Appendix N Traffic Study

Appendices

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LINSCOTT LAW & GREENSPAN engineers

TRAFFIC CIRCULATION ANALYSIS

BREA 265 SPECIFIC PLAN

Brea, California
February 8, 2022

Prepared for:

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LLG Ref. 2-18-4052-1

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TRAFFIC CIRCULATION ANALYSIS

BREA 265 SPECIFIC PLAN

Brea, California
February 8, 2022

1.0 INTRODUCTION

This Traffic Circulation Analysis report addresses the potential traffic and circulation needs associated with Brea 265 Specific Plan Project (hereinafter referred to as Project) in the City of Brea. The Project consists of the development of a mix of single family and multifamily residential units totaling 1,100 dwelling units along with a 13.0-acre sports park. The proposed Project is generally located east of the State Route (SR) 57 Freeway and north of SR-90 (Imperial Highway), towards the eastern portion of the City. The Project is expected to be developed in several phases with the Year 2035 utilized to assess the Project, at full occupancy, within a near-term cumulative traffic setting.

1.1 Scope of Work

This traffic circulation report documents the findings and recommendations of a traffic analysis conducted by Linscott, Law & Greenspan, Engineers (LLG) to determine the need for potential offsite improvements to offset Project's potential negative effect in the City's traffic circulation system. The traffic analysis evaluates the existing operating conditions at twenty-two (22) key study intersections within the project vicinity, estimates the trip generation potential of the proposed Project, and forecasts future near-term (Year 2035) and General Plan Buildout (Year 2045) operating conditions without and with the proposed Project. Where necessary, intersection improvements are identified.

This traffic report satisfies the traffic requirements of the City of Brea and is consistent with the current *Congestion Management Program (CMP) for Orange County.* The Scope of Work for this traffic study is included in ***Appendix A*** and was developed in conjunction with City of Brea Public Works Department staff.

The project site has been visited and an inventory of adjacent area roadways and intersections was performed. Existing weekday peak hour traffic count information has been collected at twenty-two (22) key study intersections for use in the preparation of intersection Level of Service (LOS) calculations. Information concerning cumulative projects (planned and/or approved) in the vicinity of the proposed Project has been researched at the Cities of Brea, Fullerton, Placentia, Yorba Linda, and Chino Hills. Based on our research, there are twenty-three (23) related projects in the City of Brea, two (2) related projects in Fullerton, and eight (8) related projects in the City of Chino Hills. The thirty-three (33) related projects were considered in the near-term cumulative traffic analysis for this project.

This traffic report analyzes existing and future weekday daily, AM peak hour and PM peak hour traffic conditions for a near-term (Year 2035) and long-term (Year 2045) traffic setting upon

completion of the proposed Project. Near-term (Year 2035) cumulative daily and peak hour traffic forecasts were projected by incorporating a one percent (1.0%) annual growth rate and the trip generation potential of thirty-three (33) related projects. General Plan Buildout (Year 2045) daily and peak hour traffic forecasts were projected based on traffic projections prepared by OCTA utilizing the OCTAM 5.0 Year 2045 Model.

1.2 Study Area

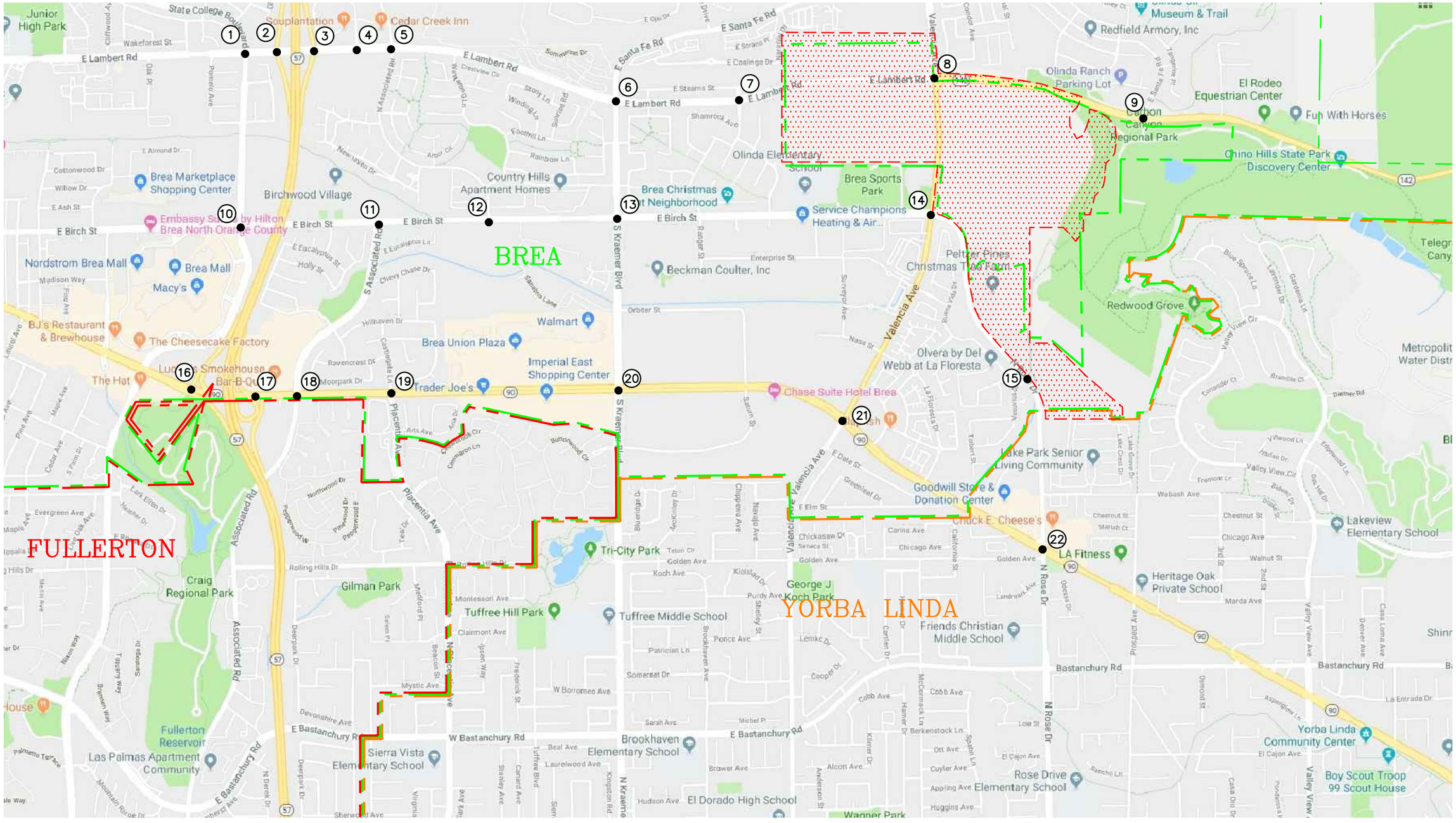
Twenty-two (22) study intersections have been identified for evaluation in collaboration with City of Brea staff. The twenty-two (22) intersections listed below provide regional and local access to the study area and define the extent of the boundaries for this traffic analysis, as well as identifies the applicable jurisdiction and/or City location.

Study Intersection	Applicable Jurisdiction (City Location)		
	Caltrans	City of Brea	City of Placentia
1. State College Boulevard at Lambert Road	--	Brea	--
2. SR-57 SB Ramps at Lambert Road	Caltrans (Brea)	--	--
3. SR-57 NB Ramps at Lambert Road	Caltrans (Brea)	--	--
4. Pointe Drive at Lambert Road	--	Brea	--
5. Wildcat Way/N Associated Road at Lambert Road	--	Brea	--
6. Santa Fe Road/Kraemer Boulevard at Lambert Road	--	Brea	--
7. Sunflower Street at Lambert Road	--	Brea	--
8. Valencia Avenue at Lambert Road/Carbon Canyon Road	Caltrans (Brea)	--	--
9. Santa Fe Road at Carbon Canyon Road	Caltrans (Brea)	--	--
10. State College Boulevard at Birch Street	--	Brea	--
11. S Associated Road at Birch Street	--	Brea	--
12. N Associated Road at Birch Street	--	Brea	--
13. Kraemer Boulevard at Birch Street	--	Brea	--
14. Valencia Avenue at Birch Street/Rose Drive	Caltrans (Brea)	--	--
15. Rose Drive at Vesuvius Drive		Brea	--
16. SR-57 SB Ramps at Imperial Highway	Caltrans (Brea)	--	--
17. SR-57 NB Ramps at Imperial Highway	Caltrans (Brea)	--	--
18. Associated Road at Imperial Highway	Caltrans (Brea)	--	--
19. Castlegate Lane/Placentia Avenue at Imperial Highway	Caltrans (Brea)	--	--
20. Kraemer Boulevard at Imperial Highway	Caltrans (Brea)	--	--
21. Valencia Avenue at Imperial Highway	Caltrans (Brea)	--	--
22. Rose Drive at Imperial Highway	--	--	Caltrans (Placentia)

Figure 1-1 presents a Vicinity Map, which illustrates the general location of the Project and depicts the study locations and surrounding street system. The Level of Service (LOS) investigations at these study locations were used to evaluate the potential traffic effect on the circulation system associated with area growth, cumulative projects and the proposed Project. When necessary, this report recommends intersection and/or roadway improvements that may be required to accommodate future traffic volumes and restore/maintain an acceptable Level of Service.

Included in this Traffic Circulation Analysis are:

- Existing traffic counts,
- Estimated project traffic generation/distribution/assignment,
- Estimated cumulative project traffic generation/distribution/assignment,
- Weekday AM and PM peak hour capacity analyses for existing conditions,
- Weekday AM and PM peak hour capacity analyses for future near-term (Year 2035) traffic conditions without and with the proposed Project,
- Weekday AM and PM peak hour capacity analyses for General Plan Buildout (Year 2045) traffic conditions without and with the proposed Project,
- Intersection Vehicle Queuing Evaluation,
- Site Access and Internal Circulation Evaluation,
- Area-Wide Traffic Improvements,
- Redbay Avenue at Birch Street Focused Assessment, and
- Voyager Avenue at Birch Street and N. Associated Road at Birch Street Focused Assessment.



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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

SOURCE: GOOGLE

KEY

(#) = STUDY INTERSECTION

= PROJECT SITE

FIGURE 1

VICINITY MAP

BREA 265 SPECIFIC PLAN, BREA

2.0 PROJECT DESCRIPTION

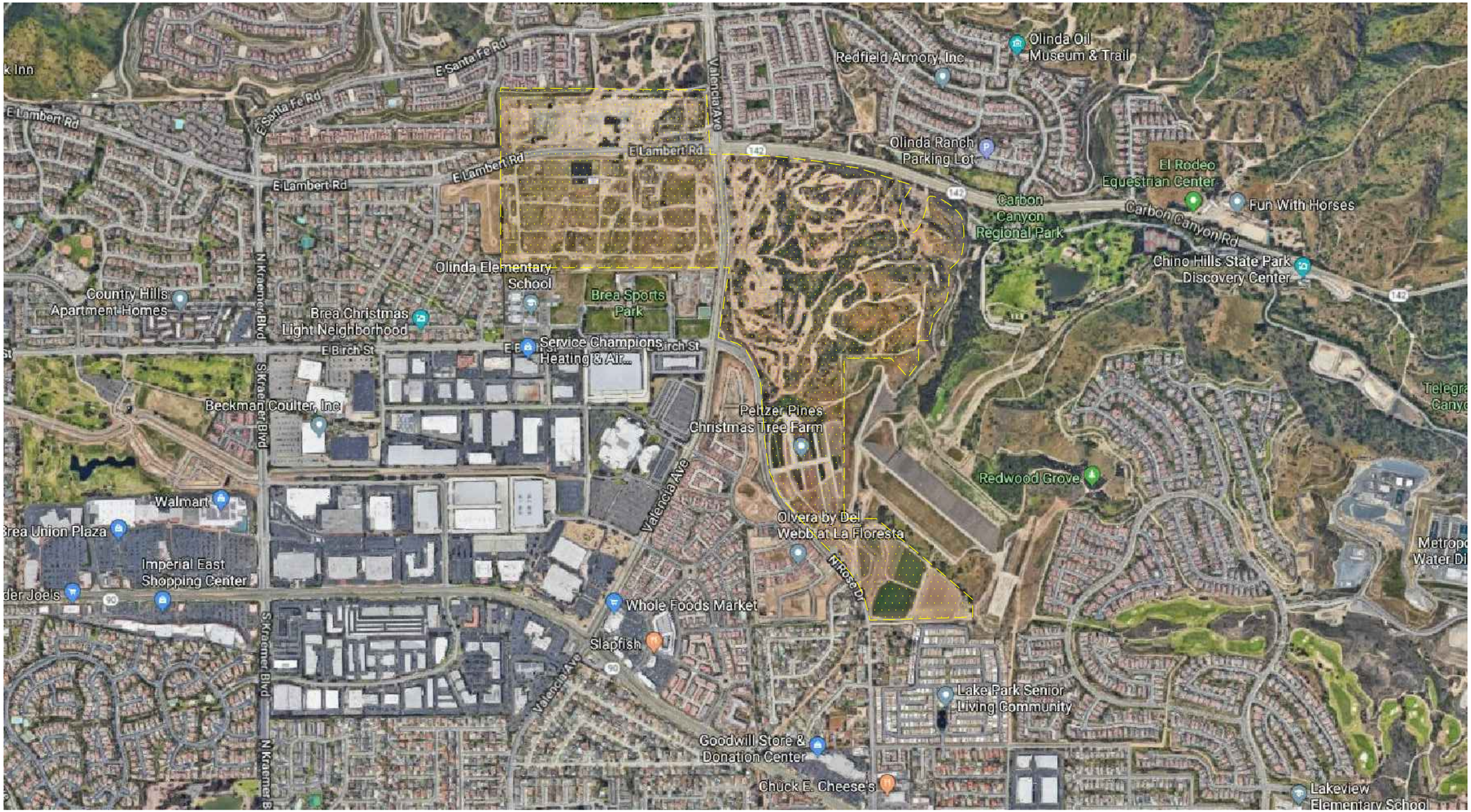
The Brea 265 Specific Plan is a master planned residential community consisting of 260.7 acres located in the City of Brea and unincorporated Orange County; although not a part of the Specific Plan, an additional 1.4 acres of open space located on the northeast corner of Valencia Avenue and Rose Drive has been included this resulting in a total overall acreage of 262.1 acres. The proposed Project is generally located east of the State Route (SR) 57 Freeway and north of SR-90 (Imperial Highway), towards the eastern portion of the City and is surrounded by existing residential neighborhood communities, the Brea Sports Park and Carbon Canyon Regional Park. The Specific Plan area is bisected by Valencia Avenue which runs in a north-south direction, and by Lambert Road which runs in an east-west direction. The Project site is located to the south of Lambert Road/Carbon Canyon Road, north of Rose Drive, east of Valencia Avenue and west of Carbon Canyon Regional Park. Of the 217.7 acres located within unincorporated Orange County, 123.2 acres is currently designated as "Hillside Residential" and 94.5 acres is designated as "Low Density Residential" land use in the City's General Plan. The 43-acre portion of the Project that is located within the City is designated as "Hillside Residential". ***Figure 2-1*** is an existing aerial photograph of the Project site.

