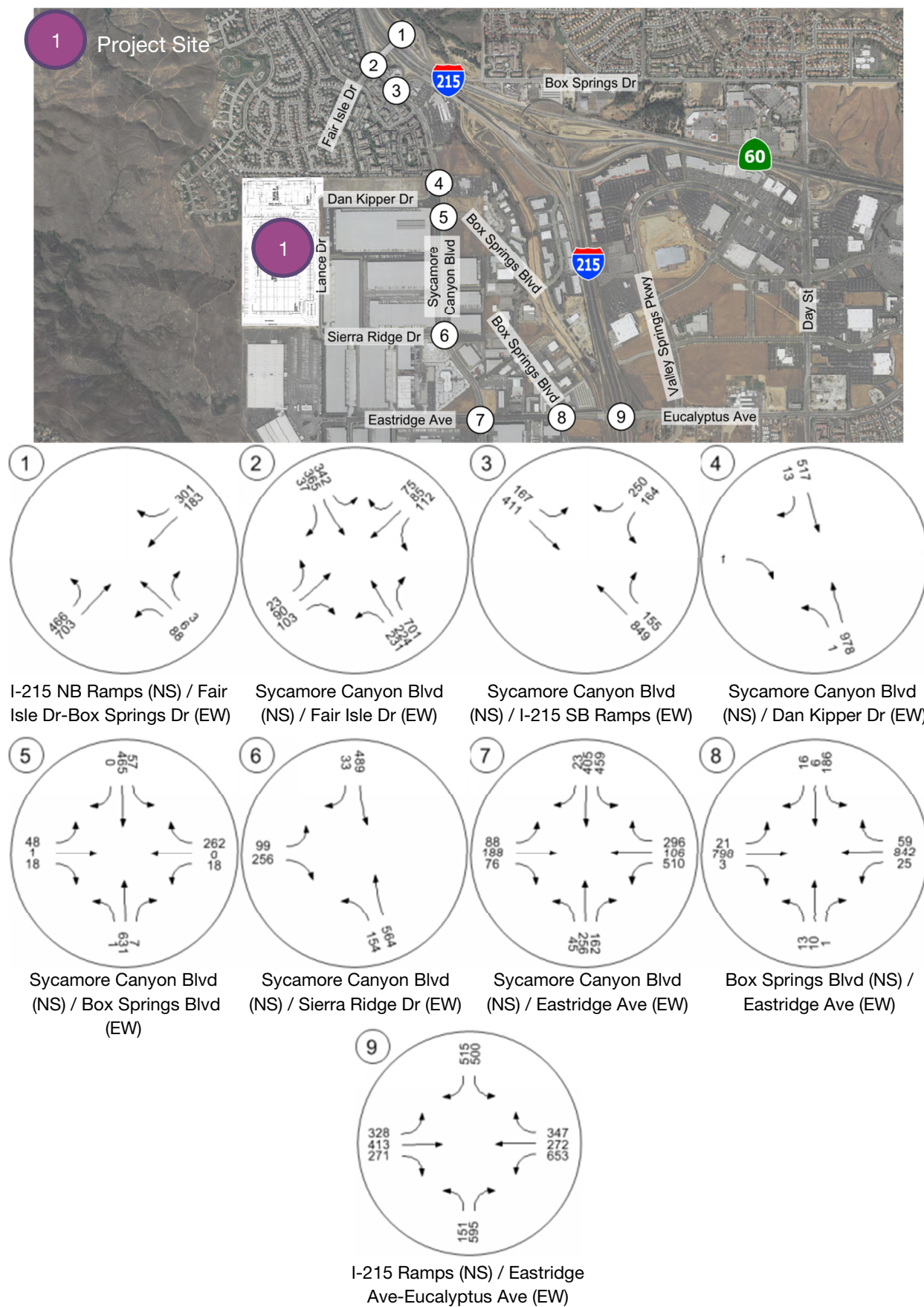


Figure 5-D – Existing Plus Ambient Growth Plus Project PM Peak Hour Intersection Volumes (in PCE) (2018)



Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions (2018)

The existing plus ambient growth plus project scenario includes existing traffic, an ambient growth of two percent for three years to 2018, cumulative projects in the project area (see Table 4-4 and Figure 4-G) provided by the City of Riverside and project traffic. All other study freeway segments are expected to operate at the target LOS of D or better during the peak hours.

Table 5-6 provides the projected delay and levels of service at the study intersections under existing plus ambient growth plus cumulative plus project conditions without off-site improvements. These levels of service vary from LOS B to F. The existing plus ambient growth plus cumulative plus project AM and PM peak hour intersection turning movement volumes are shown on Figure 5-E and Figure 5-F, respectively. The levels of service are based upon the existing geometrics for the study intersections. The level of service calculation worksheets are provided in Appendix E. The following study intersection is expected to operate at an unacceptable level of service:

4. Sycamore Canyon Boulevard (NS) / Dan Kipper Drive (EW)

However, based on the City of Riverside's guidelines, it is not considered a significant impact and the project should not be required to mitigate the intersection. All other study intersections are expected to operate at the target LOS of D or better during the peak hours.

