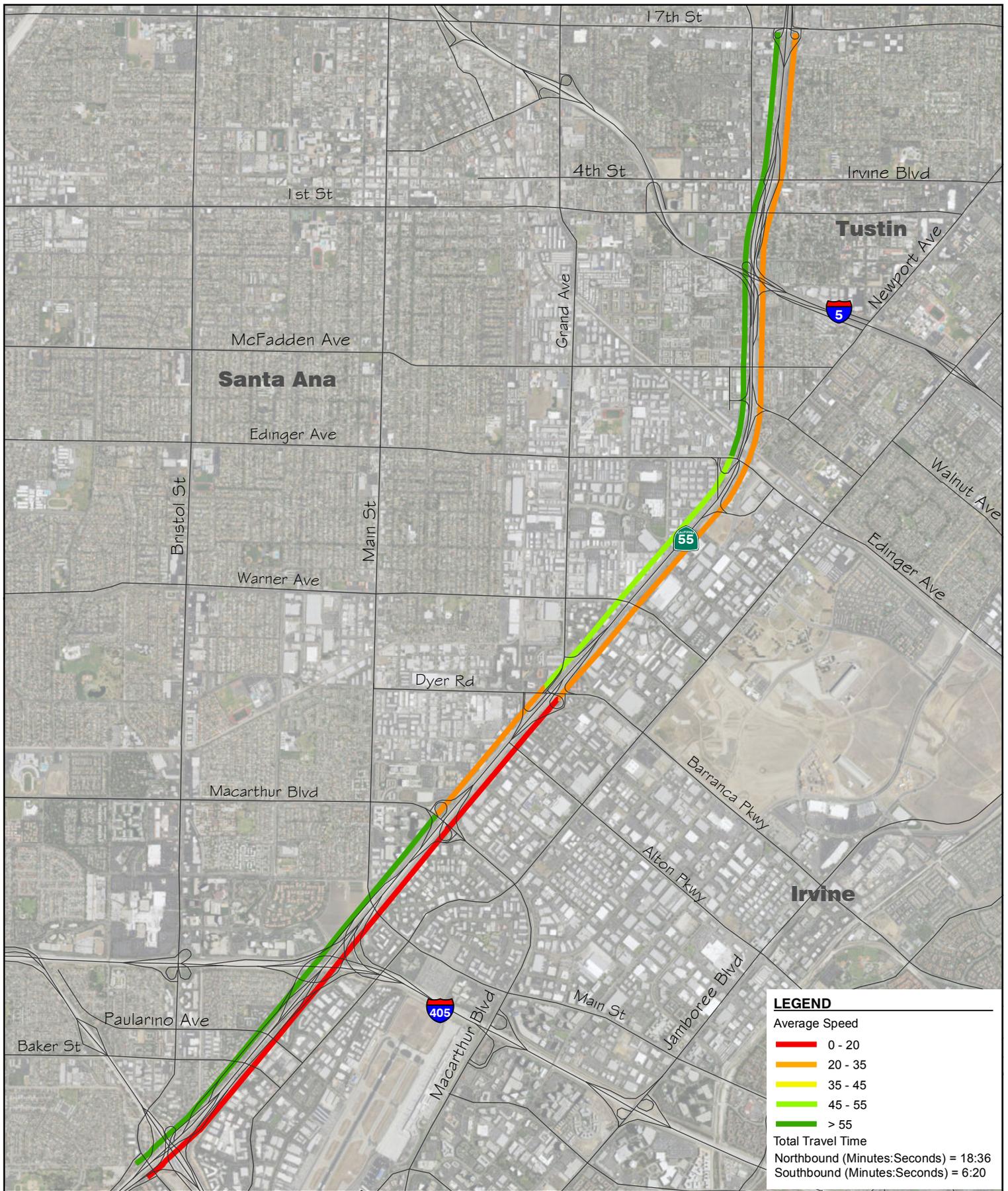
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In the southbound direction, heavy congestion between 4th Street and McFadden Avenue would result in an average speed of less than 24 mph under the No Build Alternative. After McFadden Avenue on-ramp, the travel speed would gradually pick up and increase to 50-65 mph through Dyer Road and I-405. The total travel time for southbound SR-55 is 8-9 minutes with the average speed of 39 mph under the No Build Alternative.

Similar travel patterns are expected under Alternatives 1 through 4, with traffic being metered at the I-5 interchange area and picking up on speeds south of McFadden Avenue. The proposed general purpose lane under Alternatives 1 through 3 would improve traffic flow between McFadden Avenue and Edinger Avenue. In addition, the additional HOV capacity provided under Alternative 4 would relieve the congestion on the HOV lane, and consequently improve traffic flow at adjacent general purpose lanes. Among the four build alternatives, Alternatives 3 and 4 would expect greater travel time savings by more than one minute compared to the No Build Alternative.

PM Peak Hour

During the PM peak hour, significant traffic congestion are anticipated along northbound SR-55 under all the project alternatives, which would result in an average speed of less than 20 mph through the study corridor. The total travel time for northbound SR-55 under the No Build Alternative and Alternative 1 would be 19-20 minutes with an average speed of less than 17 mph under 2020 conditions.

Under Alternatives 2 and 3, the added capacity from the general purpose lane would help northbound traffic flow faster to downstream locations, which result in a significant improvement of travel speeds between Paularino Avenue and I-405 from less than 20 mph to a free-flow speed. The total travel time for northbound SR-55 under Alternatives 2 and 3 would be 16-17 minutes with an average speed of 19-20 mph under 2020 conditions.

Under Alternative 4, significant congestion along the northbound SR-55 result in an average speed of less than 22 mph between Paularino Avenue and Edinger Avenue. The total travel time for northbound SR-55 under Alternative 4 would be 18-19 minutes with an average speed of 18 mph under 2020 conditions.

Among the four build alternatives, Alternatives 2 and 3 would expect greater travel time savings on northbound SR-55 by more than two minute compared to the No Build Alternative during the PM peak hour.

In the southbound direction, traffic would flow much better with a free-flow speed at most of locations except for some slow-down at Dyer Road and MacArthur Boulevard ramps under the No Build Alternative and Alternatives 1 and 4. The total travel time for southbound SR-55 is 6-7 minutes with the average speed of 51 mph under the three alternatives.

Under Alternatives 2 and 3, the proposed general purpose lane on southbound SR-55 would improve traffic flow to allow traffic travel at a free-flow speed through most locations. The total travel time for southbound SR-55 is 5-6 minutes with the average speed of 60 mph under Alternatives 2 and 3.

Among the four build alternatives, Alternatives 2 and 3 would expect greater travel time savings on southbound SR-55 by about one minute compared to the No Build Alternative during the PM peak hour.



Network Performance

Tables 13-A and 13-B show the AM and PM peak period network-wide summary of the total vehicle-miles-traveled, vehicle-hours-delay, and number of people served by the corridor for each of the project alternatives under 2020 conditions.

TABLE 13-A – SR-55 SYSTEMWIDE PERFORMANCE – YEAR 2020 CONDITIONS (AM PEAK PERIOD)					
Performance Measure	No Build	Build Alt 1	Build Alt 2	Build Alt 3	Build Alt 4
Number of People Served	192,380	193,170	193,710	194,770	195,750
VMT (veh-mi)	834,710	841,150	845,100	848,420	848,520
VHD (veh-hr)	5,500	4,510	3,640	2,720	2,580
Delay per Mile (sec/mi)	24	19	16	12	11
Source: Fehr & Peers, 2015					

TABLE 13-B – SR-55 SYSTEMWIDE PERFORMANCE – YEAR 2020 CONDITIONS (PM PEAK PERIOD)					
Performance Measure	No Build	Build Alt 1	Build Alt 2	Build Alt 3	Build Alt 4
Number of People Served	215,750	216,380	217,000	218,580	217,370
VMT (veh-mi)	687,300	688,300	693,310	695,340	689,320
VHD (veh-hr)	15,440	14,420	12,770	11,070	12,200
Delay per Mile (sec/mi)	81	75	66	57	64
Source: Fehr & Peers, 2015					

AM Peak Period

During the AM peak period, compared to the No Build Alternative, Alternatives 1, 2, 3, and 4 would reduce the total delay by 990, 1,860, 2,780, and 2,920 vehicle-hours under 2020 conditions, respectively. In addition, the build alternatives would serve 790-3,370 more people through the corridor during the AM peak period. The overall operational benefits in terms of delay per mile are similar between Alternatives 3 and 4 in the AM peak period. Overall, Alternative 4 would generate the most operational benefits with serving the most people with the least delay among the four project alternatives during the AM peak period.



PM Peak Period

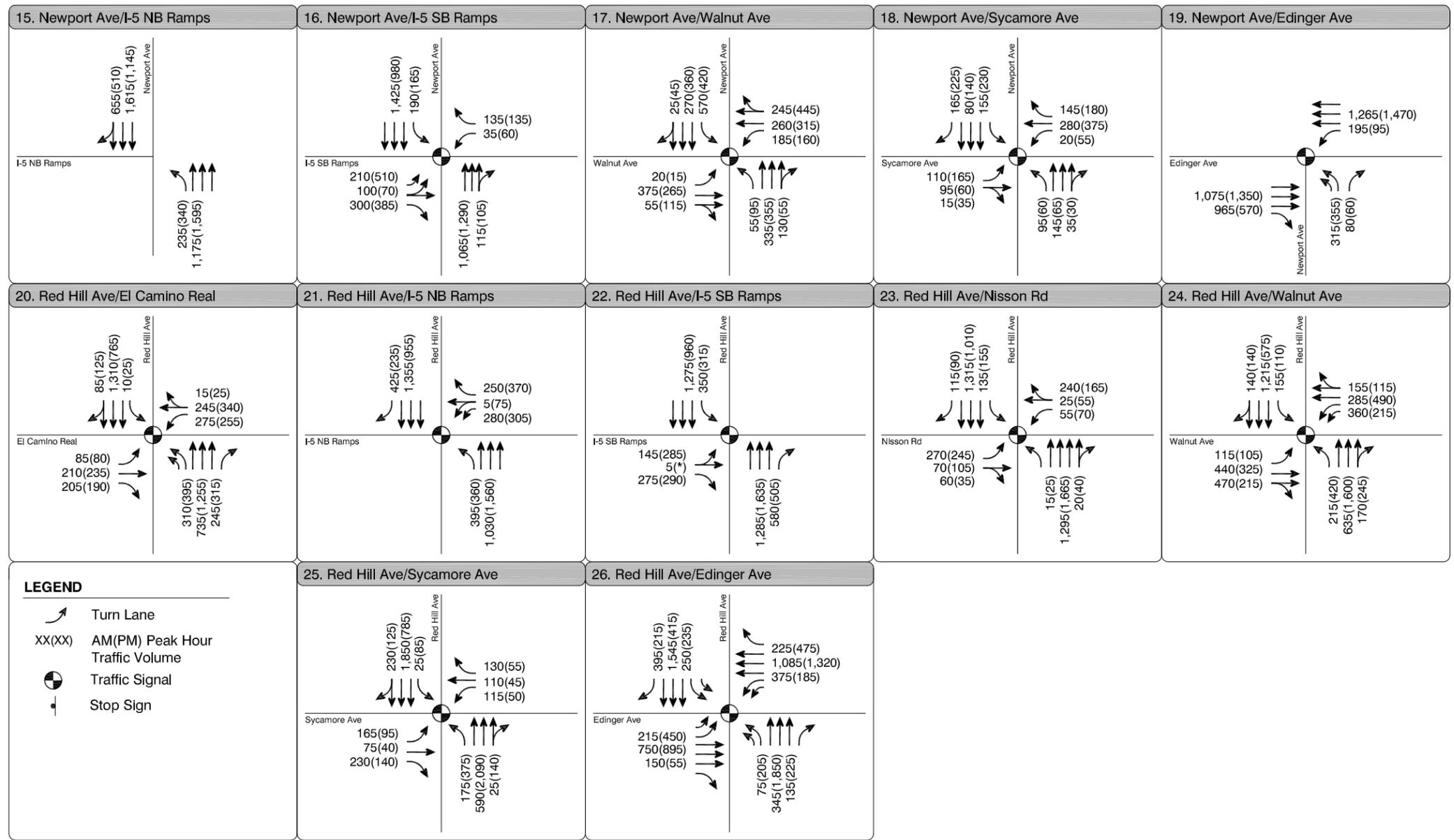
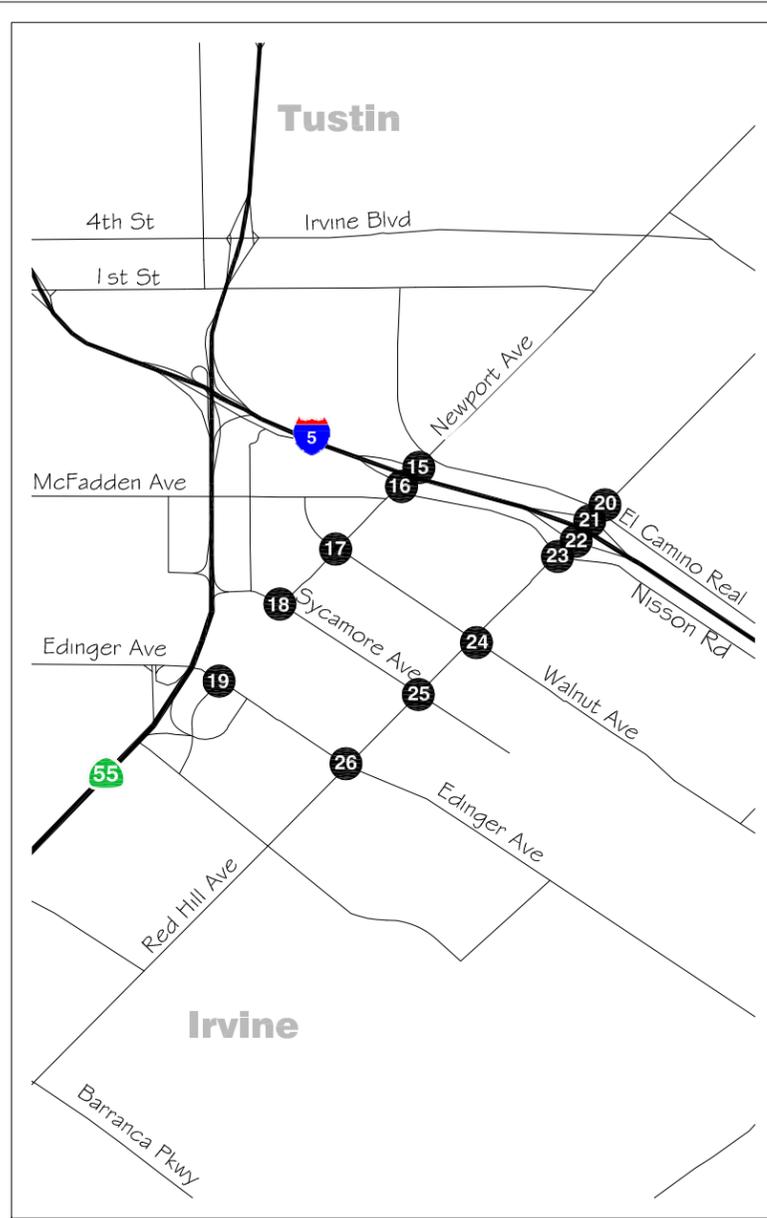
During the PM peak period, compared to the No Build Alternative, Alternatives 1, 2, 3, and 4 would reduce the total delay by 1,020, 2,670, 4,370, and 3,240 vehicle-hours under 2020 conditions, respectively. In addition, the build alternatives would serve 630-2,830 more people through the corridor during the PM peak period. Overall, Alternative 3 would generate the most operational benefits with serving the most people with the least delay among the four project alternatives during the PM peak period.

Local Intersection Operations

The limited access at McFadden Avenue on-ramp proposed under Alternatives 3 and 4 would eliminate the direct access from the McFadden Avenue on-ramp to southbound I-5 and northbound SR-55, which would potentially result in traffic diversion to nearby local roadways such as Newport Avenue and Red Hill Avenue. To identify potential impacts to local roadways, additional 12 intersections have been identified for traffic operations analysis based on discussion with the project development team. Below is a list of the 12 local intersections (#15 through #26) beyond the 14 ramp terminal intersections that were studied under Alternatives 3 and 4.

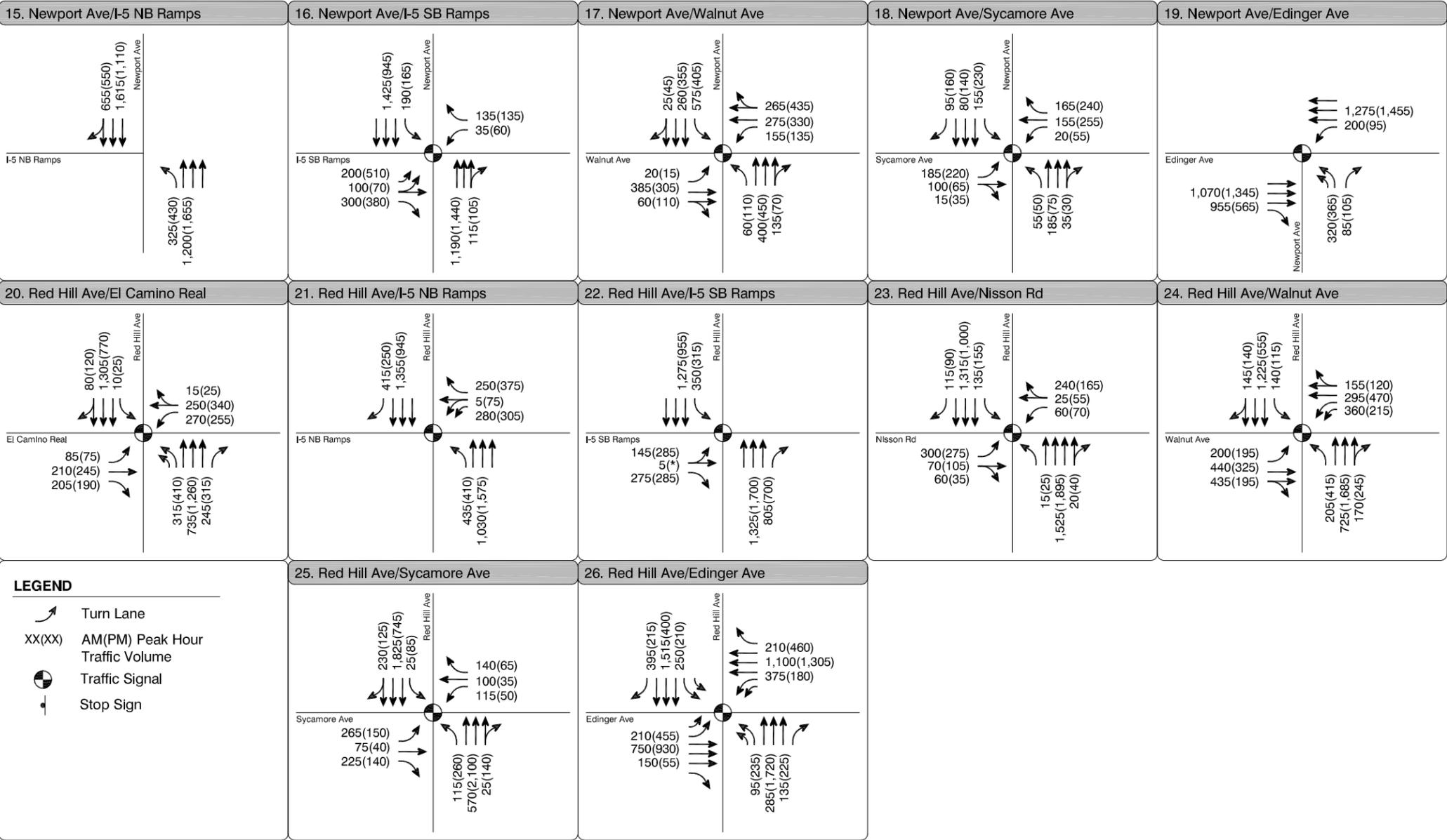
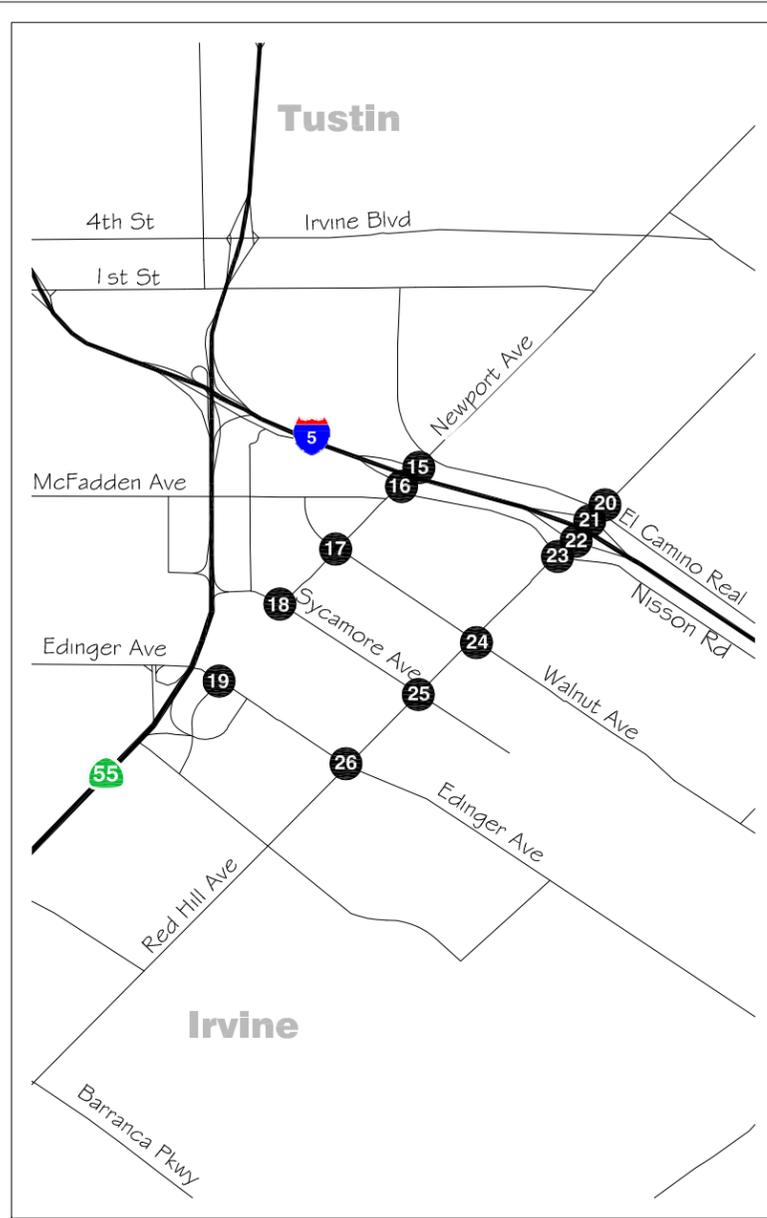
15. NB I-5 On-ramp/Newport Ave
16. SB I-5 Off-ramp/Newport Ave
17. Walnut Avenue/Newport Ave
18. Sycamore Ave/Newport Ave
19. Edinger Ave/Newport Ave
20. El Camino Real/Red Hill Ave
21. NB I-5 Ramps/Red Hill Ave
22. SB I-5 Ramps/Red Hill Ave
23. Nisson Rd/Red Hill Ave
24. Walnut Ave/Red Hill Ave
25. Sycamore Ave/Red Hill Ave
26. Edinger Ave/Red Hill Ave

The traffic impact analysis at the study local intersections were performed under Alternatives 3 and 4 with the proposed limited access at McFadden Avenue on-ramp, in comparison to the scenario that McFadden Avenue would remain to provide full access as existing conditions. The future traffic demand forecast volumes at the 12 intersections were documented in the Final Traffic Volume Report (August 2015) approved by Caltrans. The Year 2020 local intersection forecast volumes are shown in Figures 2-D-Alt for No Build, Alternative 3, and Alternative 4, respectively.



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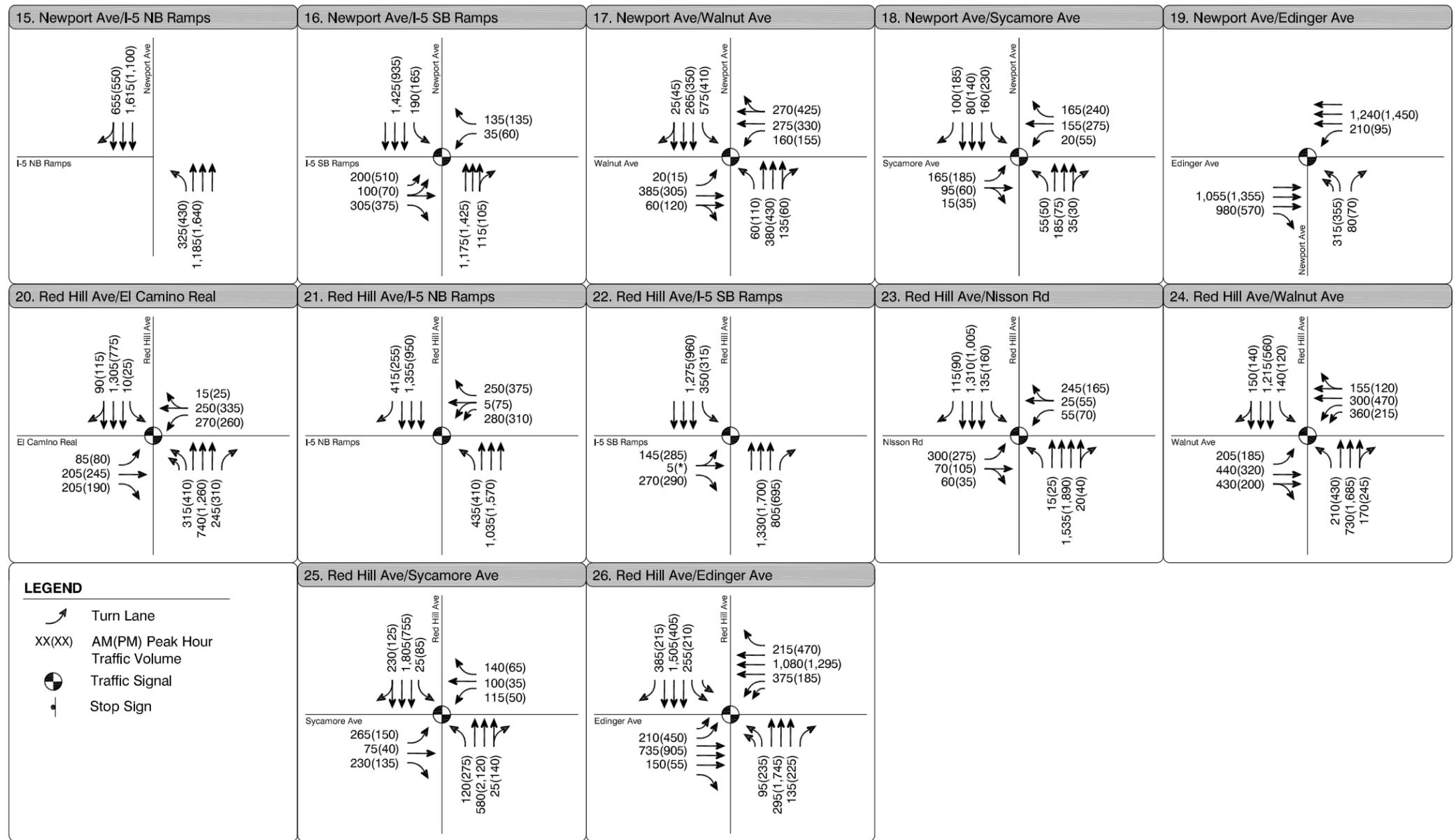
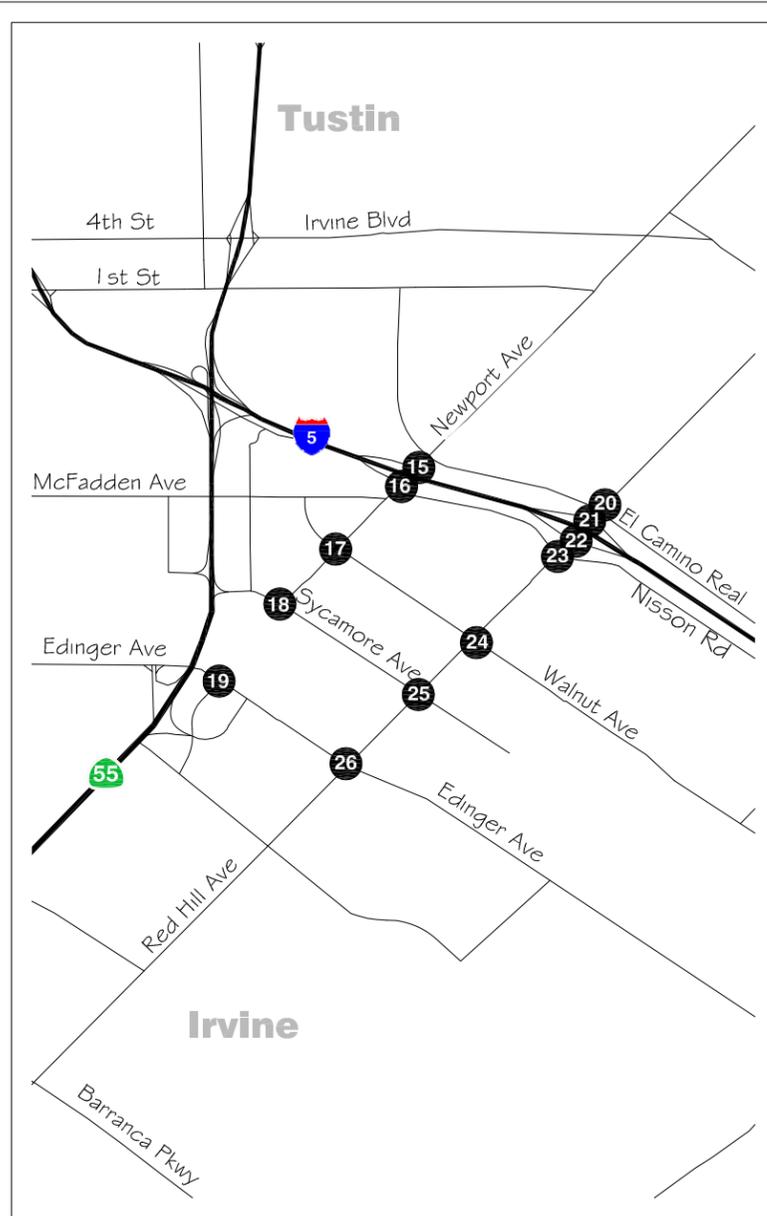
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**LOCAL INTERSECTION LANE CONFIGURATIONS
AND PEAK HOUR TRAFFIC VOLUMES -
OPENING YEAR 2020 - BUILD ALTERNATIVE 4**



Local Intersection Traffic Impact Analysis

Based on discussion with the jurisdictions where the local intersections are located, the following LOS threshold and traffic impact significance criteria are used for the operations analysis:

- LOS “D” is identified as the LOS threshold for study local intersections. LOS E or F is considered as unacceptable operational conditions.
- A significant traffic impact would occur if one of the following conditions is met during the analyzed peak hour:
 - The intersection would degrade from acceptable LOS D or better to LOS E or F;
 - The intersection’s average delay would increase by 2 seconds if this intersection already operates at LOS E or F conditions.

