
**Appendix B Supplemental Traffic Analysis—
I-5 Interchange**

Supplemental Analysis to Traffic Study

This supplemental traffic analysis evaluates the potential effect of project traffic on interchange connector ramps and freeway on and off ramps in the study area. This analysis was conducted per a request from Caltrans to evaluate the potential traffic impacts to the I-5/SR-55 interchange from the 1st/Cabrillo and the Metro East projects. This review considers project traffic that is expected to be added to freeway connectors and ramps as a result of the Metro East project, as well as the expected impact of this traffic on freeway facilities.

I-5/SR-55 Interchange Analysis

Background

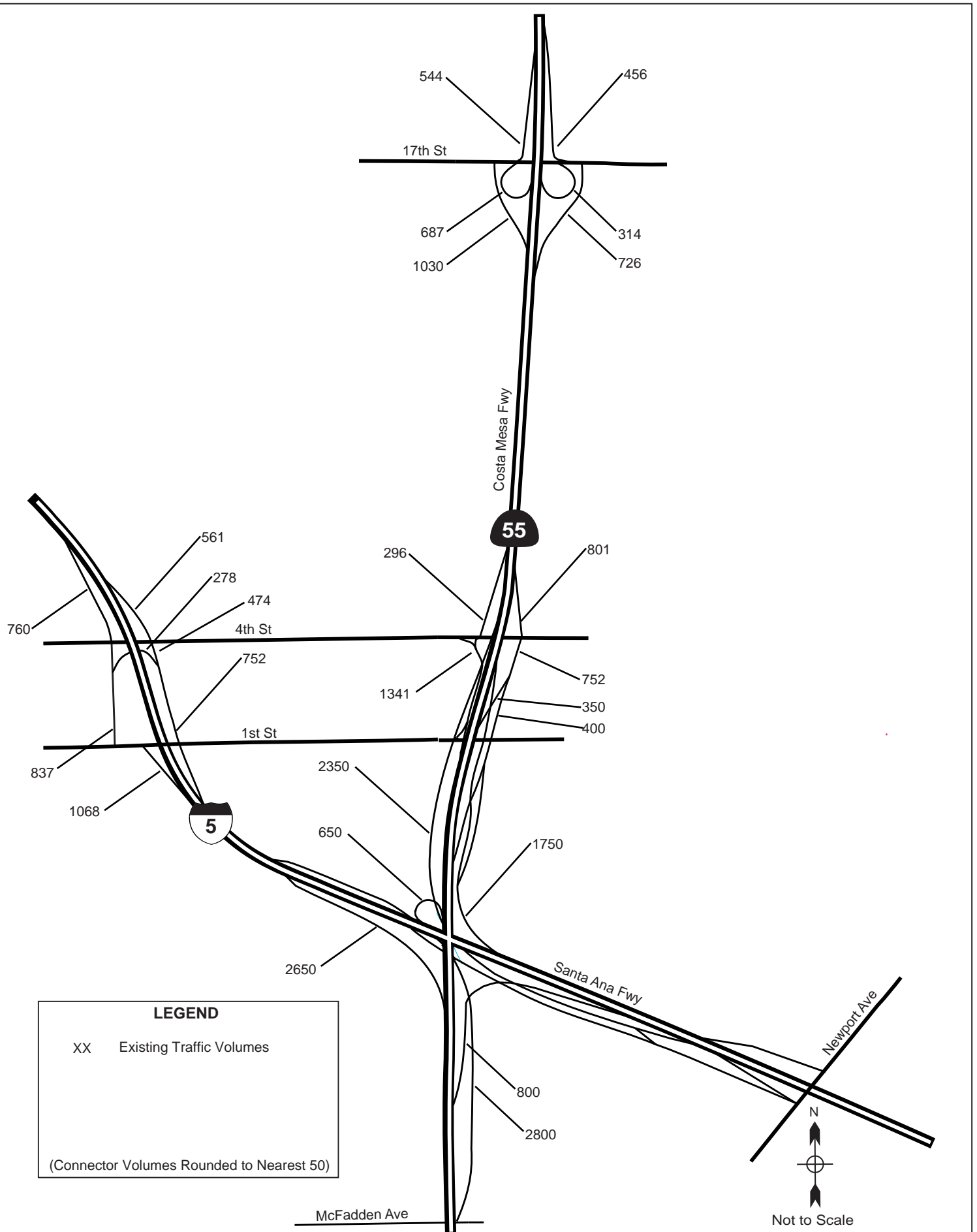
The review of potential project impacts to the I-5/SR-55 interchange was requested by Caltrans to ensure that project impacts to the interchange are fully considered in the review process. This review evaluates the expected impacts in terms of traffic volumes expected to be added to the interchange connector ramps and on/off ramps at 4th Street and 17th Street. Potential queuing on the freeway off ramps, and any expected impacts to weaving are also evaluated. Figures A and B show existing traffic volumes on the freeway ramps and connectors in the Metro East study area.