Table 5-7 presents projected AM and PM peak hour non-PCE volumes, densities and levels of service at the study freeway segments. These levels of service vary from LOS B to F. The following study freeway segments are expected to operate at an unacceptable level of service:

I-215 Northbound

1. Eastridge Ave-Eucalyptus Ave Off-Ramp
3. Fair Isle-Box Springs On-Ramp

All other study freeway segments are expected to operate at the target LOS of D or better during the peak hours.

Table 5-6 – Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions (2018)

Intersection	Peak Hour	Without Project			With Project		
		Traffic Control	Delay (sec)	LOS	Traffic Control	Delay (sec)	LOS
1. I-215 Northbound Ramps (NS) Fair Isle Drive-Box Springs Road (EW)	AM	Signal	40.5	D	Signal	40.8	D
	PM		19.1	B		19.0	B
2. Sycamore Canyon Boulevard (NS) Fair Isle Drive (EW)	AM	Signal	29.5	C	Signal	29.6	C
	PM		29.5	C		30.0	C
3. Sycamore Canyon Boulevard (NS) I-215 Southbound Ramps (EW)	AM	Signal	20.0	B	Signal	20.4	C
	PM		12.4	B		12.5	B
4. Sycamore Canyon Boulevard (NS) Dan Kipper Drive (EW)	AM	OWSC	52.9	F	OWSC	53.8	F
	PM		27.5	D		28.4	D
5. Sycamore Canyon Boulevard (NS) Box Springs Boulevard (EW)	AM	Signal	18.0	B	Signal	18.1	B
	PM		13.6	B		13.7	B
6. Sycamore Canyon Boulevard (NS) Sierra Ridge Drive (EW)	AM	Signal	11.1	B	Signal	13.7	B
	PM		11.2	B		14.1	B
7. Sycamore Canyon Boulevard (NS) Eastridge Avenue (EW)	AM	Signal	41.8	D	Signal	53.0	D
	PM		24.6	C		26.1	C
8. Box Springs Boulevard (NS) Eastridge Avenue (EW)	AM	Signal	32.2	C	Signal	32.1	C
	PM		36.2	D		36.9	D
9. I-215 Ramps (NS) Eastridge Avenue-Eucalyptus Avenue (EW)	AM	Signal	22.7	C	Signal	22.3	C
	PM		22.5	C		22.7	C

OWSC = One Way Stop Controlled

Delay and LOS were calculated in the TIA using Vistro (version 3.00, 2014) for signalized and unsignalized intersections. Per the 2010 Highway Capacity Manual, overall average intersection delay and LOS are shown for intersections with a traffic signal or all-way stop control. For intersections with cross-street stop control, the delay and LOS for the worst individual movement (or movements sharing a single lane) are shown.

Table 5-7 – Freeway Segment Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project Phase Conditions (2018)

Freeway/Direction of Travel From/To or Junction	Segment Type	Lanes		Without Project				With Project							
		Main	Ramp	AM Peak Hour		PM Peak Hour		AM Peak Hour				PM Peak Hour			
				Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Mainline Vol.	Ramp Vol.	Density (pc/mi/ln)	LOS	Mainline Vol.	Ramp Vol.	Density (pc/mi/ln)	LOS
I-215 Northbound															
1. Eastridge-Eucalyptus Off	Diverge	3	1	32.8	D	36.0	E	4967	799	32.9	D	5727	773	36.0	E
2. Eastridge-Eucalyptus On	Merge	3	1	26.2	C	32.0	D	4169	394	26.3	C	4954	657	32.3	D
3. Fair Isle-Box Springs On ¹	Merge	4	1	36.2	E	36.6	F	6635	1436	36.3	E	8342	739	37.0	F
I-215 Southbound															
4. Sycamore Canyon Blvd Off ¹	Basic	5	NA	17.0	B	24.2	C	5831	NA	17.1	B	7761	NA	24.3	C
5. Truck Bypass/Eastridge Off	Weave	4	1	27.6	C	31.8	D	4940	1130	27.8	C	5744	1142	31.9	D
		4	2					5554	516			5901	985		
6. Eastridge-Eucalyptus On	Merge	3	1	26.2	C	32.0	D	4447	448	26.3	C	4768	979	32.2	D

¹ HOV lanes and HOV volumes not included in the mainline volume.

NA = Not applicable

Density and LOS for freeway segments were calculated in the TIA using HCS 2010 (version 6.60, 2014). Per the 2010 Highway Capacity Manual, freeway segment density and LOS are shown for merge and diverge segments, weaving segments, and basic segments.

Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project with Improvements (2018)

Table 5-8 provides the projected delay and levels of service at the study intersections and freeway segments under existing plus ambient growth plus cumulative plus project conditions with off-site improvements. With the off-site improvements presented in Table 6-5, Table 6-6, and Figure 6-C, the study area intersections and freeway segments would operate at the target LOS of D or better during the peak hours. The level of service calculation worksheets are provided in Appendix E.