The local intersection delay and LOS under the No Build, Alternative 3, and Alternative 4 are summarized in Tables 14-A and 14-B during the AM and PM peak hour, respectively. As shown in the tables, a majority of local intersections would operate at similar delay and LOS under Alternatives 3 and 4, in comparison to the No Build Alternative. One intersection is identified to be significantly impacted by the limited access at McFadden during the 2020 conditions under both Alternatives 3 and 4.

15. I-5 NB On-ramp/Newport Avenue This intersection would already operate at LOS F conditions during the peak hour with full access at McFadden Avenue on-ramp under the No Build Alternative. The limited access at McFadden Avenue on-ramp under Alternatives 3 and 4 would divert more traffic to use this location resulting in increased delay and significant impact under both AM and PM peak hours.

Mitigation Measures

Mitigation measures for the impacted location were developed based on a combination of factors including potential operational improvements such as signal phasing and timings, geometric feasibility, right-of-way conditions, programmed improvements by other projects, etc. The recommended mitigation measures for the impacted intersection under year 2020 are discussed below and the intersection delay and LOS after mitigation are shown in Tables 15-A and 15-B.

15. I-5 NB On-ramp/Newport Avenue This intersection is currently unsignalized, and the traffic from northbound Newport Avenue getting onto the northbound I-5 on-ramp has to yield to the upcoming through traffic on southbound Newport Avenue. This movement already operates at unacceptable LOS under existing conditions, and any increased future demand would further exacerbate the delay at this location. Installation of a traffic signal at this intersection would mitigate the impact at this intersection to operate at acceptable LOS during both AM and PM peak hours under Alternatives 3 and 4.



**TABLE 14-A – LOCAL INTERSECTION OPERATIONS
– YEAR 2020 CONDITIONS (AM PEAK HOUR)**

Location	Control Type	No Build		Alt 3		Alt 4	
		Delay ²	LOS	Delay ²	LOS	Delay ²	LOS
15. I-5 NB On-ramp/Newport Ave	SSSC ¹	366.1	F	671.0	F	677.6	F
16. I-5 SB Ramps/Newport Ave	Signal	13.1	B	13.5	B	22.0	C
17. Walnut Ave/Newport Ave	Signal	69.8	E	70.5	E	70.3	E
18. Sycamore Ave/Newport Ave	Signal	19.8	B	17.9	B	17.3	B
19. Edinger Ave/Newport Ave	Signal	28.8	C	30.3	C	33.5	C
20. El Camino Real/Red Hill Ave	Signal	46.5	D	42.1	D	41.9	D
21. I-5 NB Ramps/Red Hill Ave	Signal	17.5	B	18.0	B	18.1	B
22. I-5 SB Ramps/Red Hill Ave	Signal	12.7	B	13.4	B	13.1	B
23. Nisson Rd/Red Hill Ave	Signal	15.5	B	15.7	B	15.5	B
24. Walnut Ave/Red Hill Ave	Signal	47.5	D	52.4	D	54.1	D
25. Sycamore Ave/Red Hill Ave	Signal	38.8	D	48.1	D	47.8	D
26. Edinger Ave/Red Hill Ave	Signal	112.8	F	113.7	F	112.8	F

Notes: 1.SSSC = Side street stop-control.
2. Average delay reported for signalized intersections and worst-movement delay reported for SSSC intersections.
Bold font indicates unacceptable LOS E or F conditions. Grey shading indicates locations with significant impacts.

Source: Fehr & Peers, 2015



TABLE 14-B – LOCAL INTERSECTION OPERATIONS – YEAR 2020 CONDITIONS (PM PEAK HOUR)							
Location	Control Type	No Build		Alt 3		Alt 4	
		Delay ²	LOS	Delay ²	LOS	Delay ²	LOS
15. I-5 NB On-ramp/Newport Ave	SSSC ¹	101.9	F	172.7	F	170.8	F
16. I-5 SB Ramps/Newport Ave	Signal	18.1	B	18.5	B	18.5	B
17. Walnut Ave/Newport Ave	Signal	24.8	C	24.4	C	25.0	C
18. Sycamore Ave/Newport Ave	Signal	22.8	C	18.7	B	18.6	B
19. Edinger Ave/Newport Ave	Signal	9.4	A	9.6	A	9.4	A
20. El Camino Real/Red Hill Ave	Signal	30.0	C	30.1	C	30.5	C
21. I-5 NB Ramps/Red Hill Ave	Signal	18.6	B	18.5	B	18.6	B
22. I-5 SB Ramps/Red Hill Ave	Signal	20.1	C	12.5	B	12.5	B
23. Nisson Rd/Red Hill Ave	Signal	30.9	C	33.2	C	33.4	C
24. Walnut Ave/Red Hill Ave	Signal	34.3	C	41.8	D	40.7	D
25. Sycamore Ave/Red Hill Ave	Signal	21.1	C	21.5	C	21.6	C
26. Edinger Ave/Red Hill Ave	Signal	157.3	F	156.4	F	155.1	F

Notes: 1.SSSC = Side street stop-control.
2. Average delay reported for signalized intersections and worst-movement delay reported for SSSC intersections.
Bold font indicates unacceptable LOS E or F conditions. Grey shading indicates locations with significant impacts.

Source: Fehr & Peers, 2015



**TABLE 15-A – LOCAL INTERSECTION OPERATIONS WITH MITIGATION
 – YEAR 2020 CONDITIONS (AM PEAK HOUR)**

Location	Control Type	Alt 3		Alt 3 With Mitigation		Alt 4		Alt 4 With Mitigation	
		Delay ²	LOS	Delay ²	LOS	Delay ²	LOS	Delay ²	LOS
15. I-5 NB On-ramp/Newport Ave	SSSC ¹	671.0	F	14.6	B	677.6	F	14.6	B

Notes: 1.SSSC = Side street stop-control.
 2. Average delay reported for signalized intersections and worst-movement delay reported for SSSC intersections.
 Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



**TABLE 15-B – LOCAL INTERSECTION OPERATIONS WITH MITIGATION
 – YEAR 2020 CONDITIONS (PM PEAK HOUR)**

Location	Control Type	Alt 3		Alt 3 With Mitigation		Alt 4		Alt 4 With Mitigation	
		Delay ²	LOS	Delay ²	LOS	Delay ²	LOS	Delay ²	LOS
15. I-5 NB On-ramp/Newport Ave	SSSC ¹	172.7	F	7.9	A	170.8	F	8.0	A

Notes: 1.SSSC = Side street stop-control.
 2. Average delay reported for signalized intersections and worst-movement delay reported for SSSC intersections.
 Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



6. DESIGN YEAR 2040 CONDITIONS

This chapter presents the analysis results of the project alternatives under design year (2040) conditions. The purpose of the design year analysis is to evaluate long-term traffic operations on SR-55 with and without the improvements alternatives. For each alternative, traffic operations are evaluated using peak-hour density, LOS, speed, travel time, and other system-wide MOE's.

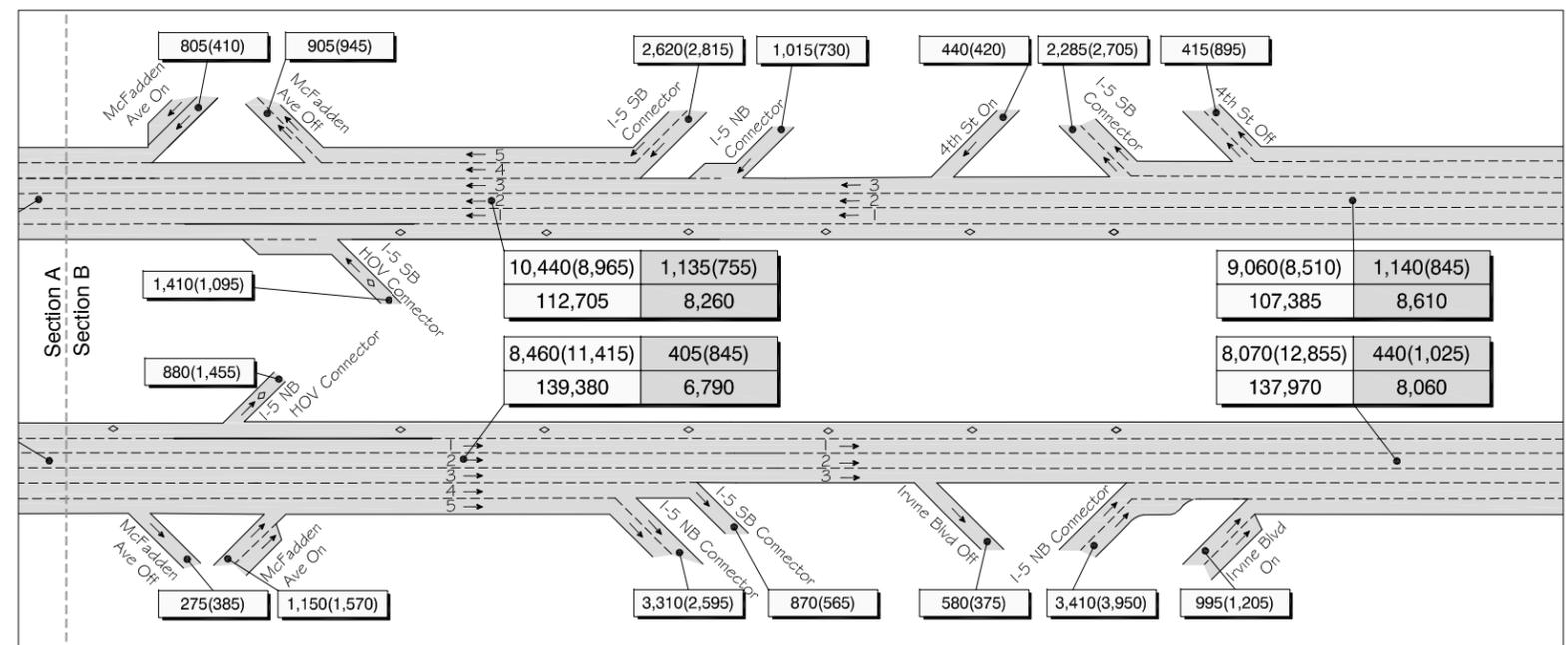
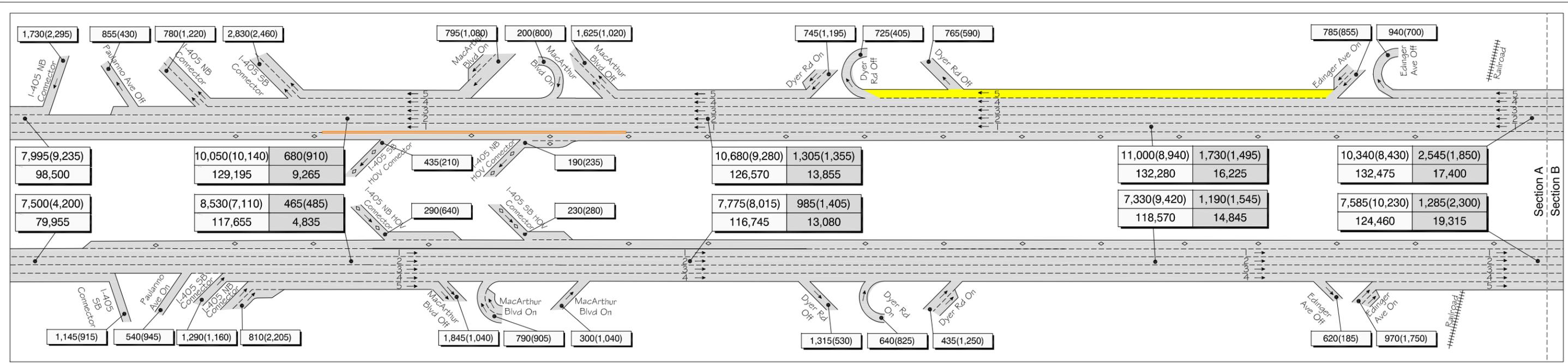
Analysis Scenarios

Traffic forecasts were developed and traffic operations were evaluated for each of the following project alternatives under opening year (2040) conditions.

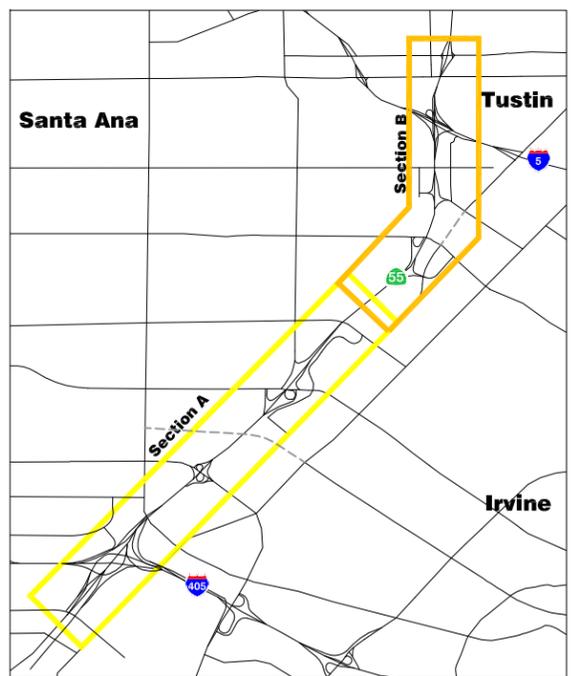
- No Build Alternative
- Build Alternative 1 – Additional Auxiliary Lanes
- Build Alternative 2 – One New General Purpose Lane
- Build Alternative 3 – One New General Purpose Lane and Additional Auxiliary Lanes
- Build Alternative 4 – One New HOV Lane and Additional Auxiliary Lanes

The detailed traffic forecasting methodology is contained in the Final Traffic Volume Report dated August 2015, and the Year 2040 traffic forecasts have been approved by Caltrans prior to the operations analysis. Per recent discussion and concurrence made by the PDT, the 2010 LRTP projects categorized under the "Preferred Plan" (see Appendix for the project list contained in the August 2015 Final Traffic Volume Report) are assumed to be completed by Year 2040 and included in the 2040 baseline conditions. The key arterial improvements within the study area include the Newport Avenue extension and the Alton Avenue overcrossing, and other major freeway projects in the study area include: I-5 HOV project (between SR-55 and SR-57), I-5 improvement project (between SR-55 and I-405), I-405 improvement project (between SR-73 and I-605), I-405 improvement project (between SR-55 and I-5), and SR-55 improvement project (between I-5 and SR-22).

Figures 3-A and 3-B displays the AM and PM peak hour traffic forecasts for freeway mainline segments, HOV lane, freeway ramps, and ramp terminal intersections for each of the project alternatives under 2040 conditions.



- LEGEND**
- - General Purpose Lane
 - ◇ - HOV Lane
 - XXX(XXX) - Ramp AM(PM) Peak Hour Traffic Volumes
 - XXX(XXX)
XXX - Freeway Mainline AM(PM) Peak Hour Traffic Volumes
Freeway Mainline ADT Traffic Volumes
 - XXX(XXX)
XXX - Freeway HOV AM(PM) Peak Hour Traffic Volumes
Freeway HOV ADT Traffic Volumes
 - Yellow line - Proposed Future Improvements by Other Projects
 - Orange line - HOV Limited Access

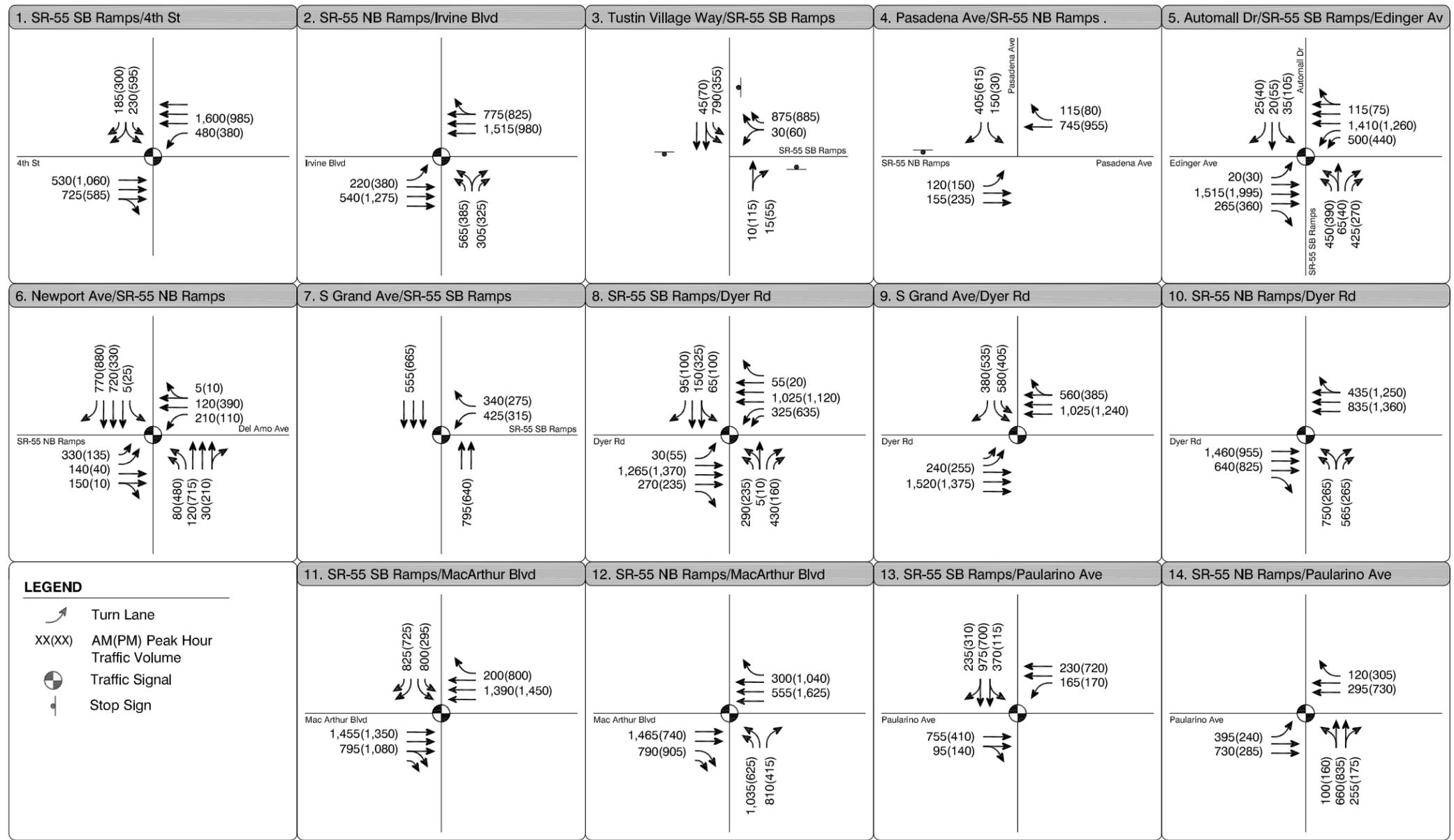
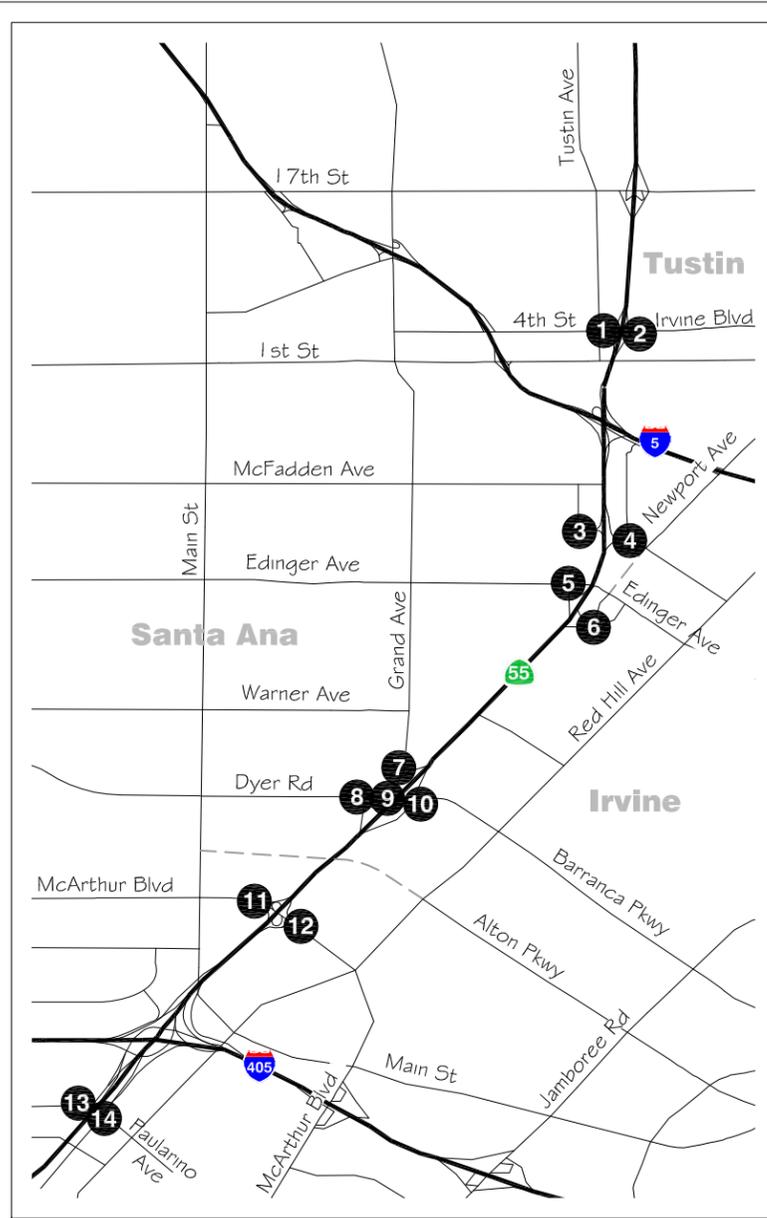


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SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - DESIGN YEAR 2040 - NO BUILD ALTERNATIVE

FIGURE 3-A-NO BUILD



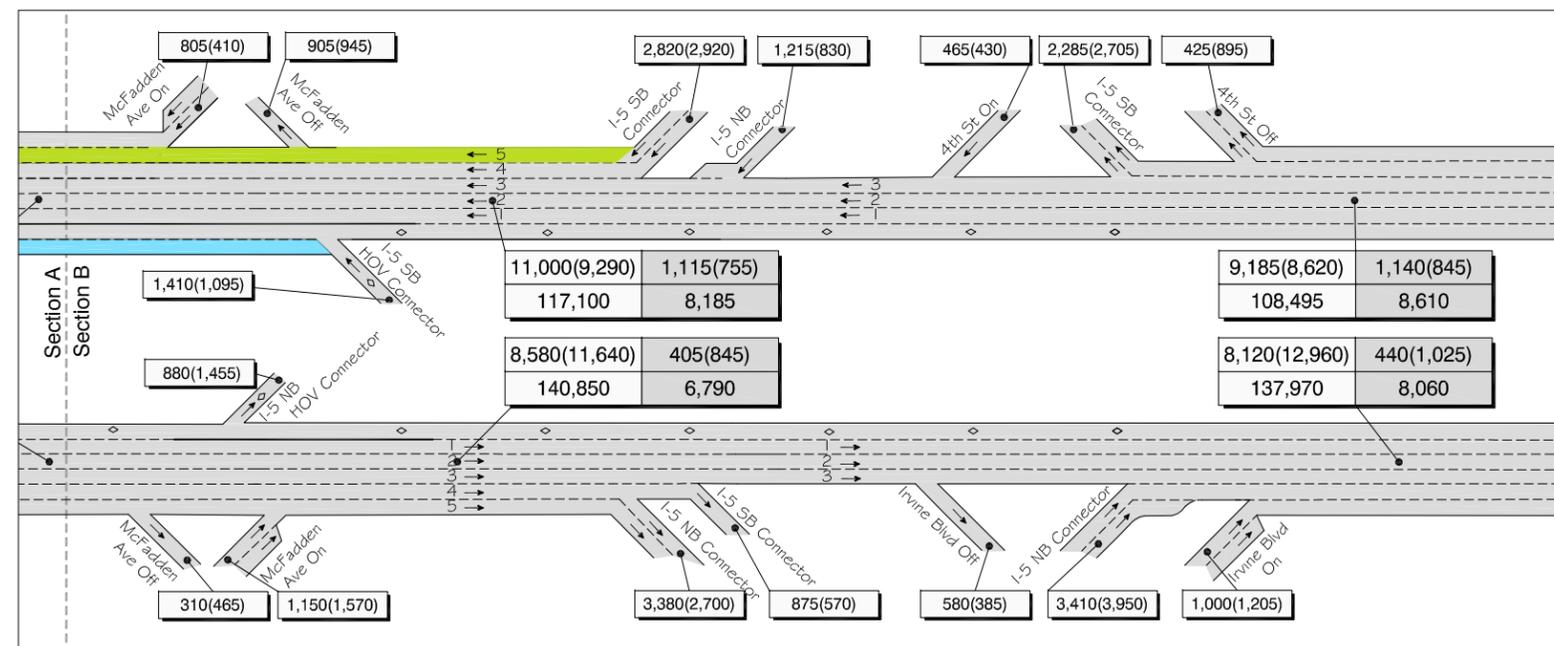
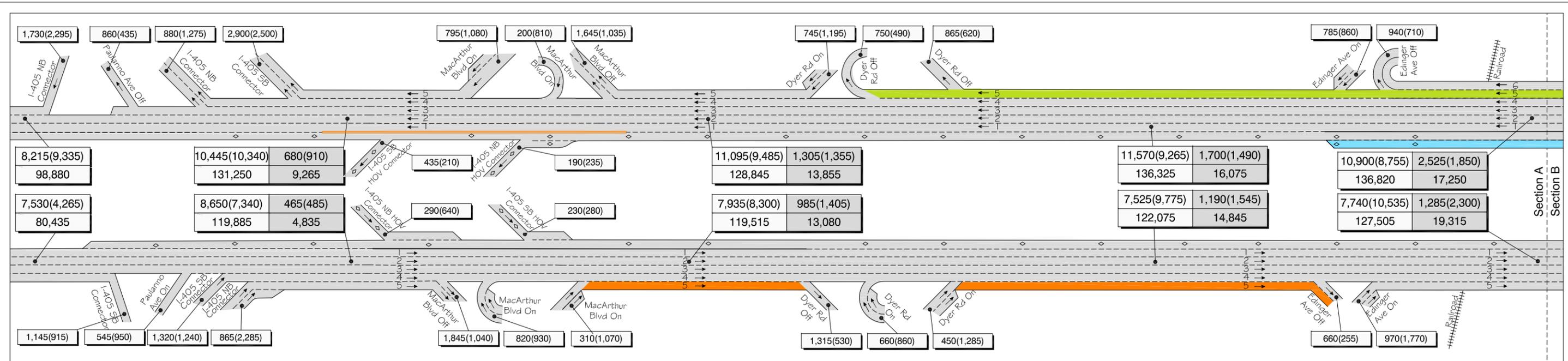
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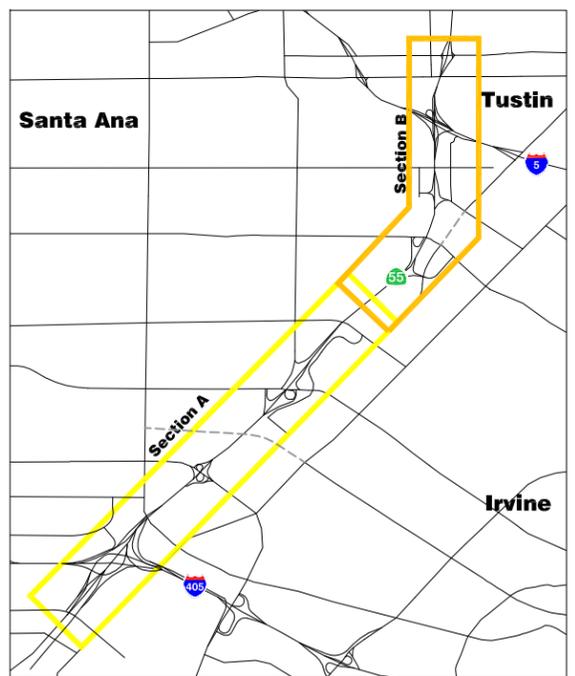
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SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - DESIGN YEAR 2040 - NO BUILD ALTERNATIVE