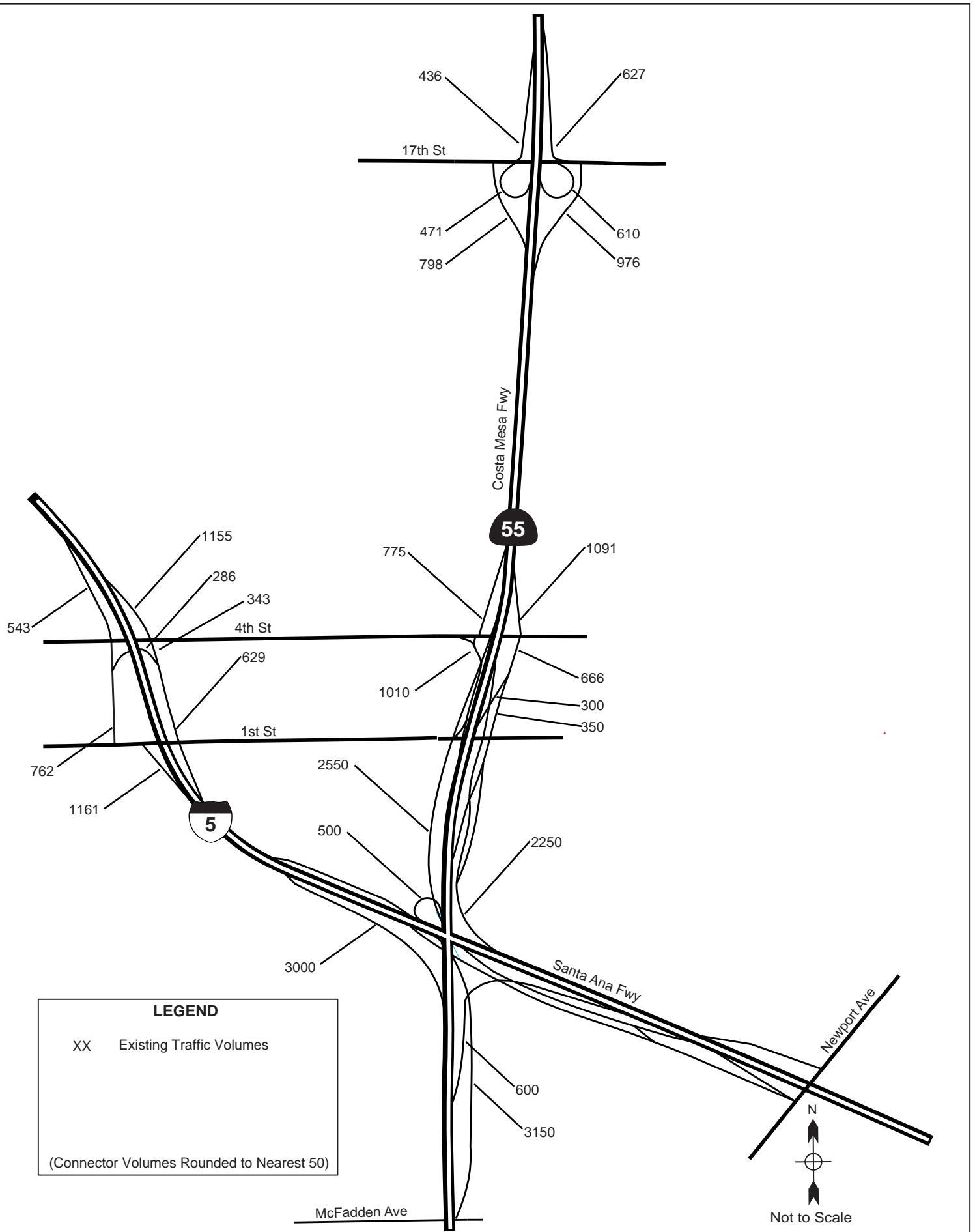
Two studies of existing and expected future traffic conditions at the I-5/SR-55 interchange were recently completed for OCTA by Katz, Okitsu & Associates: *State Route 55 Highway Capacity Analysis*, and *Interstate 5 Highway Capacity Analysis*. The highway capacity studies for I-5 and State Route 55 included the I-5/SR-55 interchange area in the Metro East project vicinity. The purpose of these studies was to locate congestion points along the I-5 and SR-55 freeways, and to identify short-term and cost efficient measures to relieve freeway congestion at these points.