2.1 General Plan Zoning

As noted above, the Project's General Plan zoning for the site is to be developed with 166.2 acres of "Hillside Residential" uses, which equates to 332 single family dwelling units (DU) at an assumed density of 2 DU per acre (166.2 acres x 2 DU/acre). For 94.5 acres of "Low Density Residential" use, the Project is zoned to allow development with a maximum density of up to 6 DU per acre. However, based on surrounding residential development, a density of 3 DU per acre has been utilized for the "Low Density Residential" uses, which translates to 283 single family dwelling units (94.5 acres x 3 DU/acre). Therefore, the Project site has a zoning development of up to 615 single family dwelling units.

2.2 Proposed Project

The proposed Project is a master planned residential community of low-density, medium-density, and high-density residential neighborhoods, parks, recreational amenities, and open space within thirteen (13) planning areas (PA) of the proposed specific plan. The Project will include a mix of approximately 1,100 residential dwelling units on 197.5 acres, up to 15.1 acres of parks/recreations uses, including up to 13 acres of Sports Park uses adjacent to the existing Brea Sports Park and a 2.1-acre Trail Staging Area, and 47.5 acres of open space/slopes. The proposed Project allows for a fire station and police substation on a 1.0 acre site on the northwest corner of Lambert and Valencia. Inclusion of 2.0 acres of Master Plan Right-of-way results in a total project acreage of 262.1 acres. Affordable housing units are also included as part of the total dwelling units proposed for the Project. The proposed Project would be developed and constructed in three (3) phases based on oil field abandonment, remediation, and construction of necessary infrastructure, as well as market conditions. The proposed land uses would be linked together by an extensive trail network that will connect to the Tracks at Brea and other regional systems, as well as to the adjacent neighborhoods and off-site parks, open space, and surrounding employment centers and retail venues.



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N NO SCALE

SOURCE: GOOGLE

KEY

= PROJECT SITE

FIGURE 2-1

EXISTING SITE AERIAL

BREA 265 SPECIFIC PLAN, BREA

Per the Project's development tabulation, two (2) residential land use categories are proposed and consists of 450 "low density" DU, and 650 "medium density" DU, with 15.1 acres of parks/recreations uses, including up to 13 acres of Sports Park uses adjacent to the existing Brea Sports Park and a 2.1-acre Trail Staging Area. From review of the Project's details, the above-referenced land uses translate to the development of 450 single family detached DU, and 650 single family attached DU (i.e. townhomes, row homes, detached cluster homes, attached motor court homes, etc.). The proposed Sports Park component of the Project is essentially an expansion of the existing Brea Sports Park, that together will provide the Brea community and new residents of the Project with recreational opportunities.

For the purposes of this analysis, the Project site was split into three (3) zones. Zone 1 is the portion of the Project site located north of Lambert Road. Zone 2 is the portion located south of Lambert Road, west of Valencia Avenue (includes proposed Sports Park). Zone 3 is the portion located east of Valencia Avenue and east of Rose Drive. ***Table 2-1*** provides the Project development summary. ***Figure 2-2*** illustrates the Brea Specific Plan Land Use Plan for the Project. This figure generally illustrates the Parks and Open Space plan for the Project as well.

For our understanding, units may be transferred between land use designations and locations so long as the total number of units does not exceed 1,100 units and the number of units in the planning area does not exceed the maximum number of dwelling units per acre permitted for the planning area's land use designation.

The Project is expected to be completed in three (3) phases over the next several years or so by Year 2030 but is dependent on several factors, including the timing of Project approval. Project funding, market conditions and/or the current COVID-19 environment which could delay Project completion. Due the current COVID-19 pandemic, the Project, like most other proposed development, have experienced delays. As such, Year 2035 has been utilized to assess the Project's potential effect (full buildout/occupancy) on the City's circulation system within a near-term traffic setting.

2.3 Vehicular Site Access

As a part of the development of the Project, vehicular access to the Project from the public streets bordering the subject property will be provided via one (1) full access signalized driveway on Lambert Road, one (1) full access signalized driveway on Valencia Avenue, one (1) full access signalized driveway on Rose Drive, and one (1) full access signalized driveway at the existing intersection of Rose Drive at Vesuvius Drive. Vehicular circulation internal to the various proposed neighborhoods will be provided by a system of local residential streets. ***Figure 2-3*** illustrates the Project-sponsored proposed intersection lane configurations and traffic controls for the Project's vehicular access points noted above.

For the proposed Sports Park, primary vehicular access will be provided via the proposed signalized Project entries on Valencia Avenue and on Lambert Road, with additional vehicular access provided through the existing Brea Sports Park via the unsignalized easterly park driveway located on Birch Street. The "loop" road, which now serves as a "fire lane" and is used by authorized park service

Table 3-1 Proposed Land Use Summary

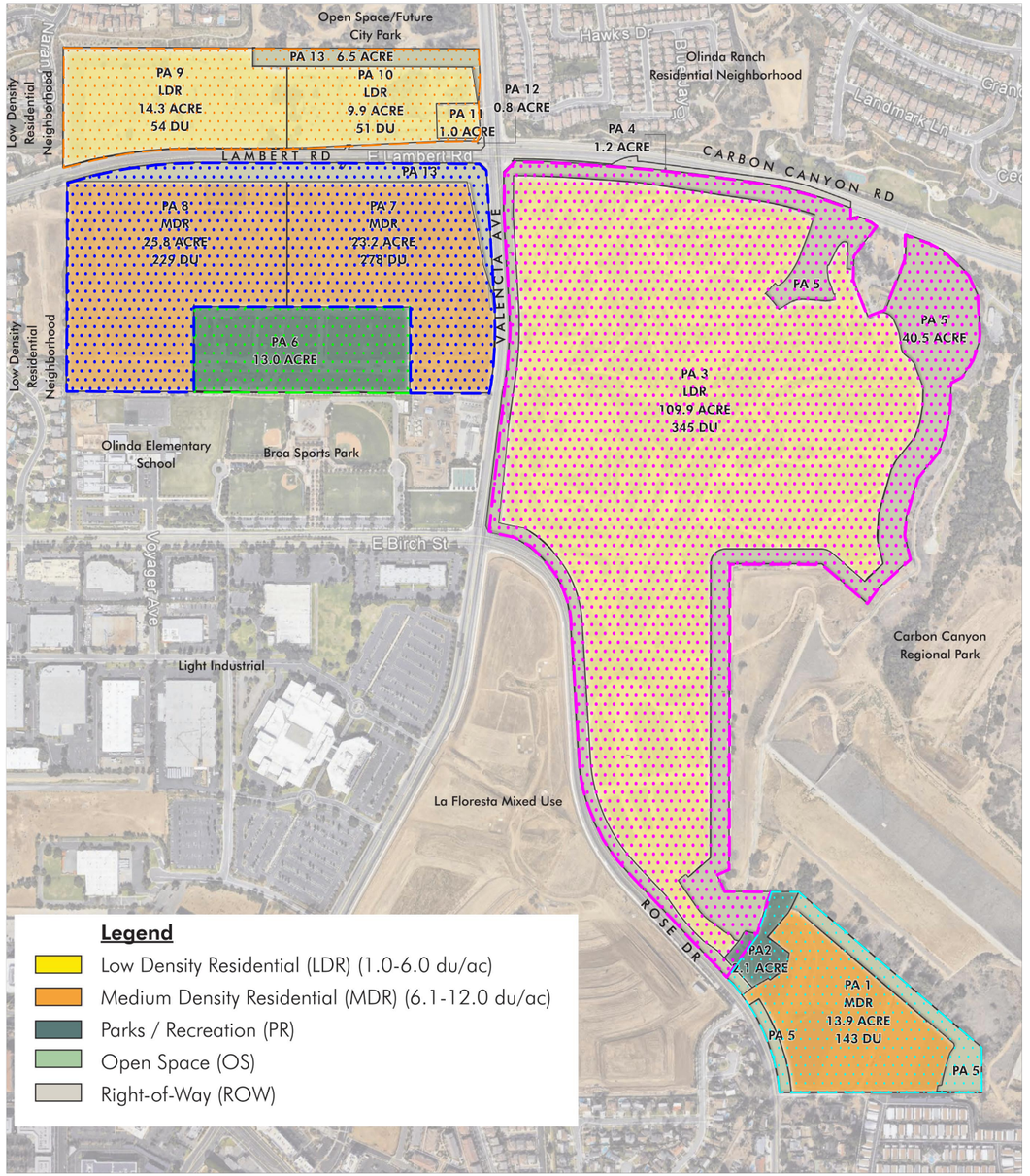
Land Use	Gross Area (Acres)	Density Range (DU/AC)	Dwelling Units
Residential[1]			
Low Density Residential (LDR)	134.6	1.0–6.0	450
Medium Density Residential (MDR)	62.9	6.1–12.0	650
Residential Subtotal	197.5		1,100
Nonresidential			
Park/Recreation (PR)	15.1	—	—
Open Space (OS)[2]	47.5	—	—
Master Plan Right-of-Way	2.0	—	—
Nonresidential Subtotal	64.6	—	—
Total	262.1 acres	4.2	1,100 units

[1] Units may be transferred between density designations and locations.
[2] Open Space category does not include private open space and recreation areas.

Table 3-2 Proposed Land Use Category Statistical Summary by Planning Area

Planning Area (PA)	Land Use Category	Gross Area (AC)	Density Range (DU/AC)[1]	Target Density (DU/AC)[2]	Dwelling Units (DU)[3]
1	MDR	13.9	6.1–12.0	10.3	143
2	PR	2.1	—	—	—
3	LDR	109.4	1.0–6.0	3.2	345
4	ROW	1.2	—	—	—
5	OS	40.5	—	—	—
6	PR	13.0	—	—	—
7	MDR	23.2	6.1–12.0	12.0	278
8	MDR	25.8	6.1–12.0	8.9	229
9	LDR	14.3	1.0–6.0	3.8	54
10	LDR	9.9	1.0–6.0	5.2	51
11[4]	LDR	1.0	1.0–6.0	—	—
12	ROW	0.8	—	—	—
13	OS	6.5	—	—	—
	Specific Plan Total	**262.1 acres**		**4.2**	**1,100**

[1] Density Range is the range between the minimum and maximum number of dwelling units per acre permitted for the planning area's land use designation, as defined by the Orange County General Plan.
[2] Target Density is the number of dwelling units per acre for the planning area as proposed by the Brea 265 Specific Plan and described in Table 3-2 of the Brea 265 Specific Plan). The proposed number of dwelling units in an implementing subdivision application may exceed the target density specified in any planning area without necessitating the preparation of a Specific Plan Amendment or Substantial Conformance provided that: 1) the proposed density transfer in the implementing subdivision application is within the density range for the planning area as described in Table 3-2 of the Brea 265 Specific Plan; and 2) the maximum number of 1,100 dwelling units for the entire Specific Plan is not exceeded.
[3] Transfer of dwelling units from one residential planning area to another within a residential land use category is permitted pursuant to the provisions in Section 6.3, Density Transfer, of the Brea 265 Specific Plan, provided that the maximum total of 1,100 dwelling units within the Brea 265 area is not exceeded.
[4] PA 11 provides for a reserved site for a public safety/civic uses within the time frame described in the Brea 265 Development Agreement. See Section 5.4.1 of the Brea 265 Specific Plan for permitted uses in the LDR residential category.