FIGURE 3-B-NO BUILD



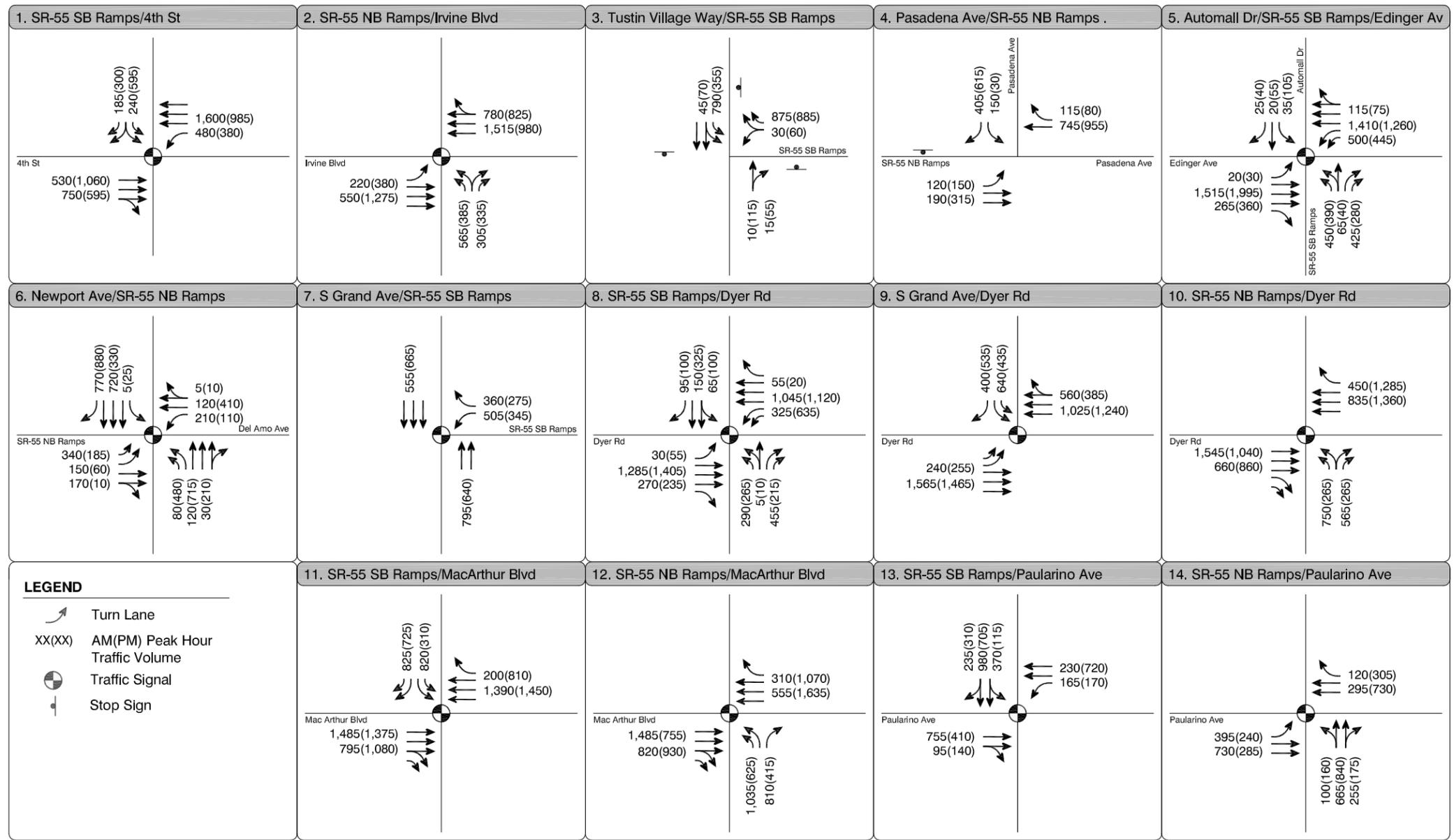
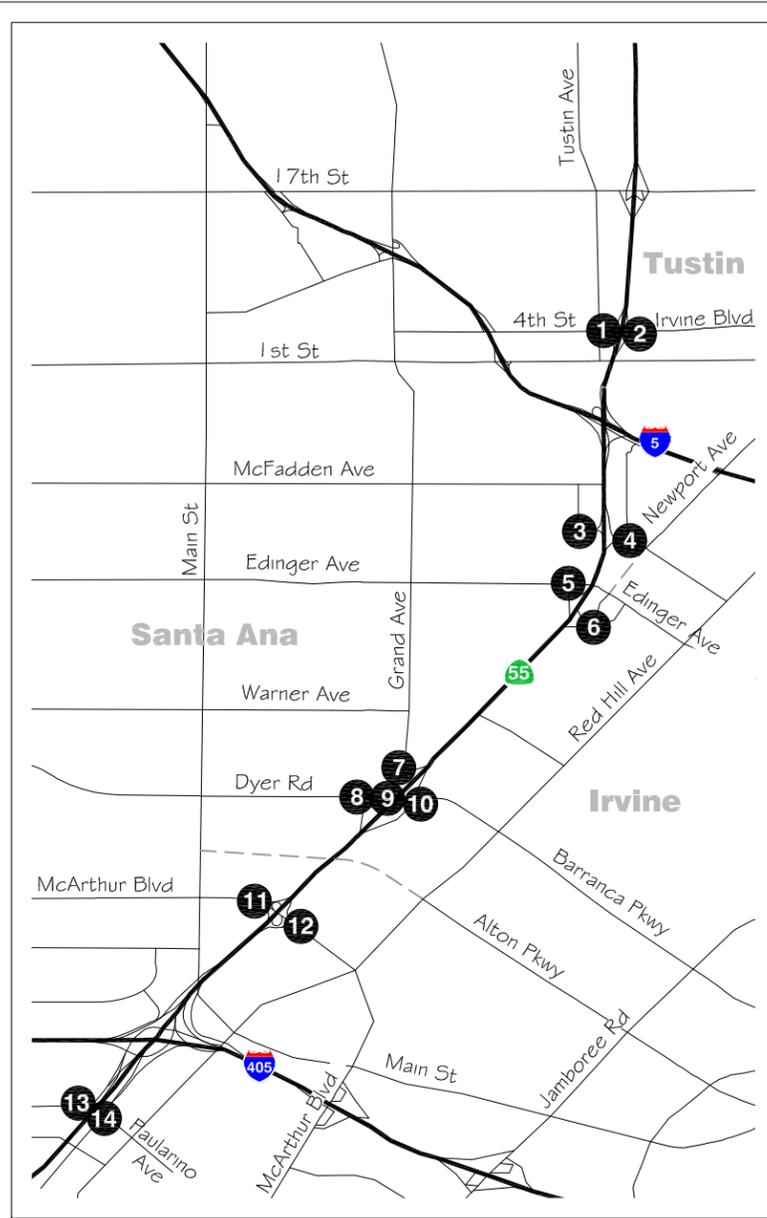
- LEGEND**
- - General Purpose Lane
 - ◇ - HOV Lane
 - XXX(XXX) - Ramp AM(PM) Peak Hour Traffic Volumes
 - XXX(XXX) - Freeway Mainline AM(PM) Peak Hour Traffic Volumes
 - XXX - Freeway Mainline ADT Traffic Volumes
 - XXX(XXX) - Freeway HOV AM(PM) Peak Hour Traffic Volumes
 - XXX - Freeway HOV ADT Traffic Volumes
 - (Green) - Proposed General Purpose Lane
 - (Orange) - Proposed Auxiliary Lane
 - (Blue) - Proposed HOV Lane
 - (Light Blue) - HOV Limited Access



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SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - DESIGN YEAR 2040 - BUILD ALTERNATIVE 1

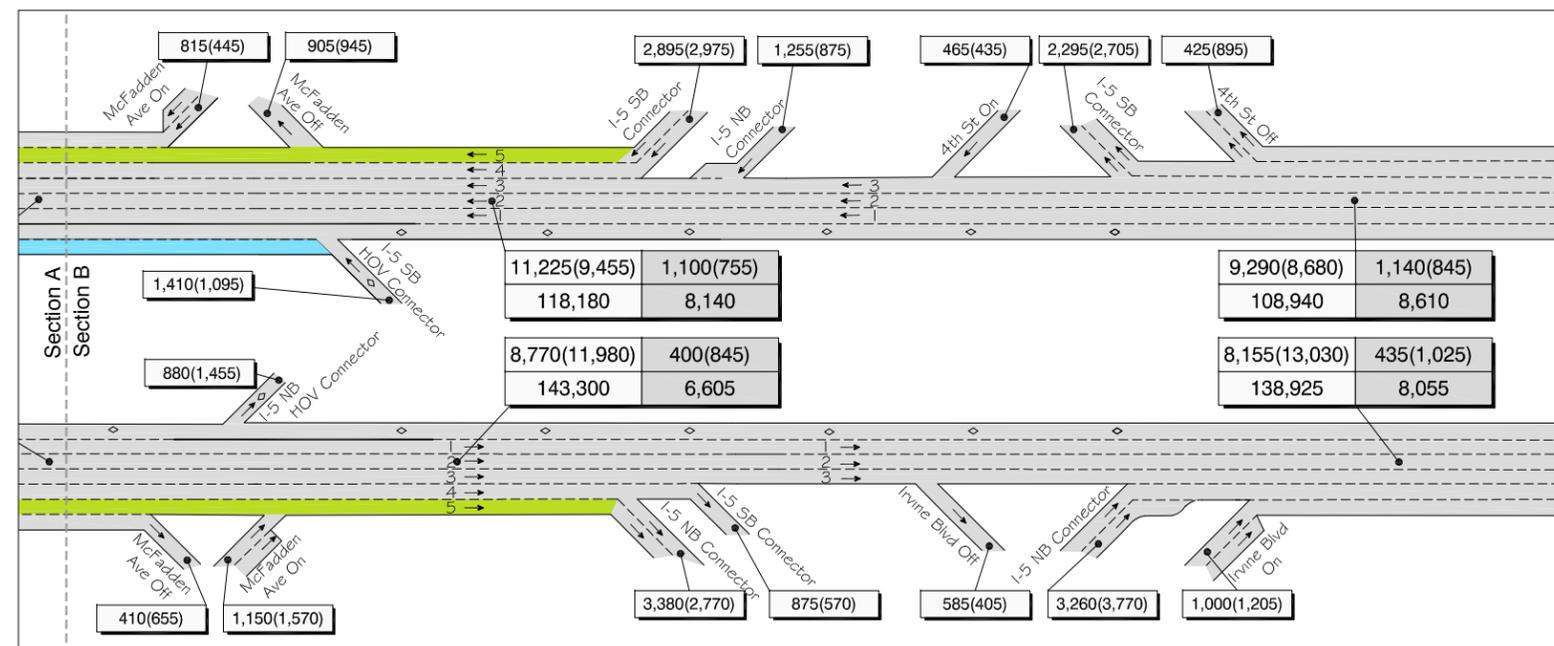
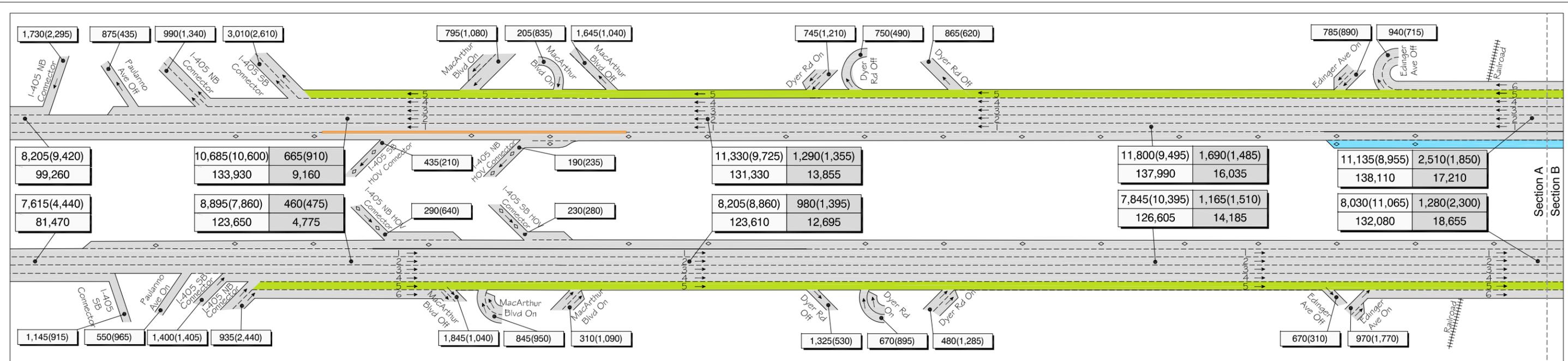


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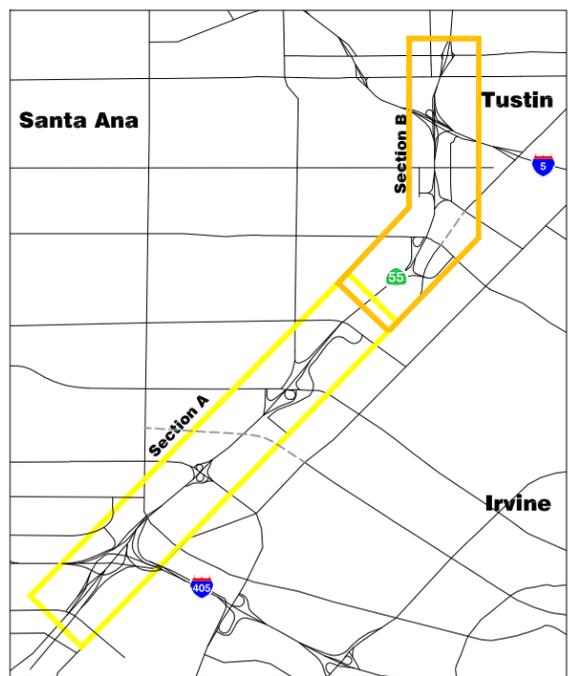
REVISED

SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - DESIGN YEAR 2040 - BUILD ALTERNATIVE 1



LEGEND

- - General Purpose Lane
- ◇ - HOV Lane
- xxx(xxx) - Ramp AM(PM) Peak Hour Traffic Volumes
- XXX(XXX) - Freeway Mainline AM(PM) Peak Hour Traffic Volumes
- XXX - Freeway Mainline ADT Traffic Volumes
- XXX(XXX) - Freeway HOV AM(PM) Peak Hour Traffic Volumes
- XXX - Freeway HOV ADT Traffic Volumes
- (Green) - Proposed General Purpose Lane
- (Blue) - Proposed HOV Lane
- (Orange) - HOV Limited Access

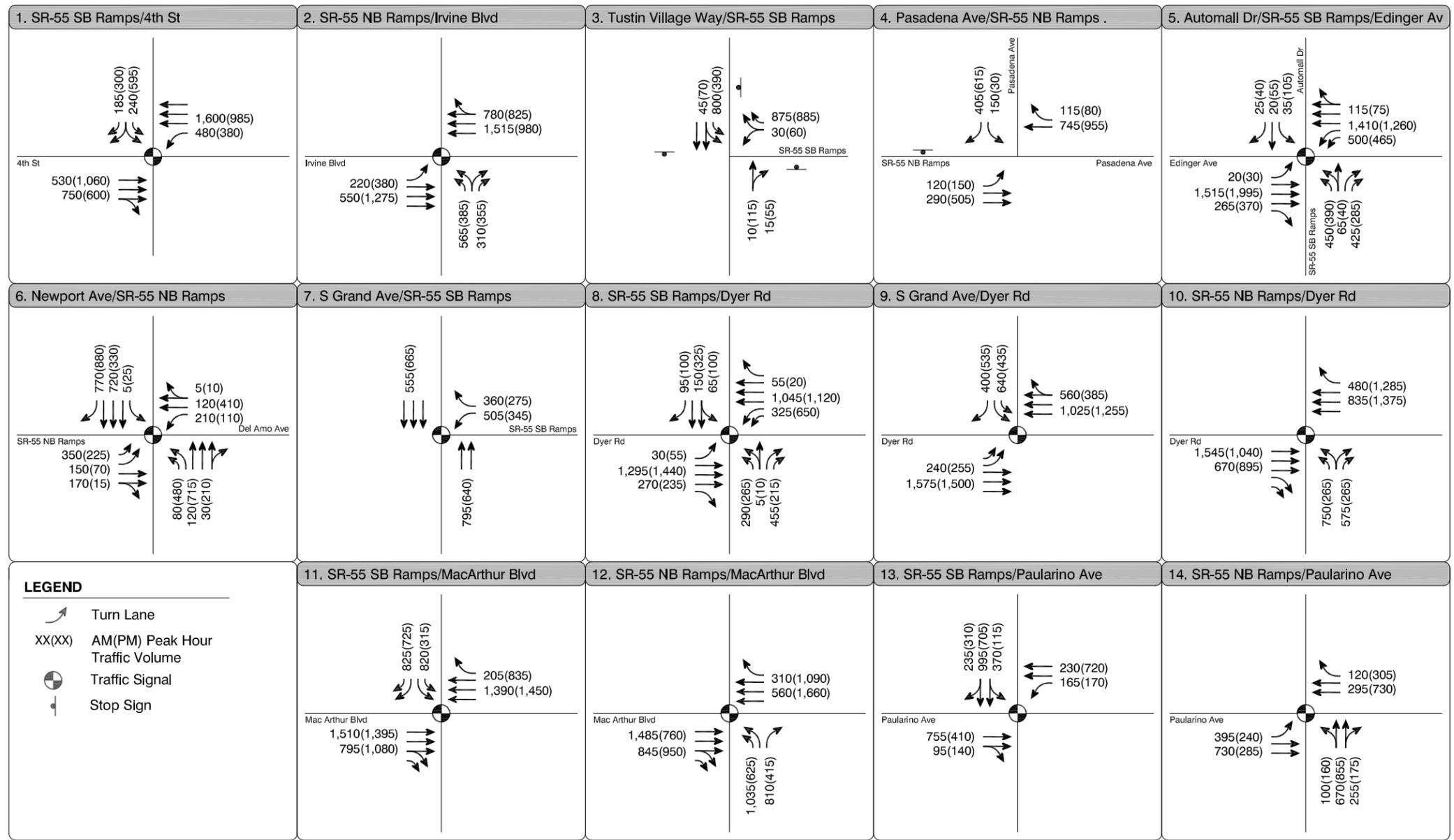
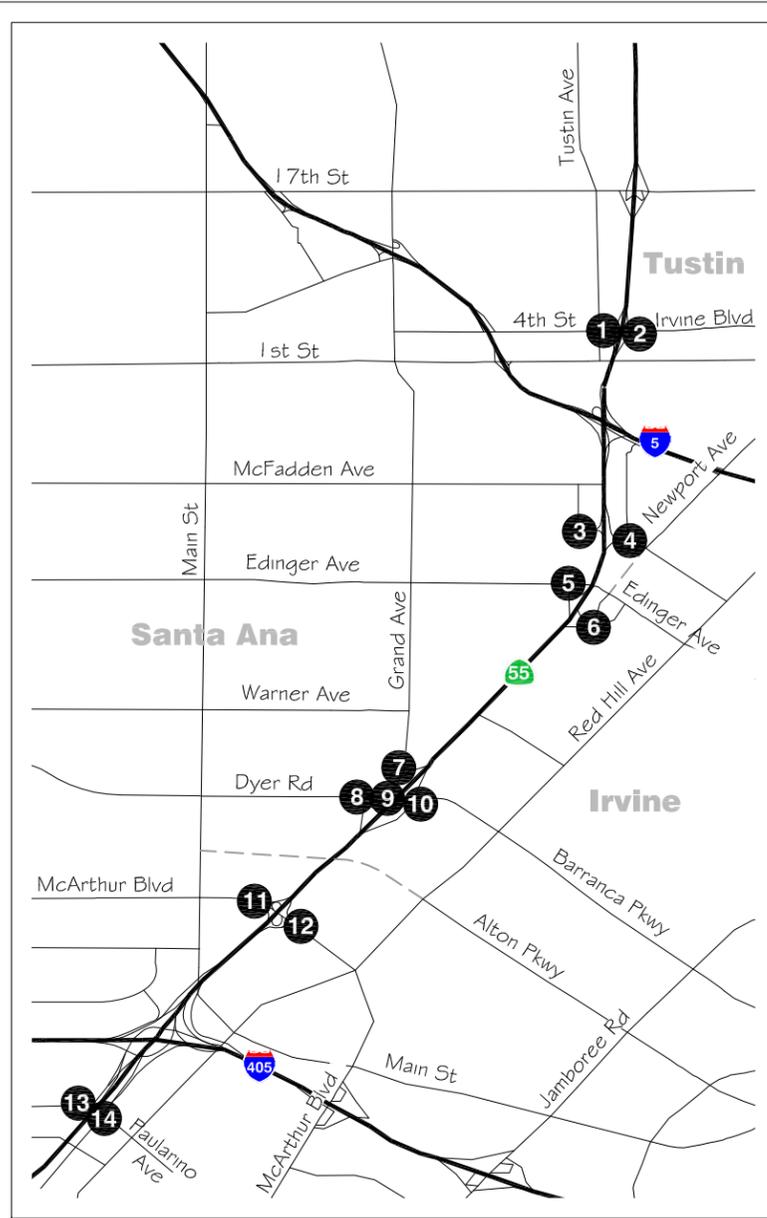


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REVISED

SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - DESIGN YEAR 2040 - BUILD ALTERNATIVE 2

FIGURE 3-A -ALT 2

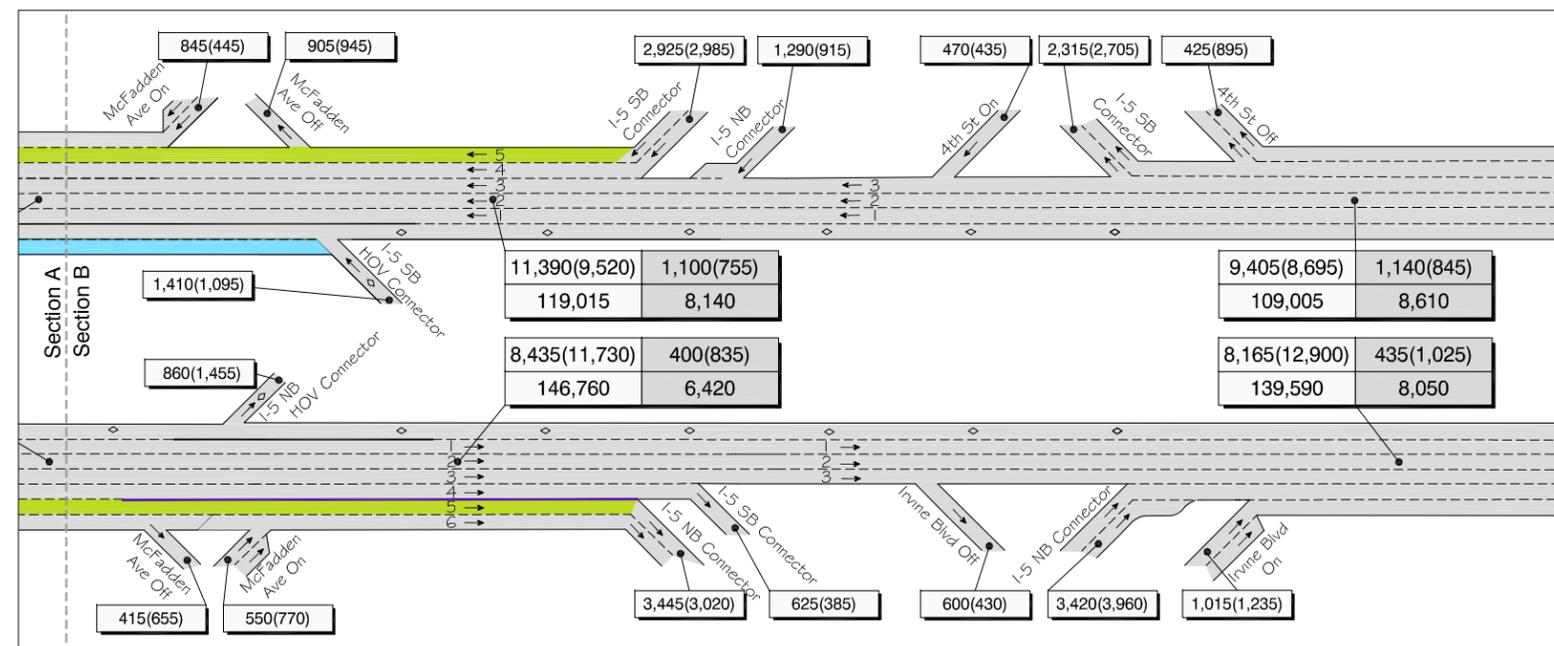
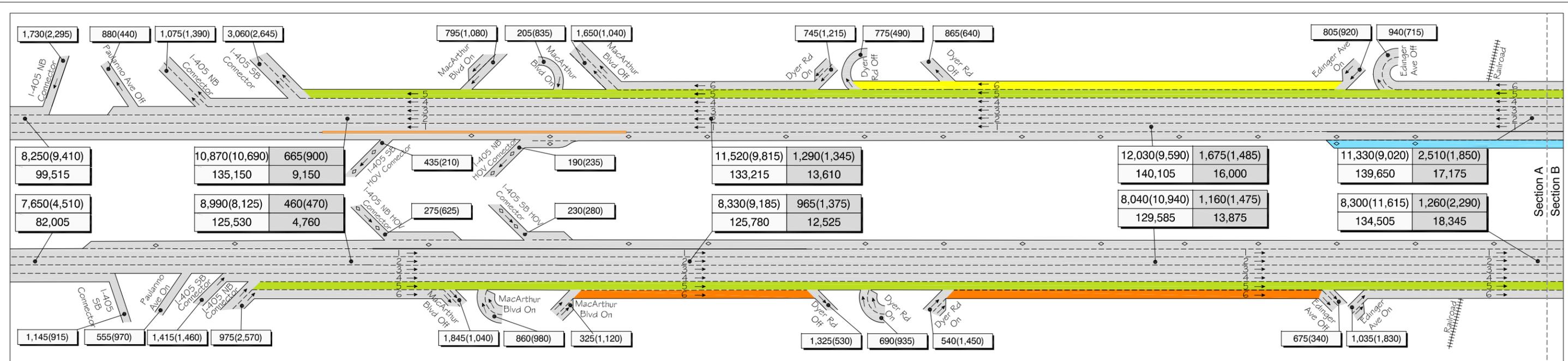


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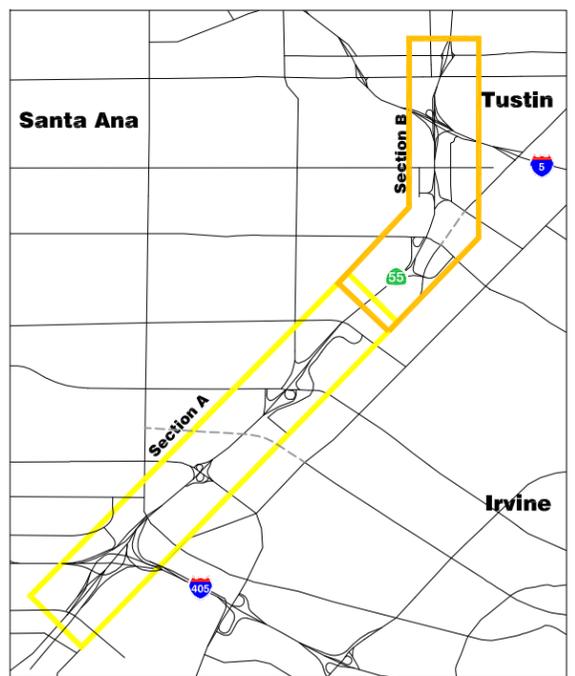
REVISED

SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - DESIGN YEAR 2040 - BUILD ALTERNATIVE 2



LEGEND

- - General Purpose Lane
- ◇ - HOV Lane
- XXX(XXX) - Ramp AM(PM) Peak Hour Traffic Volumes
- XXX(XXX) / XXX - Freeway Mainline AM(PM) Peak Hour Traffic Volumes / Freeway Mainline ADT Traffic Volumes
- XXX(XXX) / XXX - Freeway HOV AM(PM) Peak Hour Traffic Volumes / Freeway HOV ADT Traffic Volumes
- (Green) - Proposed General Purpose Lane
- (Orange) - Proposed Auxiliary Lane
- (Blue) - Proposed HOV Lane
- (Purple) - Separator
- (Yellow) - Improvements by Other Project Completed in 2012
- (Red) - HOV Limited Access