Note that for the intersection of Sycamore Canyon Boulevard/Dan Kipper Drive and the Fair Isle-Box Springs On-Ramp freeway segment, the intersection and freeway segment were failing in the without project scenario and the necessary improvements are a result of the cumulative projects considered. Based on the City of Riverside’s traffic impact analysis guidelines, the project does not cause a significant impact to the intersection.

Table 5-8 – Freeway Segment Levels of Service – Existing Plus Ambient Growth Plus Cumulative Plus Project with Improvements (2018)

Freeway/Direction of Travel From/To or Junction	Seg- ment Type	Without Improvements										With Improvements					
		Lanes		Without Project				With Project				Lanes		With Project			
		Main	Ramp	AM Peak		PM Peak		AM Peak		PM Peak		Main	Ramp	AM Peak		PM Peak	
				Density (pc/mi/in)	LOS	Density (pc/mi/in)	LOS	Density (pc/mi/in)	LOS	Density (pc/mi/in)	LOS			Density (pc/mi/in)	LOS	Density (pc/mi/in)	LOS
I-215 Northbound																	
1. Eastridge-Eucalyptus Off ¹	Diverge	3	1	32.8	D	36.0	E	32.9	D	36.0	E	3	1	28.0	C	32.6	D
3. Fair Isle-Box Springs On	Merge	4	1	36.2	E	36.6	F	36.3	E	37.0	F	5	1	30.2	D	28.7	D

XX - Exceeds Target LOS

- = Density is below LOS threshold. Number shown has been rounded up to the nearest tenth.

¹ I-215 North Project - Adds one HOV lane in both directions from Nuevo Road to the 60/215 Interchange. Based on the HOV volumes at Box Springs/Fair-Isle, the HOV lane carries approx. 80% of a multi-flow lane in the AM peak and 50% in the PM peak. Therefore the volumes in the multi-flow lanes will be reduced with the project.

Density and LOS for freeway segments were calculated in the TIA using HCS 2010 (version 6.60, 2014) . Per the 2010 Highway Capacity Manual, freeway segment density and LOS are shown for merge and diverge segments, weaving segments, and basic segments.

Figure 5-E – Existing Plus Ambient Growth Plus Cumulative Plus Project AM Peak Hour Intersection Volumes (in PCE) (2018)