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N NO SCALE

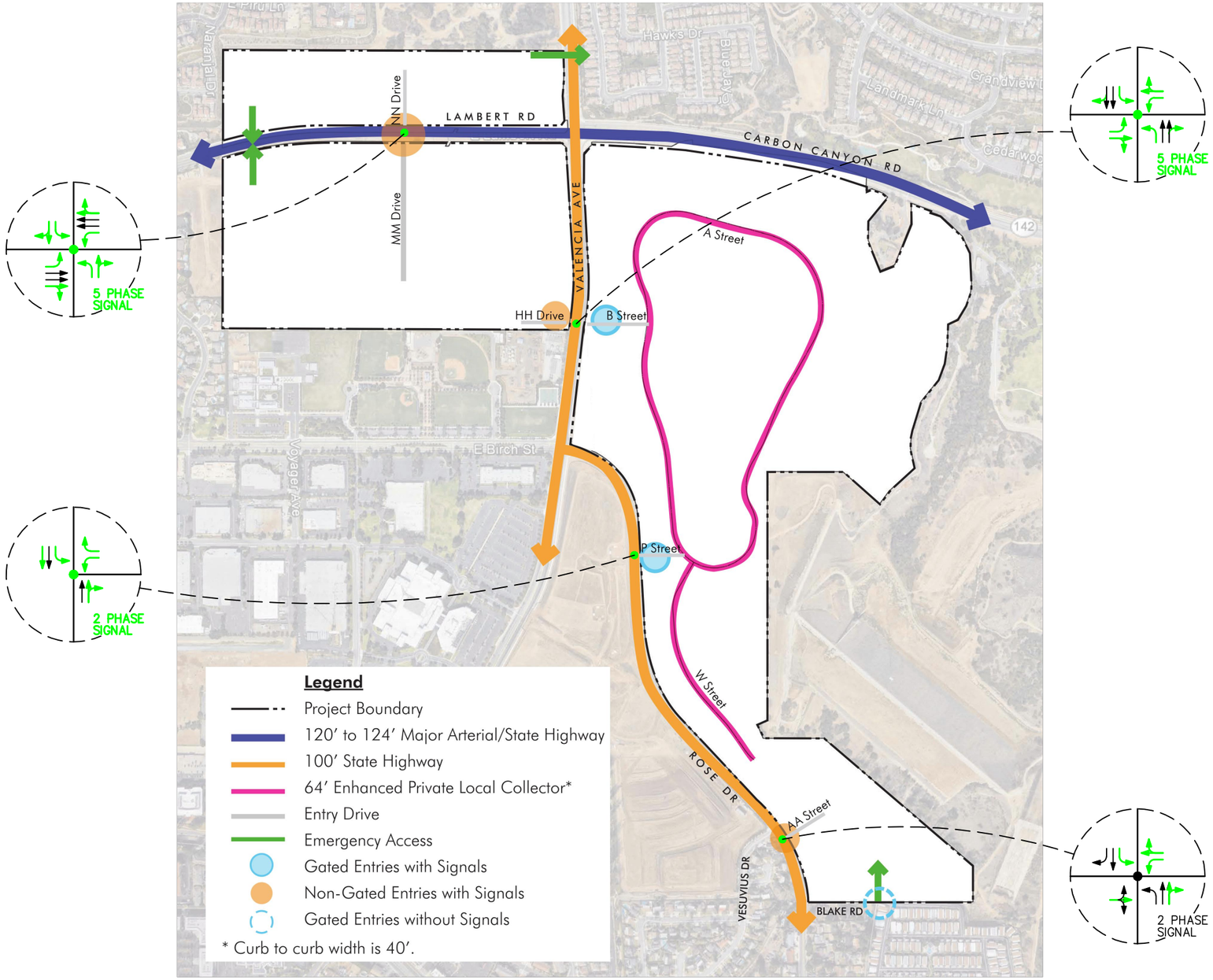
SOURCE: KTGY ARCHITECTURE+PLANNING

KEY
= ZONE 1
= ZONE 2A
= ZONE 2B
= ZONE 3A
= ZONE 3B

N-17

FIGURE 2–2

PROPOSED SITE PLAN
BREA 265 SPECIFIC PLAN, BREA



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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

SOURCE: KTGY ARCHITECTURE+PLANNING

KEY

= APPROACH LANE ASSIGNMENT
= PROJECT SPECIFIC IMPROVEMENTS
= TRAFFIC SIGNAL, = STOP SIGN
= PROJECT SITE

FIGURE 2-3

CIRCULATION PLAN

BREA 265 SPECIFIC PLAN, BREA

vehicles, will be open to through traffic as well as provide for pedestrian and bicycle connectivity between the existing Brea Sports Park and this project component.

2.3.1 *Project Design Features*

In conjunction with access improvements noted above, inclusive of Project-sponsored traffic signals, proposed improvements to be completed as a part of the Project along Lambert Road, Carbon Canyon Road, Valencia Avenue and Rose Drive bordering the subject property include the following Project Design Features:

- Lambert Road, from Valencia Avenue west along Project frontage to just east of Sunflower Street - widen and construct Lambert Road along project frontage to Major Arterial Highway Standards per the City's requirements, providing three 12-foot travel lanes and an 8-foot bike lane in each direction, separated by a 14-foot median within 88-feet of paved width and a right-of way of 120-feet. Lambert Road currently includes two travel lanes in each direction, midblock along the Project frontage.

- Carbon Canyon Road (SR-142), from Valencia Avenue east along Project frontage - widen and construct the south side of Carbon Canyon Road along project frontage to ultimate half-section width per the City's Major Arterial Highway standard and provide three 12-foot travel lanes and an 8-foot bike lane in the eastbound direction, separated by a 14-foot median within 88-feet of paved width and a right-of way of 120-feet. Carbon Canyon Road currently includes three travel lanes, narrowing to two lanes in the easterly direction along the Project frontage.

- Valencia Avenue (SR-142), from Lambert Road/Carbon Canyon Road south to along project frontage - this state route is currently improved to the City's Primary Arterial standards, and now provides two travel lanes and an 8-foot bike lane in each direction, separated by a 14-foot median within 84-feet of paved width and a right-of way of 100-feet; no additional travel lanes are proposed with the Project.

- Rose Drive, from Valencia Avenue south along Project frontage to Vesuvius Drive - widen and construct the east side of Rose Drive along project frontage to Primary Arterial Standards per the City's requirements, providing two foot travel lanes and an 8-foot bike lane in the northbound, separated by a median within 42-feet of half-paved width and a 50-foot half right-of way. To achieve two southbound travels lane along the Project's entire frontage, modifications to the future median and/or lane widths may be needed. Subject to the City's review/approval, it is expected that the design of second southbound through lane will require motorist to merge left to continue through and be terminated as a right-turn lane at the intersection of Rose Drive and Vesuvius Drive to align with the existing southbound right-turn lane at this intersection. Rose Drive currently includes one travel lane in each direction and bike lanes, separated by a painted median.

Figure 2-3 illustrates the Project's Circulation Plan as presented in the Brea 265 Specific Plan.

2.4 Pedestrian and Bicycle Circulation

Pedestrian circulation will be provided via the existing sidewalk system. It should be noted that the existing public sidewalk currently terminates along Lambert Road at the western boundary of the Project site and at Carbon Canyon Road at the northeastern boundary of the Project site. The Project will construct sidewalks along the frontage with construction of the Project along Lambert Road, Carbon Canyon Road, and Rose Drive. The existing sidewalk system within the Project vicinity provides direct connectivity to the existing development located along major thoroughfares. Pedestrian access to the Project will be provided via the proposed Project driveways.

Existing pedestrian facilities within the project area are adequate. Sidewalks are generally provided throughout the City along with crosswalks at most major intersections. In close proximity to the site, Valencia Avenue, Lambert Road, and Imperial Highway provides pedestrians connectivity via the existing sidewalks linking the project site to the surrounding community. ***Figure 2-4*** illustrates the Non-Vehicular Circulation Plan that identifies the existing trails/sidewalks adjacent to the Project site and the proposed trails within the Project site as presented in the Brea 265 Specific Plan.

In addition to the trail and pedestrian connectivity proposed by the Project, a planned bikeway system will facilitate continuous bicycle access throughout the Project site, linking the site the current bicycle facilities in the immediate area. On-street bike plane will be provided on both sides of Lambert Road, Valencia Avenue, and Rose Drive, and on the south side of Carbon Canyon Road upon completion of proposed Project Design Features.

LEGEND

Public Multi-Purpose Trails:

20' Wide Dual Tread Multi-Purpose Trail
10' Asphalt + 10' D.G.

14' Wide Trail - AC Paving Center Striped
10' Asphalt + (x2) 2' Shoulder

On-street Bikeway

Existing Trail

N.A.P- Potential Future Trail Access

Pedestrian Under Crossing

Potential Future Access

SOURCE: KTGY ARCHITECTURE+PLANNING

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FIGURE 2-4

NON-VEHICULAR CIRCULATION PLAN

BREA 265 SPECIFIC PLAN, BREA

TABLE 2-1

PROJECT DEVELOPMENT SUMMARY

Land Use/Project Description	Project Development Totals No. of Dwelling Units (DU) / Acres
Proposed Project Zone 1 (north of Lambert, west of Valencia):	
▪ Single Family Detached Residential	105 DU
▪ Public Facility	1.0 acre
Zone 1 Subtotal	*105 DU*
Proposed Project Zone 2 (south of Lambert, west of Valencia:	
▪ Multifamily /Single Family Attached Residential	507 DU
▪ Sport Park	13.0 acres[1]
Zone 2 Subtotal	*507 DU*
Proposed Project Zone 3 (south of Carbon Canyon Road, east of Valencia and east of Rose:	
▪ Single Family Detached Residential	345 DU
▪ Multifamily/Single Family Attached Residential	143 DU
Zone 3 Subtotal	*488 DU*
Total Proposed Project	**1,100 Units 13.0 acre Sports Park**

[1] The Sports Park component of the Project assumed to developed with a combination of a baseball/softball field and multi-purpose field that can be used for football or soccer. Other on-site amenities include a fitness trail, an activities shelter, basketball and tennis courts, and a playground plus pickleball courts, For this analysis, it is assumed up to two (2) full-sized soccer fields will be provided. However, when taking into consideration that a full-sized soccer field can be subdivided into approximately 2-3 child-sized fields, this analysis will conservatively analyze a total of six (6) soccer fields.

3.0 EXISTING CONDITIONS

3.1 Existing Street System

The principal local network of streets serving the project site includes Lambert Road, Birch Street, Imperial Highway, Kraemer Boulevard, Valencia Avenue, and Rose Drive. The following discussion provides a brief synopsis of these key area streets. The descriptions are based on an inventory of existing roadway conditions.

Lambert Road is a six-lane, divided roadway west of Kraemer Boulevard and a four-lane, divided roadway east of Kraemer Boulevard, oriented in the east-west direction. Lambert Road borders the northeast side of the Project site. The posted speed limit on Lambert Road is 50 miles per hour (mph). On-street parking is not permitted along this roadway. Traffic signals control the study intersections of Lambert Road at State College Boulevard, SR-57 Ramps, Pointe Drive, Wildcat Way/N Associated Road, Santa Fe Road/Kraemer Boulevard, Sunflower Street, and Valencia Avenue. Project access will be provided via a signalized driveway along Lambert Road.

Birch Street is a four-lane, divided roadway oriented in the east-west direction. The posted speed limit on Birch Street is 50 miles per hour (mph). On-street parking is not permitted along this roadway. Traffic signals control the study intersections of Birch Street at State College Boulevard, S Associated Road, N Associated Road, Kraemer Boulevard, and Valencia Avenue.

Imperial Highway is a six-lane, divided roadway generally oriented in the east-west direction. The posted speed limit on Imperial Highway is 45 mph west of the SR-57 Freeway and 50 mph east of the SR-57 Freeway. On-street parking is not permitted along this roadway. A traffic signal controls the study intersections of Imperial Highway at SR-57 Ramps, Associated Road, Placentia Avenue, Kramer Boulevard, Valencia Avenue, and Rose Drive.

Kraemer Boulevard is a six-lane, divided roadway north of Imperial Highway and a four-lane, divided roadway south of Imperial Highway oriented in the north-south direction. The posted speed limit is 50 mph north of Imperial Highway and 45 mph south of Imperial Highway, with no on-street parking permitted. Traffic signals control the study intersections of Kraemer Boulevard at Lambert Road, Birch Street, and Imperial Highway.

Valencia Avenue is a four-lane, divided roadway that borders the Project site to the west, generally oriented in the north-south direction. The posted speed limit is 45 mph north of Imperial Highway and 40 mph south of Imperial Highway. Parking is not permitted on either side of the roadway. Traffic signals control the study intersections of Valencia Avenue at Lambert Road, Birch Street/Rose Drive, and Imperial Highway. Project access will be provided via a signalized driveway along Valencia Avenue.

Rose Drive is a two-lane, divided roadway that borders the southern portion of the Project site. The posted speed limit is 40 mph. On-street parking is not permitted on either side of the roadway. Traffic signals control the study intersections of Rose Drive at Valencia Avenue, Vesuvius Drive,

and Imperial Highway. Project access will be provided at a signalized driveway along Rose Drive and at the signalized intersection with Vesuvius Drive.