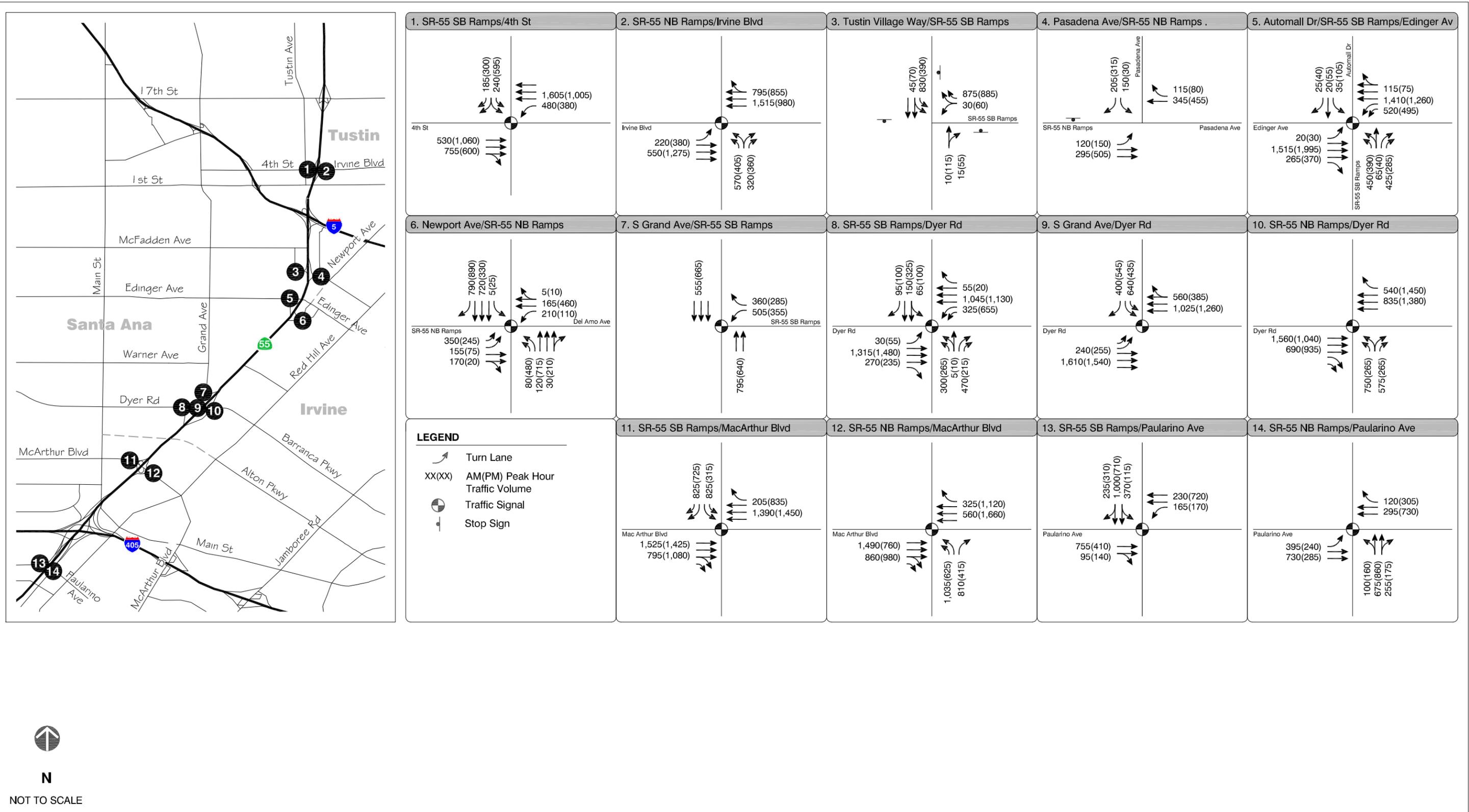
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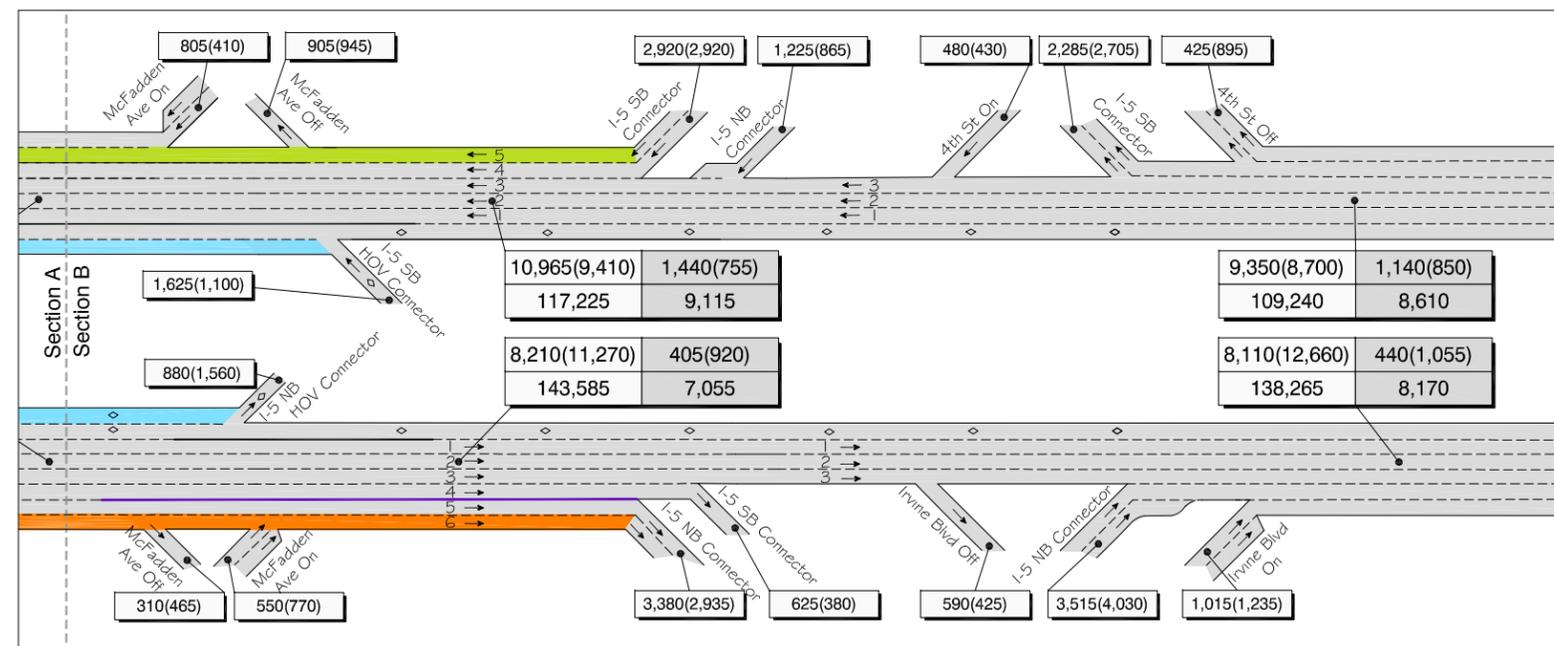
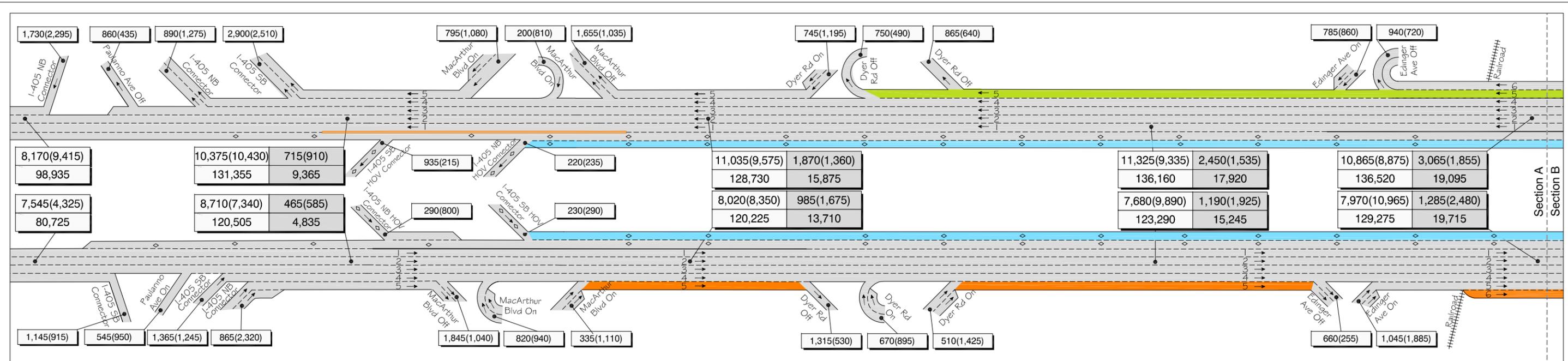
SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - DESIGN YEAR 2040 - BUILD ALTERNATIVE 3

FIGURE 3-A-ALT 3



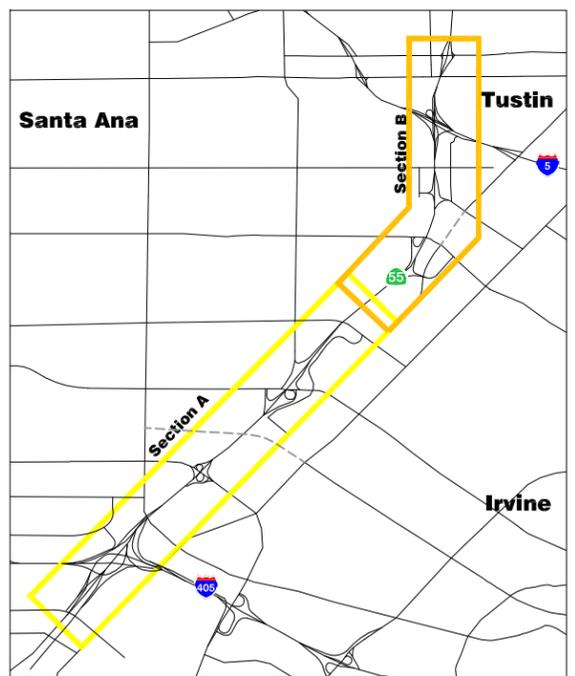
REVISED

SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - DESIGN YEAR 2040 - BUILD ALTERNATIVE 3



LEGEND

- - General Purpose Lane
- ◇ - HOV Lane
- XXX(XXX) - Ramp AM(PM) Peak Hour Traffic Volumes
- XXX(XXX) - Freeway Mainline AM(PM) Peak Hour Traffic Volumes
- XXX - Freeway Mainline ADT Traffic Volumes
- XXX(XXX) - Freeway HOV AM(PM) Peak Hour Traffic Volumes
- XXX - Freeway HOV ADT Traffic Volumes
- (Green) - Proposed General Purpose Lane
- (Orange) - Proposed Auxiliary Lane
- (Blue) - Proposed HOV Lane
- (Purple) - Separator
- (Red) - HOV Limited Access



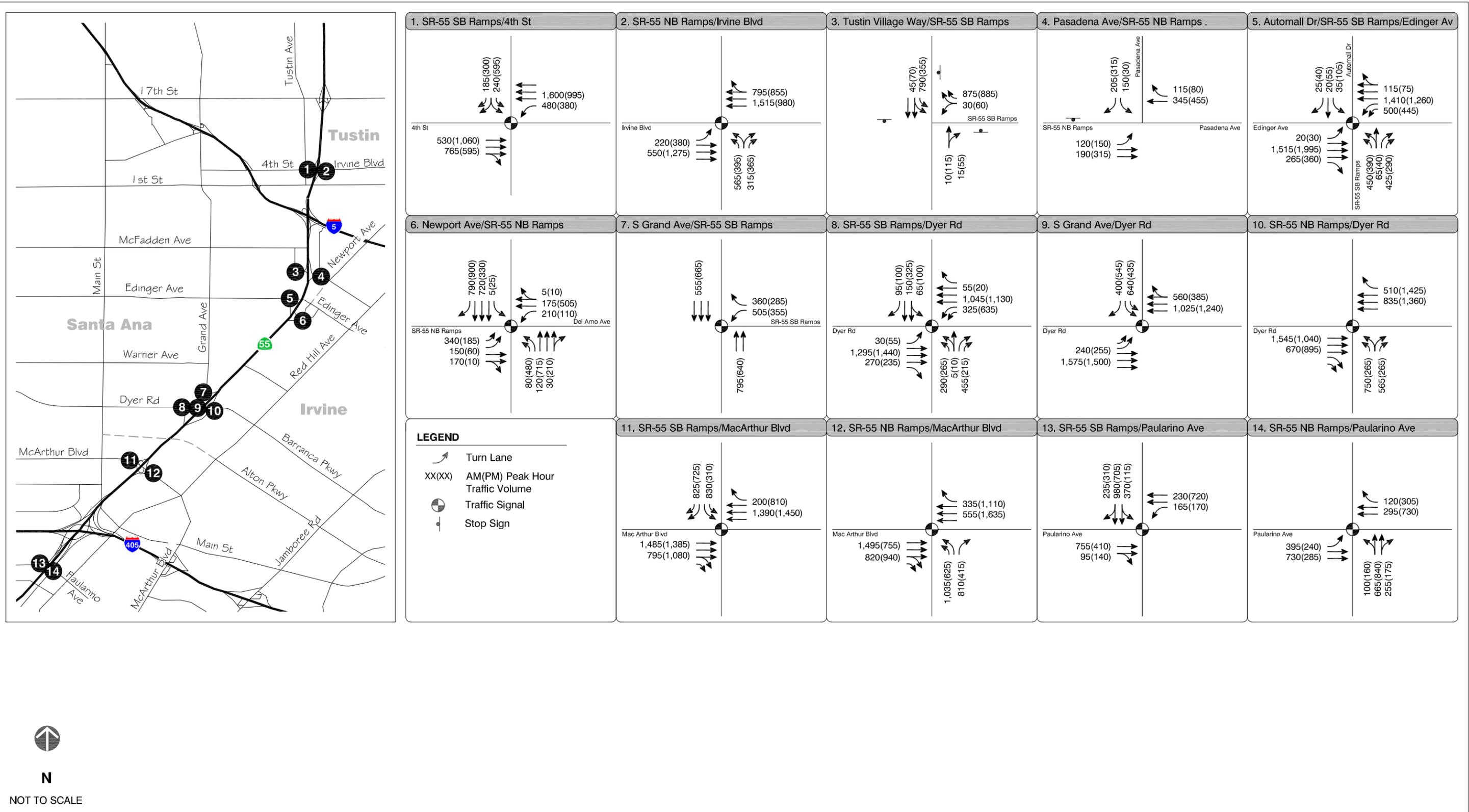
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REVISED

SR-55 (I-405 TO I-5) FREEWAY LANE CONFIGURATIONS AND PEAK HOUR AND DAILY TRAFFIC VOLUMES - DESIGN YEAR 2040 - BUILD ALTERNATIVE 4

FIGURE 3-A-ALT 4



REVISED

SR-55 (I-405 TO I-5) INTERSECTION LANE CONFIGURATIONS AND PEAK HOUR TRAFFIC VOLUMES - DESIGN YEAR 2040 - BUILD ALTERNATIVE 4



Freeway Operations

Mainline Segments and Ramps Operations Analysis

Tables 16-A and 16-B show the AM peak hour density and LOS for the study freeway mainline segments and ramp junctions on northbound and southbound SR-55 under 2040 conditions, respectively. The PM peak hour results are shown in Tables 16-C and 16-D.

AM Peak Hour

Northbound SR-55

Under the No Build Alternative, northbound SR-55 would operate at LOS F conditions at the Paularino Avenue on-ramp. Traffic congestion at those locations would meter traffic getting downstream, resulting in LOS D or better conditions on northbound SR-55 north of I-405 in the AM peak hour, except for the weaving section between McFadden Avenue on-ramp and northbound I-5 off-ramp, which would operate at LOS E under 2040 conditions.

Similar situation occurs to Alternative 1, in which northbound SR-55 would operate at LOS E or F south of MacArthur Boulevard, LOS F at the weaving section between McFadden Avenue on-ramp and northbound I-5 off-ramp, and LOS D or better at other locations.

Under Alternative 2, the Paularino Avenue on-ramp would still operate at LOS F due to capacity constraints at this location. In addition, the weaving section from McFadden Avenue on-ramp to NB I-5 off-ramp would operate at LOS F conditions due to more traffic able to travel to this location. The remaining freeway locations would operate at LOS D or better.

Alternative 3 is very similar to Alternative 2, except that the limited access at McFadden Avenue on-ramp would improve northbound SR-55 between McFadden Avenue and NB I-5 off-ramp from LOS F to LOS C conditions. In addition, the McFadden Avenue on-ramp would also operate at LOS C in the AM peak hour under Alternative 3.

Alternative 4 is very similar to Alternative 1, except that the limited access at McFadden Avenue on-ramp would improve northbound SR-55 between McFadden Avenue and NB I-5 off-ramp from LOS F to LOS C conditions. In addition, the McFadden Avenue on-ramp would also operate at LOS C in the AM peak hour under Alternative 4.

Southbound SR-55

In the southbound direction, heavy congestion and vehicle queue would extend from Edinger on-ramp back to 4th Street and beyond, resulting in LOS E or F conditions under the No Build Alternative. In addition, the segment between Dyer Road on-ramp and MacArthur Boulevard off-ramp would operate at LOS E or F conditions during the AM peak hour.



**TABLE 16-A – NORTHBOUND SR-55 FREEWAY MAINLINE AND RAMPS OPERATIONS
– YEAR 2040 CONDITIONS (AM PEAK HOUR)**

Location	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS
Paularino Ave On-ramp	Merge	54.3	F	Merge	53.5	F	Merge	55.1	F	Merge	52.1	F	Merge	52.8	F
SB I-405 On-ramp	Merge	31.0	D	Merge	35.3	E	Merge	32.8	D	Merge	31.6	D	Merge	37.2	E
NB I-405 On-ramp	Weave	30.4	D	Weave	35.1	E	Weave	26.7	C	Weave	25.4	C	Weave	38.6	E
MacArthur Blvd Off-ramp	Weave	30.4	D	Weave	35.1	E	Weave	26.7	C	Weave	25.4	C	Weave	38.6	E
MacArthur Blvd On-ramp (EB)	Merge	29.7	D	Merge	33.8	D	Merge	23.4	C	Merge	28.7	D	Merge	41.8	E
MacArthur Blvd On-ramp (WB)	Merge	34.0	D	Weave	25.1	C	Merge	25.4	C	Weave	21.7	C	Weave	27.6	C
Dyer Rd Off-ramp	Diverge	29.1	D	Weave	25.1	C	Diverge	23.9	C	Weave	21.7	C	Weave	27.6	C
Dyer Rd On-ramp (EB)	Merge	28.3	D	Merge	33.5	D	Merge	23.2	C	Merge	24.6	C	Merge	35.5	E
Dyer Rd On-ramp (WB)	Merge	31.5	D	Weave	24.9	C	Merge	26.3	C	Weave	21.2	C	Weave	24.8	C
Dyer Rd to Edinger Ave	Basic	28.1	D	Weave	24.9	C	Basic	23.3	C	Weave	21.2	C	Weave	24.8	C
Edinger Ave Off-ramp	Diverge	29.7	D	Weave	24.9	C	Diverge	24.6	C	Weave	21.2	C	Weave	24.8	C
Edinger Ave On-ramp	Weave	24.8	C	Weave	25.6	C	Weave	21.8	C	Weave	21.9	C	Weave	23.2	C
McFadden Ave Off-ramp	Weave	24.8	C	Weave	25.6	C	Weave	21.8	C	Weave	21.9	C	Weave	23.2	C
McFadden Ave On-ramp	Weave	35.8	E	Weave	40.3	E	Weave	44.2	F	Merge	21.3	C	Merge	35.0	D
NB I-5 Off-ramp	Weave	35.8	E	Weave	40.3	E	Weave	44.2	F	Diverge	22.1	C	Diverge	23.3	C
SB I-5 Off-ramp	Diverge	25.0	C	Diverge	26.2	C	Diverge	27.1	C	Diverge	20.1	C	Diverge	19.6	B
Irvine Blvd Off-ramp	Diverge	22.1	C	Diverge	22.2	C	Diverge	23.2	C	Diverge	21.5	C	Diverge	21.0	C
NB I-5 On-ramp	Merge	28.4	D	Merge	28.4	D	Merge	28.1	D	Merge	28.5	D	Merge	28.8	D

Notes: Bold font indicates unacceptable LOS E or F conditions.
Source: Fehr & Peers, 2015



**TABLE 16-B – SOUTHBOUND SR-55 FREEWAY MAINLINE AND RAMPS OPERATIONS
– YEAR 2040 CONDITIONS (AM PEAK HOUR)**

Location	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS
SB I-5 Off-ramp	Diverge	87.0	F	Diverge	74.2	F	Diverge	70.8	F	Diverge	55.5	F	Diverge	41.8	E
4 th St On-ramp	Merge	99.7	F	Merge	95.4	F	Merge	96.4	F	Merge	95.9	F	Merge	83.9	F
NB I-5 On-ramp	Merge	82.2	F	Merge	86.2	F	Merge	85.6	F	Merge	83.4	F	Merge	74.6	F
SB I-5 On-ramp	Weave	42.9	E	Weave	39.2	E	Weave	39.9	E	Weave	42.5	E	Weave	39.5	E
McFadden Off-ramp	Weave	42.9	E	Weave	39.2	E	Weave	39.9	E	Weave	42.5	E	Weave	39.5	E
McFadden On-ramp	Weave	36.7	E	Weave	27.3	C	Weave	28.0	C	Weave	28.0	D	Weave	28.5	D
Edinger Off-ramp	Weave	36.7	E	Weave	27.3	C	Weave	28.0	C	Weave	28.0	D	Weave	28.5	D
Edinger On-ramp	Weave	30.7	D	Merge	43.2	F	Merge	48.1	F	Weave	27.3	C	Merge	50.9	F
Edinger Ave to Dyer Rd	Weave	30.7	D	Basic	32.9	D	Basic	32.8	D	Weave	27.3	C	Basic	47.6	F
Grand Ave Off-ramp	Weave	30.7	D	Diverge	39.6	E	Diverge	33.2	D	Weave	27.3	C	Diverge	56.1	F
Dyer Rd Off-ramp	Diverge	47.1	F	Diverge	74.5	F	Diverge	35.7	E	Diverge	29.4	D	Diverge	61.5	F
Dyer Rd On-Ramp	Weave	40.5	E	Weave	61.7	F	Merge	47.4	F	Weave	33.0	D	Weave	68.7	F
MacArthur Blvd Off-ramp	Weave	40.5	E	Weave	61.7	F	Diverge	37.3	E	Weave	33.0	D	Weave	68.7	F
MacArthur Blvd On-ramp (WB)	Merge	41.5	E	Merge	43.0	F	Merge	31.0	D	Merge	51.3	F	Merge	45.0	F
MacArthur Blvd On-ramp (EB)	Weave	28.9	D	Weave	29.6	D	Weave	36.0	E	Weave	40.0	E	Weave	30.3	D
SB I-405 Off-ramp	Weave	28.9	D	Weave	29.6	D	Weave	36.0	E	Weave	40.0	E	Weave	30.3	D
NB I-405 Off-ramp	Diverge	27.9	C	Diverge	28.6	D	Diverge	29.0	D	Diverge	29.4	D	Diverge	28.6	D
Paularino Ave Off-ramp	Diverge	27.0	C	Diverge	27.6	C	Diverge	28.0	C	Diverge	27.8	C	Diverge	27.3	C

Notes: Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



**TABLE 16-C – NORTHBOUND SR-55 FREEWAY MAINLINE AND RAMPS OPERATIONS
– YEAR 2040 CONDITIONS (PM PEAK HOUR)**

Location	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS
Paularino Ave On-ramp	Merge	129.3	F	Merge	143.0	F	Merge	66.5	F	Merge	100.5	F	Merge	89.5	F
SB I-405 On-ramp	Merge	138.3	F	Merge	139.6	F	Merge	78.0	F	Merge	107.3	F	Merge	113.8	F
NB I-405 On-ramp	Weave	137.2	F	Weave	135.9	F	Weave	122.0	F	Weave	121.4	F	Weave	126.4	F
MacArthur Blvd Off-ramp	Weave	137.2	F	Weave	135.9	F	Weave	122.0	F	Weave	121.4	F	Weave	126.4	F
MacArthur Blvd On-ramp (EB)	Merge	138.2	F	Merge	138.2	F	Merge	131.7	F	Merge	133.7	F	Merge	116.0	F
MacArthur Blvd On-ramp (WB)	Merge	133.3	F	Weave	132.6	F	Merge	140.7	F	Weave	132.1	F	Weave	117.9	F
Dyer Rd Off-ramp	Diverge	151.0	F	Weave	132.6	F	Diverge	152.3	F	Weave	132.1	F	Weave	117.9	F
Dyer Rd On-ramp (EB)	Merge	124.2	F	Merge	119.5	F	Merge	127.5	F	Merge	121.6	F	Merge	96.3	F
Dyer Rd On-ramp (WB)	Merge	125.4	F	Weave	124.9	F	Merge	127.7	F	Weave	129.1	F	Weave	114.2	F
Dyer Rd to Edinger Ave	Basic	120.0	F	Weave	124.9	F	Basic	125.5	F	Weave	129.1	F	Weave	114.2	F
Edinger Ave Off-ramp	Diverge	94.3	F	Weave	124.9	F	Diverge	105.9	F	Weave	129.1	F	Weave	114.2	F
Edinger Ave On-ramp	Weave	90.6	F	Weave	84.3	F	Weave	102.7	F	Weave	93.7	F	Weave	81.1	F
McFadden Ave Off-ramp	Weave	90.6	F	Weave	84.3	F	Weave	102.7	F	Weave	93.7	F	Weave	81.1	F
McFadden Ave On-ramp	Weave	99.8	F	Weave	95.1	F	Weave	97.0	F	Merge	24.7	C	Merge	28.7	D
NB I-5 Off-ramp	Weave	99.8	F	Weave	95.1	F	Weave	97.0	F	Diverge	89.2	F	Diverge	78.0	F
SB I-5 Off-ramp	Diverge	106.2	F	Diverge	104.8	F	Diverge	103.6	F	Diverge	97.1	F	Diverge	50.0	F
Irvine Blvd Off-ramp	Diverge	84.2	F	Diverge	82.9	F	Diverge	79.6	F	Diverge	68.9	F	Diverge	54.2	F
NB I-5 On-ramp	Merge	85.1	F	Merge	88.3	F	Merge	90.3	F	Merge	89.6	F	Merge	92.4	F

Notes: Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



**TABLE 16-D – SOUTHBOUND SR-55 FREEWAY MAINLINE AND RAMPS OPERATIONS
– YEAR 2040 CONDITIONS (PM PEAK HOUR)**

Location	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS	Type	Density	LOS
SB I-5 Off-ramp	Diverge	36.8	E	Diverge	52.0	F	Diverge	36.7	E	Diverge	35.9	E	Diverge	56.4	F
4 th St On-ramp	Merge	64.0	F	Merge	74.3	F	Merge	39.8	E	Merge	41.9	E	Merge	80.2	F
NB I-5 On-ramp	Merge	82.9	F	Merge	89.5	F	Merge	63.3	F	Merge	67.7	F	Merge	91.8	F
SB I-5 On-ramp	Weave	70.2	F	Weave	76.6	F	Weave	42.5	E	Weave	47.0	F	Weave	77.8	F
McFadden Off-ramp	Weave	70.2	F	Weave	76.6	F	Weave	42.5	E	Weave	47.0	F	Weave	77.8	F
McFadden On-ramp	Weave	38.8	E	Weave	82.0	F	Weave	26.0	C	Weave	26.1	C	Weave	84.2	F
Edinger Off-ramp	Weave	38.8	E	Weave	82.0	F	Weave	26.0	C	Weave	26.1	C	Weave	84.2	F
Edinger On-ramp	Weave	68.0	F	Merge	100.5	F	Merge	28.7	D	Weave	26.8	C	Merge	99.7	F
Edinger Ave to Dyer Rd	Weave	68.0	F	Basic	125.3	F	Basic	29.7	D	Weave	26.8	C	Basic	114.9	F
Grand Ave Off-ramp	Weave	68.0	F	Diverge	128.1	F	Diverge	30.4	D	Weave	26.8	C	Diverge	116.5	F
Dyer Rd Off-ramp	Diverge	117.7	F	Diverge	127.1	F	Diverge	29.7	D	Diverge	52.4	F	Diverge	106.0	F
Dyer Rd On-Ramp	Weave	78.5	F	Weave	82.1	F	Merge	51.4	F	Weave	59.9	F	Weave	84.6	F
MacArthur Blvd Off-ramp	Weave	78.5	F	Weave	82.1	F	Diverge	38.4	E	Weave	59.9	F	Weave	84.6	F
MacArthur Blvd On-ramp (WB)	Merge	50.5	F	Merge	53.9	F	Merge	47.3	F	Merge	67.4	F	Merge	53.9	F
MacArthur Blvd On-ramp (EB)	Weave	30.9	D	Weave	29.8	D	Weave	49.0	F	Weave	52.1	F	Weave	30.4	D
SB I-405 Off-ramp	Weave	30.9	D	Weave	29.8	D	Weave	49.0	F	Weave	52.1	F	Weave	30.4	D
NB I-405 Off-ramp	Diverge	28.7	D	Diverge	27.6	C	Diverge	32.0	D	Diverge	32.2	D	Diverge	28.4	D
Paularino Ave Off-ramp	Diverge	30.2	D	Diverge	29.2	D	Diverge	33.0	D	Diverge	32.0	D	Diverge	29.0	D

Notes: Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



With the proposed southbound general purpose lane from McFadden Avenue to Dyer Road under Alternative 1, southbound SR-55 between southbound I-5 on-ramp and Edinger Avenue would improve with better LOS or lower density. However with more traffic able to travel downstream but no capacity or operational improvements at downstream locations, southbound SR-55 south of Dyer Road would operate with higher density/delay under Alternative 1, compared to the No Build Alternative. The operational characteristics under Alternative 4 would be similar to Alternative 1, except that the HOV lane under Alternative 4 would operate at better conditions than Alternative 1 which is shown in the following HOV lane operations section.

Under Alternative 2, the proposed general purpose lane would also improve southbound SR-55 between southbound I-5 on-ramp and Edinger Avenue with better LOS or lower density. In addition, the operations at the Dyer Road on- and off-ramps would improve due to additional capacity provided by the extended general purpose lane compared to Alternative 1. However, southbound SR-55 between MacArthur Boulevard and I-405 under Alternative 2 would experience higher density/delay than Alternative 1 due to a combination of higher traffic demand and lack of an auxiliary lane from MacArthur Boulevard on-ramp to I-405 off-ramp.

Compared to Alternative 2, the addition of auxiliary lanes proposed in Alternative 3 would improve the LOS between Edinger Avenue on-ramp and MacArthur Boulevard off-ramp. Also, Alternative 3 shows higher density/congestion on southbound SR-55 between MacArthur Boulevard on-ramp and the southbound I-405 off-ramp than Alternative 2 due to higher traffic demand able to get to this location.

PM Peak Hour

Northbound SR-55

Under all the project alternatives, all the study locations on northbound SR-55 would experience severe congestion and operate at LOS F conditions under 2040 conditions. Vehicle queue on northbound extend from Irvine Boulevard/I-5 all the way back to south of Paularino Avenue. According to the 2040 analysis results, the two bottlenecks identified in northbound SR-55 would be Dyer Road on-ramp and McFadden on-ramp. The only exception is that the limited access at McFadden Avenue on-ramp would significantly improve operations at this on-ramp from LOS F to D or better conditions under Alternatives 3 and 4.

Southbound SR-55

In the southbound direction, most study locations operate at LOS E or worse under the No Build Alternative under 2040 conditions, with the exception of the segments south of MacArthur Boulevard on-ramp.

Under Alternative 1, the additional general purpose lane on southbound SR-55 between McFadden Avenue and Dyer Road would relieve the congestion near the I-5 interchange and send more people to downstream locations. With more traffic able to travel downstream but lack of adequate capacity to accommodate the higher demand, southbound SR-55 between Edinger Avenue and MacArthur Boulevard would expect a higher density than the No Build Alternative. Traffic operations on southbound SR-55 mainline under Alternative 4 would be similar to Alternative 1.



Under Alternative 2, the proposed general purpose lane would improve southbound SR-55 between southbound I-5 on-ramp and Dyer Road from LOS E or F to LOS C or E conditions. However, southbound SR-55 between MacArthur Boulevard and I-405 under Alternative 2 would experience higher density/delay than Alternative 1 due to a combination of higher traffic demand and lack of an auxiliary lane from MacArthur Boulevard on-ramp to I-405 off-ramp.

Compared to Alternative 2, Alternative 3 shows the similar operations on southbound SR-55 between southbound I-5 and Edinger Avenue. Also, higher density/congestion is shown between MacArthur Boulevard on-ramp and I-405 off-ramp than Alternative 2 due to higher traffic demand at this location.