The studies identified several areas at and near the I-5/SR-55 interchange that experience significant freeway congestion. These areas include the SR-55 southbound freeway mainline between Chapman Avenue and McFadden Avenue (the vicinity of the I-5/SR-55 interchange), the SR-55 northbound mainline from the Dyer Road westbound on ramp to the McFadden Avenue on ramp, and the I-5 northbound mainline from Red Hill Avenue to SR-55.

The studies reported that the congested conditions on the SR-55 in the southbound direction are due primarily to the merge from the I-5 connector ramps with the SR-55 mainline and the need for an additional southbound lane on SR-55 from I-5 to Dyer Road. The study also reported that the congested conditions on SR-55 in the northbound direction are due to the need for an additional northbound lane on SR-55 between Dyer Road and Edinger Avenue.

The addition of a continuous auxiliary lane on northbound I-5 from Red Hill Avenue to Newport Avenue was also recommended, in combination with improved signage at this location. The studies also noted that significant congestion is caused by the merge of the northbound SR-55 connector on ramp with the northbound I-5 mainline just south of Fourth Street. An extension of





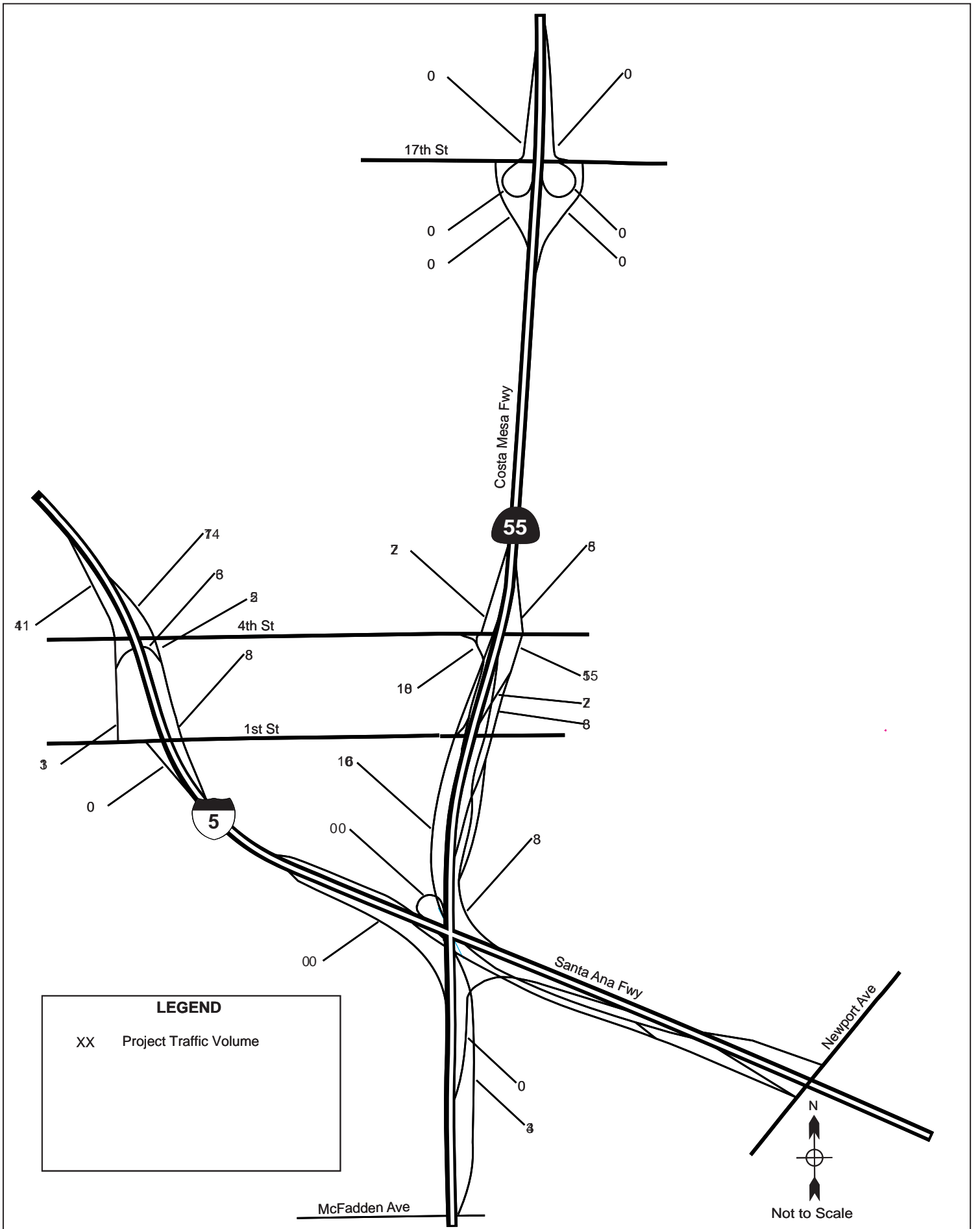
one of the SR-55 connector lanes to the off ramp at 4th Street would likely reduce congestion significantly. The studies also noted that the connector ramp from SR-55 northbound joins the I-5 southbound mainline without benefit of an auxiliary lane. The addition of an auxiliary lane from the SR-55 northbound connector to I-5 was recommended.

The OCTA studies also analyzed traffic conditions at the I-5/SR-55 interchange using five percent and ten percent increases in ramp, connector, and mainline volumes to test the sensitivity of recommended improvements to potential traffic growth. The studies showed that the additional recommended mainline and auxiliary lanes generally handled the increased traffic levels well. A five percent increase in traffic is expected to result in relatively little additional congestion after the recommended improvements are in place.

The conclusions of these studies indicated that the interchange can handle a five to ten percent increase in traffic relatively well if the recommended improvements are made. The additional traffic volumes expected as a result of the First & Cabrillo project are minimal compared to existing volumes or five to ten percent increases in existing volumes. Existing ramp and connector traffic volumes and expected First & Cabrillo project traffic volumes are documented in Table A on the following page. As shown in Table A, additional traffic on the connectors as a result of the First & Cabrillo project will increase traffic only ½ of one percent on the connector ramps. On and off ramps will experience traffic increases of up to 2.5% where they join the mainline as a result of the First & Cabrillo project. There will be no significant increases in off ramp queues as a result of the First & Cabrillo project. No off ramp queues will block mainline lanes in the interchange area. Figures C and D show expected First & Cabrillo project volumes on the freeway ramps and connectors in 2010.