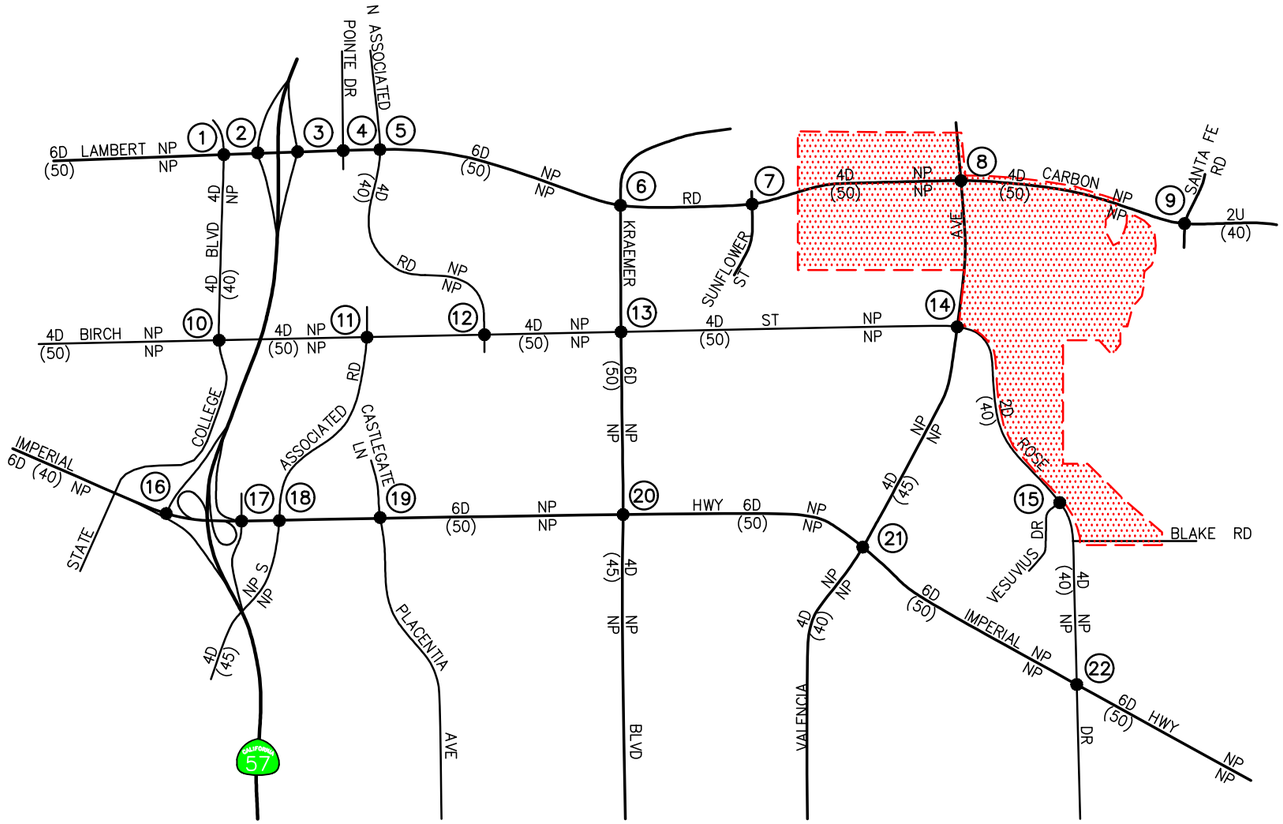
Figure 3-1 presents an inventory of the existing roadway conditions for the arterials and intersections evaluated in this report. This figure identifies the number of travel lanes for key arterials, as well as intersection configurations and controls for the key area study intersections.

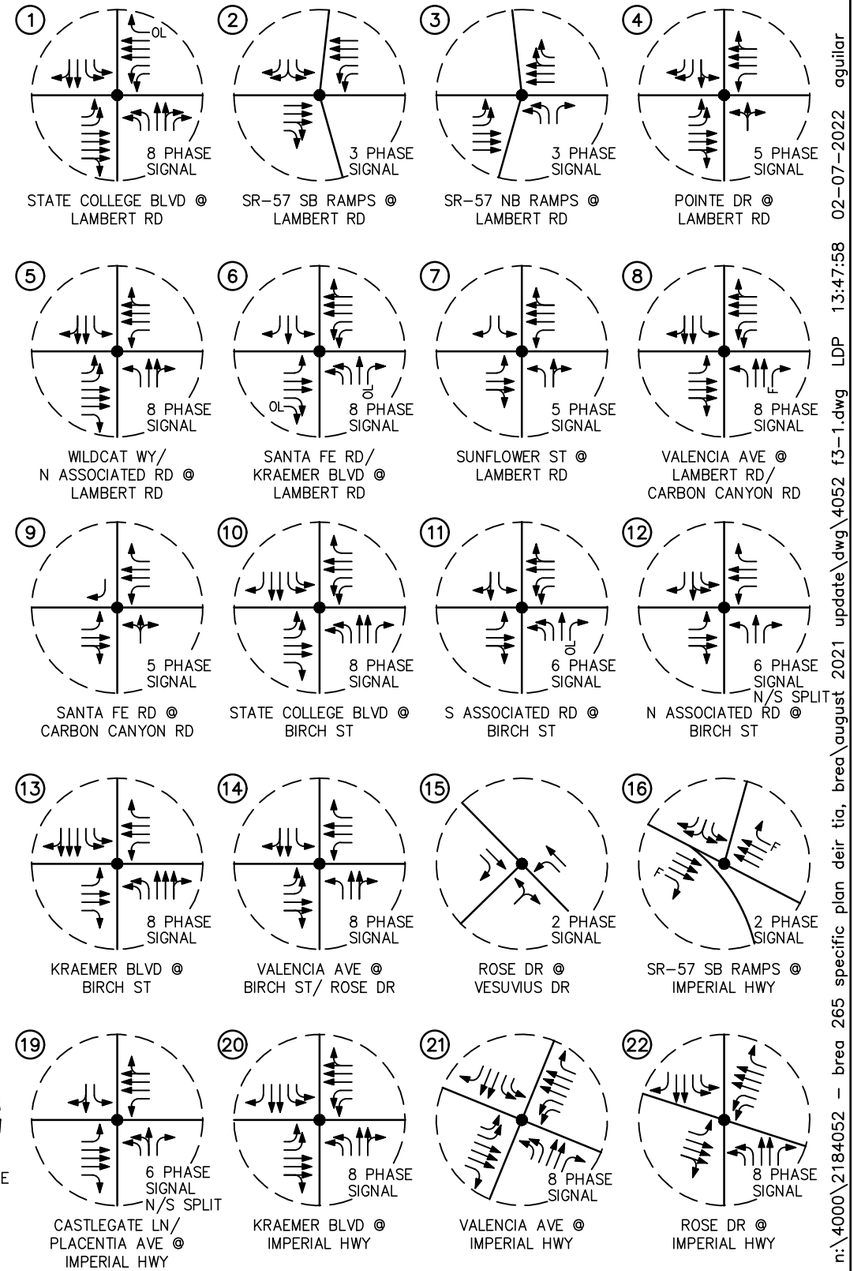
3.2 Existing Public Transit

Public transit bus service is provided in the project area by the Orange County Transportation Authority (OCTA). Five (5) OCTA bus routes operate within the vicinity of the Project site on State College Boulevard, Birch Street, Kraemer Boulevard, and Rose Drive, which consist of the following:

- OCTA Route 26 (Fullerton to Yorba Linda): Route 26 is a local bus route serving the Cities of Placentia, Fullerton, and Buena Park. The major routes of travel include Yorba Linda Avenue. Nearest to the project site are bus stops at the intersection of Rose Drive at Yorba Linda Boulevard. Route 26 operates on approximate 30-minute headways during weekdays and 45-minute headways during weekends.
- OCTA Route 57 (Brea to Newport Beach): Route 57 is a local bus route serving the Cities of Brea, Fullerton, Anaheim, Orange, Santa Ana, Costa Mesa, and Newport Beach. The major routes of travel include State College Boulevard. Nearest to the project site are bus stops at the intersection of State College Boulevard at Birch Street. Route 57 operates on approximate 15-minute headways during the weekdays and weekends.
- OCTA Route 71 (Yorba Linda to Newport Beach): Route 71 is a local bus route serving the Cities of Yorba Linda, Placentia, Anaheim, Orange, Tustin, Santa Ana, Irvine, Costa Mesa, and Newport Beach. The major routes of travel include Rose Drive and Red Hill Avenue. Nearest to the project site are bus stops at the intersection of Rose Drive at Yorba Linda Boulevard. Route 71 operates on approximate 45-minute headways during weekdays and 60-minute headways on weekends.
- OCTA Route 129 (La Habra to Anaheim): Route 129 is a community bus route serving the Cities of Anaheim, Placentia, Yorba Linda, Brea, and La Habra. The major routes of travel include La Habra Boulevard, Brea Boulevard, Birch Street, and Kraemer Boulevard. Nearest to the project site are bus stops at the intersection of Birch Street at Kraemer Boulevard. Route 129 operates on approximate 55-minute headways during weekdays and 60-minute headways on weekends.
- OCTA Route 153 (Brea to Anaheim): Route 153 is a community bus route serving the Cities of Brea, Placentia, Fullerton, Anaheim, and Orange. The major routes of travel include Placentia Avenue. Nearest to the project site are bus stops at the intersection of Birch Street at S Associated Road. Route 153 operates on approximate 60-minute headways during weekdays and weekends.

Figure 3-2 graphically illustrates the transit routes of OCTA within the vicinity of the Project site, as of October 10, 2021. ***Figure 3-3*** identifies the location of the existing bus stops in proximity to the Project site.





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N NO SCALE

KEY

- ← = APPROACH LANE ASSIGNMENT
- ● = TRAFFIC SIGNAL, ▼ = STOP SIGN
- P = PARKING, NP = NO PARKING
- U = UNDIVIDED, D = DIVIDED
- 2 = NUMBER OF TRAVEL LANES
- (XX)= POSTED SPEED LIMIT (MPH)
- F = FREE-RIGHT
- OL = OVERLAP
- ▭ = PROJECT SITE

FIGURE 3-1

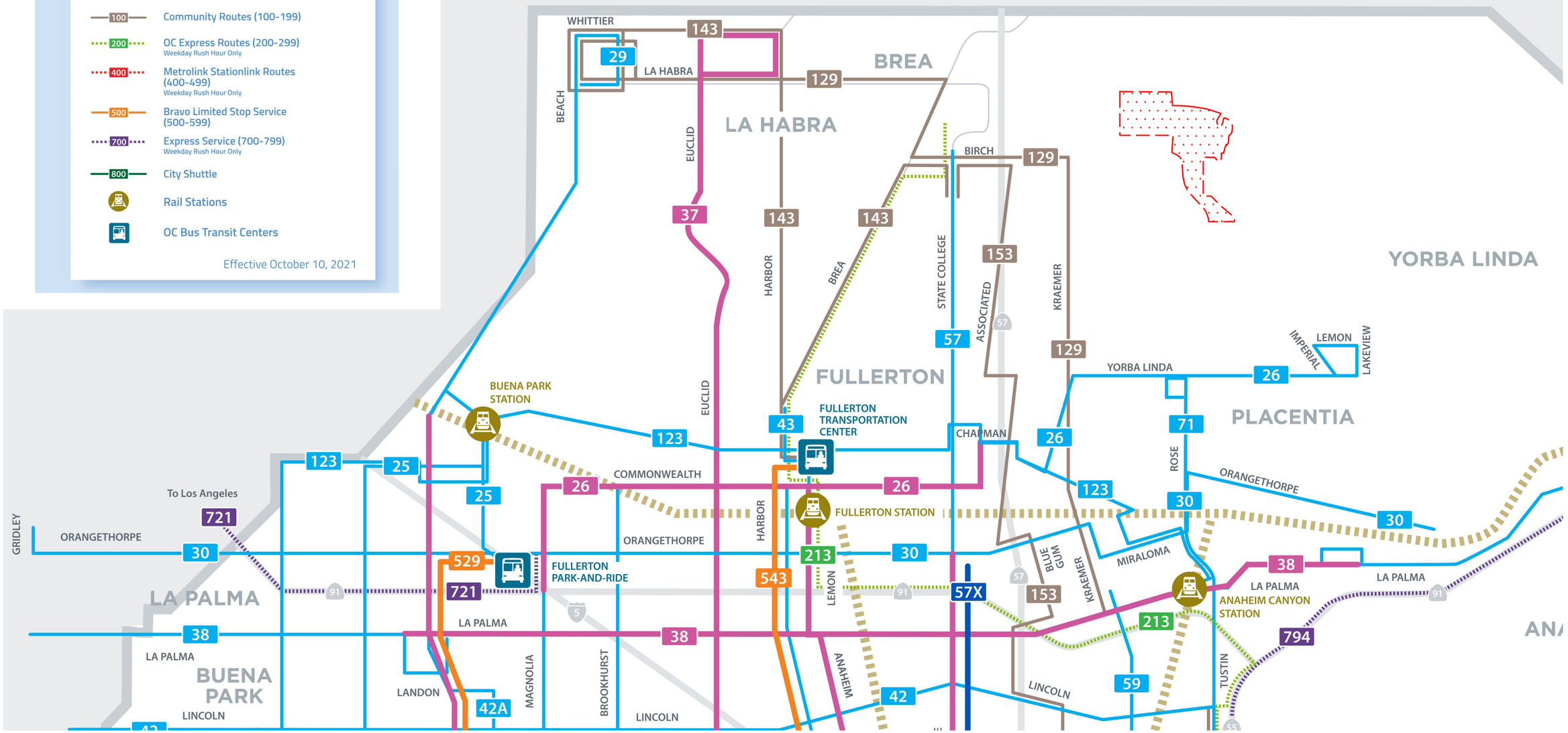
EXISTING ROADWAY CONDITIONS AND INTERSECTION CONTROLS

BREA 265 SPECIFIC PLAN, BREA

System Map

- 1 — Routes offering 15 minutes (or less) Weekday rush hour frequency
- 1 — Local Routes (1-99)
- 100 — Community Routes (100-199)
- 200 — OC Express Routes (200-299) Weekday Rush Hour Only
- 400 — Metrolink Stationlink Routes (400-499) Weekday Rush Hour Only
- 500 — Bravo Limited Stop Service (500-599)
- 700 — Express Service (700-799) Weekday Rush Hour Only
- 800 — City Shuttle
- Rail Stations
- OC Bus Transit Centers