On-ramp Queuing Analysis

In addition to freeway operational analysis, a queuing analysis was also conducted for all the project alternatives at the on-ramps to identify if the on-ramp queue would extend back to local streets during the AM and PM peak hour under Year 2040 conditions, and the queuing results are shown in Tables 16-E and 16-F. During the AM peak hour, the storage at all the on-ramps is adequate to accommodate vehicle queues. In the PM peak hour, three on-ramps along northbound SR-55 including westbound Dyer Road, Edinger Avenue, and McFadden Avenue would have vehicle queues spill back to arterials under the No Build Alternative and Alternatives 1-2. Alternatives 3 and 4 would eliminate the queue spillback at the McFadden Avenue on-ramp, while the queues at the two other northbound SR-55 on-ramps would exceed storage length with shorter queue lengths compared to the No Build Alternative.

HOV Lane Operations Analysis

In addition to the mainline segments and ramp junctions, the HOV lane operational conditions were also analyzed under 2040 conditions, and the AM and PM peak hour density, average speed, and LOS results are summarized in Table 17-A and 17-B, respectively.



TABLE 16-E – ON-RAMP QUEUING ANALYSIS
– YEAR 2040 CONDITIONS (AM PEAK HOUR)

Location	Number of Lanes	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Storage (ft)	Queue (ft)								
1. SR-55 NB: Paularino Ave On-ramp	1	1,700	550	1,700	495	1,700	590	1,700	565	1,700	505
2. SR-55 NB: EB MacArthur Blvd On-ramp	2	840	245	840	250	840	320	840	260	840	250
3. SR-55 NB: WB MacArthur Blvd On-ramp ¹	1	940	125	940	75	940	100	940	75	940	70
4. SR-55 NB: EB Dyer Rd On-ramp ¹	1	790	550	790	370	790	335	790	350	790	650
5. SR-55 NB: WB Dyer Rd On-ramp	2	720	95	720	70	720	95	720	75	720	70
6. SR-55 NB: Edinger Ave On-ramp	2	480	80	480	80	480	80	480	345	480	85
7. SR-55 NB: McFadden Ave On-ramp	2	320	300	320	310	320	300	320	70	320	70
8. SR-55 NB: Irvine Blvd On-ramp	2	500	85	500	85	500	85	500	90	500	90
9. SR-55 SB: 4 th St On-ramp	1	740	150	740	155	740	155	740	180	740	230
10. SR-55 SB: McFadden Ave On-ramp	2	390	255	390	245	390	255	390	265	390	245
11. SR-55 SB: Edinger Ave On-ramp	2	570	140	570	170	570	185	570	175	570	160
12. SR-55 SB: Dyer Rd On-ramp	2	540	115	540	130	540	115	540	120	540	115
13. SR-55 SB: WB MacArthur Blvd On-ramp	1	720	135	720	155	720	140	720	150	720	135
14. SR-55 SB: EB MacArthur Blvd On-ramp	2	600	75	600	70	600	75	600	75	600	75

Note: 1. The on-ramps would be widened to have 2 metered lanes under Project Alternatives 1, 2, 3, and 4.

Bold and underline indicates vehicle queue exceeds the available storage.

Source: Fehr & Peers, 2015



TABLE 16-F – ON-RAMP QUEUING ANALYSIS
– YEAR 2040 CONDITIONS (PM PEAK HOUR)

Location	Number of Lanes	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Storage (ft)	Queue (ft)								
1. SR-55 NB: Paularino Ave On-ramp	1	1,700	1690	1,700	1690	1,700	1680	1,700	1690	1,700	1695
2. SR-55 NB: EB MacArthur Blvd On-ramp	2	840	590	840	590	840	330	840	585	840	330
3. SR-55 NB: WB MacArthur Blvd On-ramp ¹	1	940	870	940	875	940	895	940	880	940	290
4. SR-55 NB: EB Dyer Rd On-ramp ¹	1	790	690	790	165	790	205	790	195	790	175
5. SR-55 NB: WB Dyer Rd On-ramp	2	720	830	720	810	720	825	720	805	720	800
6. SR-55 NB: Edinger Ave On-ramp	2	480	655	480	600	480	680	480	640	480	630
7. SR-55 NB: McFadden Ave On-ramp	2	320	505	320	510	320	500	320	65	320	65
8. SR-55 NB: Irvine Blvd On-ramp	2	500	100	500	90	500	90	500	90	500	100
9. SR-55 SB: 4 th St On-ramp	1	740	420	740	580	740	235	740	275	740	470
10. SR-55 SB: McFadden Ave On-ramp	2	390	90	390	90	390	120	390	105	390	95
11. SR-55 SB: Edinger Ave On-ramp	2	570	245	570	690	570	235	570	230	570	695
12. SR-55 SB: Dyer Rd On-ramp	2	540	305	540	330	540	460	540	300	540	320
13. SR-55 SB: WB MacArthur Blvd On-ramp	1	720	565	720	605	720	535	720	630	720	625
14. SR-55 SB: EB MacArthur Blvd On-ramp	2	600	150	600	135	600	130	600	145	600	135

Note: 1. The on-ramps would be widened to have 2 metered lanes under Project Alternatives 1, 2, 3, and 4.

Bold and underline indicates vehicle queue exceeds the available storage.

Source: Fehr & Peers, 2015



**TABLE 17-A – FREEWAY HOV LANE OPERATIONS
– YEAR 2040 CONDITIONS (AM PEAK HOUR)**

Location	Type	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
		Density	Speed	LOS	Density	Speed	LOS									
Northbound																
NB 55: I-405 to MacArthur Blvd	HOV	6.4	64	A	6.3	64	A	6.2	64	A	5.6	65	A	6.3	64	A
NB 55: MacArthur Blvd to Dyer Rd	HOV	14.1	67	B	14.0	67	B	13.8	67	B	13.1	67	B	7.7	68	A
NB 55: Dyer Rd to Edinger Ave	HOV	12.5	66	B	11.8	66	B	11.4	67	B	10.6	65	A	7.5	67	A
NB 55: Edinger Ave to McFadden Ave	HOV	15.4	66	B	15.2	66	B	14.8	66	B	14.2	65	B	7.9	67	A
NB 55: McFadden Ave to I-5	HOV	5.4	66	A	5.4	66	A	5.2	66	A	5.1	67	A	6.2	67	A
Southbound																
SB 55: I-5 to McFadden Ave	HOV	127.2	10	F	58.6	20	F	41.8	23	E	88.8	14	F	22.2	56	C
SB 55: McFadden Ave to Edinger Ave	HOV	28.5	60	D	154.6	7	F	155.0	7	F	153.3	7	F	22.6	66	C
SB 55: Edinger Ave to Dyer Rd	HOV	25.1	63	C	22.1	63	C	21.8	63	C	18.1	65	C	21.1	64	C
SB 55: Dyer Rd to MacArthur Blvd	HOV	17.6	63	B	18.7	63	C	17.4	63	B	15.6	66	B	18.1	63	C
SB 55: MacArthur Blvd to I-405	HOV	13.6	67	B	13.0	67	B	13.0	67	B	13.0	67	B	22.6	66	C
Source: Fehr & Peers, 2015																



TABLE 17-B – FREEWAY HOV LANE OPERATIONS
– YEAR 2040 CONDITIONS (PM PEAK HOUR)

Location	Type	No Build			Build Alt 1			Build Alt 2			Build Alt 3			Build Alt 4		
		Density	Speed	LOS	Density	Speed	LOS									
Northbound																
NB 55: I-405 to MacArthur Blvd	HOV	7.5	60	A	7.0	59	A	7.1	60	A	7.5	60	A	9.1	62	A
NB 55: MacArthur Blvd to Dyer Rd	HOV	21.0	62	C	20.5	62	C	21.1	63	C	20.6	63	C	14.1	65	B
NB 55: Dyer Rd to Edinger Ave	HOV	45.2	33	F	45.7	34	F	46.5	30	F	60.8	25	F	29.2	43	D
NB 55: Edinger Ave to McFadden Ave	HOV	42.8	38	E	35.9	44	E	43.5	38	E	53.1	30	F	33.2	42	D
NB 55: McFadden Ave to I-5	HOV	11.8	64	B	11.4	62	B	12.6	62	B	12.2	63	B	13.6	66	B
Southbound																
SB 55: I-5 to McFadden Ave	HOV	25.3	47	C	28.8	46	D	13.4	62	B	14.3	60	B	29.1	46	D
SB 55: McFadden Ave to Edinger Ave	HOV	25.6	53	C	13.9	66	B	14.0	66	B	14.0	66	B	13.8	66	B
SB 55: Edinger Ave to Dyer Rd	HOV	27.9	47	D	30.6	46	D	21.7	62	C	21.3	60	C	14.2	54	B
SB 55: Dyer Rd to MacArthur Blvd	HOV	28.5	52	D	28.9	52	D	20.9	63	C	21.4	60	C	17.2	60	B
SB 55: MacArthur Blvd to I-405	HOV	16.0	66	B	16.0	66	B	16.2	66	B	16.0	66	B	16.2	66	B
Source: Fehr & Peers, 2015																



AM Peak Hour

During the AM peak hour, all the study HOV locations on northbound SR-55 operate at LOS B or better with an average speed of approximately 65 mph for each of the project alternatives under 2040 conditions.

In the southbound direction, SR-55 HOV lane between I-5 and McFadden Avenue would operate at LOS F and 10 mph due to the short-distance merging from the southbound I-5 HOV on-ramp under the No Build Alternative. Although Build Alternatives 1-3 would extend the 2nd HOV lane from the existing terminus to Edinger Avenue, the high HOV demand would result in merging issues at Edinger Avenue terminus and cause LOS F/E and an average speed of less than 25 mph in the HOV lane between I-5 and Edinger Avenue. Under Build Alternative 4, all the southbound HOV lanes would operate at LOS C or better with an average speed of higher than 50 mph during the AM peak hour.

PM Peak Hour

During the PM peak hour, the northbound HOV lane between Dyer Road and McFadden Avenue would operate at LOS E or F conditions with an average speed of less than 45 mph under the No Build Alternative and Alternatives 1-3, due to HOV capacity constraints and the interactions between HOV and general purpose lane traffic. With the additional capacity provided by the 2nd HOV lane, Alternative 4 would improve the northbound SR-55 HOV lane operations from LOS E/F to D or better and increase the average speed for HOV traffic. However, the HOV lane between Dyer Road and McFadden Avenue would operate at an average speed of right below 45 mph under Alternative 4 due to congestion on the general purpose lane interacting with the HOV traffic.

In the southbound direction, all the study HOV locations on southbound SR-55 operate at LOS D or better for each of the project alternatives under 2040 conditions. With the extended 2nd HOV lane on southbound SR-55, the HOV lane between McFadden Avenue and Edinger Avenue would improve from LOS C to B under Build Alternatives 1-3. Under Build Alternative 4, the southbound HOV lanes south of McFadden Avenue would operate at LOS B during the PM peak hour. All the southbound HOV locations would operate at an average speed of higher than 45 mph under each of the project alternatives during the PM peak hour.

Intersection Operations

Intersection Operations Analysis

Tables 18-A and 18-B show the AM and PM peak hour delay and LOS for the study ramp terminal intersections for each of the project alternatives under 2040 conditions.

AM Peak Hour

During the AM peak hour, a majority of the study intersections would operate at LOS D or better for each of the project alternatives under 2040 conditions, except for the Southbound SR-55/4th Street intersection, which would operate at LOS E or F conditions.



TABLE 18-A – INTERSECTION OPERATIONS
– YEAR 2040 CONDITIONS (AM PEAK HOUR)

Location	Control Type	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Delay ²	LOS								
1. SR-55 SB/4 th St	Signal	62.2	E	72.2	E	72.4	E	74.4	E	>80	F
2. SR-55 NB/Irvine Blvd	Signal	29.9	C	29.6	C	29.4	C	29.8	C	30.2	C
3. SR-55 SB/Village Way	AWSC ¹	14.8	B	14.5	B	14.8	B	16.3	C	14.7	B
4. SR-55 NB/Pasadena Ave	SSSC ¹	19.8	C	22.0	C	19.0	C	10.6	B	10.6	B
5. SR-55 SB/Edinger Ave	Signal	25.9	C	25.8	C	25.2	C	26.1	C	26.4	C
6. SR-55 NB/Newport Ave	Signal	24.2	C	24.0	C	24.3	C	26.4	C	25.7	C
7. SR-55 SB/ Grand Ave	Signal	9.3	A	10.4	B	10.1	B	10.3	B	10.4	B
8. SR-55 SB/Dyer Ave	Signal	19.0	B	19.4	B	19.3	B	20.0	B	19.7	B
9. Grand Ave/Dyer Rd	Signal	18.7	B	20.8	C	21.7	C	20.3	C	24.7	C
10. SR-55 NB/Dyer Rd	Signal	12.8	B	12.1	B	12.2	B	11.7	B	16.6	B
11. SR-55 SB/MacArthur Blvd	Signal	10.0	A	10.0	A	9.9	A	10.0	A	9.9	A
12. SR-55 NB/MacArthur Blvd	Signal	13.5	B	14.8	B	13.4	B	13.1	B	15.9	B
13. SR-55 SB/Paularino Ave	Signal	41.0	D	39.3	D	41.8	D	45.3	D	40.9	D
14. SR-55 NB/Paularino Ave	Signal	32.9	C	31.2	C	33.0	C	34.8	C	30.1	C

Notes: 1. AWSC = All way stop control, SSSC = Side street stop-control.
2. Average delay reported for ASWC and signalized intersections and worst-approach delay reported for SSSC intersections.
Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



TABLE 18-B – INTERSECTION OPERATIONS
– YEAR 2040 CONDITIONS (PM PEAK HOUR)

Location	Control Type	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Delay ²	LOS								
1. SR-55 SB/4 th St	Signal	20.4	C	20.9	C	20.8	C	20.9	C	20.8	C
2. SR-55 NB/Irvine Blvd	Signal	18.0	B	18.3	B	18.4	B	19.7	B	20.2	C
3. SR-55 SB/Village Way	AWSC ¹	14.3	B	12.8	B	15.3	C	16.0	C	13.1	B
4. SR-55 NB/Pasadena Ave	SSSC ¹	73.2	F	>80	F	>80	F	9.1	A	9.1	A
5. SR-55 SB/Edinger Ave	Signal	28.2	C	28.7	C	29.8	C	29.1	C	28.1	C
6. SR-55 NB/Newport Ave	Signal	>80	F								
7. SR-55 SB/ Grand Ave	Signal	10.0	A	9.7	A	11.1	B	11.3	B	10.3	B
8. SR-55 SB/Dyer Ave	Signal	27.9	C	29.2	C	28.9	C	28.5	C	29.8	C
9. Grand Ave/Dyer Rd	Signal	15.2	B	14.2	B	17.2	B	18.2	B	15.3	B
10. SR-55 NB/Dyer Rd	Signal	>80	F								
11. SR-55 SB/MacArthur Blvd	Signal	56.5	E	65.8	E	61.0	E	66.2	E	61.3	E
12. SR-55 NB/MacArthur Blvd	Signal	>80	F	>80	F	>80	F	>80	F	62.5	E
13. SR-55 SB/Paularino Ave	Signal	66.5	E	>80	F	27.9	C	30.0	C	32.5	C
14. SR-55 NB/Paularino Ave	Signal	>80	F								

Notes: 1. AWSC = All way stop control, SSSC = Side street stop-control.
2. Average delay reported for ASWC and signalized intersections and worst-approach delay reported for SSSC intersections.
Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



PM Peak Hour

Under the No Build Alternative, seven of the study intersections would operate at LOS E or F conditions, including NB SR-55/McFadden Avenue/Pasadena Avenue, NB SR-55/Newport Avenue/Del Amo, NB SR-55/Dyer Road, SB SR-55/MacArthur Boulevard, NB SR-55/MacArthur Boulevard and SR-55/Paularino Avenue ramp intersections. In addition, the NB SR-55/Paularino Avenue intersection would operate at LOS F conditions under all the project alternatives. Under Alternatives 1 and 4, the proposed 2nd lane on the MacArthur Boulevard on-ramp to northbound SR-55 would improve traffic operations at the Northbound SR-55 Ramps/MacArthur Boulevard intersection with significant delay savings.

With the proposed improvements under Alternatives 3 and 4, two of the seven intersections would improve from LOS F or E to C or better conditions during the PM peak hour. In addition, the limited access at McFadden Avenue on-ramp would significantly improve operations at the NB I-5/McFadden Avenue intersection from LOS F to LOS A under Alternatives 3 and 4.

Intersection Turning Movement Queuing Analysis

The intersection turning movement vehicle queues at study locations under each of the project alternatives are summarized in Tables 18-C and 18-D. During the AM peak hour, most of locations under the No Build Alternative have adequate storage to accommodate vehicle queues except for five turning movements including the westbound left-turn at the SB SR-55/Edinger Avenue intersection, eastbound left-turn at the Grand Avenue/Dyer Road intersection, westbound left-turn at the SB SR-55/Paularino Avenue intersection, and the eastbound left-turn at the NB SR-55/Paularino Avenue intersection. Vehicle queues at these locations would either decrease or remain similar under Alternatives 1 through 4.

During the PM peak hour, more locations with vehicle queue exceeding storage length would occur under all the project alternatives. Under the No Build Alternative, significant queuing are expected on westbound Sycamore Avenue at the NB SR-55/Pasadena Avenue intersection, southbound Newport Avenue at the NB SR-55/Newport Avenue intersection, eastbound and westbound Dyer Road at the Dyer Road interchange, and eastbound and westbound MacArthur Boulevard at the NB SR-55/MacArthur Boulevard intersection, which result from a combination of high traffic demand and vehicle queue spillback from the downstream NB SR-55 on-ramps at those locations. Alternatives 1 and 4 would significantly reduce the queue along Dyer Road and MacArthur Boulevard with addition of the NB SR-55 auxiliary lanes from MacArthur Boulevard to Dyer Road and from Dyer Road to Edinger Avenue. The limited access at the McFadden Avenue on-ramp would significantly reduce queues on Sycamore under Alternatives 3 and 4.



TABLE 18-C – INTERSECTION VEHICLE QUEUING ANALYSIS
– YEAR 2040 CONDITIONS (AM PEAK HOUR)

Intersection	Movement	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Storage (ft)	Queue (ft)								
1. SR-55 SB/4 th St	SB – off-ramp	1,430	155	1,430	140	1,430	150	1,430	150	1,430	140
	WB – left turn	310	155	310	130	310	125	310	125	310	150
	WB – through	310	110	310	115	310	115	310	120	310	130
2. SR-55 NB/Irvine Blvd	NB – off-ramp	2,030	275	2,030	270	2,030	300	2,030	295	2,030	265
	EB – left turn	310	250	310	235	310	240	310	260	310	265
	EB – through	310	120	310	110	310	110	310	110	310	110
3. SR-55 SB/Village Way	SB – left turn	820	140	820	105	820	145	820	160	820	120
	WB – off-ramp	900	120	900	105	900	130	900	100	900	110
4. SR-55 NB/Pasadena Ave	SB – left turn	1,170	120	1,170	135	1,170	120	1,170	70	1,170	75
	SB – right turn	1,170	25	1,170	35	1,170	35	1,170	10	1,170	5
	EB – off-ramp	875	215	875	230	875	230	875	50	875	45
	WB – through	375	240	375	285	375	280	375	15	375	15
5. SR-55 SB/Edinger Ave	NB – off-ramp	995	380	995	315	995	300	995	290	995	315
	EB – left turn	180	60	180	55	180	50	180	55	180	60
	EB – through	1,285	370	1,285	365	1,285	370	1,285	380	1,285	365
	WB – left turn	255	325	255	275	255	290	255	320	255	300
	WB – through	1,055	270	1,055	260	1,055	265	1,055	280	1,055	270
6. SR-55 NB/Newport Ave	NB - Left	330	75	330	85	330	75	330	80	330	85
	SB – through	1,180	290	1,180	300	1,180	300	1,180	370	1,180	300



	SB – right turn	600	290	600	300	600	300	600	370	600	305
	EB – off-ramp	1,080	135	1,080	145	1,080	150	1,080	155	1,080	155
	WB – through	1,210	80	1,210	80	1,210	75	1,210	90	1,210	95
7. SR-55 SB/ Grand Ave	NB – through	1,070	135	1,070	145	1,070	120	1,070	135	1,070	135
	WB – off-ramp	930	225	930	275	930	265	930	315	930	275
8. SR-55 SB/Dyer Ave	NB – off-ramp	1,145	145	1,145	145	1,145	145	1,145	160	1,145	150
	EB – through	430	245	430	265	430	255	430	280	430	260
	WB – left turn	250	185	250	195	250	205	250	190	250	200
	WB – through	470	95	470	95	470	95	470	95	470	90
9. Grand Ave/Dyer Rd	SB – left turn	1,090	290	1,090	330	1,090	315	1,090	340	1,090	345
	SB – right-turn	1,090	290	1,090	330	1,090	315	1,090	340	1,090	345
	EB – left turn	100	235	100	185	100	195	100	230	100	205
	EB – through	460	225	460	225	460	210	460	205	460	235
	WB – through	500	355	500	390	500	425	500	385	500	325
10. SR-55 NB/Dyer Rd	NB – off-ramp	1,710	320	1,710	370	1,710	330	1,710	320	1,710	340
	EB – through	500	260	500	195	500	215	500	205	500	245
	EB – right turn	400	95	400	0	400	0	400	0	400	180
	WB – through	560	220	560	155	560	155	560	170	560	170
	WB – right turn	--	--	330	60	330	65	330	75	330	70
11. SR-55 SB/MacArthur Blvd	SB – off-ramp	1,425	280	1,425	295	1,425	240	1,425	260	1,425	265
	EB – through	815	225	815	210	815	225	815	250	815	230
	EB – right turn	815	0	815	0	815	0	815	0	815	0
	WB – through	885	80	885	85	885	85	885	80	885	80
	WB – right turn	350	0	350	0	350	0	350	0	350	0



12. SR-55 NB/MacArthur Blvd	NB – off-ramp	1,195	345	1,195	385	1,195	365	1,195	375	1,195	425
	EB – through	885	440	885	255	885	225	885	260	885	260
	EB – right turn	530	0	530	0	530	0	530	0	530	0
	WB – through	705	130	705	150	705	135	705	130	705	130
	WB – right turn	705	0	705	0	705	0	705	0	705	0
13. SR-55 SB/Paularino Ave	SB – off-ramp	2,135	750	2,135	785	2,135	835	2,135	825	2,135	765
	WB – left turn	190	<u>285</u>	190	<u>295</u>	190	<u>280</u>	190	<u>270</u>	190	<u>285</u>
	WB – through	345	85	345	85	345	90	345	90	345	90
14. SR-55 NB/Paularino Ave	NB – through	845	610	845	575	845	610	845	660	845	515
	EB – left turn	130	<u>395</u>	130	<u>395</u>	130	<u>390</u>	130	<u>385</u>	130	<u>405</u>
	EB – through	345	255	345	230	345	240	345	220	345	265
Note: Bold and underline indicates vehicle queue exceeds the available storage. Source: Fehr & Peers, 2015											



TABLE 18-D – INTERSECTION VEHICLE QUEUING ANALYSIS
– YEAR 2040 CONDITIONS (PM PEAK HOUR)

Intersection	Movement	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Storage (ft)	Queue (ft)								
1. SR-55 SB/4 th St	SB – off-ramp	1,430	240	1,430	230	1,430	240	1,430	260	1,430	240
	WB – left turn	310	310	310	310	310	305	310	290	310	305
	WB – through	310	115	310	95	310	100	310	105	310	105
2. SR-55 NB/Irvine Blvd	NB – off-ramp	2,030	150	2,030	155	2,030	165	2,030	155	2,030	165
	EB – left turn	310	295	310	290	310	290	310	300	310	320
	EB – through	310	125	310	120	310	125	310	130	310	130
3. SR-55 SB/Village Way	SB – left turn	820	80	820	75	820	90	820	90	820	85
	WB – off-ramp	900	195	900	155	900	200	900	185	900	150
4. SR-55 NB/Pasadena Ave	SB – left turn	1,170	95	1,170	310	1,170	140	1,170	35	1,170	35
	SB – right turn	1,170	100	1,170	325	1,170	165	1,170	15	1,170	15
	EB – off-ramp	875	55	875	50	875	55	875	25	875	30
	WB – through	375	720	375	1155	375	850	375	20	375	25
5. SR-55 SB/Edinger Ave	NB – off-ramp	995	270	995	385	995	380	995	375	995	405
	EB – left turn	180	65	180	65	180	60	180	65	180	65
	EB – through	1,285	515	1,285	495	1,285	475	1,285	480	1,285	600
	WB – left turn	255	335	255	335	255	275	255	300	255	335
	WB – through	1,055	240	1,055	240	1,055	230	1,055	230	1,055	230
6. SR-55 NB/Newport Ave	NB - Left	330	345	330	360	330	790	330	345	330	300
	SB – through	1,180	1335	1,180	1335	1,180	1335	1,180	1335	1,180	1325



	SB – right turn	600	1335	600	1335	600	1335	600	1335	600	1325
	EB – off-ramp	1,080	75	1,080	90	1,080	115	1,080	115	1,080	105
	WB – through	1,210	200	1,210	195	1,210	480	1,210	245	1,210	230
7. SR-55 SB/ Grand Ave	NB – through	1,070	65	1,070	65	1,070	70	1,070	80	1,070	75
	WB – off-ramp	930	235	930	295	930	280	930	335	930	270
8. SR-55 SB/Dyer Ave	NB – off-ramp	1,145	140	1,145	165	1,145	145	1,145	150	1,145	150
	EB – through	430	365	430	385	430	405	430	380	430	375
	WB – left turn	250	285	250	260	250	260	250	280	250	275
	WB – through	470	200	470	215	470	200	470	195	470	235
9. Grand Ave/Dyer Rd	SB – left turn	1,090	230	1,090	230	1,090	265	1,090	335	1,090	250
	SB – right-turn	1,090	230	1,090	230	1,090	265	1,090	335	1,090	250
	EB – left turn	100	175	100	160	100	160	100	170	100	165
	EB – through	460	380	460	400	460	425	460	410	460	390
	WB – through	500	260	500	325	500	285	500	360	500	310
10. SR-55 NB/Dyer Rd	NB – off-ramp	1,710	130	1,710	130	1,710	140	1,710	140	1,710	125
	EB – through	500	105	500	100	500	115	500	110	500	105
	EB – right turn	400	270	400	0	400	0	400	0	400	0
	WB – through	560	1700	560	1690	560	1700	560	1700	560	1700
	WB – right turn	--	--	330	1685	330	1700	330	1700	330	1700
11. SR-55 SB/MacArthur Blvd	SB – off-ramp	1,425	170	1,425	190	1,425	135	1,425	185	1,425	185
	EB – through	815	815	815	1120	815	165	815	370	815	185
	EB – right turn	815	0	815	0	815	0	815	0	815	0
	WB – through	885	575	885	600	885	685	885	955	885	955
	WB – right turn	350	265	350	645	350	140	350	830	350	805



12. SR-55 NB/MacArthur Blvd	NB – off-ramp	1,195	225	1,195	210	1,195	315	1,195	300	1,195	235
	EB – through	885	105	885	75	885	95	885	90	885	95
	EB – right turn	530	<u>950</u>	530	350	530	<u>945</u>	530	<u>710</u>	530	150
	WB – through	705	<u>1695</u>	705	<u>1000</u>	705	<u>1695</u>	705	<u>1680</u>	705	630
	WB – right turn	705	<u>1695</u>	705	<u>1045</u>	705	<u>1695</u>	705	<u>1680</u>	705	10
13. SR-55 SB/Paularino Ave	SB – off-ramp	2,135	365	2,135	455	2,135	360	2,135	360	2,135	405
	WB – left turn	190	150	190	170	190	150	190	140	190	145
	WB – through	345	170	345	150	345	165	345	175	345	165
14. SR-55 NB/Paularino Ave	NB – through	845	<u>865</u>	845	<u>865</u>	845	<u>870</u>	845	<u>860</u>	845	<u>865</u>
	EB – left turn	130	<u>450</u>	130	<u>455</u>	130	<u>370</u>	130	<u>375</u>	130	<u>400</u>
	EB – through	345	<u>420</u>	345	<u>455</u>	345	285	345	265	345	310
Note: Bold and underline indicates vehicle queue exceeds the available storage.											
Source: Fehr & Peers, 2015											



Systemwide Performance

The systemwide performance measures applied to this project include travel time, travel speeds, vehicle-miles-traveled, and vehicle-hours-delay.

Travel Time and Speeds

Tables 19-A and 19-B compare the AM and PM peak hour segment by segment travel time and speeds along the SR-55 corridor for all the project alternatives under 2040 conditions. The Year 2040 AM and PM peak hour travel speeds along the study corridor under each project alternative are illustrated in Figures 3-C-Alt-AM and 3-C-Alt-PM, respectively.

AM Peak Hour

Similar travel times and speeds would occur on northbound SR-55 during the AM peak hour under all the project alternatives. Northbound SR-55 traffic starts at a speed of lower than 30 mph between Paularino Avenue and I-405 due to the bottleneck at the I-405/MacArthur area. This bottleneck would meter through traffic getting downstream, and therefore northbound traffic would flow well at/near free-flow speed north of MacArthur Boulevard. The total travel time for northbound SR-55 under all the alternative would be approximately 6 minutes with an average speed of 51-56 mph under 2020 conditions.

In the southbound direction, heavy congestion between 4th Street and McFadden Avenue would result in an average speed of less than 15 mph under the No Build Alternative. After McFadden Avenue on-ramp, the travel speed would gradually pick up and increase to 50-65 mph through Dyer Road and I-405. The total travel time for southbound SR-55 is approximately 8 minutes with the average speed of 41 mph under the No Build Alternative.

Similar travel patterns are expected under Alternatives 1 through 4, with traffic being metered at the I-5 interchange area and picking up on speeds south of McFadden Avenue. The proposed general purpose lane under Alternatives 1 through 3 would improve traffic flow between McFadden Avenue and Edinger Avenue. In addition, the additional HOV capacity provided under Alternative 4 would relieve the congestion on the HOV lane, and consequently improve traffic flow at adjacent general purpose lanes.

PM Peak Hour

During the PM peak hour, significant traffic congestion is anticipated along northbound SR-55 under all the project alternatives, which would result in an average speed of less than 15 mph through the study corridor. The total travel time for northbound SR-55 under all the alternatives would be 22-23 minutes under 2040 conditions.

Under Alternative 2, the added capacity from the general purpose lane would help northbound traffic flow faster to downstream locations, which result in a noticeable improvement of travel speeds between Paularino Avenue and I-405 from less than 12 mph to 24 mph. Due to the existing bottleneck at the McFadden on-ramp, traffic would flow at a speed of lower than 15 mph through Dyer Road and Edinger Avenue.