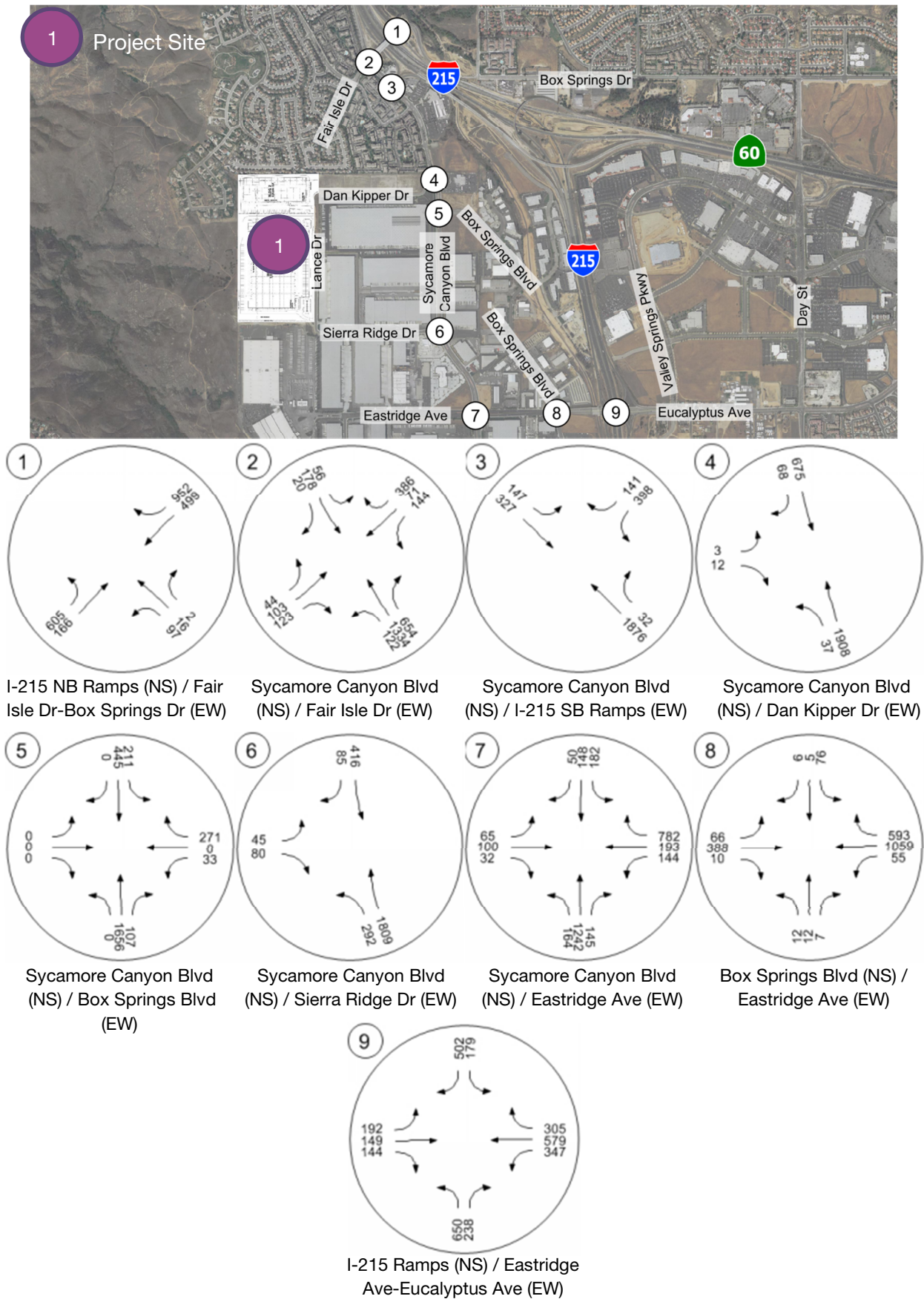
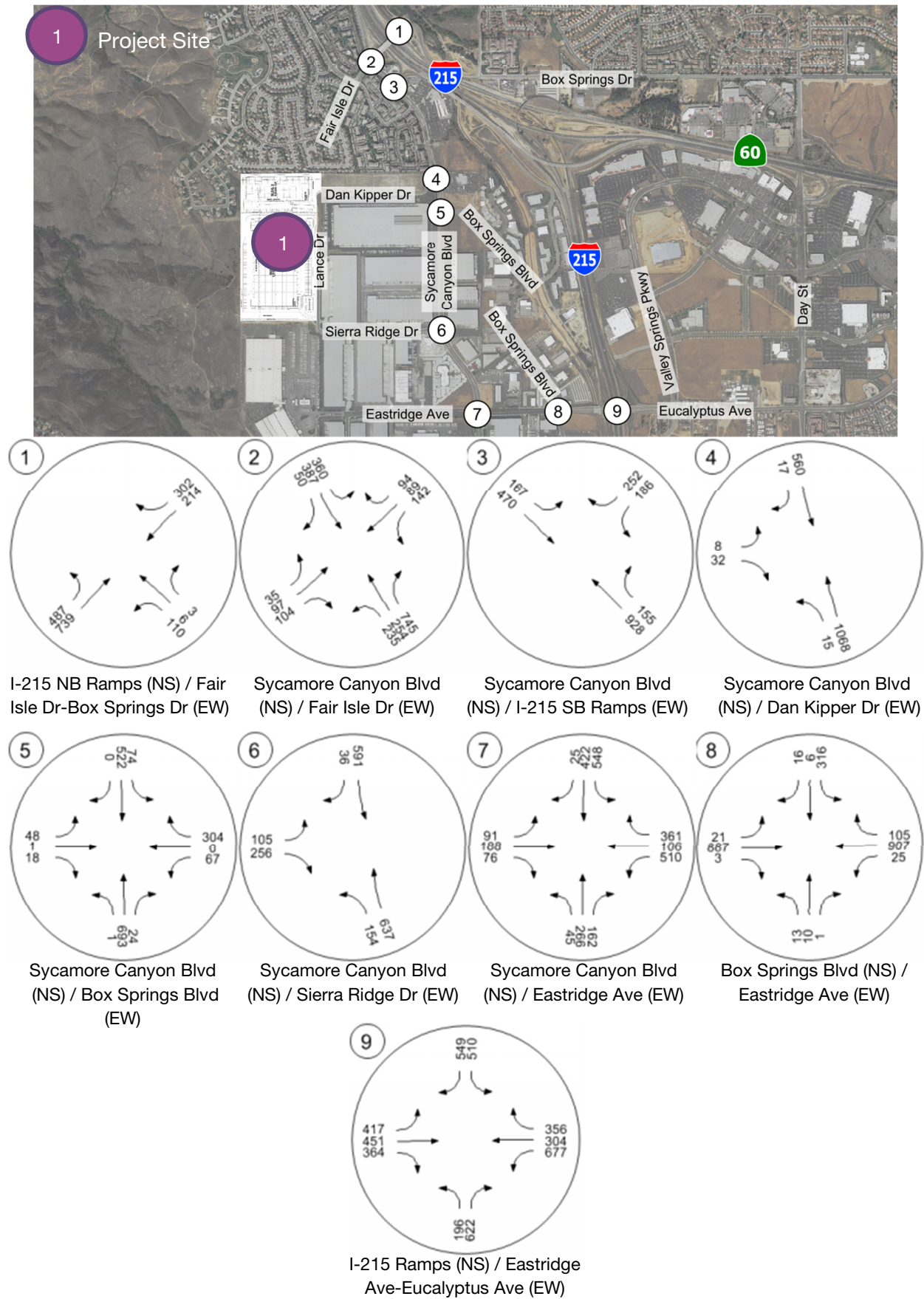