Effective October 10, 2021



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SOURCE: OCTA

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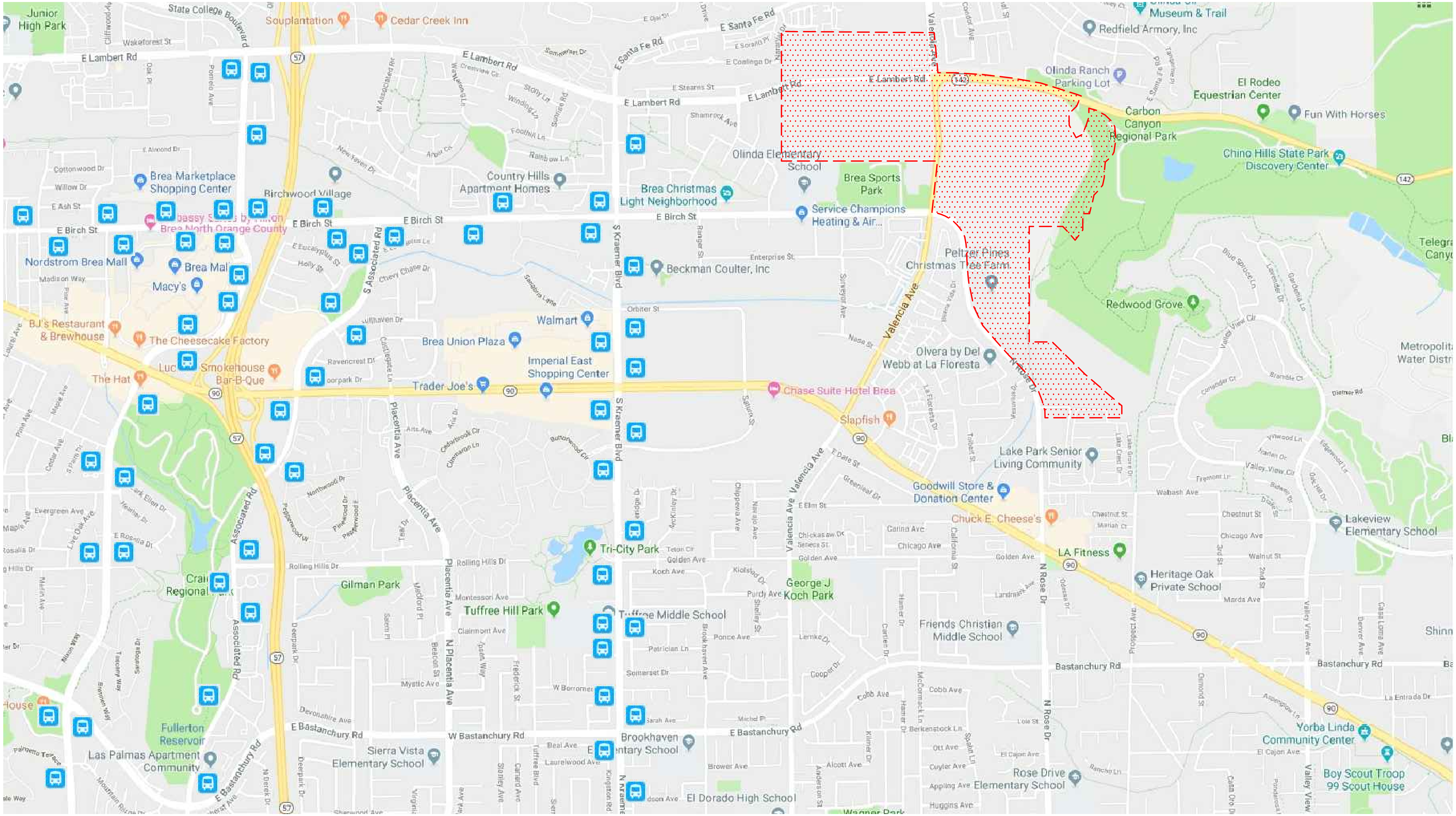
N NO SCALE

FIGURE 3-2

OCTA ROUTES

BREA 265 SPECIFIC PLAN, BREA



LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

SOURCE: GOOGLE

KEY

= PROJECT SITE

= TRANSIT STOP

FIGURE 3–3

TRANSIT STOP LOCATIONS

BREA 265 SPECIFIC PLAN, BREA

3.3 Existing Bikeway Plan

The City of Brea promotes bicycling as a means of mobility and a way in which to improve the quality of life within its community. The Bikeway Plan recognizes the needs of bicycle users and aims to create a complete and safe bicycle network throughout the City. The City of Brea Bike Plan (existing and proposed) is shown on ***Figure 3-4***. In close proximity to the site, an existing Class II bike lane is provided along Rose Drive. There is a proposed Class I bike path along Carbon Canyon Road and Valencia Avenue.

3.4 Existing Traffic Volumes

Due to the Covid-19 virus, the Governor of California has issued a state-wide "stay at home" order which has ultimately resulted in a decrease in traffic. Based on these current conditions, the ability to collect traffic counts to establish baseline conditions that would be reflective of traffic conditions without "stay at home" orders in effect are not possible. As such, to establish "baseline" traffic conditions, pre-Covid-19 (i.e. under normal circumstances without "stay at home" orders in effect), LLG has researched historic data and was able to obtain Year 2018/2019 AM peak hour and PM peak hour traffic counts at all twenty-two (22) study locations, as well as Year 2018 daily traffic counts at twenty-five (25) roadway segments. As such, to establish existing "baseline" traffic conditions, an annual growth factor of 1% per year was applied to the Year 2018/2019 conditions to establish Year 2021 pre-COVID-19 baseline traffic conditions.

Figures 3-5 and ***3-6*** illustrate the existing Year 2021 AM and PM peak hour traffic volumes at the twenty-two (22) study intersections evaluated in this report, respectively. *Figure 3-6* also presents the existing average daily traffic volumes for the twenty-five (25) roadway segments in the vicinity of the proposed Project.

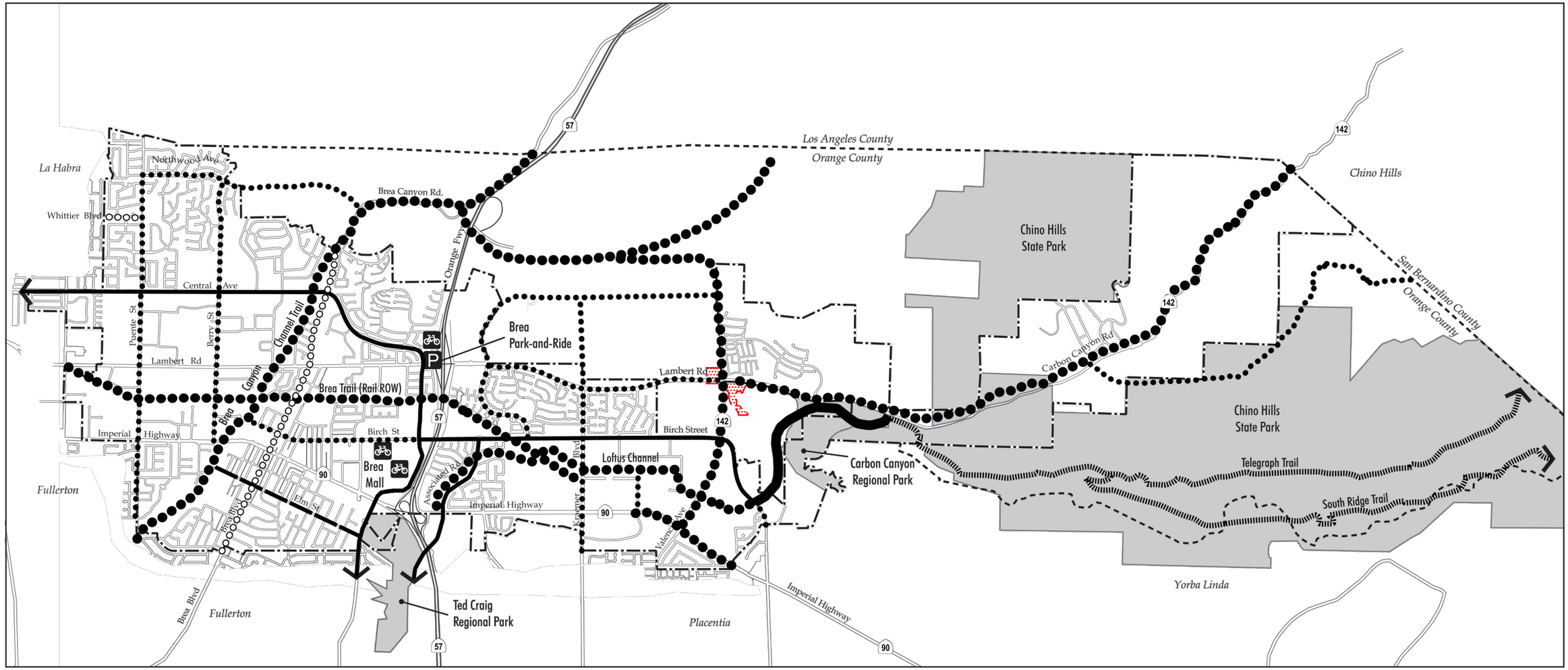
Appendix B contains the detailed peak hour and daily traffic count sheets for the study intersections and roadway segments.

3.5 Level of Service (LOS) Analysis Methodologies

Existing weekday AM and PM peak hour operating conditions for the study intersections were evaluated using the *Intersection Capacity Utilization* (ICU) methodology for signalized intersections as well as the methodology outlined in the *Highway Capacity Manual*. Per the City's direction, the Intersection Capacity Utilization (ICU) method will be used for the purpose of consistency with the City of Brea General Plan.

3.5.1 *Intersection Capacity Utilization (ICU) Method of Analysis*

Weekday AM and PM peak hour operating conditions for the signalized study intersections were evaluated using the Intersection Capacity Utilization (ICU) method. The ICU technique is intended for signalized intersection analysis and estimates the volume to capacity (V/C) relationship for an intersection based on the individual V/C ratios for key conflicting traffic movements. The ICU numerical value represents the percent signal (green) time, and thus capacity, required by existing



Legend

- City Boundary
- Sphere of Influence

Bike Ways

- Bike Path (Class I)
- Bike Lane (Class II)
- Bike Route (Class III)
- Off Road (Unpaved)

Bike Ways (Proposed)

- Bike Path (Class I)
- Bike Lane (Class II)
- Bike Route (Class III)

- Park and Ride
- Bike Parking Facility

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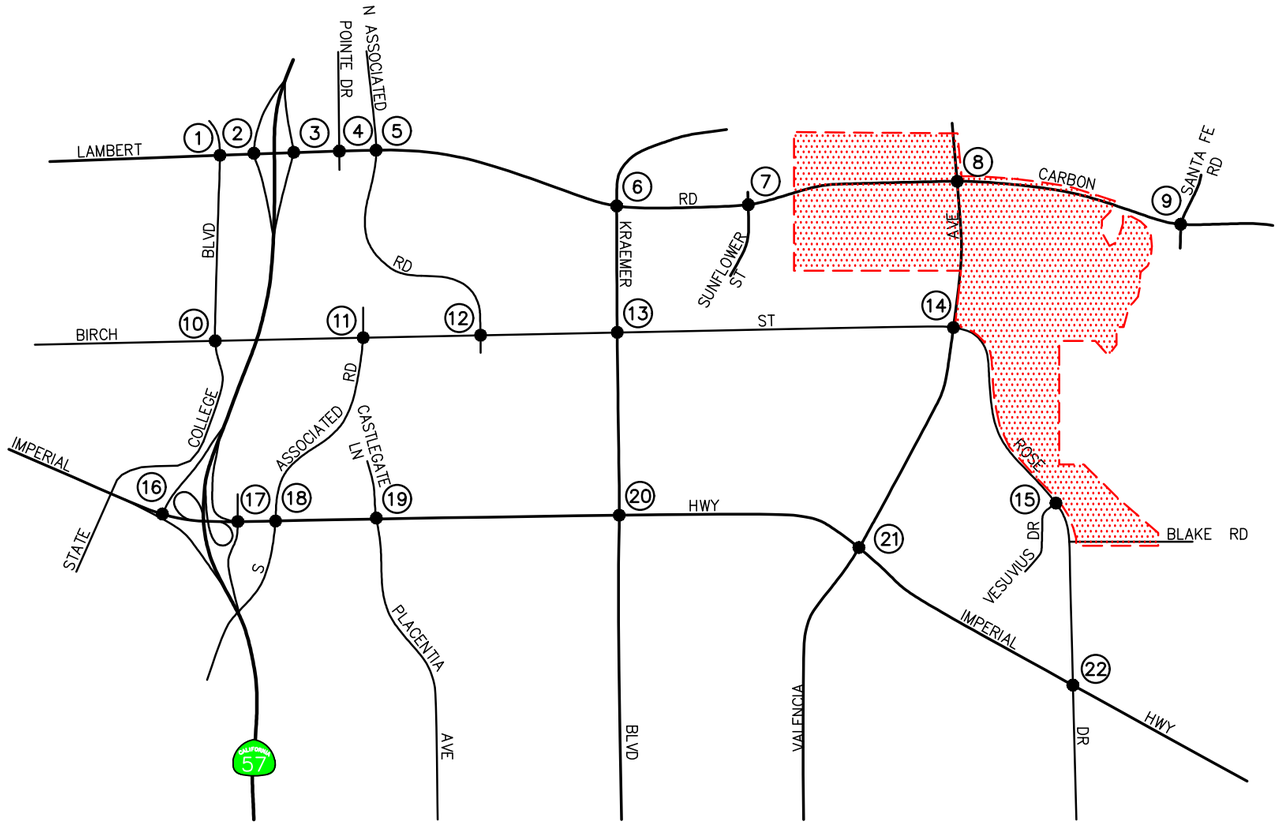
N NO SCALE