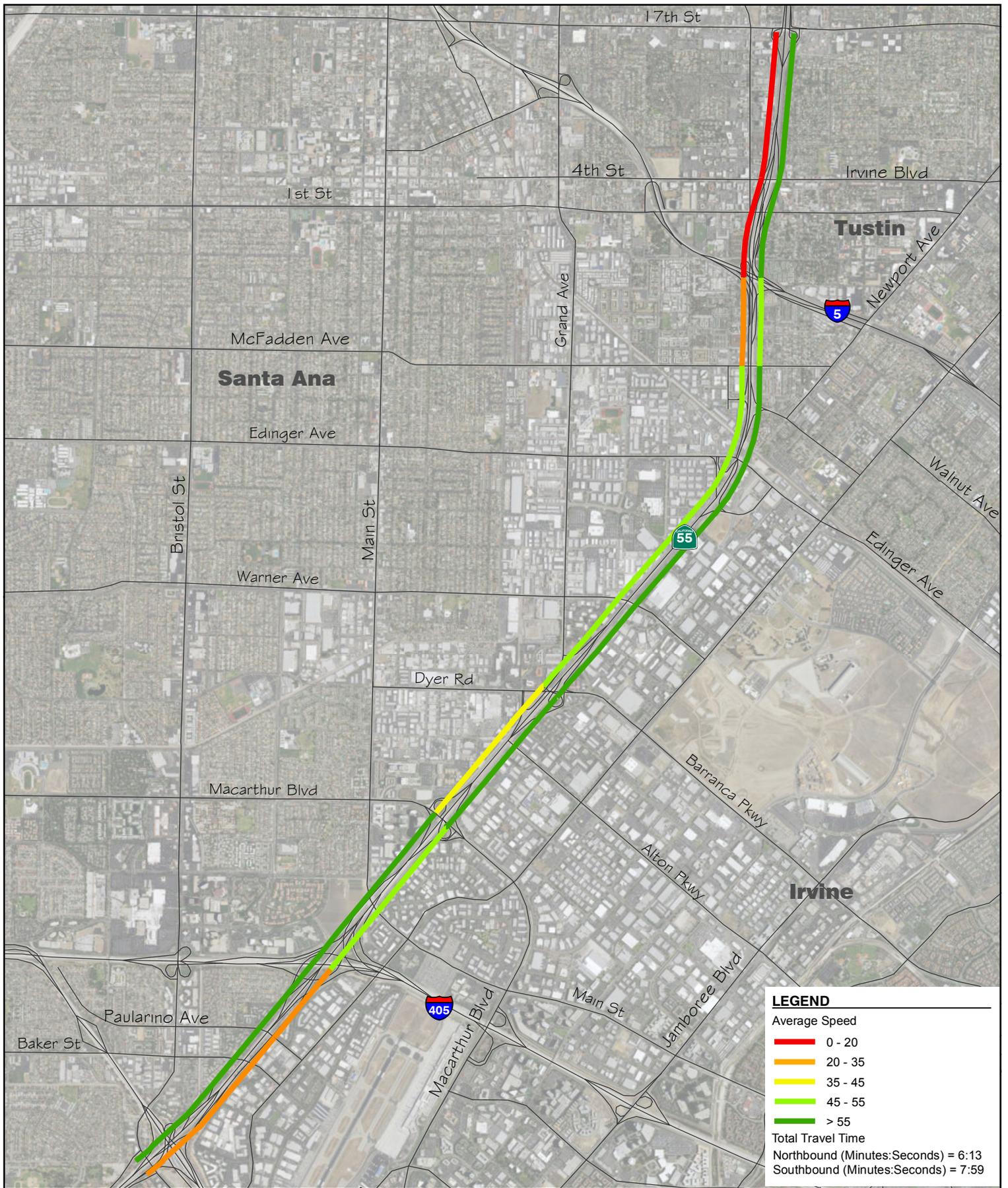
**TABLE 19-A – SR-55 AM PEAK HOUR TRAVEL TIME AND SPEEDS
– YEAR 2040 CONDITIONS**

Location	Mile	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Travel Time (min:sec)	Travel Speed (mph)								
Northbound											
NB 55: Paularino Ave to I-405	0.5	01:12	23.5	01:12	23.5	01:17	22.0	01:00	28.2	01:06	25.6
NB 55: I-405 to MacArthur Blvd	1.0	01:06	53.7	01:11	50.0	01:04	55.4	01:04	55.4	01:19	44.9
NB 55: MacArthur Blvd to Dyer Rd	0.9	00:51	62.6	00:50	63.8	00:49	65.1	00:49	65.1	00:51	62.6
NB 55: Dyer Rd to Edinger Ave	1.6	01:31	62.5	01:30	63.2	01:27	65.3	01:36	59.2	01:28	64.6
NB 55: Edinger Ave to McFadden Ave	0.5	00:32	56.9	00:32	56.9	00:35	52.0	00:27	67.5	00:28	65.0
NB 55: McFadden Ave to I-5	0.5	00:32	52.6	00:36	46.7	00:35	48.1	00:25	67.3	00:25	67.3
NB 55: I-5 to Irvine Blvd	0.5	00:29	66.1	00:29	66.1	00:29	66.1	00:29	66.1	00:29	66.1
<u>NB 55 - Total</u>	<u>5.4</u>	<u>06:13</u>	<u>52.4</u>	<u>06:20</u>	<u>51.4</u>	<u>06:16</u>	<u>52.0</u>	<u>05:50</u>	<u>55.8</u>	<u>06:06</u>	<u>53.4</u>
Southbound											
SB 55: 4 th St to I-5	0.5	02:08	15.0	01:53	17.0	01:53	17.0	01:47	17.9	01:15	25.6
SB 55: I-5 to McFadden Ave	0.5	00:55	30.6	00:51	33.0	00:51	33.0	00:53	31.7	00:50	33.7
SB 55: McFadden Ave to Edinger Ave	0.5	00:35	52.0	00:28	65.0	00:29	62.8	00:29	62.8	00:29	62.8
SB 55: Edinger Ave to Dyer Rd	1.6	01:45	54.1	01:59	47.8	01:47	53.1	01:29	63.9	02:00	47.4
SB 55: Dyer Rd to MacArthur Blvd	0.9	01:15	42.6	01:28	36.3	01:11	45.0	01:24	38.0	01:30	35.5
SB 55: MacArthur Blvd to I-405	1.0	00:56	63.3	00:56	63.3	00:57	62.2	01:06	53.7	00:57	62.2
SB 55: I-405 to Paularino	0.5	00:25	67.7	00:25	67.7	00:25	67.7	00:25	67.7	00:25	67.7
<u>SB 55 - Total</u>	<u>5.4</u>	<u>07:59</u>	<u>40.8</u>	<u>08:00</u>	<u>40.7</u>	<u>07:33</u>	<u>43.1</u>	<u>07:33</u>	<u>43.1</u>	<u>07:26</u>	<u>43.8</u>
Source: Fehr & Peers, 2015											



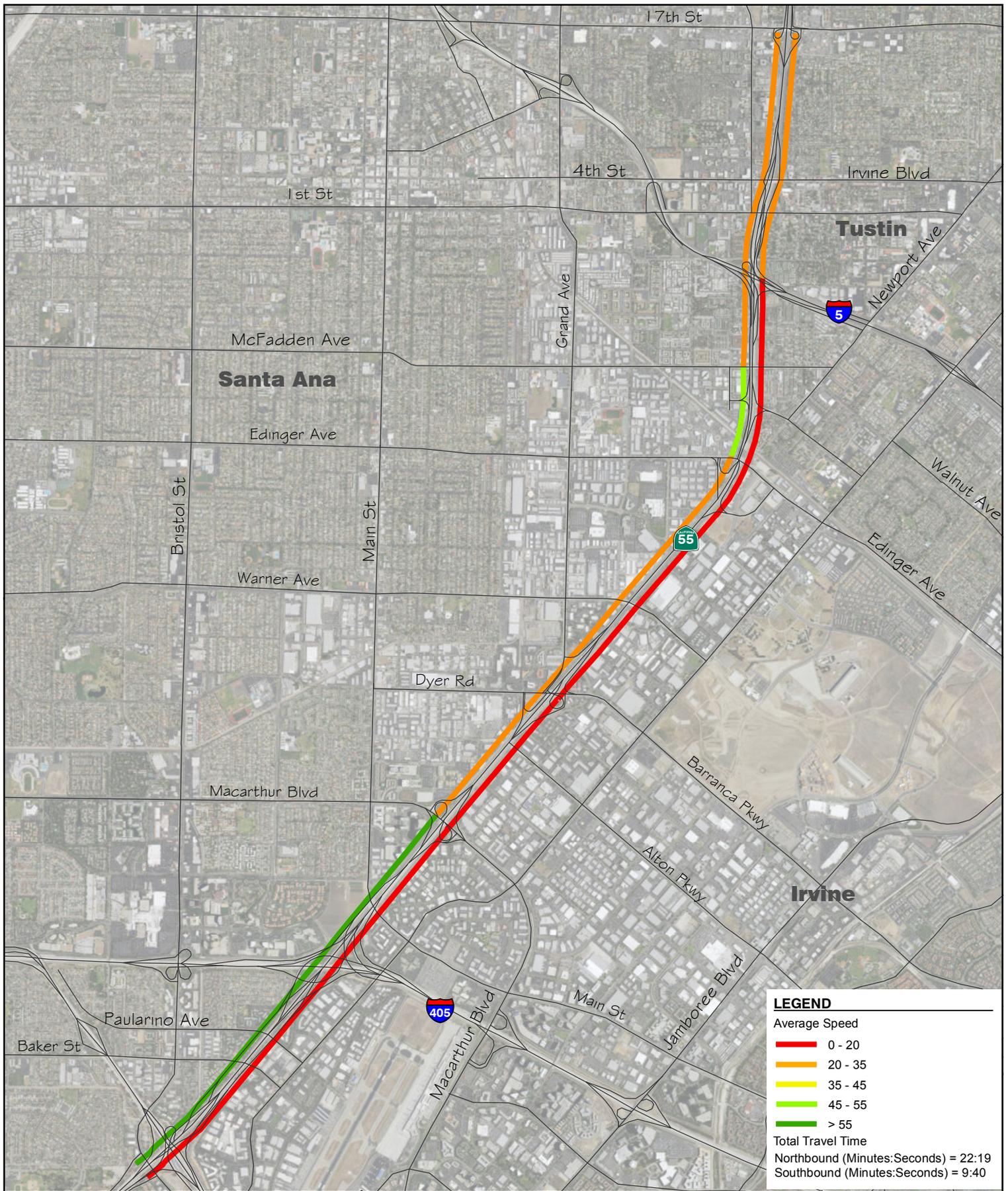
**TABLE 19-B – SR-55 PM PEAK HOUR TRAVEL TIME AND SPEEDS
– YEAR 2040 CONDITIONS**

Location	Mile	No Build		Build Alt 1		Build Alt 2		Build Alt 3		Build Alt 4	
		Travel Time (min:sec)	Travel Speed (mph)								
Northbound											
NB 55: Paularino Ave to I-405	0.5	02:22	11.9	02:25	11.7	01:10	24.2	01:18	21.7	02:25	11.7
NB 55: I-405 to MacArthur Blvd	1.0	05:02	11.7	05:20	11.1	03:54	15.2	04:05	14.5	05:15	11.3
NB 55: MacArthur Blvd to Dyer Rd	0.9	04:40	11.4	04:45	11.2	05:04	10.5	05:27	9.8	04:29	11.9
NB 55: Dyer Rd to Edinger Ave	1.6	05:35	17.0	05:54	16.1	06:57	13.6	07:28	12.7	05:56	16.0
NB 55: Edinger Ave to McFadden Ave	0.5	01:57	15.6	01:46	17.2	02:20	13.0	01:52	16.3	01:39	18.4
NB 55: McFadden Ave to I-5	0.5	01:25	19.8	01:21	20.8	01:23	20.3	01:16	22.1	01:11	23.7
NB 55: I-5 to Irvine Blvd	0.5	01:18	24.6	01:17	24.9	01:19	24.3	01:07	28.6	01:06	29.0
<u>NB 55 - Total</u>	<u>5.4</u>	<u>22:19</u>	<u>14.6</u>	<u>22:48</u>	<u>14.3</u>	<u>22:07</u>	<u>14.7</u>	<u>22:33</u>	<u>14.4</u>	<u>22:01</u>	<u>14.8</u>
Southbound											
SB 55: 4 th St to I-5	0.5	00:55	34.9	01:10	27.4	00:38	50.5	00:38	50.5	01:10	27.4
SB 55: I-5 to McFadden Ave	0.5	01:02	27.1	01:15	22.4	00:46	36.6	00:40	42.1	01:14	22.7
SB 55: McFadden Ave to Edinger Ave	0.5	00:36	50.6	00:50	36.4	00:30	60.7	00:29	62.8	00:50	36.4
SB 55: Edinger Ave to Dyer Rd	1.6	03:26	27.6	04:20	21.9	01:29	63.9	01:32	61.8	04:10	22.7
SB 55: Dyer Rd to MacArthur Blvd	0.9	02:15	23.6	02:20	22.8	01:16	42.0	01:20	39.9	02:23	22.3
SB 55: MacArthur Blvd to I-405	1.0	01:00	59.1	01:00	59.1	01:07	52.9	01:12	49.3	01:00	59.1
SB 55: I-405 to Paularino	0.5	00:26	65.1	00:26	65.1	00:32	52.9	00:32	52.9	00:26	65.1
<u>SB 55 - Total</u>	<u>5.4</u>	<u>09:40</u>	<u>33.7</u>	<u>11:21</u>	<u>28.7</u>	<u>06:18</u>	<u>51.7</u>	<u>06:23</u>	<u>51.0</u>	<u>11:13</u>	<u>29.0</u>
Source: Fehr & Peers, 2015											



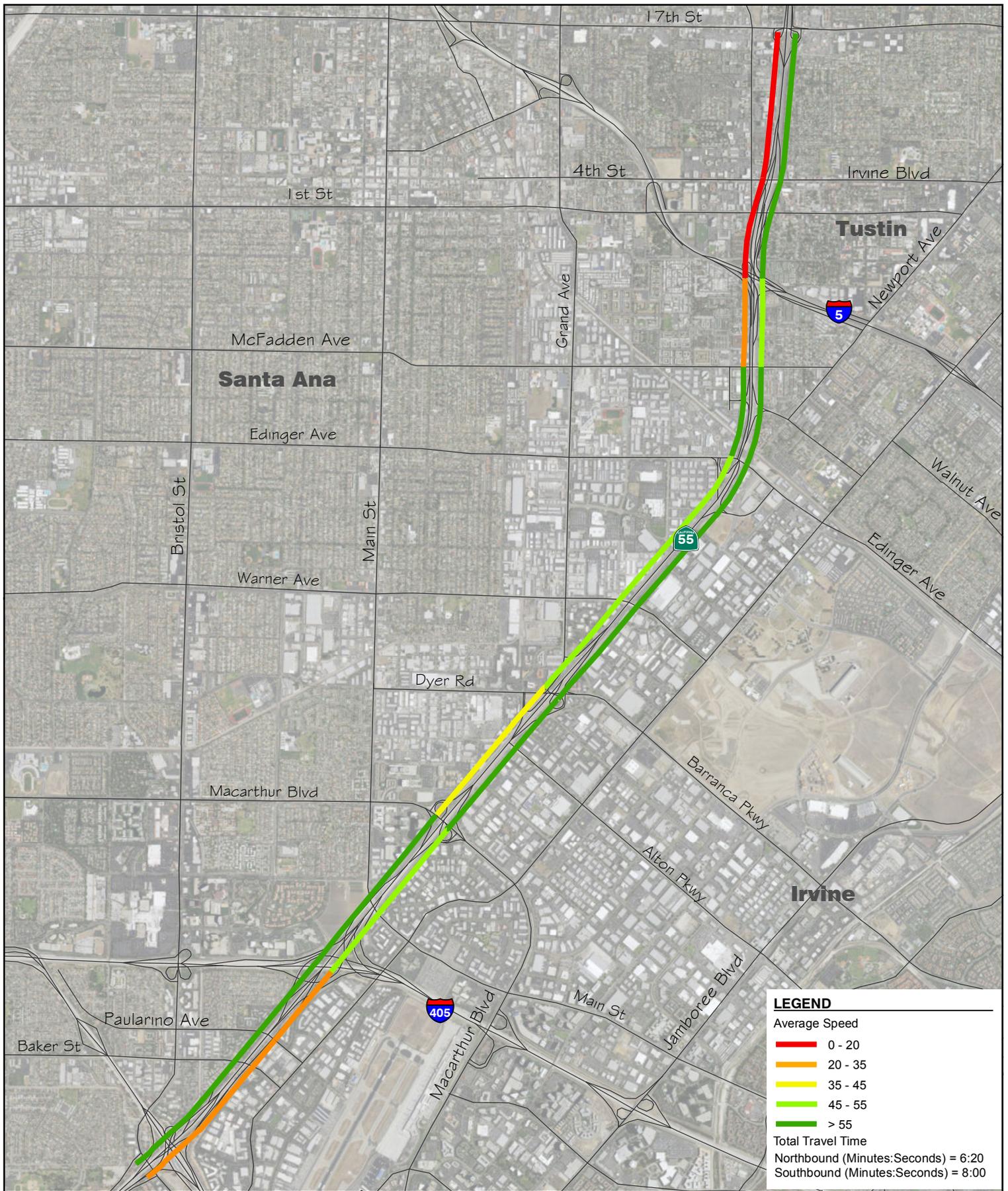
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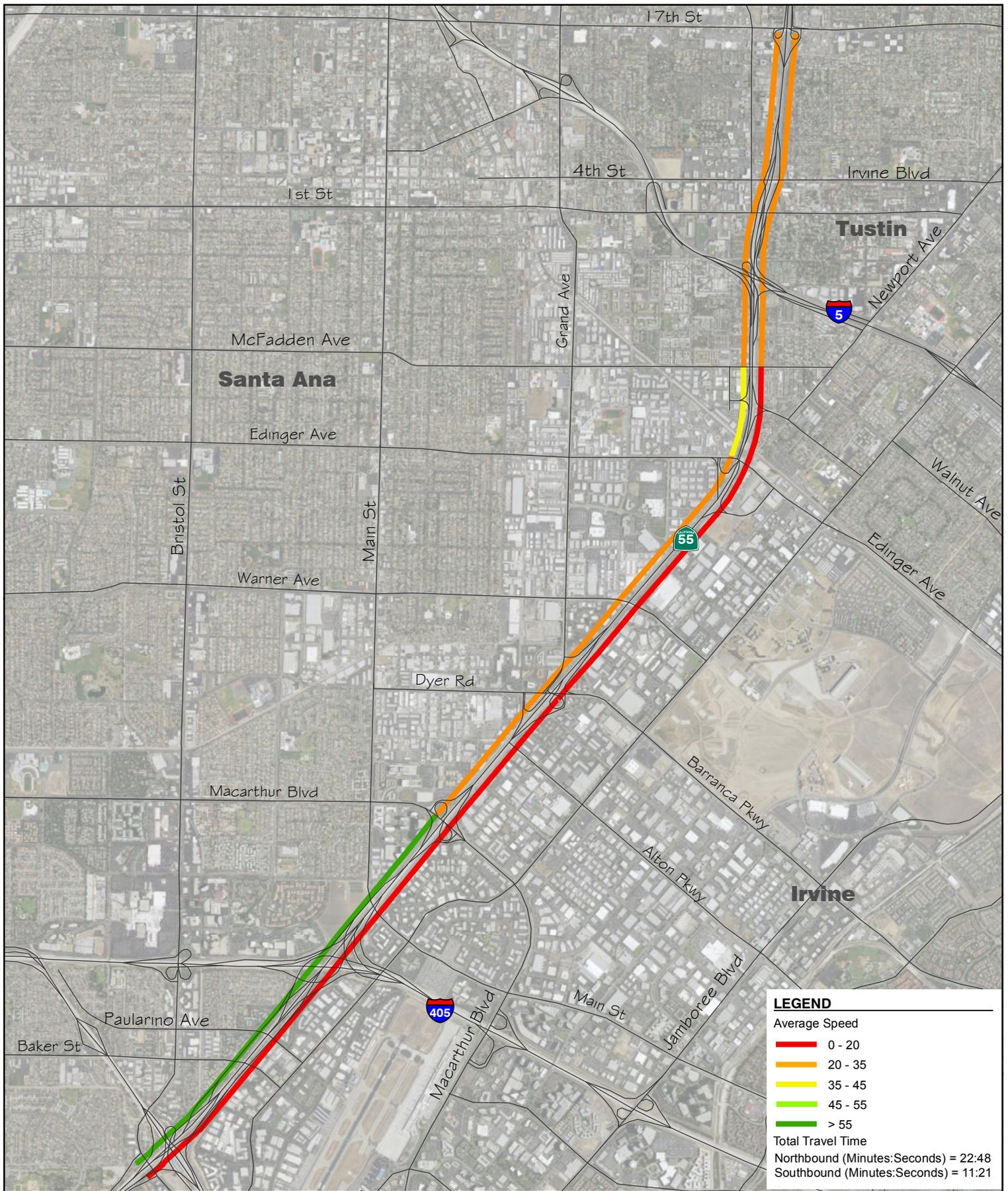
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LEGEND