Figure 5-F – Existing Plus Ambient Growth Plus Cumulative Plus Project PM Peak Hour Intersection Volumes (in PCE) (2018)



FINDINGS AND RECOMMENDATIONS

Traffic Impacts and Level of Service Analysis

Proposed Roadway Geometrics – Existing Plus Project Conditions (2015)

Table 6-1 and Figure 6-A present the intersection geometry that achieves a satisfactory level of service at the study intersections in existing plus project conditions. Table 6-2 presents proposed roadway geometrics for the study freeway segments that achieve satisfactory LOS. No improvements are necessary to the study intersections or the study freeway segments for this scenario.

Table 6-1 – Summary of Roadway Geometrics for Existing Plus Project Conditions (2015)

Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
		L	T	R	L	T	R	L	T	R	L	T	R	
1. I-215 Northbound Ramps (NS) Fair Isle Drive-Box Springs Road (EW)	Existing	1	LT	S	NA	NA	NA	2	2	NA	NA	TR	1	Signal
2. Sycamore Canyon Boulevard (NS) Fair Isle Drive (EW)	Existing	1	2	1	2	1	S	1	2	S	1	2	1	Signal
3. Sycamore Canyon Boulevard (NS) I-215 Southbound Ramps (EW)	Existing	NA	3	S	2	1	NA	NA	NA	NA	NA	LR	1	Signal
4. Sycamore Canyon Boulevard (NS) Dan Kipper Drive (EW)	Existing	S	1	NA	NA	2	S	NA	LR	NA	NA	NA	NA	OWSC
5. Sycamore Canyon Boulevard (NS) Box Springs Boulevard (EW)	Existing	1	2	S	1	2	S	S	1	S	1	1	1	Signal
6. Sycamore Canyon Boulevard (NS) Sierra Ridge Drive (EW)	Existing	1	2	NA	NA	2	S	1	NA	1	NA	NA	NA	Signal
7. Sycamore Canyon Boulevard (NS) Eastridge Avenue (EW)	Existing	2	2	1ol	2	2	1ol	2	3	1f	2	2	1ol	Signal
8. Box Springs Boulevard (NS) Eastridge Avenue (EW)	Existing	1	1	1	1	2	S	1	2	1	1	2	S	Signal
9. I-215 Ramps (NS) Eastridge Avenue-Eucalyptus Avenue (EW)	Existing	2	NA	2	2	NA	1	1	2	1f	2	2	1f	Signal

OWSC = One Way Stop Controlled

NA = Not Applicable

S = Lane is shared with through movement

LR = Lane shared by left-turn and right-turn movements

LT = Lane shared by left-turn and through movements

TR = Lane shared by through and right-turn movements

f = Free right-turn movement

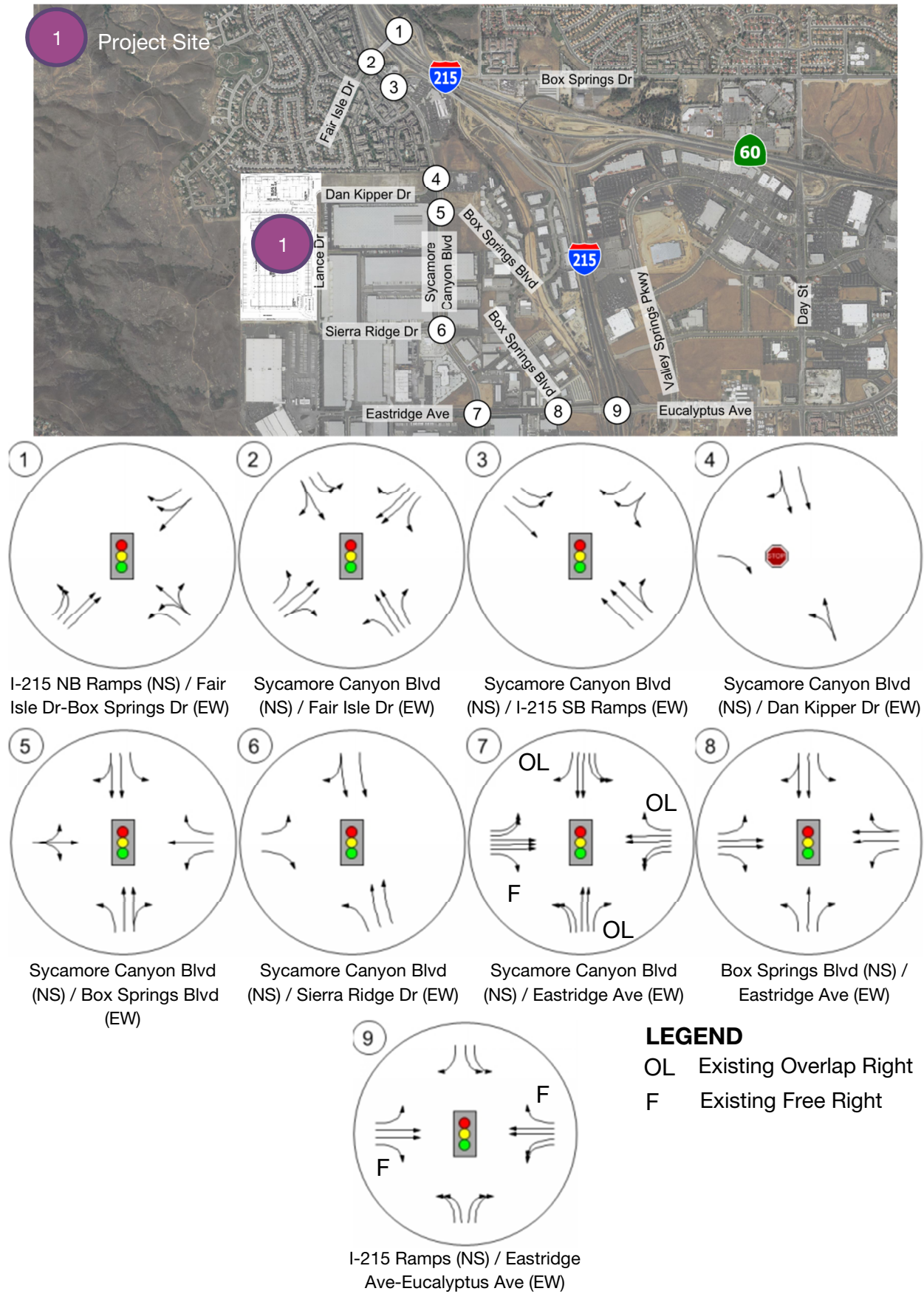
ol = Overlap right-turn movement with left-turn movement