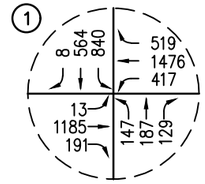
SOURCE: CITY OF BREA

FIGURE 3-4

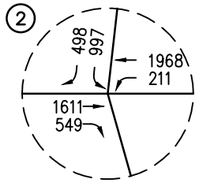
CITY OF BREA BIKE PLAN

BREA 265 SPECIFIC PLAN, BREA

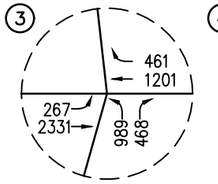




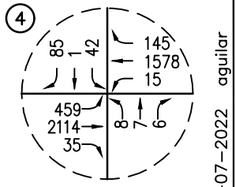
STATE COLLEGE BLVD @ LAMBERT RD



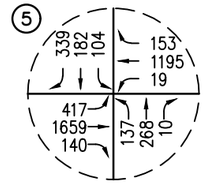
SR-57 SB RAMPS @ LAMBERT RD



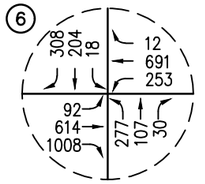
SR-57 NB RAMPS @ LAMBERT RD



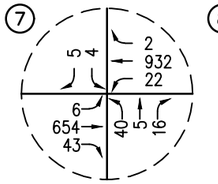
POINTE DR @ LAMBERT RD



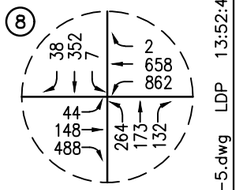
WILDCAT WY/ N ASSOCIATED RD @ LAMBERT RD



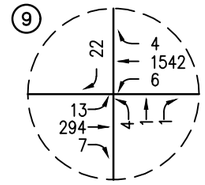
SANTA FE RD/ KRAEMER BLVD @ LAMBERT RD



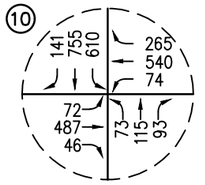
SUNFLOWER ST @ LAMBERT RD



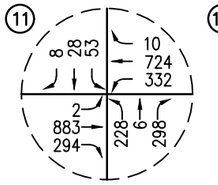
VALENCIA AVE @ LAMBERT RD/ CARBON CANYON RD



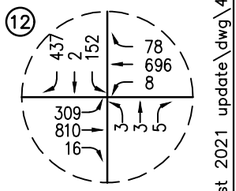
SANTA FE RD @ CARBON CANYON RD



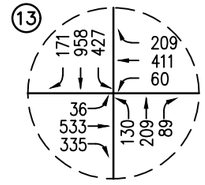
STATE COLLEGE BLVD @ BIRCH ST



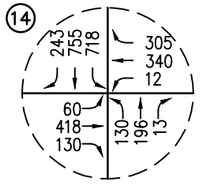
S ASSOCIATED RD @ BIRCH ST



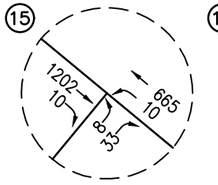
N ASSOCIATED RD @ BIRCH ST



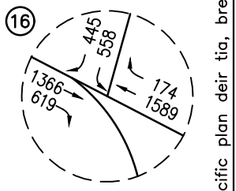
KRAEMER BLVD @ BIRCH ST



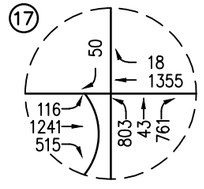
VALENCIA AVE @ BIRCH ST/ ROSE DR



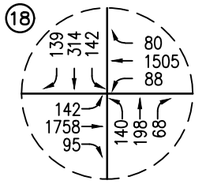
ROSE DR @ VESUVIUS DR



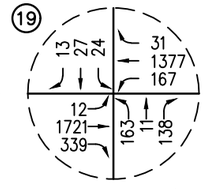
SR-57 SB RAMPS @ IMPERIAL HWY



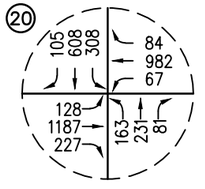
SR-57 NB RAMPS @ IMPERIAL HWY



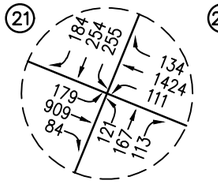
ASSOCIATED RD @ IMPERIAL HWY IMPERIAL HWY



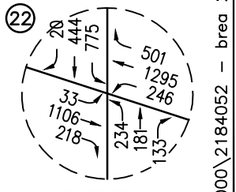
CASTLEGATE LN/ PLACENTIA AVE @



KRAEMER BLVD @ IMPERIAL HWY



VALENCIA AVE @ IMPERIAL HWY



ROSE DR @ IMPERIAL HWY

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N NO SCALE

KEY

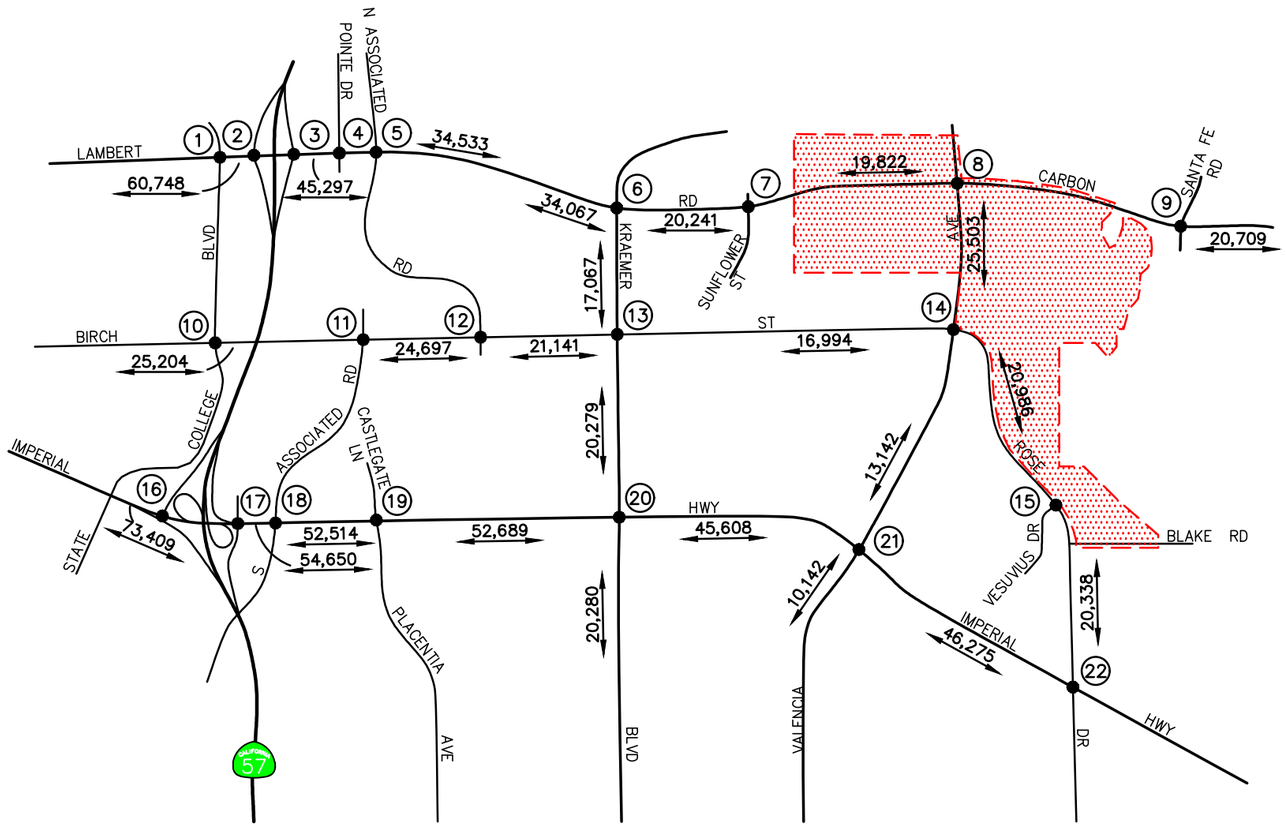
(#) = STUDY INTERSECTION

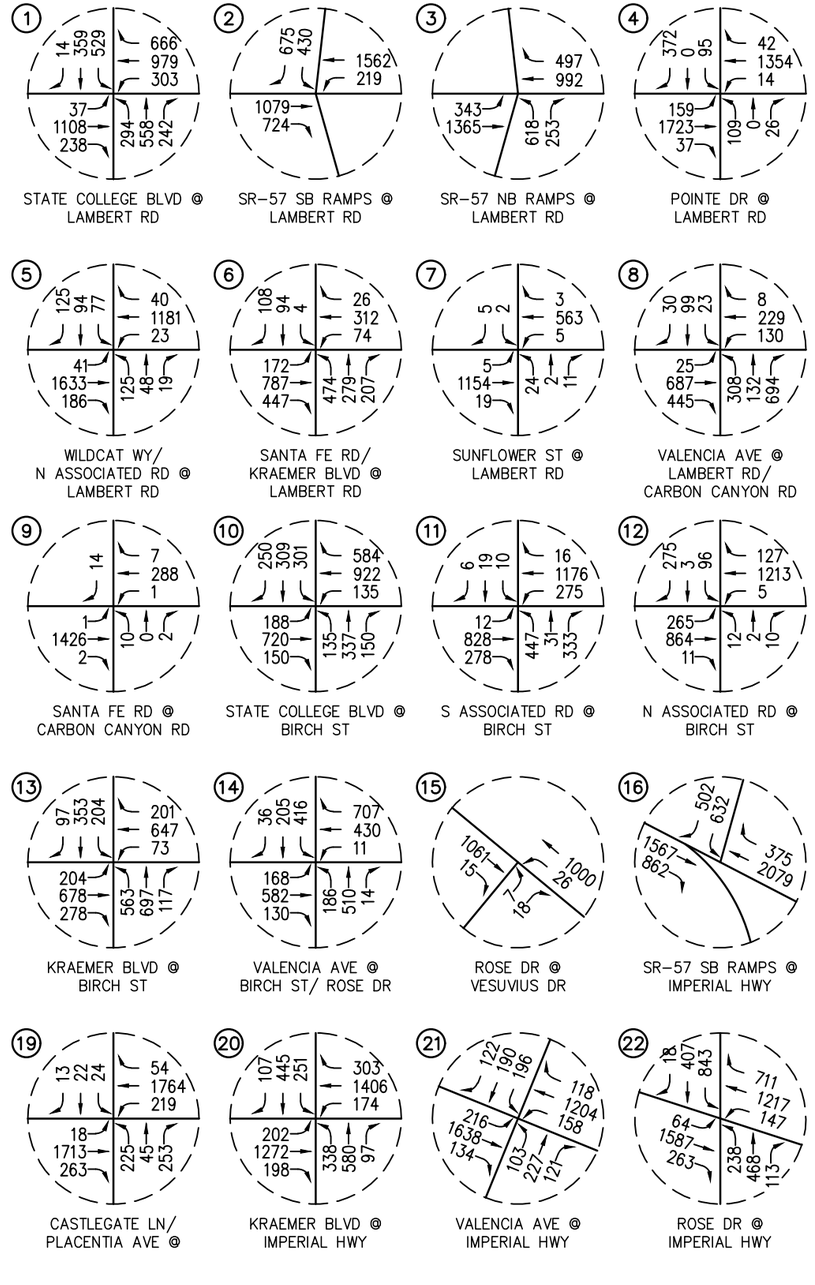
= PROJECT SITE

FIGURE 3-5

EXISTING AM PEAK HOUR TRAFFIC VOLUMES

BREA 265 SPECIFIC PLAN, BREA





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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

KEY

(#) = STUDY INTERSECTION

XX,XXX = DAILY TRAFFIC VOLUMES

= PROJECT SITE

FIGURE 3-6

EXISTING PM PEAK HOUR AND DAILY TRAFFIC VOLUMES

BREA 265 SPECIFIC PLAN, BREA

and/or future traffic. It should be noted that the ICU methodology assumes uniform traffic distribution per intersection approach lane and optimal signal timing.

Per City of Brea requirements, the ICU calculations use a lane capacity of 1,700 vehicles per hour (vph) for through and all turn lanes. A clearance adjustment factor of 0.05 was added to each Level of Service calculation.

The ICU value translates to a Level of Service (LOS) estimate, which is a relative measure of the intersection performance. The ICU value is the sum of the critical volume to capacity ratios at an intersection; it is not intended to be indicative of the LOS of each of the individual turning movements. The six qualitative categories of Level of Service have been defined along with the corresponding ICU value range and are shown in ***Table 3-1***.

3.5.2 *Highway Capacity Manual (HCM) Method of Analysis (Signalized Intersections)*

Weekday AM and PM peak hour operating conditions for study intersections were evaluated using the methodology outlined in *Chapter 19 of the Highway Capacity Manual 6 (HCM 6)* for signalized intersections.

Based on the HCM operations method of analysis, level of service for signalized intersections and approaches is defined in terms of control delay, which is a measure of the increase in travel time due to traffic signal control, driver discomfort, and fuel consumption. Control delay includes the delay associated with vehicles slowing in advance of an intersection, the time spent stopped on an intersection approach, the time spent as vehicles move up in the queue, and the time needed for vehicles to accelerate to their desired speed. LOS criteria for traffic signals are stated in terms of the control delay in seconds per vehicle. The LOS thresholds established for the automobile mode at a signalized intersection are shown in ***Table 3-2***.