Average Speed

- █ 0 - 20
- █ 20 - 35
- █ 35 - 45
- █ 45 - 55
- █ > 55

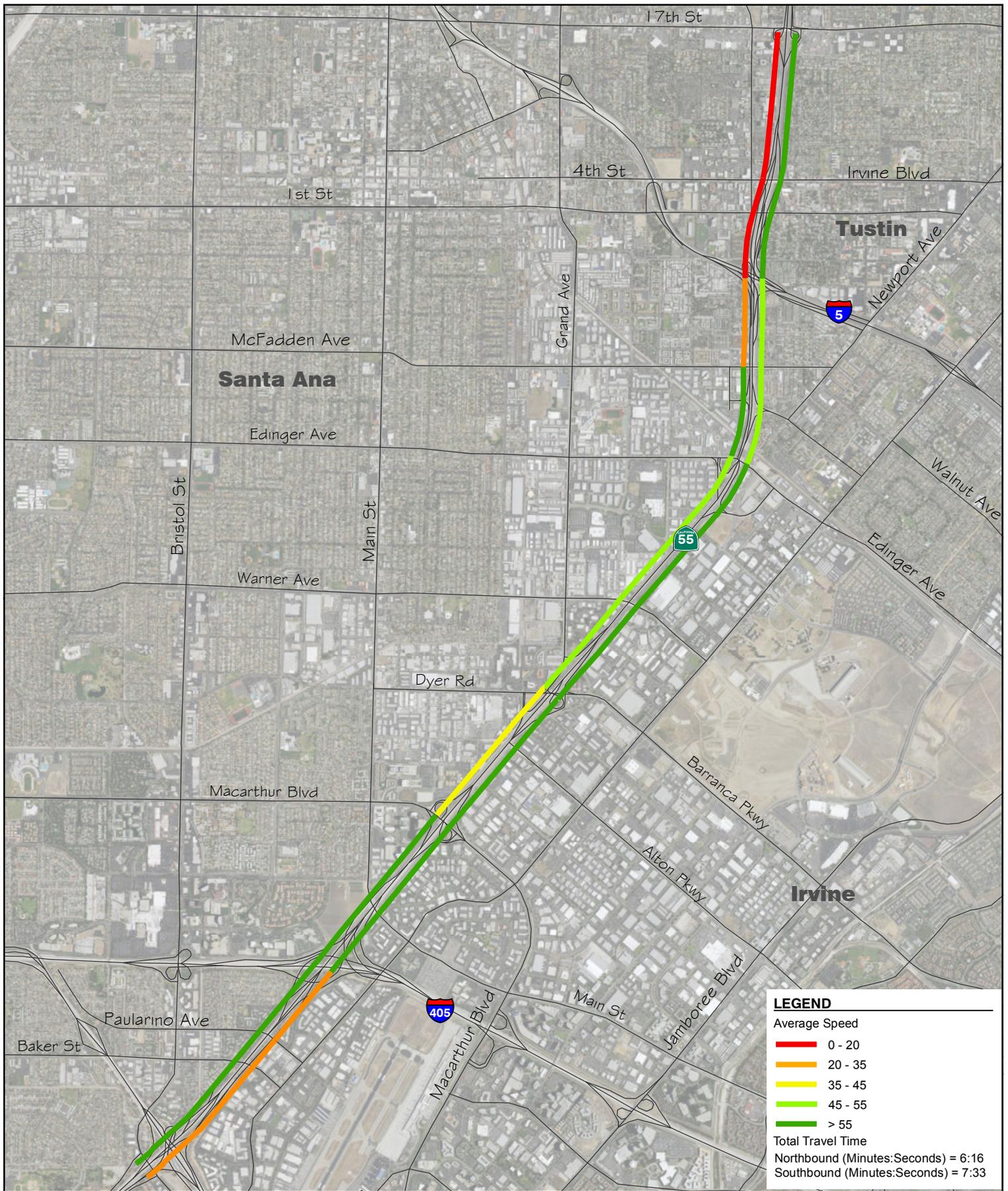
Total Travel Time

Northbound (Minutes:Seconds) = 22:48

Southbound (Minutes:Seconds) = 11:21

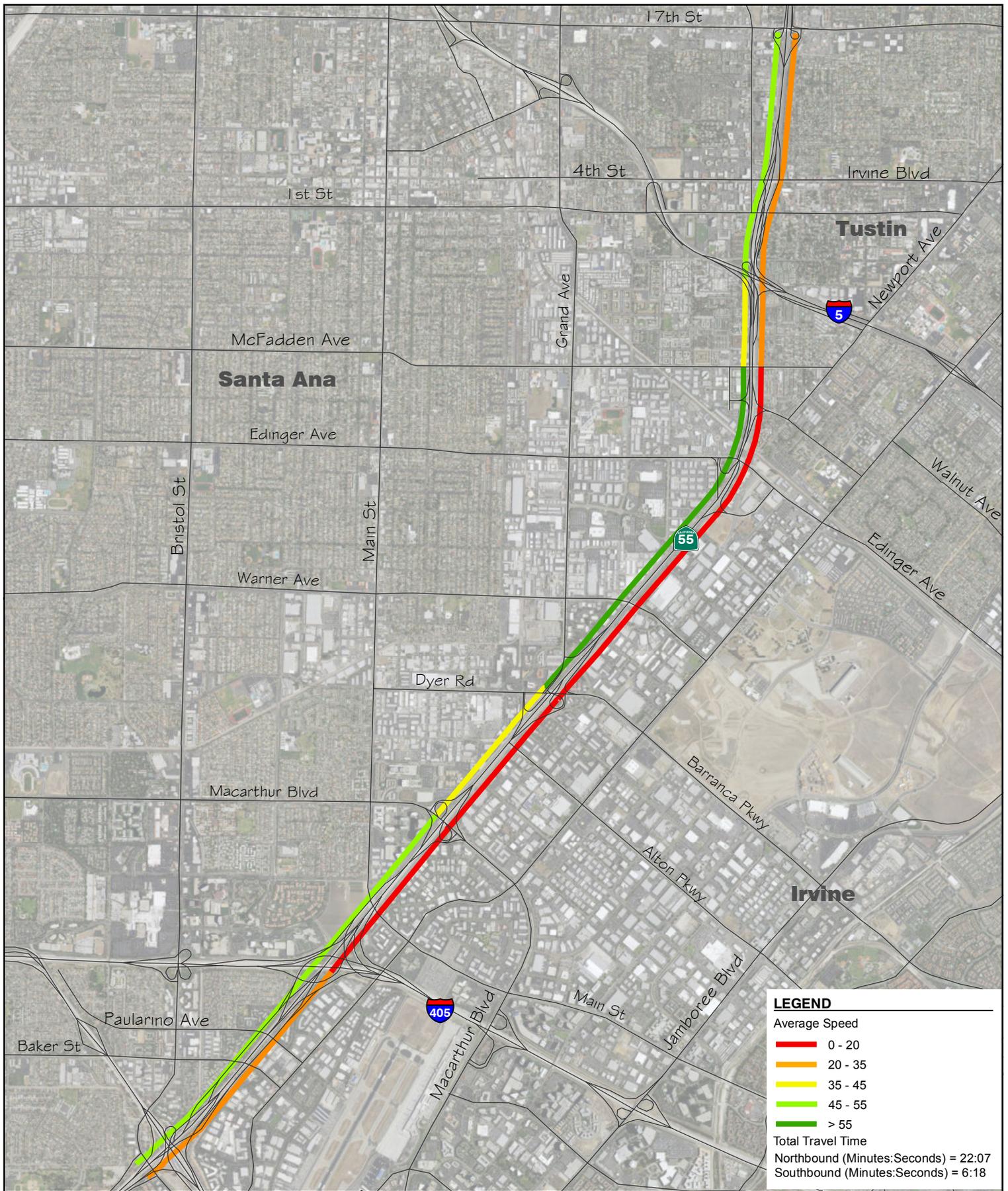


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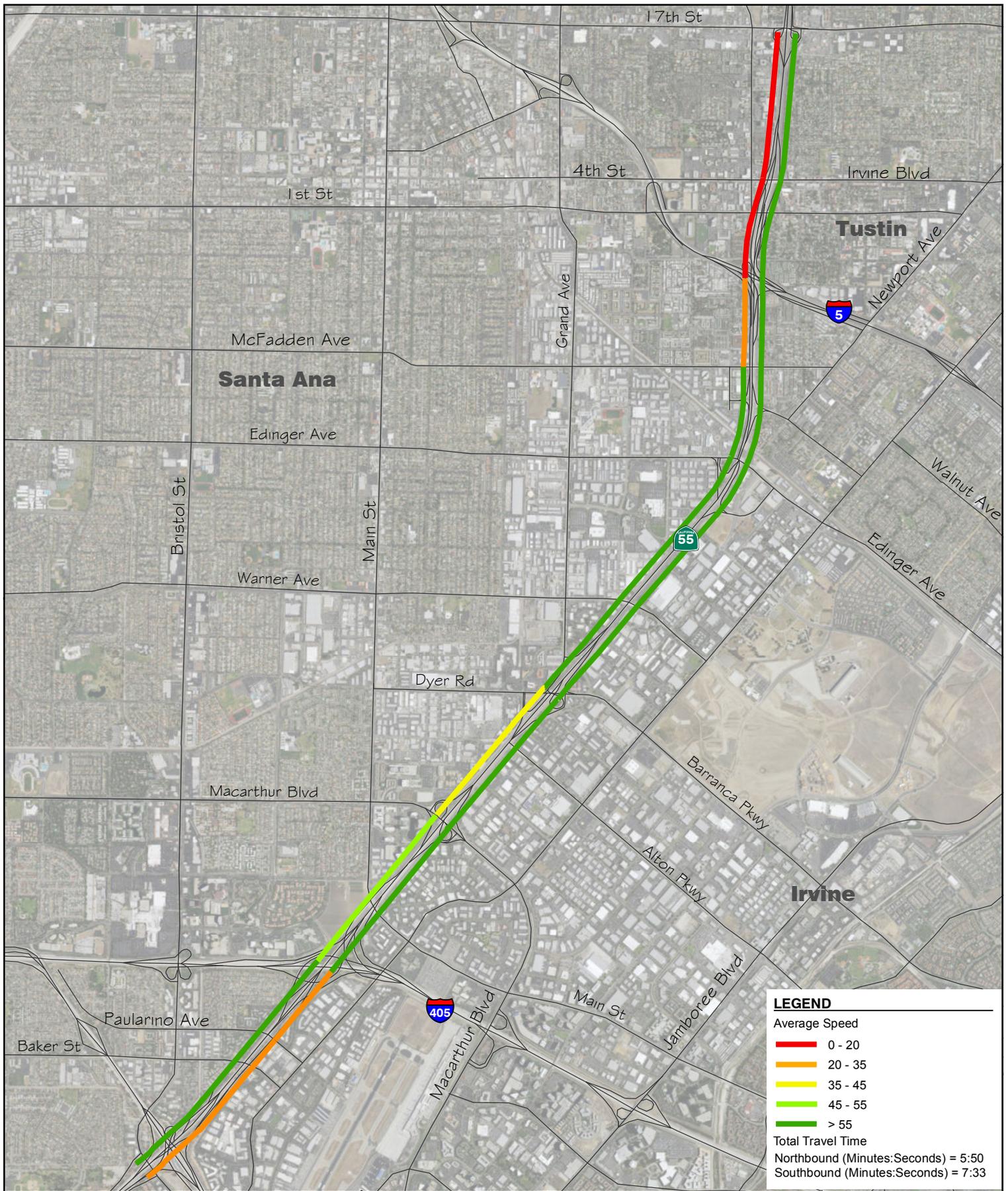
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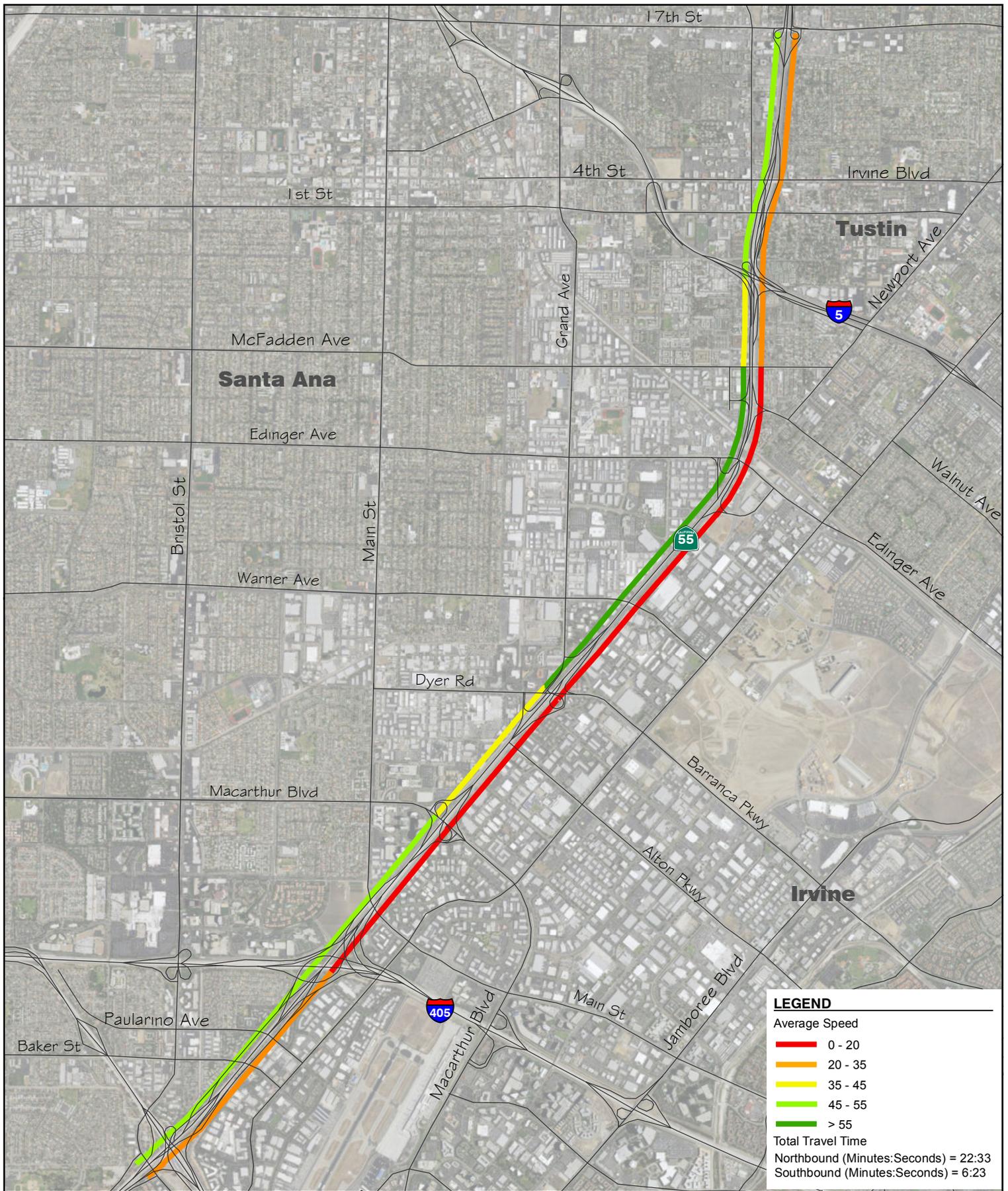


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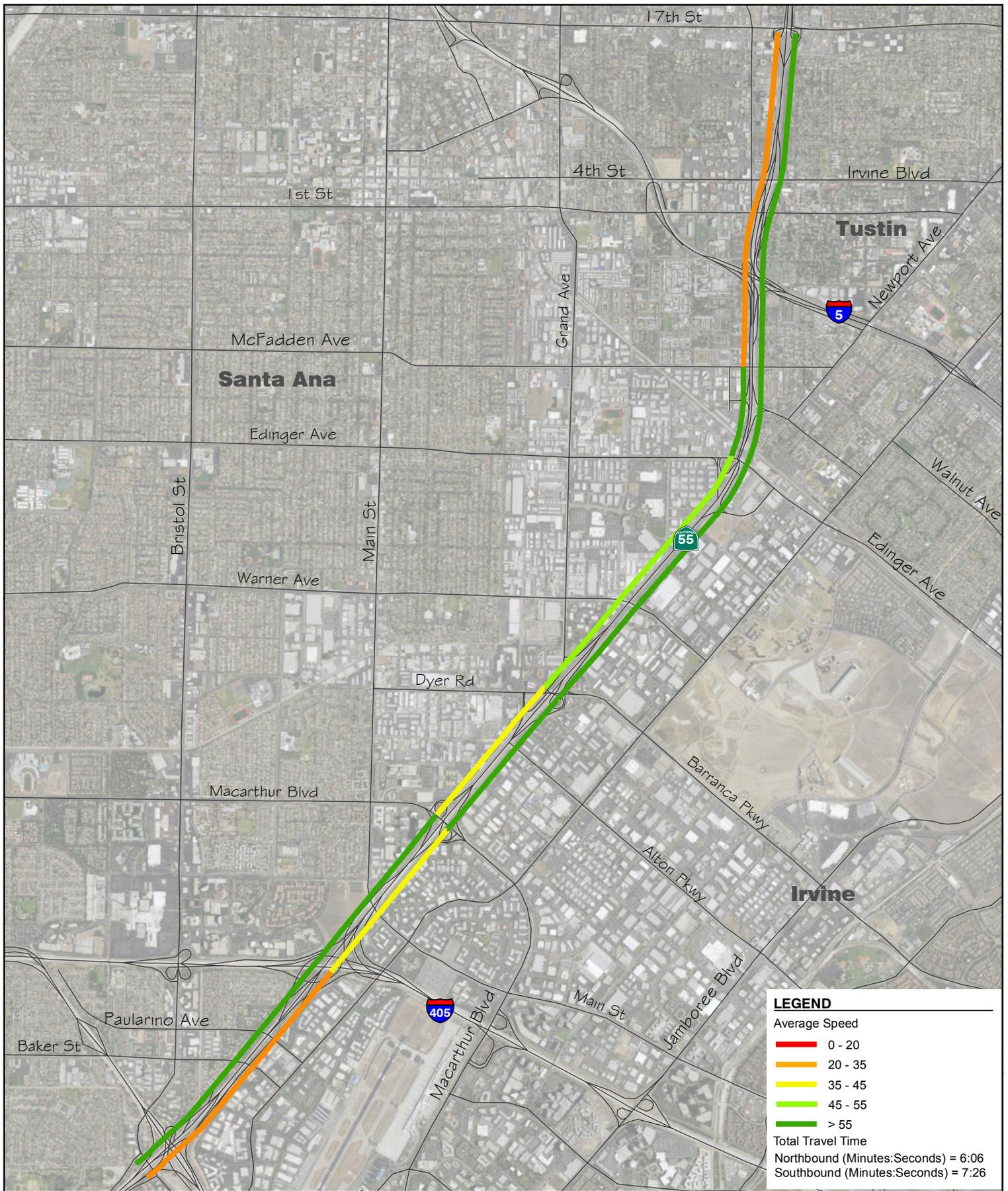
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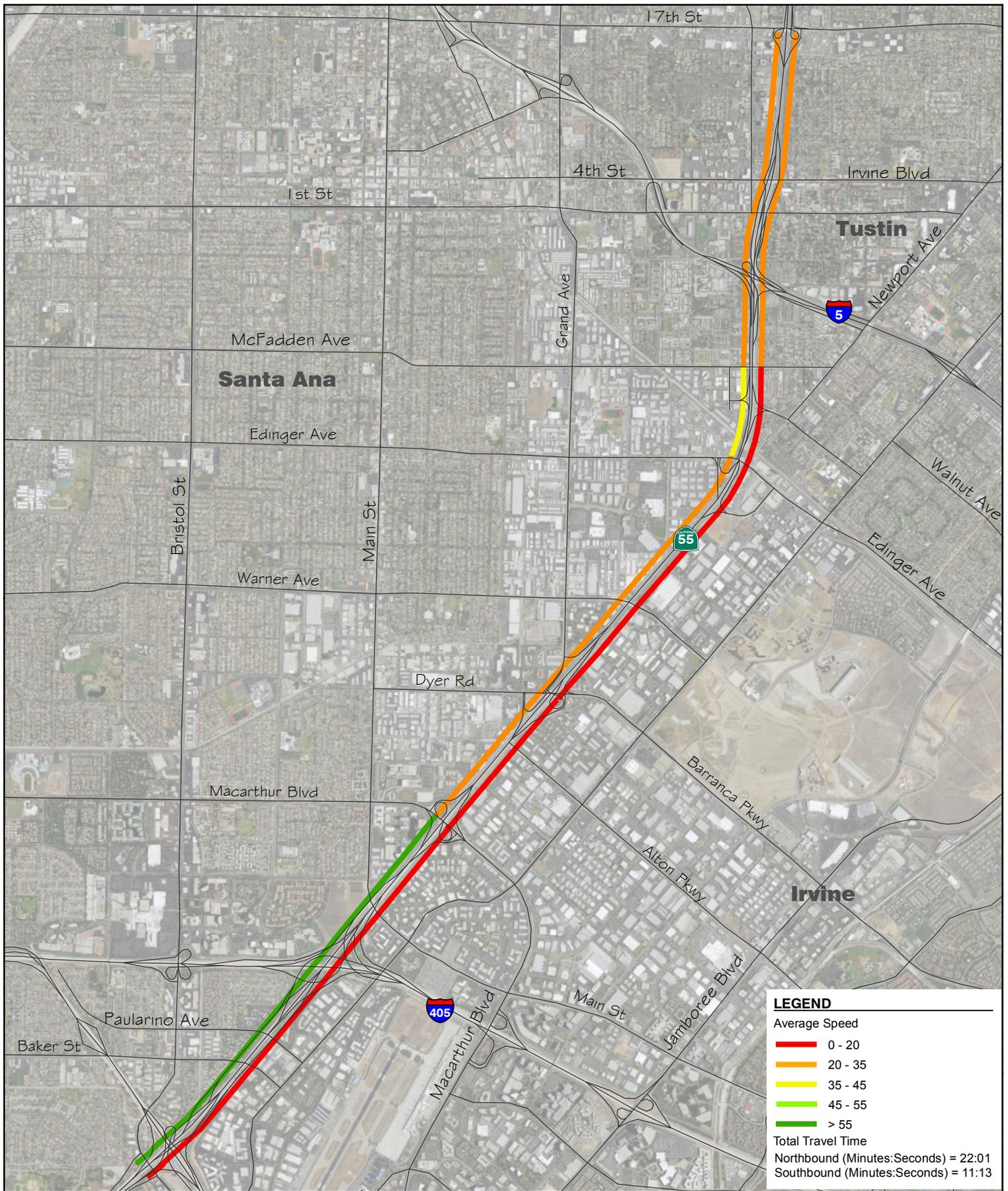


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Under Alternative 3, the added capacity from the general purpose lane and elimination of the weaving between McFadden Avenue on-ramp and NB I-5 off-ramp would help northbound traffic flow faster to downstream locations, which result in a noticeable improvement of travel speeds between Paularino Avenue and I-405 from less than 12 mph to 22 mph.

Under Alternative 4, travel time patterns on northbound SR-55 south of Edinger Avenue are similar to Alternative 1. North of Edinger Avenue, elimination of the weaving between McFadden Avenue on-ramp and NB I-5 off-ramp would increase travel speeds to 24-29 mph.

Compared to northbound SR-55, the southbound traffic would flow much better during the PM peak hour under 2040 conditions. The total travel time for southbound SR-55 is 9-10 minutes with the average speed of 34 mph under the No Build Alternative.

Under Build Alternatives 1 and 4, the proposed southbound general purpose lane would allow more traffic travel to downstream, locations. However, due to lack of additional capacity at downstream locations, traffic congestion would occur on southbound SR-55 between Dyer Road and MacArthur Boulevard and vehicle queues would extend back to McFadden Avenue and beyond. Therefore, the total travel time for southbound SR-55 under Alternatives 1 and 4 would be approximately 11 minutes with an average speed of 29 mph under 2040 conditions.

Similar to Alternative 1, the proposed general purpose lane on southbound SR-55 under Alternative 2 would improve traffic flow to allow traffic travel at a higher speed of 50-65 mph through most locations, except for some slow down between Dyer Road and MacArthur Boulevard. The total travel time for southbound SR-55 is approximately 6 minutes with the average speed of 52 mph under Alternative 2. Similar travel time patterns would occur to Alternative 3, which has a total travel time of approximately 6 minutes with an average speed of 51 mph.

Among the four build alternatives, Alternatives 2 and 3 would expect greater PM peak hour travel time savings on southbound SR-55 by more than three minutes compared to the No Build Alternative under 2040 conditions.



Network Performance

Tables 20-A and 20-B show the AM and PM peak period network-wide summary of the total vehicle-miles-traveled and vehicle-hours-delay for each of the project alternatives under 2040 conditions.

TABLE 20-A – SR-55 SYSTEMWIDE PERFORMANCE – YEAR 2040 CONDITIONS (AM PEAK PERIOD)					
Performance Measure	No Build	Build Alt 1	Build Alt 2	Build Alt 3	Build Alt 4
Number of People Served	211,840	213,940	214,640	217,560	219,200
VMT (veh-mi)	894,460	908,490	917,180	924,130	928,380
VHD (veh-hr)	17,390	13,880	13,050	12,000	11,580
Delay per Mile (sec/mi)	70	55	51	47	45
Source: Fehr & Peers, 2015					

TABLE 20-B – SR-55 SYSTEMWIDE PERFORMANCE – YEAR 2040 CONDITIONS (PM PEAK PERIOD)					
Performance Measure	No Build	Build Alt 1	Build Alt 2	Build Alt 3	Build Alt 4
Number of People Served	226,630	228,160	232,870	235,290	232,020
VMT (veh-mi)	691,120	694,050	715,480	722,100	714,200
VHD (veh-hr)	27,030	22,370	21,670	16,150	18,500
Delay per Mile (sec/mi)	141	116	109	81	93
Source: Fehr & Peers, 2015					

AM Peak Period

During the AM peak period, compared to the No Build Alternative, Build Alternatives 1, 2, 3, and 4 would reduce the total delay by 3,510, 4,340, 5,390, and 5,810 vehicle-hours under 2040 conditions, respectively. In addition, the build alternatives would serve 2,100-7,360 more people through the corridor during the AM peak period. Overall, Alternative 4 would generate the most operational benefits with serving the most people with the least delay among the four project alternatives during the AM peak period under 2040 conditions.

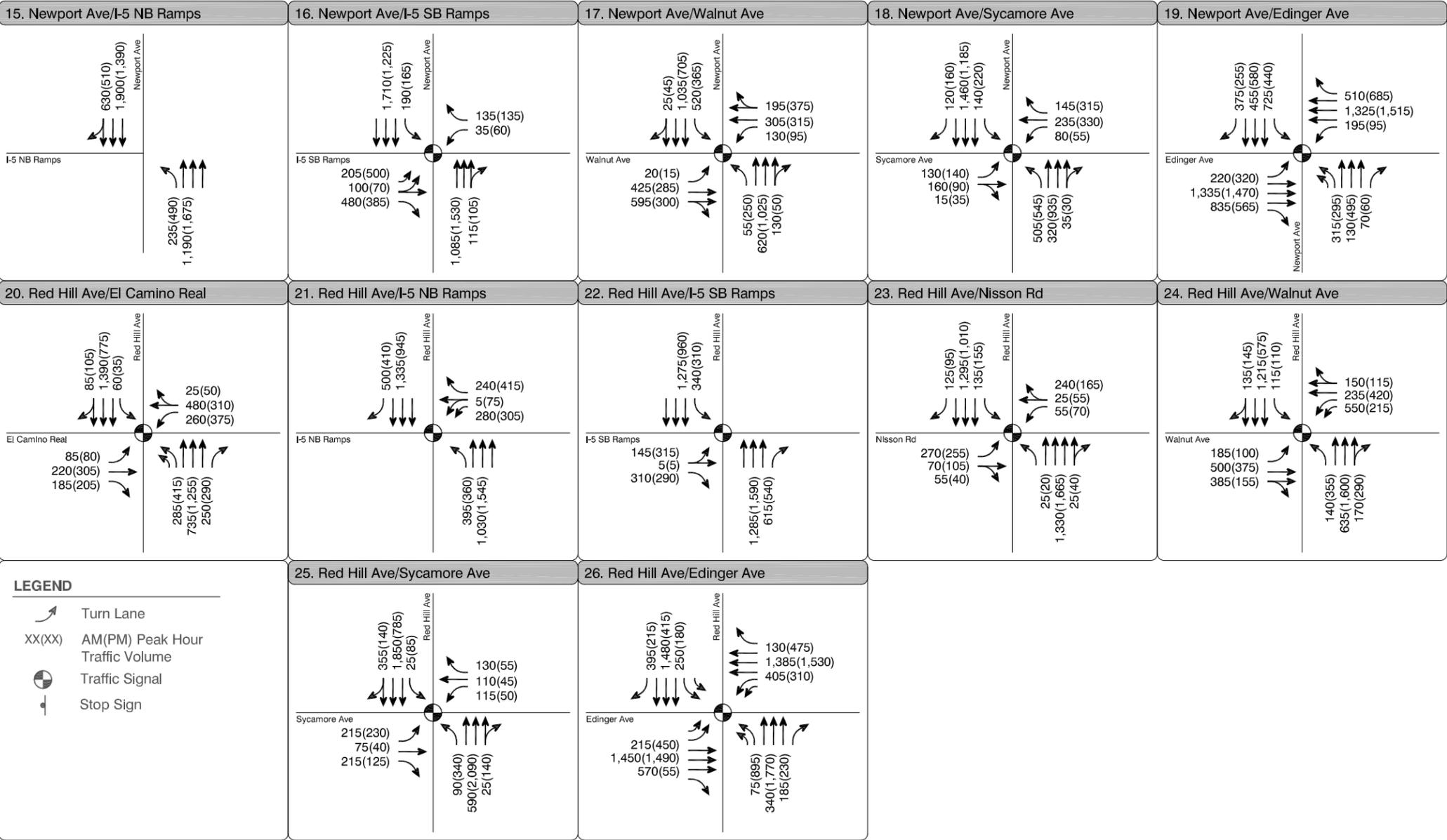
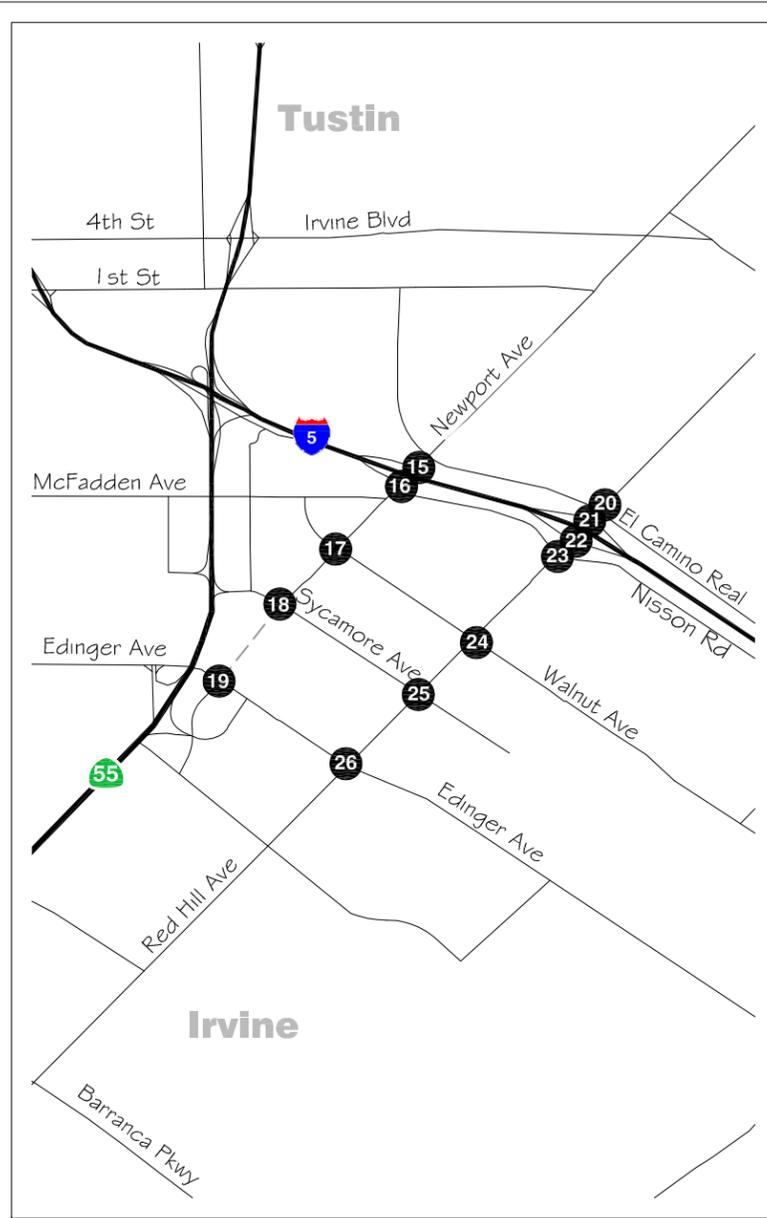


PM Peak Period

During the PM peak period, compared to the No Build Alternative, Build Alternatives 1, 2, 3, and 4 would reduce the total delay by 4,660, 5,360, 10,880, and 8,530 vehicle-hours under 2040 conditions, respectively. In addition, the build alternatives would serve 1,530-8,660 more people through the corridor during the PM peak period. Overall, Alternative 3 would generate the most operational benefits with serving the most people with the least delay among the four project alternatives during the PM peak period under 2040 conditions.

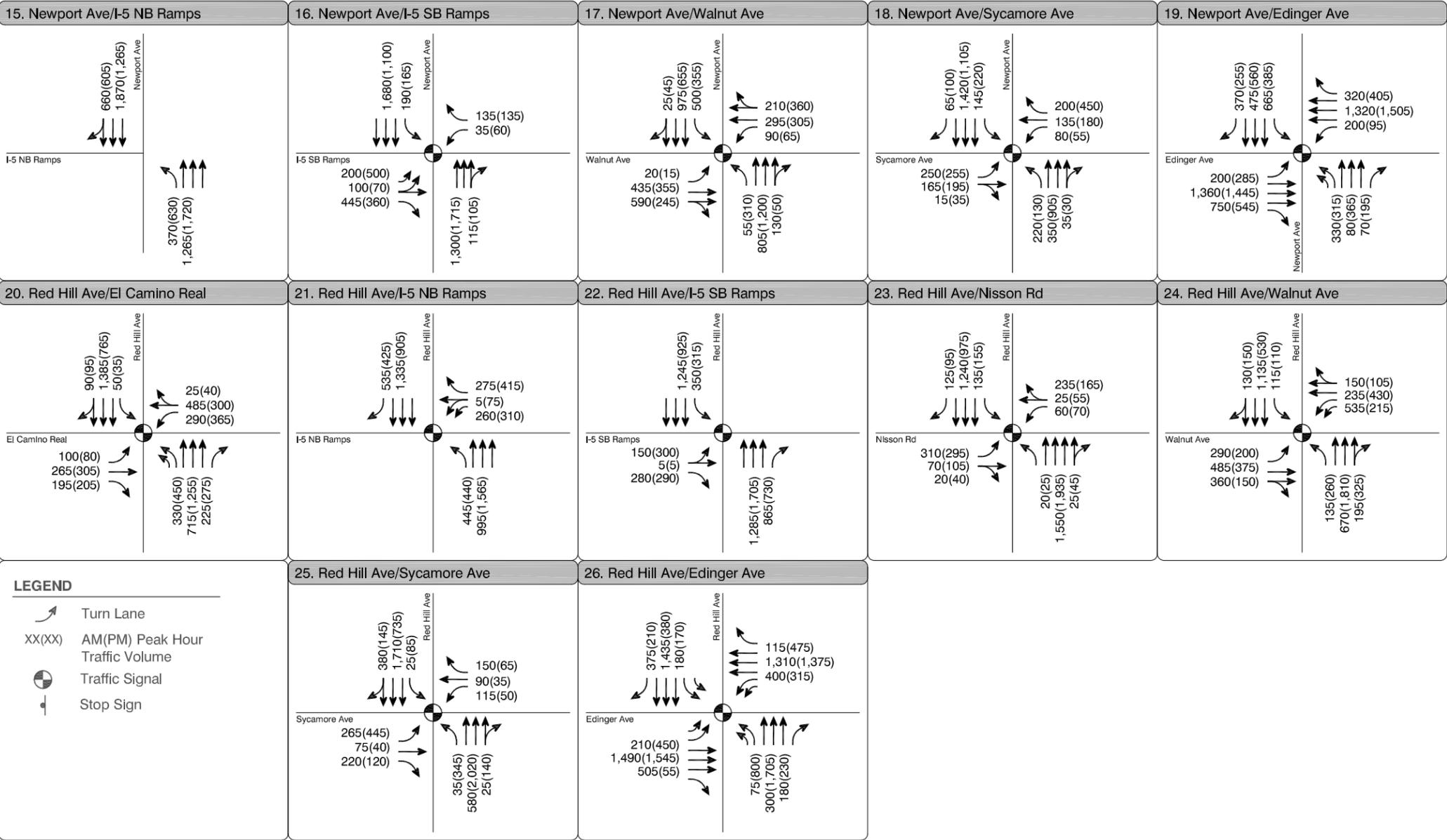
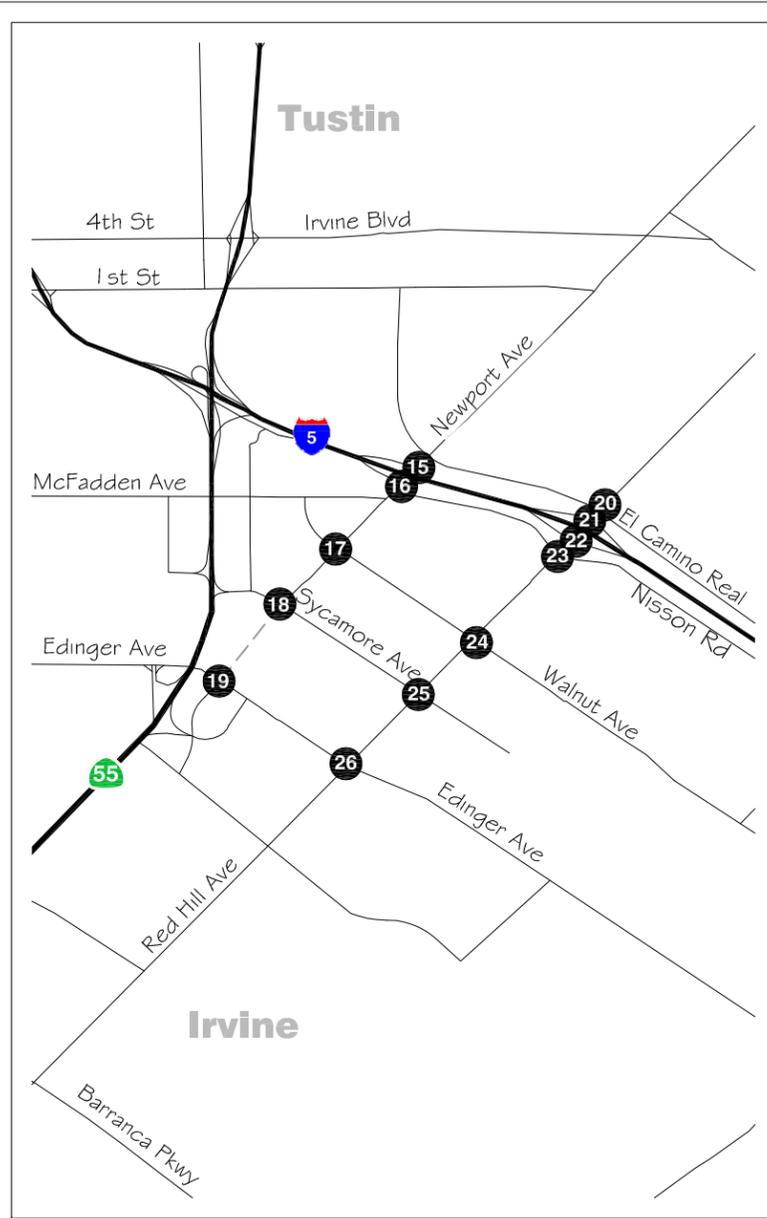
Local Intersection Operations

Similar to the Year 2020 conditions, traffic impact analysis at the study local intersections were performed under Alternatives 3 and 4 with the proposed limited access at McFadden Avenue on-ramp, in comparison to the No Build Alternative under which the McFadden Avenue on-ramp would remain to provide full access. The future traffic demand forecast volumes at the 12 intersections were documented in the Final Traffic Volume Report (August 2015) approved by Caltrans. The Year 2040 local intersection forecast volumes are shown in Figures 3-D-Alt for No Build Alternative, Alternative 3, and Alternative 4, respectively.