The additional traffic expected as a result of the Metro East project will generally increase connector ramp volumes by up to about 7% in the AM peak hour and 13% in the PM peak hour by 2030, as shown in Table A. Most increases are considerably less. The connectors experiencing the greatest impact from the Metro East project are the I-5 Northbound to SR-55 Northbound Connector, and the SR-55 Southbound to I-5 Southbound Connector. Both of these connectors are expected to experience traffic increases in the 11% to 13% range. Existing traffic volumes on these connectors are generally in the 2,000 to 2,500 range during the peak hours. Added traffic volumes resulting from the Metro East project are expected to increase the traffic volumes on the connectors by about 160 in the AM peak hour and about 300 in the PM peak hour. The resulting total volumes on the connectors of about 2,500 to 2,850 are still well within the capacity of 2-lane freeway connector ramps (approximately 4,000 vph). The capacity improvements on the I-5 and SR-55 mainlines recommended by the OCTA studies should be able to accommodate these traffic increases.

Traffic volume increases on the on and off ramps are more significant, typically in the 20% to 30% range, but with some traffic volumes increasing as much as 70% to 80% in the PM peak period. The ramps most affected are the I-5 Northbound off ramp at 4th Street (a 43.9% increase in the AM peak period by 2030), the I-5 Southbound off ramp at 4th Street (a 74.4% increase in the PM