3.5.3 *Highway Capacity Manual (HCM) Method of Analysis (Unsignalized Intersections)*

The HCM unsignalized methodology for stop-controlled intersections was utilized for the analysis of the unsignalized intersections. LOS criteria for unsignalized intersections differ from LOS criteria for signalized intersections as signalized intersections are designed for heavier traffic and therefore a greater delay. Unsignalized intersections are also associated with more uncertainty for users, as delays are less predictable, which can reduce users' delay tolerance.

Two-way stop-controlled intersections are comprised of a major street, which is uncontrolled, and a minor street, which is controlled by stop signs. Level of service for a two-way stop-controlled intersection is determined by the computed or measured control delay. The control delay by movement, by approach, and for the intersection as a whole is estimated by the computed capacity for each movement. LOS is determined for each minor-street movement (or shared movement) as well as major-street left turns. The worst side street approach delay is reported. LOS is not defined for the intersection as a whole or for major-street approaches, as it is assumed that major-street through vehicles experience zero delay. The HCM control delay value range for two-way stop-controlled intersections is shown in ***Table 3-3***.

3.6 Level of Service Criteria

According to City of Brea and City of Placentia criteria, LOS D is the minimum acceptable condition that should be maintained during the morning and evening peak commute hours at intersections.

LOS E is the minimum acceptable condition that should be maintained during the weekday morning and evening peak commute hours for Orange County CMP designated intersections. Based on the above, LOS E would be the LOS standard at the following study intersections:

LOS "E" Requirements – Study Intersections

16. SR-57 SB Ramps at Imperial Highway (Caltrans)
17. SR-57 NB Ramps at Imperial Highway (Caltrans)

TABLE 3-1

LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS (ICU METHODOLOGY)

Level of Service (LOS)	Intersection Capacity Utilization Value (V/C)	Level of Service Description
A	≤ 0.600	EXCELLENT. No vehicle waits longer than one red light, and no approach phase is fully used.
B	0.601 – 0.700	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.701 – 0.800	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.801 – 0.900	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.901 – 1.000	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	> 1.000	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Potentially very long delays with continuously increasing queue lengths.

TABLE 3-2

LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS (HCM METHODOLOGY)[2]

Control Delay (sec/veh)	Level of Service (LOS)	Level of Service Description
≤ 10	A	This level of service occurs when the v/c ratio is low and either progression is exceptionally favorable or the cycle length is very short.
> 10-20	B	This level generally occurs when the v/c ratio is low and either progression is highly favorable or the cycle length is short.
> 20-35	C	Average traffic delays. These higher delays may result when progression is favorable or the cycle length is moderate. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.
> 35-55	D	Long traffic delays. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high *v/c* ratios. Many vehicles stop and individual cycle failures are noticeable.
> 55-80	E	Very long traffic delays. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high *v/c* ratios. Individual cycle failures are frequent.
> 80	F	Severe congestion. This level, considered to be unacceptable to most drivers, often occurs with over saturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high *v/c* ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such delay levels.

[2] Source: *Highway Capacity Manual*, Chapter 18: Signalized Intersections.

TABLE 3-3

LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS (HCM)[3]

Level of Service (LOS)	Highway Capacity Manual Delay Value (sec/veh)	Level of Service Description
A	≤ 10.0	Little or no delay
B	> 10.0 and ≤ 15.0	Short traffic delays
C	> 15.0 and ≤ 25.0	Average traffic delays
D	> 25.0 and ≤ 35.0	Long traffic delays
E	> 35.0 and ≤ 50.0	Very long traffic delays
F	> 50.0	Severe congestion

[3] Source: *Highway Capacity Manual 6th Edition*, Chapter 20 (Two-Way Stop Control).

3.7 Existing Level of Service Results

3.7.1 *Existing Conditions Intersection Capacity Analysis (ICU Methodology)*

Table 3-4 summarizes the existing peak hour service level calculations for the twenty-two (22) study intersections based on existing traffic volumes and current street geometrics based on the ICU Method of Analysis.

Review of *Table 3-4* indicates one (1) of the twenty-two (22) study intersections currently operates at an unacceptable LOS during the PM peak hour. The remaining study intersections currently operate at an acceptable LOS D or better during the AM and PM peak hours. The locations identified below currently operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**ICU**	**LOS**	**ICU**	**LOS**
14. Valencia Ave at Birch St/Rose Dr	--	--	0.914	E

Appendix C presents the ICU LOS calculation worksheets for the twenty-two (22) key study intersections for the AM peak hour and PM peak hour.

3.7.2 *Existing Conditions Intersection Capacity Analysis (HCM Methodology)*

Table 3-5 summarizes the existing peak hour service level calculations for the twenty-two (22) study intersections based on existing traffic volumes and current street geometrics based on the HCM Method of Analysis.

Review of *Table 3-5* indicates that four (4) of the twenty-two (22) study intersections currently operates at an unacceptable LOS during the AM and/or PM peak hours. The remaining study intersections currently operate at an acceptable LOS D or better during the AM and PM peak hours. The locations identified below currently operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**Delay (s/v)**	**LOS**	**Delay (s/v)**	**LOS**
5. Wildcat Way/N. Associated Rd at Lambert Rd	57.3	E	--	--
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	136.6	F	--	--
14. Valencia Ave at Birch St/Rose Dr	105.1	F	57.7	E
22. Rose Dr at Imperial Hwy	205.0	F	204.8	F

Appendix D presents the HCM LOS calculation worksheets for the twenty-two (22) key study intersections for the AM peak hour and PM peak hour.

TABLE 3-4
EXISTING PEAK HOUR INTERSECTION CAPACITY ANALYSIS - ICU

Key Intersection	Jurisdiction	Minimum Acceptable LOS	Control Type	Time Period	ICU	LOS
1. State College Boulevard at Lambert Road	Brea	D	8∅ Traffic Signal	AM	0.684	B
				PM	0.657	B
2. SR-57 SB Ramps at Lambert Road	Brea/ Caltrans	D	3∅ Traffic Signal	AM	0.729	C
				PM	0.596	A
3. SR-57 NB Ramps at Lambert Road	Brea/ Caltrans	D	3∅ Traffic Signal	AM	0.798	C
				PM	0.552	A
4. Pointe Drive at Lambert Road	Brea	D	5∅ Traffic Signal	AM	0.560	A
				PM	0.539	A
5. Wildcat Way/N Associated Road at Lambert Road	Brea	D	8∅ Traffic Signal	AM	0.671	B
				PM	0.522	A
6. Santa Fe Road/Kraemer Boulevard at Lambert Road	Brea	D	8∅ Traffic Signal	AM	0.602	B
				PM	0.506	A
7. Sunflower Street at Lambert Road	Brea	D	5∅ Traffic Signal	AM	0.291	A
				PM	0.412	A
8. Valencia Avenue at Lambert Road/Carbon Canyon Road	Brea/ Caltrans	D	8∅ Traffic Signal	AM	0.861	D
				PM	0.569	A
9. Santa Fe Road at Carbon Canyon Road	Brea/ Caltrans	D	5∅ Traffic Signal	AM	0.515	A
				PM	0.478	A
10. State College Boulevard at Birch Street	Brea	D	8∅ Traffic Signal	AM	0.474	A
				PM	0.636	B
11. S Associated Road at Birch Street	Brea	D	6∅ Traffic Signal	AM	0.603	B
				PM	0.602	B
12. N Associated Road at Birch Street	Brea	D	6∅ Traffic Signal	AM	0.529	A
				PM	0.626	B
13. Kraemer Boulevard at Birch Street	Brea	D	8∅ Traffic Signal	AM	0.542	A
				PM	0.614	B
14. Valencia Avenue at Birch Street/Rose Drive	Brea/ Caltrans	D	8∅ Traffic Signal	AM	0.731	C
				PM	**0.914**	**E**

Notes:

- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

TABLE 3-4 (CONTINUED)
EXISTING PEAK HOUR INTERSECTION CAPACITY ANALYSIS - ICU

Key Intersection	Jurisdiction	Minimum Acceptable LOS	Control Type	Time Period	ICU	LOS
15. Rose Drive at Vesuvius Drive/Driveway D	Brea	D	2∅ Traffic Signal	AM	0.787	C
				PM	0.704	C
16. SR-57 SB Ramps at Imperial Highway	Brea/ Caltrans	E	2∅ Traffic Signal	AM	0.558	A
				PM	0.680	B
17. SR-57 NB Ramps at Imperial Highway	Brea/ Caltrans	E	4∅ Traffic Signal	AM	0.571	A
				PM	0.761	C
18. Associated Road at Imperial Highway	Brea/ Caltrans	D	8∅ Traffic Signal	AM	0.691	B
				PM	0.763	C
19. Castlegate Lane/Placentia Avenue at Imperial Highway	Brea/ Caltrans	D	6∅ Traffic Signal	AM	0.590	A
				PM	0.684	B
20. Kraemer Boulevard at Imperial Highway	Brea/ Caltrans	D	8∅ Traffic Signal	AM	0.574	A
				PM	0.717	C
21. Valencia Avenue at Imperial Highway	Brea/ Caltrans	D	8∅ Traffic Signal	AM	0.526	A
				PM	0.546	A
22. Rose Drive at Imperial Highway	Placentia/ Caltrans	D	8∅ Traffic Signal	AM	0.688	B
				PM	0.891	D

Notes:

- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

TABLE 3-5
EXISTING PEAK HOUR INTERSECTION CAPACITY ANALYSIS - HCM

Key Intersection	Jurisdiction	Minimum Acceptable LOS	Control Type	Time Period	Delay (s/v)	LOS
1. State College Boulevard at Lambert Road	Brea	D	8∅ Traffic Signal	AM	33.3	C
				PM	34.7	C
2. SR-57 SB Ramps at Lambert Road	Brea/ Caltrans	D	3∅ Traffic Signal	AM	26.3	C
				PM	19.1	B
3. SR-57 NB Ramps at Lambert Road	Brea/ Caltrans	D	3∅ Traffic Signal	AM	25.4	C
				PM	23.4	C
4. Pointe Drive at Lambert Road	Brea	D	5∅ Traffic Signal	AM	13.0	B
				PM	14.8	B
5. Wildcat Way/N Associated Road at Lambert Road	Brea	D	8∅ Traffic Signal	AM	**57.3**	**E**
				PM	18.3	B
6. Santa Fe Road/Kraemer Boulevard at Lambert Road	Brea	D	8∅ Traffic Signal	AM	28.8	C
				PM	29.5	C
7. Sunflower Street at Lambert Road	Brea	D	5∅ Traffic Signal	AM	9.3	A
				PM	6.7	A
8. Valencia Avenue at Lambert Road/Carbon Canyon Road	Brea/ Caltrans	D	8∅ Traffic Signal	AM	**136.6**	**F**
				PM	31.8	C
9. Santa Fe Road at Carbon Canyon Road	Brea/ Caltrans	D	5∅ Traffic Signal	AM	4.7	A
				PM	4.0	A
10. State College Boulevard at Birch Street	Brea	D	8∅ Traffic Signal	AM	40.3	D
				PM	30.2	C
11. S Associated Road at Birch Street	Brea	D	6∅ Traffic Signal	AM	25.6	C
				PM	25.1	C
12. N Associated Road at Birch Street	Brea	D	6∅ Traffic Signal	AM	25.4	C
				PM	23.0	C
13. Kraemer Boulevard at Birch Street	Brea	D	8∅ Traffic Signal	AM	36.1	D
				PM	41.9	D
14. Valencia Avenue at Birch Street/Rose Drive	Brea/ Caltrans	D	8∅ Traffic Signal	AM	**105.1**	**F**
				PM	**57.7**	**E**

Notes:

- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

TABLE 3-5 (CONTINUED)
EXISTING PEAK HOUR INTERSECTION CAPACITY ANALYSIS - HCM

Key Intersection	Jurisdiction	Minimum Acceptable LOS	Control Type	Time Period	Delay (s/v)	LOS
15. Rose Drive at Vesuvius Drive/Driveway D	Brea	D	2∅ Traffic Signal	AM	6.8	A
				PM	4.1	A
16. SR-57 SB Ramps at Imperial Highway	Brea/ Caltrans	E	2∅ Traffic Signal	AM	14.9	B
				PM	15.3	B
17. SR-57 NB Ramps at Imperial Highway	Brea/ Caltrans	E	4∅ Traffic Signal	AM	26.7	C
				PM	29.9	C
18. Associated Road at Imperial Highway	Brea/ Caltrans	D	8∅ Traffic Signal	AM	26.7	C
				PM	39.5	D
19. Castlegate Lane/Placentia Avenue at Imperial Highway	Brea/ Caltrans	D	6∅ Traffic Signal	AM	17.7	B
				PM	23.4	C
20. Kraemer Boulevard at Imperial Highway	Brea/ Caltrans	D	8∅ Traffic Signal	AM	27.3	C
				PM	32.1	C
21. Valencia Avenue at Imperial Highway	Brea/ Caltrans	D	8∅ Traffic Signal	AM	27.2	C
				PM	25.4	C
22. Rose Drive at Imperial Highway	Placentia/ Caltrans	D	8∅ Traffic Signal	AM	**205.0**	**F**
				PM	**204.8**	**F**

Notes:

- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

4.0 TRAFFIC FORECASTING METHODOLOGY

In order to estimate the traffic characteristics of the proposed Project, a multi-step process has been utilized. The first step is traffic generation, which estimates the total arriving and departing traffic on a peak hour and daily basis. The traffic generation potential is forecast by applying the appropriate vehicle trip generation equations or rates to the project development tabulation.

The second step of the forecasting process is traffic distribution, which identifies the origins and destinations of inbound and outbound project traffic. These origins and destinations are typically based on demographics and existing/expected future travel patterns in the study area.