Table 6-2 – Summary of Freeway Segment Geometrics for Existing Plus Project Conditions (2015)

Freeway/Direction of Travel From/To or Junction	Segment Type	Lanes		
		Main	HOV	Ramp
I-215 Northbound				
1. Eastridge-Eucalyptus Off	Diverge	3	0	1
2. Eastridge-Eucalyptus On	Merge	3	0	1
3. Fair Isle-Box Springs On	Merge	4	1	1
I-215 Southbound				
4. Sycamore Canyon Blvd Off	Basic	5	1	NA
5. Truck Bypass/Eastridge Off	Weave	4	0	1
		4	0	2
6. Eastridge-Eucalyptus On	Merge	3	0	1

NA = Not Applicable

Figure 6-A – Summary of Intersection Geometrics for Existing Plus Project (2015)



Proposed Roadway Geometrics – Existing Plus Ambient Growth Plus Project Conditions (2018)

Table 6-3 and Figure 6-B present the proposed intersection geometry that achieves a satisfactory level of service at the study intersections in existing plus ambient growth plus project conditions. No improvements are necessary to the study intersections for this scenario.

Table 6-4 presents proposed roadway geometrics (bolded) for the study freeway segments that achieve satisfactory LOS. The following improvement is needed for the study freeway segment in this scenario:

- Add one HOV lane for northbound I-215 at Eastridge Avenue/Eucalyptus Avenue off-ramp. (This improvement is included in the I-215 North Project.)

Table 6-3 – Summary of Roadway Geometrics for Existing Plus Ambient Growth Plus Project Conditions (2018)

Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
		L	T	R	L	T	R	L	T	R	L	T	R	
1. I-215 Northbound Ramps (NS) Fair Isle Drive-Box Springs Road (EW)	Existing	1	LT	S	NA	NA	NA	2	2	NA	NA	TR	1	Signal
2. Sycamore Canyon Boulevard (NS) Fair Isle Drive (EW)	Existing	1	2	1	2	1	S	1	2	S	1	2	1	Signal
3. Sycamore Canyon Boulevard (NS) I-215 Southbound Ramps (EW)	Existing	NA	3	S	2	1	NA	NA	NA	NA	NA	LR	1	Signal
4. Sycamore Canyon Boulevard (NS) Dan Kipper Drive (EW)	Existing	S	1	NA	NA	2	S	NA	LR	NA	NA	NA	NA	OWSC
5. Sycamore Canyon Boulevard (NS) Box Springs Boulevard (EW)	Existing	1	2	S	1	2	S	S	1	S	1	1	1	Signal
6. Sycamore Canyon Boulevard (NS) Sierra Ridge Drive (EW)	Existing	1	2	NA	NA	2	S	1	NA	1	NA	NA	NA	Signal
7. Sycamore Canyon Boulevard (NS) Eastridge Avenue (EW)	Existing	2	2	1ol	2	2	1ol	2	3	1f	2	2	1ol	Signal
8. Box Springs Boulevard (NS) Eastridge Avenue (EW)	Existing	1	1	1	1	2	S	1	2	1	1	2	S	Signal
9. I-215 Ramps (NS) Eastridge Avenue-Eucalyptus Ave	Existing	2	NA	2	2	NA	1	1	2	1f	2	2	1f	Signal