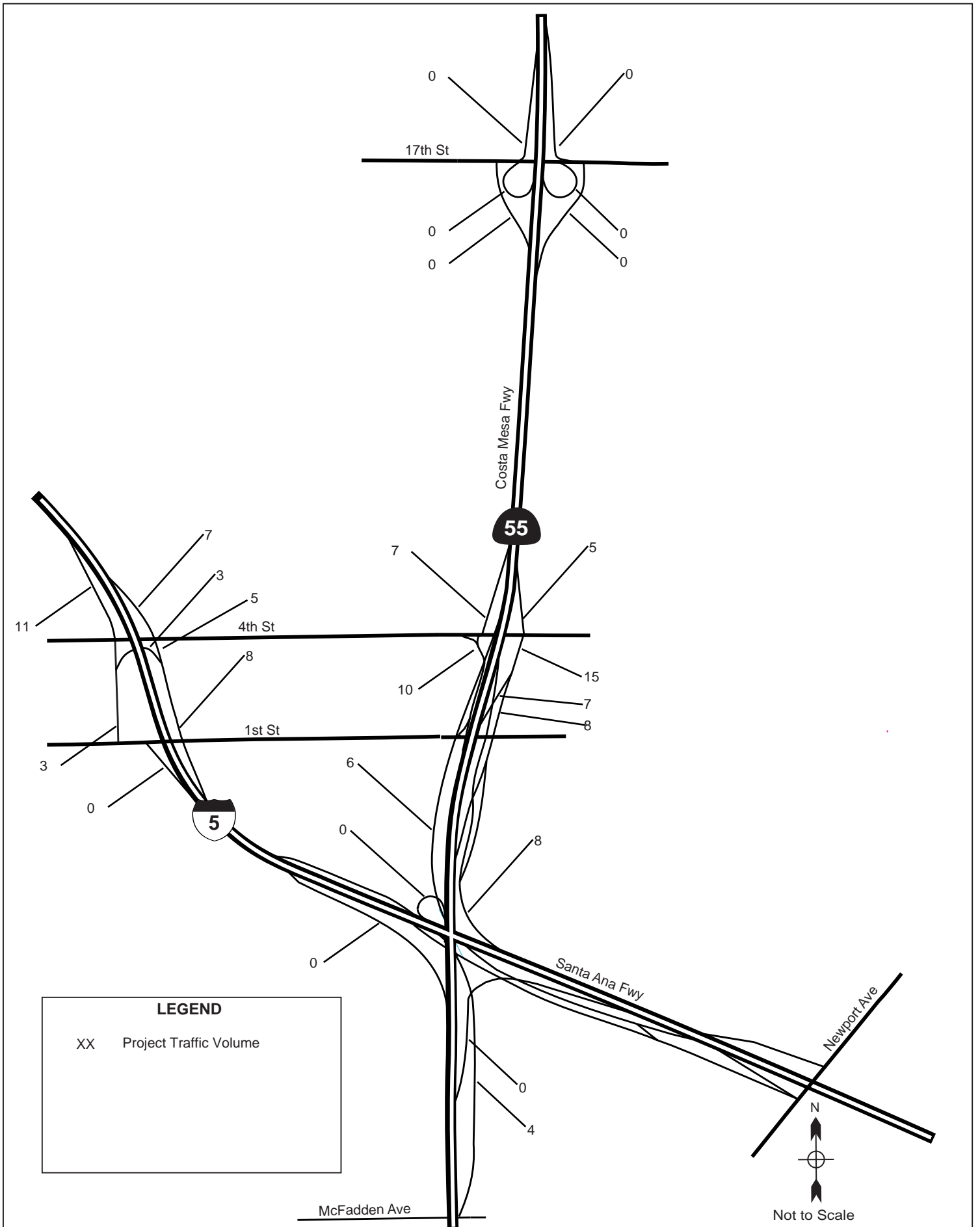


Table A – Freeway Connector and Ramp Volumes

Interchange Location	Existing Traffic Volume	2010		2030	
		2010 Project Traffic	2010 Percent Change	2030 Project Traffic	2030 Percent Change
AM Peak Hour Traffic Volumes					
I-5 SB to SR-55 SB Connector	2,650	0	0.0%	50	1.9%
I-5 NB to SR-55 SB Connector	650	0	0.0%	0	0.0%
I-5 NB to SR-55 NB Connector	1,750	3	0.2%	117	6.7%
SR-55 SB to I-5 SB Connector	2,350	10	0.4%	157	6.7%
SR-55 NB to I-5 SB Connector	800	0	0.0%	0	0.0%
SR-55 NB to I-5 NB Connector	2,800	3	0.1%	41	1.5%
I-5 SB Off Ramp at 4 th St.	760	4	0.5%	175	23.0%
I-5 SB On Ramp at 1 st St.	1,068	0	0.0%	111	10.4%
I-5 NB Off Ramp at Mabury	278	6	2.2%	58	20.9%
I-5 NB Off Ramp at 4 th St.	474	2	0.4%	32	6.8%
I-5 NB On Ramp at 4 th St.	561	14	2.5%	246	43.9%
SR-55 SB Off Ramp to WB 17 th St.	544	0	0.0%	47	8.6%
SR-55 SB Off Ramp to EB 17 th St.	687	0	0.0%	3	0.4%
SR-55 SB On Ramp at 17 th St	1,030	0	0.0%	0	0.0%
SR-55 SB Off Ramp at 4 th St.	296	2	0.7%	75	25.3%
SR-55 SB On Ramp at 4 th St.	1,341	18	1.3%	286	21.3%
SR-55 NB Off Ramp at 4 th St.	752	5	0.7%	213	28.3%
SR-55 NB On Ramp at 4 th St.	801	8	1.0%	110	13.7%