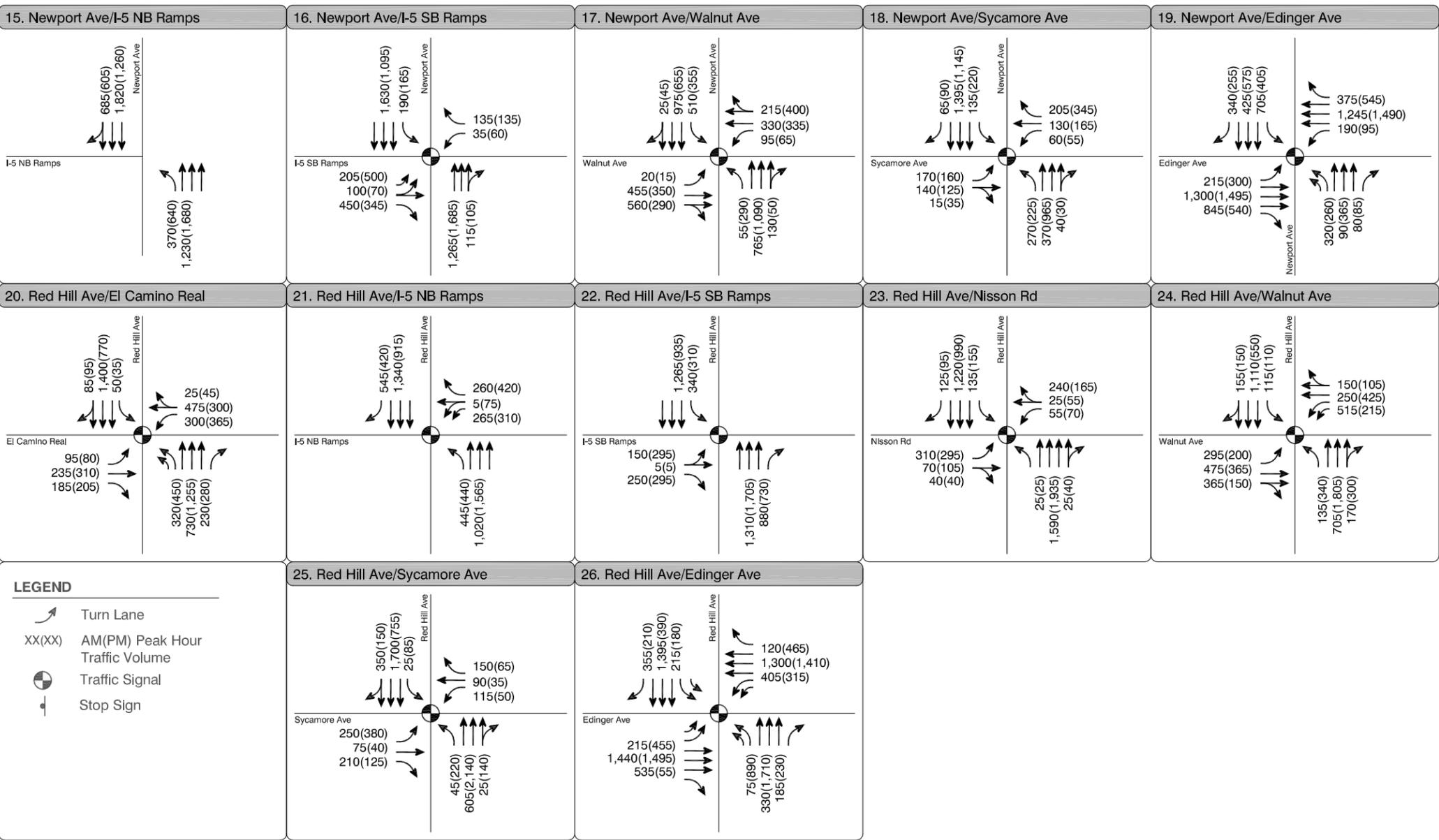
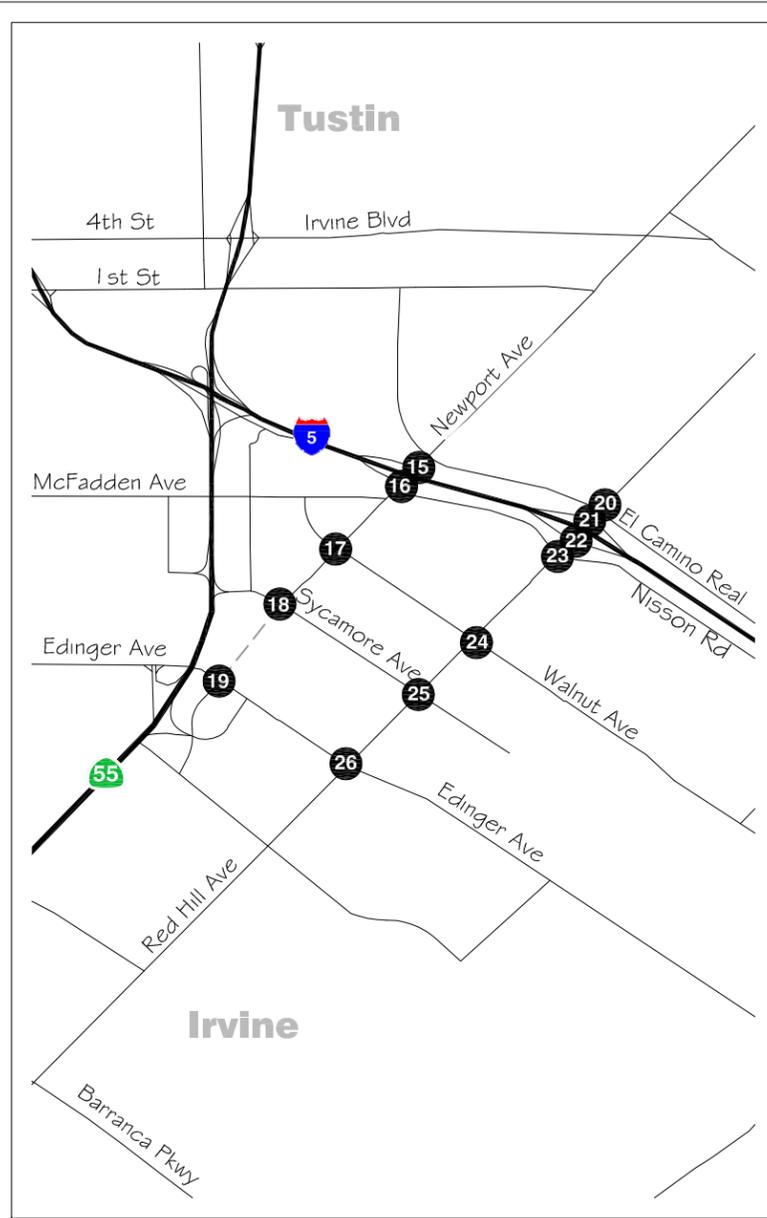
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Local Intersection Traffic Impact Analysis

The local intersection delay and LOS under No Build Alternative, Alternative 3, and Alternative 4 are summarized in Tables 21-A and 21-B during the AM and PM peak hour, respectively. As shown in the tables, a majority of local intersections would operate at similar delay and LOS with and without the limited access at McFadden. One intersection is identified to be significantly impacted by the limited access at McFadden Avenue on-ramp during the 2040 conditions under both Alternatives 3 and 4.

15. I-5 NB On-ramp/Newport Avenue This intersection would already operate at LOS F conditions during both AM and PM peak hours under the No Build Alternative with full access at McFadden Avenue on-ramp. The limited access at McFadden Avenue on-ramp under Alternatives 3 and 4 would divert more traffic to use this location resulting in increased delay during both AM and PM peak hours.

In addition to the I-5 NB On-ramp/Newport Avenue intersection, two other intersections are identified to expect significant amount of traffic diverted from the SR-55 mainline due to the limited access at McFadden Avenue on-ramp. Although the two intersections would operate at acceptable LOS with the diverted traffic, potential improvements may be considered at the two locations to minimize any impacts resulted from the diverted traffic. The two locations are:

16. I-5 SB Ramps/Newport Avenue

22. I-5 SB Ramps/Red Hill Avenue



TABLE 21-A – LOCAL INTERSECTION OPERATIONS – YEAR 2040 CONDITIONS (AM PEAK HOUR)							
Location	Control Type	No Build		Alt 3		Alt 4	
		Delay ²	LOS	Delay ²	LOS	Delay ²	LOS
15. I-5 NB On-ramp/Newport Ave	SSSC ¹	549.6	F	1217.7	F	1175.4	F
16. I-5 SB Ramps/Newport Ave	Signal	26.0	C	24.6	C	24.3	C
17. Walnut Ave/Newport Ave	Signal	75.0	E	54.1	D	56.4	E
18. Sycamore Ave/Newport Ave	Signal	242.2	F	58.1	E	60.4	E
19. Edinger Ave/Newport Ave	Signal	178.3	F	164.3	F	165.7	F
20. El Camino Real/Red Hill Ave	Signal	65.1	E	62.7	E	61.7	E
21. I-5 NB Ramps/Red Hill Ave	Signal	16.8	B	18.9	B	18.1	B
22. I-5 SB Ramps/Red Hill Ave	Signal	14.6	B	16.0	B	14.0	B
23. Nisson Rd/Red Hill Ave	Signal	28.4	C	36.6	D	37.0	D
24. Walnut Ave/Red Hill Ave	Signal	38.3	D	36.5	D	35.4	D
25. Sycamore Ave/Red Hill Ave	Signal	19.6	B	19.6	B	18.9	B
26. Edinger Ave/Red Hill Ave	Signal	62.4	E	55.6	E	54.0	D
Notes: 1.SSSC = Side street stop-control. 2. Average delay reported for signalized intersections and worst-movement delay reported for SSSC intersections. Bold font indicates unacceptable LOS E or F conditions. Grey shading indicates significant impacts. Source: Fehr & Peers, 2015							



TABLE 21-B – LOCAL INTERSECTION OPERATIONS – YEAR 2040 CONDITIONS (PM PEAK HOUR)							
Location	Control Type	No Build		Alt 3		Alt 4	
		Delay ²	LOS	Delay ²	LOS	Delay ²	LOS
15. I-5 NB On-ramp/Newport Ave	SSSC ¹	342.8	F	523.4	F	548.7	F
16. I-5 SB Ramps/Newport Ave	Signal	17.1	B	18.2	B	18.0	B
17. Walnut Ave/Newport Ave	Signal	27.7	C	32.3	C	29.1	C
18. Sycamore Ave/Newport Ave	Signal	144.1	F	72.8	E	35.9	D
19. Edinger Ave/Newport Ave	Signal	131.8	F	114.4	F	123.9	F
20. El Camino Real/Red Hill Ave	Signal	40.9	D	40.4	D	40.7	D
21. I-5 NB Ramps/Red Hill Ave	Signal	20.5	C	20.5	C	20.7	C
22. I-5 SB Ramps/Red Hill Ave	Signal	18.0	B	18.7	B	18.6	B
23. Nisson Rd/Red Hill Ave	Signal	40.5	D	44.5	D	44.5	D
24. Walnut Ave/Red Hill Ave	Signal	34.8	C	43.0	D	43.0	D
25. Sycamore Ave/Red Hill Ave	Signal	27.1	C	54.3	D	49.2	D
26. Edinger Ave/Red Hill Ave	Signal	107.8	F	94.9	F	100.5	F
Notes:	1.SSSC = Side street stop-control. 2. Average delay reported for signalized intersections and worst-movement delay reported for SSSC intersections. Bold font indicates unacceptable LOS E or F conditions. Grey shading indicates significant impacts.						
Source:	Fehr & Peers, 2015						



Mitigation Measures

Mitigation measures for the impacted locations were developed based on a combination of factors including potential operational improvements such as signal phasing and timings, geometric feasibility, right-of-way conditions, programmed improvements by other projects, etc. The recommended mitigation measures for the impacted intersection are discussed below and the intersection delay and LOS after mitigation are shown in Tables 22-A and 22-B.

15. I-5 NB On-ramp/Newport Avenue This intersection is currently unsignalized, and the traffic from northbound Newport Avenue getting onto the northbound I-5 on-ramp has to yield to the upcoming through traffic on southbound Newport Avenue. This movement already operates at unacceptable LOS under existing conditions, and any increased future demand would further exacerbate the delay at this location. Installation of a traffic signal at this intersection would mitigate the impact at this intersection to operate at acceptable LOS C or better during both AM and PM peak hours under Alternatives 3 and 4.

In addition to the mitigation measures, the following potential improvements to minimize any impacts resulted from the diverted traffic may be considered at the two other locations.

16. I-5 SB Ramps/Newport Avenue Potential improvements at this location consist of re-striping the shared left-through lane at the EB approach to a shared left/through/right lane.
22. I-5 SB Ramps/Red Hill Avenue Potential improvements at this location consist of re-striping the NB approach to provide a 2nd right-turn lane to the SB I-5 on-ramp. However, the feasibility of improvement needs to be evaluated along with the future roadway classification and improvements plans proposed for Red Hill Avenue.



**TABLE 22-A – LOCAL INTERSECTION OPERATIONS WITH MITIGATION
 – YEAR 2040 CONDITIONS (AM PEAK HOUR)**

Location	Control Type	Alt 3		Alt 3 With Mitigation		Alt 4		Alt 4 With Mitigation	
		Delay ²	LOS	Delay ²	LOS	Delay ²	LOS	Delay ²	LOS
15. I-5 NB On-ramp/Newport Ave	SSSC ¹	1217.7	F	24.7	C	1175.4	F	24.1	C

Notes: 1.SSSC = Side street stop-control.
 2. Average delay reported for signalized intersections and worst-movement delay reported for SSSC intersections.
 Bold font indicates unacceptable LOS E or F conditions.

Source: Fehr & Peers, 2015



**TABLE 22-B – LOCAL INTERSECTION OPERATIONS WITH MITIGATION
 – YEAR 2040 CONDITIONS (PM PEAK HOUR)**

Location	Control Type	Alt 3		Alt 3 With Mitigation		Alt 4		Alt 4 With Mitigation	
		Delay ²	LOS	Delay ²	LOS	Delay ²	LOS	Delay ²	LOS
15. I-5 NB On-ramp/Newport Ave	SSSC ¹	523.4	F	16.0	B	548.7	F	16.5	B

Notes: 1.SSSC = Side street stop-control.
 2. Average delay reported for signalized intersections and worst-movement delay reported for SSSC intersections.
 Bold font indicates unacceptable LOS E or F conditions.
 Source: Fehr & Peers, 2015



7. CONCLUSIONS

This chapter compares the analysis results of the project alternatives under both opening year (2020) and design year (2040) conditions. The comparison was performed from the traffic operations point of view to identify either marginal or significant operational differences between the project alternatives.

Opening Year 2020 Traffic Operations Comparison

AM Peak Period

Table 23-A compares the AM peak period traffic operations results between the project alternatives under 2020 conditions. The system-wide MOE's for Alternatives 1 through 4 were compared to the No Build Alternative.

TABLE 23-A – AM PEAK TRAFFIC OPERATIONS COMPARISON – 2020 CONDITIONS						
	MOE	No Build	Alt 1	Alt 2	Alt 3	Alt 4
Number of Study Freeway Locations	Peak Hour LOS D or Better	24	22	22	27	27
	Peak Hour LOS E or F	12	14	14	9	9
Number of Study HOV Locations	Peak Hour LOS D or Better	8	8	8	8	10
	Peak Hour LOS E or F	2	2	2	2	0
Number of Study Intersections	Peak Hour LOS D or Better	14	14	14	14	14
	Peak Hour LOS E or F	0	0	0	0	0
NB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	-1%	-3%	-7%	-5%
SB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	-1%	-8%	-14%	-17%
Peak Period Number of People Served Changes (Compared to No Build Alternative)		--	+0%	+1%	+1%	+2%
Peak Period Vehicle Miles Traveled Changes (Compared to No Build Alternative)		--	+1%	+1%	+2%	+2%
Peak Period Vehicle Hours Delay Changes (Compared to No Build Alternative)		--	-18%	-34%	-51%	-53%
Note: Change in percentages compared to the No Build Alternative. Source: Fehr & Peers, 2015						



The 2020 AM peak period traffic operations benefits under each of the project alternatives are summarized below.

- Alternative 1 would have more freeway segments operating at LOS E or F due to the higher traffic demand served by Alternative 1. Specifically, the improvements under Alternative 1 would allow more traffic to travel to downstream locations along the corridor and consequently result in greater traffic volumes at those downstream locations. Compared to the No Build Alternative, Alternative 1 would slightly reduce SR-55 travel time and significantly reduce the network vehicle hours of delay by 18 percent while serving more people through the network.
- Alternative 2 would reduce northbound and southbound SR-55 travel time by 3 and 8 percent, and significantly reduce the network vehicle hours of delay by 34 percent while serving one percent more people through the network.
- Alternative 3 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 3 freeway mainline segments, reduce northbound and southbound SR-55 travel time by 7 and 14 percent, and significantly reduce the network vehicle hours of delay by 51 percent while serving one percent more people through the network.
- Alternative 4 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 2 HOV segments and 3 freeway mainline segments, reduce northbound and southbound SR-55 travel time by 5 and 17 percent, and significantly reduce the network vehicle hours of delay by 53 percent while serving two percent more people through the network.
- Overall, Alternative 4 would generate the most operational benefits with serving the most people with the least delay among the four project build alternatives during the AM peak period in 2020.



PM Peak Period

Table 23-B compares the PM peak period traffic operations results for the project alternatives under 2020 conditions. The system-wide MOE's for Build Alternatives 1 through 4 were compared to the No Build Alternative.

TABLE 23-B – PM PEAK TRAFFIC OPERATIONS COMPARISON – 2020 CONDITIONS						
	MOE	No Build	Alt 1	Alt 2	Alt 3	Alt 4
Number of Study Freeway Locations	Peak Hour LOS D or Better	14	12	17	18	13
	Peak Hour LOS E or F	22	24	19	18	23
Number of Study HOV Locations	Peak Hour LOS D or Better	9	8	8	8	10
	Peak Hour LOS E or F	1	2	2	2	0
Number of Study Intersections	Peak Hour LOS D or Better	11	9	10	11	10
	Peak Hour LOS E or F	3	5	4	3	4
NB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	0%	-15%	-12%	-4%
SB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	0%	-15%	-16%	-1%
Peak Period Number of People Served Changes (Compared to No Build Alternative)		--	+0%	+1%	+1%	+1%
Peak Period Vehicle Mile Traveled Changes (Compared to No Build Alternative)		--	+0%	+1%	+1%	0%
Peak Period Vehicle Hours Delay Changes (Compared to No Build Alternative)		--	-7%	-17%	-28%	-21%
Note: Change in percentages compared to the No Build Alternative. Source: Fehr & Peers, 2015						



The 2020 PM peak period traffic operations benefits under each of the project alternatives are summarized below.

- Compared to the No Build Alternative, Alternative 1 would have two more freeway locations operating unacceptably at LOS E or F during the PM peak hour, due to a combination of the higher traffic demand served by Alternative 1 and alleviation of the bottlenecks at entry points (i.e., SR-55/I-5/McFadden in the southbound direction) resulting in greater traffic volumes at downstream locations. However, noticeable reduction in the network vehicle hours of delay by 7 percent would occur while serving more people through the network under Alternative 1.
- Alternative 2 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 3 freeway segments. Compared to the No Build Alternative, Alternative 2 would significantly reduce northbound and southbound SR-55 travel time by 15 percent, and significantly reduce the network vehicle hours of delay by 17 percent while serving one percent more people through the network.
- Alternative 3 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 4 freeway segments. Compared to the No Build Alternative, Alternative 3 would significantly reduce northbound and southbound SR-55 travel time by 12 and 16 percent, and significantly reduce the network vehicle hours of delay by 28 percent while serving one percent more people through the network.
- Alternative 4 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at two HOV segments. Compared to the No Build Alternative, Alternative 4 would reduce northbound SR-55 travel time by 4 percent, slightly reduce southbound SR-55 travel time, and significantly reduce the network vehicle hours of delay by 21 percent while serving one percent more people through the network.
- Overall, Alternative 3 would generate the most operational benefits with serving the most people with the least delay among the four project build alternatives during the PM peak period in 2020.



Design Year 2040 Traffic Operations Comparison

AM Peak Period

Table 24-A compares the AM peak period traffic operations results for the project alternatives under 2040 conditions. The system-wide MOE's for Build Alternatives 1 through 4 were compared to the No Build Alternative.

TABLE 24-A – AM PEAK TRAFFIC OPERATIONS COMPARISON – 2040 CONDITIONS						
	MOE	No Build	Alt 1	Alt 2	Alt 3	Alt 4
Number of Study Freeway Locations	Peak Hour LOS D or Better	22	20	22	27	18
	Peak Hour LOS E or F	14	16	14	9	18
Number of Study HOV Locations	Peak Hour LOS D or Better	9	8	8	8	10
	Peak Hour LOS E or F	1	2	2	2	0
Number of Study Intersections	Peak Hour LOS D or Better	13	13	13	13	13
	Peak Hour LOS E or F	1	1	1	1	1
NB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	+2%	+1%	-6%	-2%
SB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	+0%	-5%	-5%	-7%
Peak Period Number of People Served Changes (Compared to No Build Alternative)		--	+1%	+1%	+3%	+3%
Peak Period Vehicle Mile Traveled Changes (Compared to No Build Alternative)		--	+2%	+3%	+3%	+4%
Peak Period Vehicle Hours Delay Changes (Compared to No Build Alternative)		--	-20%	-25%	-31%	-33%
Note: "+" indicates an increase and "-" indicates a decrease. Source: Fehr & Peers, 2015						



The 2040 AM peak period traffic operations benefits under each of the project alternatives are summarized below.

- Under Alternative 1, two more freeway locations would operate unacceptably at LOS E or F during the AM peak hour compared to the No Build Alternative, due to a combination of the higher traffic demand served by Alternative 1 and alleviation of the bottlenecks at entry points (i.e., SR-55/I-5/McFadden in the southbound direction) resulting in greater traffic volumes at downstream locations. The northbound SR-55 corridor travel time would increase by 2 percent due to the higher traffic demand served by this alternative, while the southbound SR-55 corridor travel time would be similar to the No Build Alternative. In addition, Alternative 1 would significantly reduce the network vehicle hours of delay by 20 percent while serving one percent more people through the network.
- Under Alternative 2, the northbound SR-55 corridor travel time would increase by 5 percent compared to the No Build Alternative due to the higher traffic demand served by this alternative, while the southbound SR-55 travel time would reduce by 5 percent. In addition, Alternative 2 would significantly reduce the network vehicle hours of delay by 25 percent while serving one percent more people through the network.
- Alternative 3 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 5 freeway segments. Compared to the No Build Alternative, Alternative 3 would reduce northbound and southbound SR-55 travel time by 6 and 5 percent, and significantly reduce the network vehicle hours of delay by 31 percent while serving three percent more people through the network.
- Alternative 4 would improve and maintain all the study HOV segments operating at acceptable LOS D or better. Compared to the No Build Alternative, Alternative 4 would reduce northbound and southbound SR-55 travel time by 2 and 7 percent, and significantly reduce the network vehicle hours of delay by 33 percent while serving three percent more people through the network.
- Overall, Alternative 4 would generate the most operational benefits with serving the most people with the least delay among the four project alternatives during the AM peak period in 2040.



PM Peak Period

Table 24-B compares the PM peak period traffic operations results for the project alternatives under 2040 conditions. The system-wide MOE's for Build Alternatives 1 through 4 were compared to the No Build Alternative.

TABLE 24-B – PM PEAK TRAFFIC OPERATIONS COMPARISON – 2040 CONDITIONS						
	MOE	No Build	Alt 1	Alt 2	Alt 3	Alt 4
Number of Study Freeway Locations	Peak Hour LOS D or Better	4	4	8	8	5
	Peak Hour LOS E or F	32	32	28	28	31
Number of Study HOV Locations	Peak Hour LOS D or Better	9	8	8	8	10
	Peak Hour LOS E or F	1	2	2	2	0
Number of Study Intersections	Peak Hour LOS D or Better	7	7	8	9	9
	Peak Hour LOS E or F	7	7	6	5	5
NB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	+2%	-1%	+1%	-1%
SB SR-55 Peak Hour Travel Time Changes (Compared to No Build Alternative)		--	+17%	-35%	-34%	+16%
Peak Period Number of People Served Changes (Compared to No Build Alternative)		--	+1%	+3%	+4%	+2%
Peak Period Vehicle Mile Traveled Changes (Compared to No Build Alternative)		--	+0%	+4%	+4%	+3%
Peak Period Vehicle Hours Delay Changes (Compared to No Build Alternative)		--	-17%	-20%	-40%	-32%
Note: "+" indicates an increase and "-" indicates a decrease. Source: Fehr & Peers, 2015						



The 2040 PM peak period traffic operations benefits under each of the project alternatives are summarized below.

- Under Alternative 1, the northbound SR-55 corridor peak hour travel time would be similar to the No Build Alternative, while the southbound SR-55 peak hour travel time would increase by 17 percent due to a combination of higher traffic demand under Alternative 1 and alleviation of the bottlenecks at entry points (i.e., SR-55/I-5/McFadden in the southbound direction) resulting in greater traffic volumes with greater congestion at downstream locations where no additional capacity is provided. However during the PM peak period, Alternative 1 would reduce the network vehicle hours of delay by 17 percent while serving one percent more people through the network.
- Alternative 2 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 4 freeway segments. The northbound SR-55 corridor peak hour travel time would be similar to the No Build Alternative, while the southbound SR-55 peak hour travel time would expect significant reduction by 35 percent. Alternative 2 would significantly reduce the network vehicle hours of delay by 20 percent while serving three percent more people through the network.
- Similar to Alternative 2, Alternative 3 would improve traffic operational service level from LOS E or F to acceptable LOS D or better at 4 freeway segments. The northbound SR-55 corridor peak hour travel time would be similar to the No Build Alternative, while the southbound SR-55 peak hour travel time would expect significant reduction by 34 percent. Alternative 3 would significantly reduce the network vehicle hours of delay by 40 percent while serving four percent more people through the network.
- Alternative 4 would improve and maintain all the study HOV segments operating at acceptable LOS D or better. The northbound SR-55 corridor peak hour travel time would be similar to the No Build Alternative, while the southbound SR-55 peak hour travel time would increase by 16 percent due to a combination of higher traffic demand under Alternative 4 and alleviation of the bottlenecks at entry points (i.e., SR-55/I-5/McFadden in the southbound direction) resulting in greater traffic volumes with greater congestion at downstream locations where no additional capacity is provided. However during the PM peak period, Alternative 4 would significantly reduce the network vehicle hours of delay by 32 percent while serving three percent more people through the network.
- Overall, Alternative 3 would generate the most operational benefits with serving the most people with the least delay among the four project alternatives during the PM peak period in 2040.



Findings

The findings of comparison analysis of the proposed project alternatives are summarized below.

- Alternative 1 would provide significant benefits on southbound SR-55 and marginal benefits on northbound SR-55. Compared to the No Build Alternative, Alternative 1 would serve 1,420 and 3,630 more people getting through the corridor during the peak periods (AM and PM combined) in 2020 and 2040, respectively.
- Alternative 2 would provide significant benefits on both southbound and northbound SR-55. Compared to the No Build Alternative, Alternative 2 would serve 2,580 and 9,040 more people getting through the corridor during the peak periods (AM and PM combined) in 2020 and 2040, respectively.
- Alternative 3 would provide significant benefits on both southbound and northbound SR-55. Compared to the No Build Alternative, Alternative 3 would serve 5,220 and 14,380 more people getting through the corridor during the peak periods (AM and PM combined) in 2020 and 2040, respectively.
- Alternative 4 would provide significant benefits on both northbound and southbound SR-55. Compared to the No Build Alternative, Alternative 4 would serve 4,990 and 12,750 more people getting through the corridor during the peak periods (AM and PM combined) in 2020 and 2040, respectively.
- In terms of Design Year 2040 peak hour travel time, Alternatives 2, 3, and 4 would result in similar travel time savings in the southbound direction during the AM peak hour, which is approximately half a minute or 6 percent less than the No Build Alternative and Alternative 1. During the PM peak hour, due to the projected peak hour traffic demand exceeding the capacity of the I-5/SR-55 bottleneck, the peak hour travel times are similar between alternatives with a variation of 3% or lower. Therefore, the performance matrices measured during the 4-hour peak periods are presented to provide a better understanding of operational benefits between project alternatives.
- From system-wide operational performance perspective, Alternative 3 would result in the most operational benefits by serving the most people traveling through the corridor with the least delay among the four project alternatives during the PM peak period under both 2020 and 2040 conditions. Alternative 4 would result in the most operational benefits by serving the most people traveling through the corridor with the least delay among the four project alternatives during the AM peak period under both 2020 and 2040 conditions. Combining the AM and PM peak periods, Alternative 3 would serve the most people with the least delay among the four project alternatives under both 2020 and 2040 conditions.
- Under Alternatives 3 and 4, one local intersection (Northbound I-5 On-ramp/Newport Avenue) has been identified to be significantly impacted by traffic diversion resulted from the limited access at McFadden Avenue on-ramp under 2020 and 2040 conditions. Mitigation measure of installation of a traffic signal is recommended at this intersection, which would adequately mitigate the traffic impacts within the existing ROW.