OWSC = One Way Stop Controlled

NA = Not Applicable

S = Lane is shared with through movement

LR = Lane shared by left-turn and right-turn movements

LT = Lane shared by left-turn and through movements

TR = Lane shared by through and right-turn movements

A = Lane shared by left-turn, through and right-turn movements

< = Left-turn movement also allowed from shared left-turn and through lane

> = Right-turn movement also allowed from shared through and right-turn lane

f = Free right-turn movement

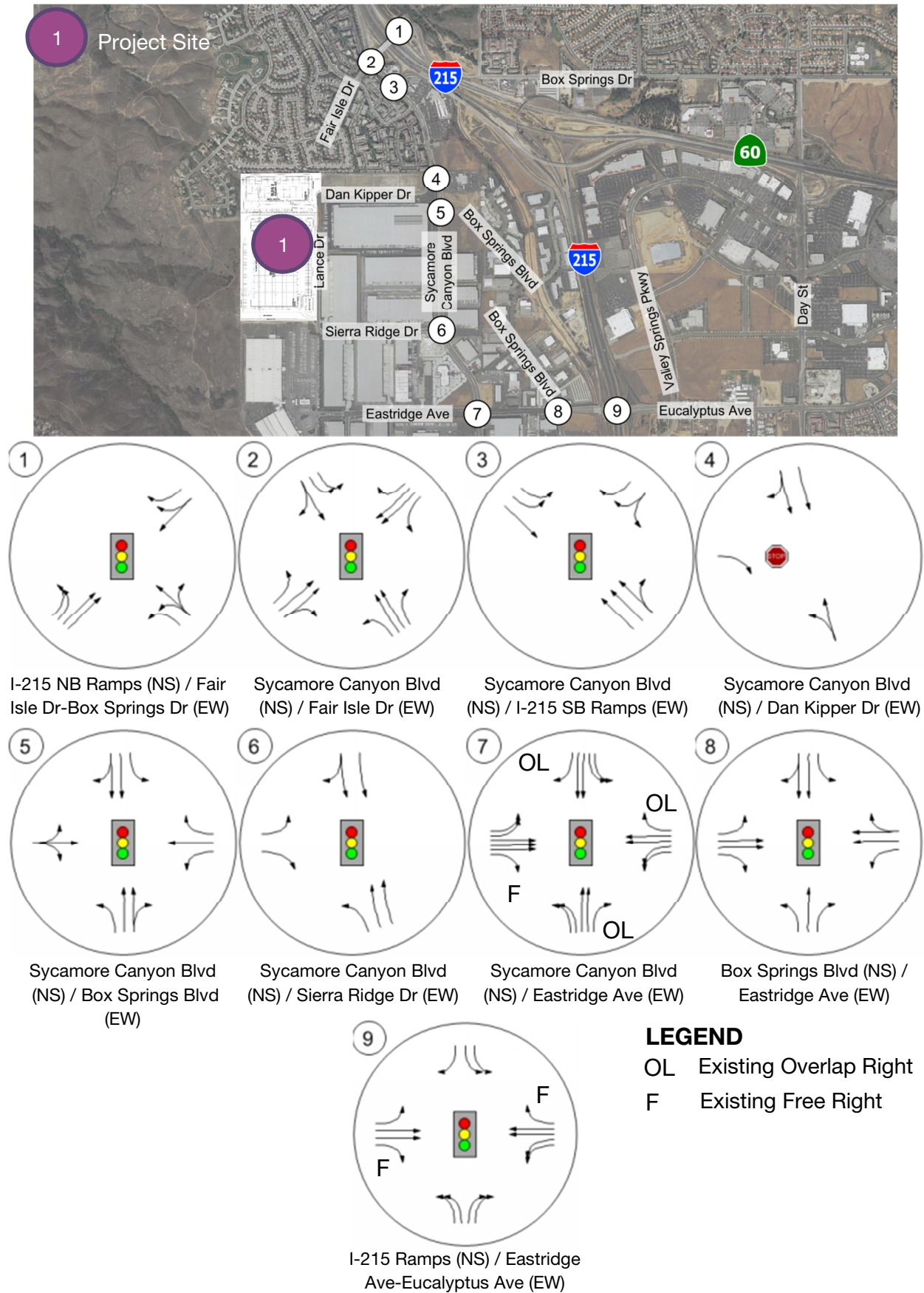
ol = Overlap right-turn movement with left-turn movement

Table 6-4 – Summary of Freeway Segment Improvements for Existing Plus Ambient Growth Plus Project Conditions (2018)