SR-55 NB Off Ramp at 17 th St.	726	0	0.0%	7	1.0%
SR 55 NB On Ramp at 17 th St.	456	0	0.0%	0	0.0%
PM Peak Hour Traffic Volumes					
I-5 SB to SR-55 SB Connector	3,000	0	0.0%	77	2.6%
I-5 NB to SR-55 SB Connector	500	0	0.0%	0	0.0%
I-5 NB to SR-55 NB Connector	2,250	4	0.2%	298	13.2%
SR-55 SB to I-5 SB Connector	2,550	6	0.2%	293	11.5%
SR-55 NB to I-5 SB Connector	600	0	0.0%	0	0.0%
SR-55 NB to I-5 NB Connector	3,150	4	0.1%	99	3.1%
I-5 SB Off Ramp at 4 th St.	543	11	2.0%	404	74.4%
I-5 SB On Ramp at 1 st St.	1,161	0	0.0%	172	14.8%
I-5 NB Off Ramp at Mabury	286	3	1.0%	105	36.7%
I-5 NB Off Ramp at 4 th St.	343	5	1.5%	115	33.5%
I-5 NB On Ramp at 4 th St.	1,155	7	0.6%	393	34.0%
SR-55 SB Off Ramp to WB 17 th St.	436	0	0.0%	96	22.0%
SR-55 SB Off Ramp to EB 17 th St.	471	0	0.0%	11	2.3%
SR-55 SB On Ramp at 17 th St	798	0	0.0%	0	0.0%
SR-55 SB Off Ramp at 4 th St.	775	7	0.9%	183	23.6%
SR-55 SB On Ramp at 4 th St.	1,010	10	1.0%	533	52.8%
SR-55 NB Off Ramp at 4 th St.	666	15	2.3%	542	81.4%
SR-55 NB On Ramp at 4 th St.	1,091	5	0.5%	175	16.0%
SR-55 NB Off Ramp at 17 th St.	976	0	0.0%	8	0.8%
SR 55 NB On Ramp at 17 th St.	627	0	0.0%	0	0.0%

peak period), the SR-55 Southbound on ramp at 4th Street (a 52.8% increase), and the SR-55 Northbound off ramp at 4th Street (an 81.4% increase). A summary of off ramps expected to experience traffic increases of 10% or greater by 2030 as a result of the Metro East project is provided in Table B. Expected queue lengths, delay, and level of service associated with the AM and PM peak hours at these ramps are also provided. Figures E and F show expected Metro East project volumes on the freeway ramps and connectors in 2030.

Table B – Freeway Off Ramp Queuing and Delay

Freeway Ramp	AM Peak Hour			PM Peak Hour		
	Queue Length	Delay ²	Level of Service ⁴	Queue Length	Delay ²	Level of Service ⁴
I-5 SB Off Ramp at 4 th Street	200 Ft	18.8 Sec.	B	200 Ft	25.1 Sec.	C
I-5 NB Off Ramp at Mabury St.	N/A ³	N/A. ³	N/A ³	N/A ³	N/A. ³	N/A ³
I-5 NB Off Ramp at 4 th St.	180 Ft	40.5 Sec.	D	200 Ft	56.6 Sec.	E
SR-55 SB Off Ramp to WB 17 th St.	80 Ft	48.6 Sec.	D	40 Ft	60.2 Sec.	E
SR-55 SB Off Ramp to 4 th St.	220 Ft	78.2 Sec.	E	440 Ft	110.7 Sec.	F
SR-55 NB Off Ramp to 4 th St.	380 Ft	31.4 Sec.	C	460 Ft	44.1 Sec.	D

Note 1: Queue length in feet on freeway off ramp approach to intersection; Note 2: Delay in seconds per vehicle average for off ramp approach only; Note 3: No intersection controls at this location; Note 4: level of service for off ramp approach to intersection.

As shown in Table B, the additional Metro East project traffic on the off ramps will not result in queue lengths exceeding ramp capacity by 2030. No off ramp queues are expected to block mainline lanes in the interchange area. Delay and level of service at these ramps is expected to be within acceptable levels if the recommended mitigation measures for the Metro East project are implemented. Table C shows expected volume/capacity (V/C) ratios for freeway off ramps in the study area in the PM peak hour. As shown in the table, the V/C ratios are within acceptable ranges, indicating that the expected background and project traffic volumes on the freeway off ramps are manageable.

Table C – Freeway Ramp Volume/Capacity Analysis

Freeway Ramp	PM Peak Hour				
	Lanes at Entry/Exit	Capacity	Existing Volume	Future + Project Volumes	V/C Ratio
I-5 SB Off Ramp at 4 th Street	1 + Optional	2,800	543	1,098	.39
I-5 NB Off Ramp at 4 th St.	1 + Optional	2,800	629	780	.28
SR-55 SB Off Ramp to WB 17 th	1	1,800	436	1,055	.59
SR-55 SB Off Ramp to 4 th St.	1 + Optional	2,800	775	1,429	.51
SR-55 NB Off Ramp to 4 th St.	1 + Optional	2,800	666	1,652	.59
SR-55 NB Off Ramp to 17 th St.	1 + Optional	2,800	976	1,460	.52