Freeway/Direction of Travel From/To or Junction	Segment Type	Lanes					
		Without Imp.			With Imp.		
		Main	HOV	Ramp	Main	HOV	Ramp
I-215 Northbound							
1. Eastridge-Eucalyptus Off	Diverge	3	0	1	3	1*	1
2. Eastridge-Eucalyptus On	Merge	3	0	1	3	0	1
3. Fair Isle-Box Springs On	Merge	4	1	1	4	1	1
I-215 Southbound							
4. Sycamore Canyon Blvd Off	Basic	5	1	NA	5	1	NA
5. Truck Bypass/Eastridge Off	Weave	4	0	1	4	0	1
		4	0	2	4	0	2
6. Eastridge-Eucalyptus On	Merge	3	0	1	3	0	1

* I-215 North Project - Adds one HOV lane in both directions from Nuevo Road to the 60/215 interchange.
 NA = Not applicable

Figure 6-B – Summary of Intersection Geometrics for Existing Plus Ambient Growth Plus Project (2018)



Proposed Roadway Geometrics – Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions (2018)

Table 6-5 and Figure 6-C present the proposed roadway geometrics in order to achieve a satisfactory level of service at the study intersections in existing plus ambient growth plus cumulative plus project conditions. No improvements are necessary to the study intersections for this scenario.

Table 6-6 presents proposed roadway geometrics (bolded) for the study freeway segments that achieve satisfactory LOS. The following improvements are needed for the study freeway segments in this scenario:

- Add one HOV lane for northbound I-215 at Eastridge Avenue/Eucalyptus Avenue off-ramp. (This improvement is included in the I-215 North Project.)
- Add one mainline mixed flow lane for northbound I-215 at Fair Isle Drive/Box Springs Drive on-ramp.

As stated before, the improvements shown are not a result of a significant impact from the project based on the City of Riverside’s traffic impact analysis guidelines.

Table 6-5 – Summary of Improvements for Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions (2018)

Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound			Traffic Control
		L	T	R	L	T	R	L	T	R	L	T	R	
1. I-215 Northbound Ramps (NS) Fair Isle Drive-Box Springs Road (EW)	Existing	1	LT	S	NA	NA	NA	2	2	NA	NA	TR	1	Signal
2. Sycamore Canyon Boulevard (NS) Fair Isle Drive (EW)	Existing	1	2	1	2	1	S	1	2	S	1	2	1	Signal
3. Sycamore Canyon Boulevard (NS) I-215 Southbound Ramps (EW)	Existing	NA	3	S	2	1	NA	NA	NA	NA	NA	LR	1	Signal
4. Sycamore Canyon Boulevard (NS) Dan Kipper Drive (EW)	Existing	S	1	NA	NA	2	S	NA	LR	NA	NA	NA	NA	OWSC
5. Sycamore Canyon Boulevard (NS) Box Springs Boulevard (EW)	Existing	1	2	S	1	2	S	S	1	S	1	1	1	Signal
6. Sycamore Canyon Boulevard (NS) Sierra Ridge Drive (EW)	Existing	1	2	NA	NA	2	S	1	NA	1	NA	NA	NA	Signal
7. Sycamore Canyon Boulevard (NS) Eastridge Avenue (EW)	Existing	2	2	1ol	2	2	1ol	2	3	1f	2	2	1ol	Signal
8. Box Springs Boulevard (NS) Eastridge Avenue (EW)	Existing	1	1	1	1	2	S	1	2	1	1	2	S	Signal
9. I-215 Ramps (NS) Eastridge Avenue-Eucalyptus Ave	Existing	2	NA	2	2	NA	1	1	2	1f	2	2	1f	Signal

OWSC = One Way Stop Controlled
 NA = Not Applicable
 S = Lane is shared with through movement
 LR = Lane shared by left-turn and right-turn movements
 LT = Lane shared by left-turn and through movements
 TR = Lane shared by through and right-turn movements
 A = Lane shared by left-turn, through and right-turn movements
 < = Left-turn movement also allowed from shared left-turn and through lane
 > = Right-turn movement also allowed from shared through and right-turn lane
 f = Free right-turn movement
 ol = Overlap right-turn movement with left-turn movement

Table 6-6 – Summary of Freeway Segment Improvements for Existing Plus Ambient Growth Plus Cumulative Plus Project Conditions (2018)

Freeway/Direction of Travel From/To or Junction	Segment Type	Lanes					
		Without Imp.			With Imp.		
		Main	HOV	Ramp	Main	HOV	Ramp
I-215 Northbound							
1. Eastridge-Eucalyptus Off ¹	Diverge	3	0	1	3	1*	1
2. Eastridge-Eucalyptus On	Merge	3	0	1	3	0	1
3. Fair Isle-Box Springs On	Merge	4	1	1	5	1	1
I-215 Southbound							
4. Sycamore Canyon Blvd Off	Basic	5	1	NA	5	1	NA
5. Truck Bypass/Eastridge Off	Weave	4	0	1	4	0	1
		4	0	2	4	0	2
6. Eastridge-Eucalyptus On	Merge	3	0	1	3	0	1

* I-215 North Project - Adds one HOV lane in both directions from Nuevo Road to the 60/215 interchange.
 NA = Not applicable