The third step is traffic assignment, which involves the allocation of project traffic to study area streets and intersections. Traffic assignment is typically based on minimization of travel time, which may or may not involve the shortest route, depending on prevailing operating conditions and travel speeds. Traffic distribution patterns are indicated by general percentage orientation, while traffic assignment allocates specific volume forecasts to individual roadway links and intersection turning movements throughout the study area.

With the forecasting process complete and project traffic assignments developed, the proposed project is isolated by comparing operational (LOS) conditions at selected study intersections using expected future traffic volumes with and without forecast project traffic. The need for site-specific and/or cumulative local area traffic improvements can then be evaluated.

5.0 PROJECT TRAFFIC CHARACTERISTICS

5.1 Project Traffic Generation

The trip generation potential of the proposed Project will be estimated using trip rates contained in the 11th Edition of *Trip Generation,* published by the Institute of Transportation Engineers (ITE), [Washington, D.C., 2021]. ***Table 5-1*** summarizes the trip generation rates used in forecasting the vehicular trips generated by the proposed Project and also presents the project's forecast peak hour and daily traffic volumes.

Based on the Project description, the upper portion of *Table 5-1* identifies land use categories and trip rates which were considered in forecasting the trip generation of the Project. The land uses include ITE Land Use 210: Single Family Detached Housing, 215: Single Family Attached Housing, ITE Land Use 220: Multifamily Housing (Low-Rise), and ITE Land Use 488: Soccer Complex. The trip generation potential of both the Project's medium density ("multifamily" and "single family attached") components will be forecast based on ITE Land Use 215: Single Family Attached trip rates. Given the description of the Project's proposed Sports Park component, the trip generation potential will be forecast based on ITE Land Use 488: Soccer Complex[4] trip rates.

A review of the lower portion of this table indicates that the proposed Project is forecast to generate approximately 9,351 daily trips, with 634 trips (182 inbound, 452 outbound) produced in the AM peak hour and 893 trips (542 inbound, 351 outbound) produced in the PM peak hour on a "typical" weekday.

5.2 Project Traffic Distribution and Assignment

Tables 5-2 and 5-3 present the overall directional north/south/east/west distribution pattern for the residential and sports park components, respectively. ***Figures 5-1 through 5-5*** present the detailed Project Trip Distribution for Zone 1, Zone 2A, Zone 2B, Zone 3A and Zone 3B for review by the City. Project traffic volumes, both entering and exiting the site, have been distributed and assigned to the adjacent street system based on Project Select Zone model runs and were further refined based on the following considerations:

- location of site access points in relation to the surrounding street system,
- the site's proximity to major traffic carriers and regional access routes,
- physical characteristics of the circulation system such as lane channelization and presence of traffic signals that affect travel patterns,
- presence of traffic congestion in the surrounding vicinity,
- ingress/egress availability at the project site, and
- prior discussions with City Staff.

[4] Per Trip Generation, a soccer complex is an outdoor facility that is used for non-professional soccer games. It may consist of multiple fields. The size of each field within the land use may vary to accommodate games for different age groups. On-site amenities may include stadium seating, a fitness trail, an activities shelter, aquatic center, picnic grounds, basketball and tennis courts, and a playground, similar to the proposed Project's Sports Park component. For this analysis, it is assumed up to two (2) full-sized soccer fields will be provided. However, when taking into consideration that a full-sized soccer field can be subdivided into approximately 2-3 child-sized fields, this analysis will conservatively analyze a total of six (6) soccer fields.

The anticipated weekday AM and PM peak hour project traffic volumes associated with the proposed Project are presented in ***Figures 5-6*** and ***5-7***, respectively. *Figure 5-7* also presents the weekday daily Project traffic volumes. The traffic volume assignments presented in *Figures 5-6* and *5-7* reflect the traffic distribution characteristics shown in *Figures 5-1* through *5-5* and the traffic generation forecast presented in *Table 5-1*.

TABLE 5-1
PROJECT TRAFFIC GENERATION RATES AND FORECAST[5]

Description	Daily 2-Way	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Trip Generation Rates:							
▪ 210: Single Family Detached Housing (TE/DU)	9.43	26%	74%	0.70	63%	37%	0.94
▪ 215: Single Family Attached Housing (TE/DU)	7.20	31%	69%	0.48	57%	43%	0.57
▪ 220: Multifamily Housing (Low-Rise[6]) (TE/DU)	6.74	24%	76%	0.40	63%	37%	0.51
▪ 488: Soccer Complex (TE/Field) [7]	71.33	61%	39%	0.99	66%	34%	16.43
Proposed Project Zone 1:							
▪ Single Family Homes (105 DU)	990	19	55	74	62	37	99
Proposed Project Zone 2:							
▪ Multifamily/Single Family Attached (507 DU)	3,650	75	168	243	165	124	289
▪ Sports Park (6 soccer fields)	428	4	2	6	65	34	99
Zone 2 Subtotal	*4,078*	*79*	*170*	*249*	*230*	*158*	*388*
Proposed Project Zone 3:							
▪ Single Family Homes (345 DU)	3,253	63	179	242	204	120	324
▪ Multifamily/Single Family Attached (143 DU)	1,030	21	48	69	46	36	82
Zone 3 Subtotal	*4,283*	*84*	*227*	*311*	*250*	*156*	*406*
Total Proposed Project	**9,351**	**182**	**452**	**634**	**542**	**351**	**893**

Notes:
TE/DU = Trip End per Dwelling Unit

5 Source: *Trip Generation*, 11th Edition, Institute of Transportation Engineers (ITE), Washington, D.C. (2021).

6 Low-Rise Multifamily Housing consists of buildings that are less than 3 levels.

7 A soccer complex is an outdoor facility that is used for non-professional soccer games. It may consist of multiple fields. The size of each field within the land use may vary to accommodate games for different age groups. On-site amenities may include stadium seating, a fitness trail, an activities shelter, aquatic center, picnic grounds, basketball and tennis courts, and a playground.

TABLE 5-2

PROJECT DIRECTIONAL DISTRIBUTION PATTERN – RESIDENTIAL COMPONENT[8]

Distribution Percentage	Orientation/Direction
15%	To/from the north
43%	To/from the south
14%	To/from the east
14%	To/from the west
14%	To/from a local destination
100%	**Total**

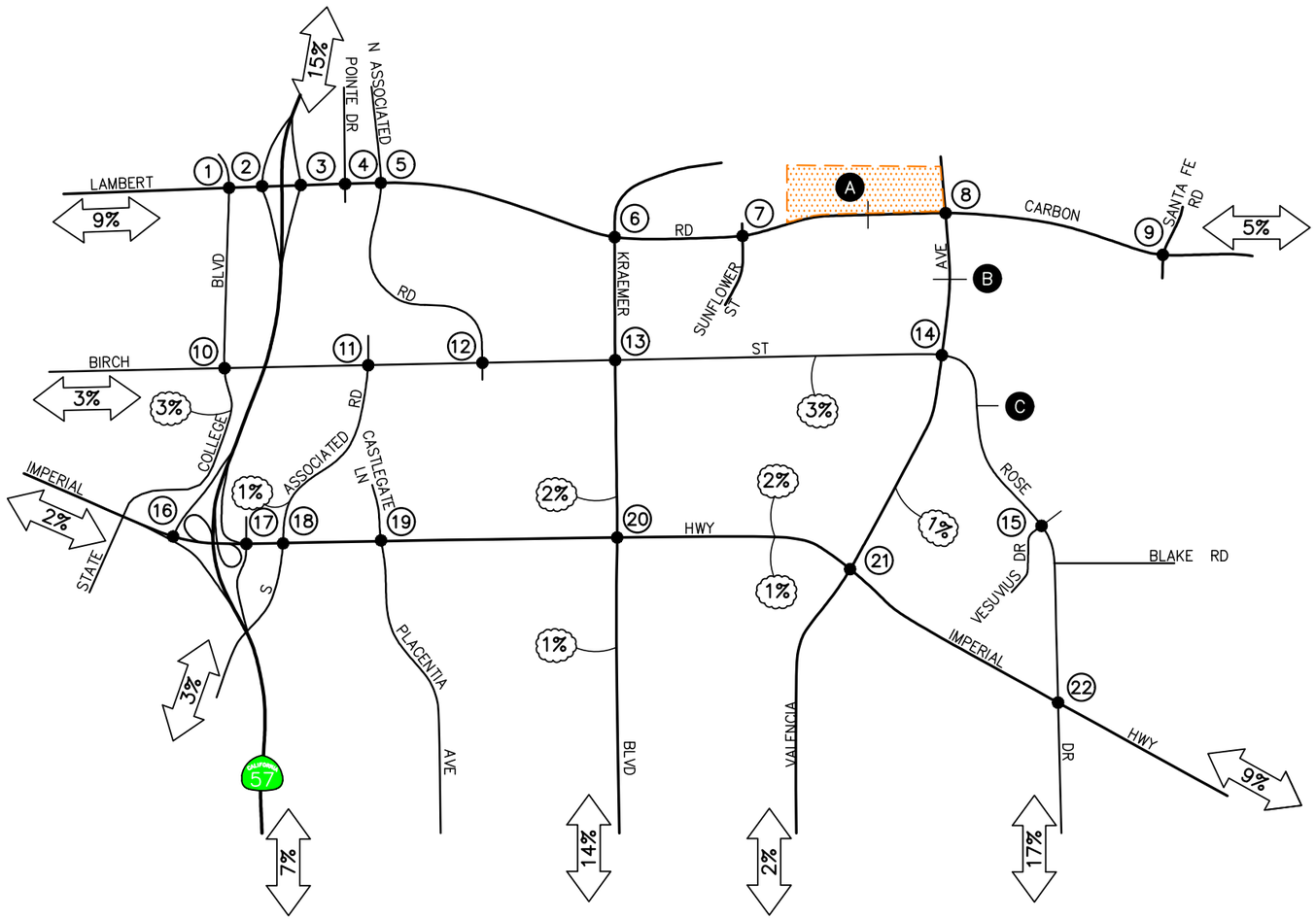
[8] Residential component of the project includes Zones 1,2A, 3A and 3B.

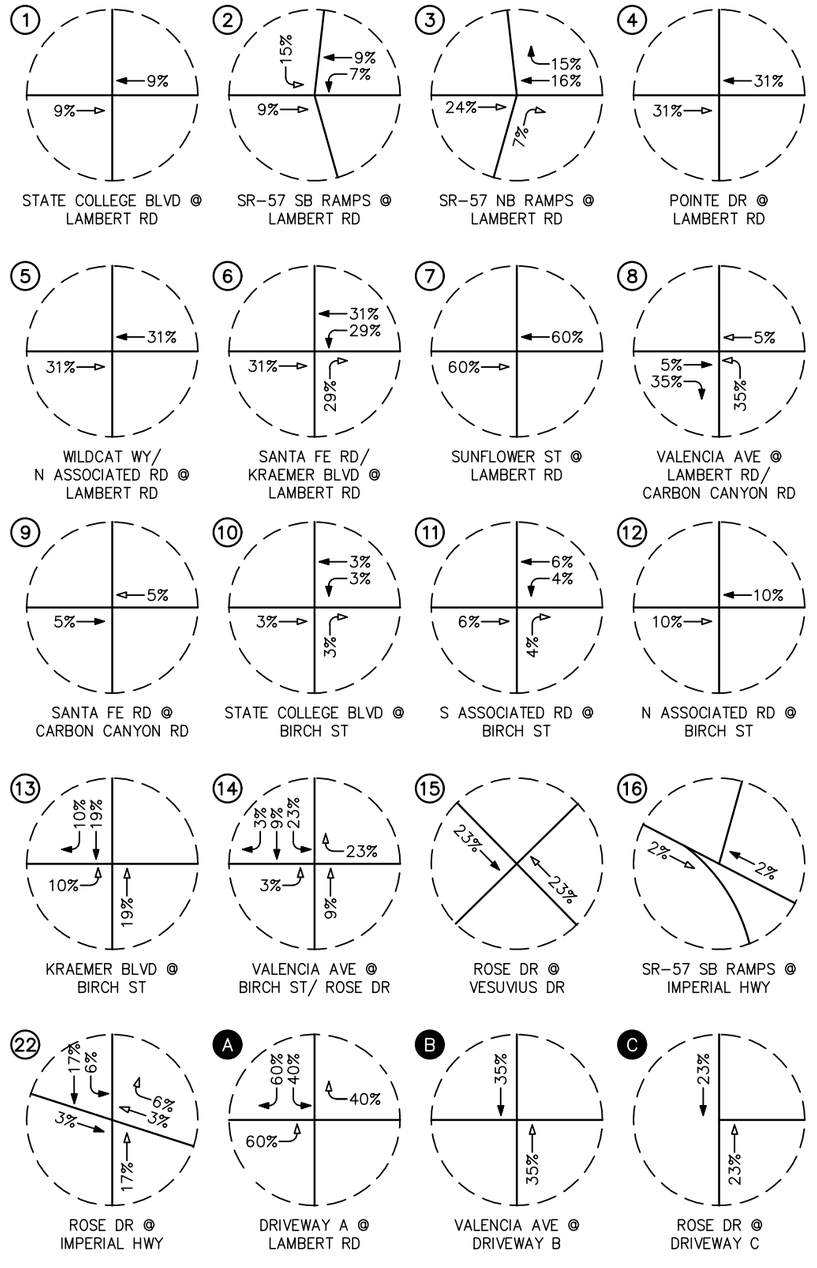
TABLE 5-3

PROJECT DIRECTIONAL DISTRIBUTION PATTERN – SPORTS PARK COMPONENT[9]

Distribution Percentage	Orientation/Direction
7%	To/from the north
51%	To/from the south
17%	To/from the east
19%	To/from the west
6%	To/from a local destination
100%	**Total**

[9] Residential component of the project includes Zone 2B.





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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

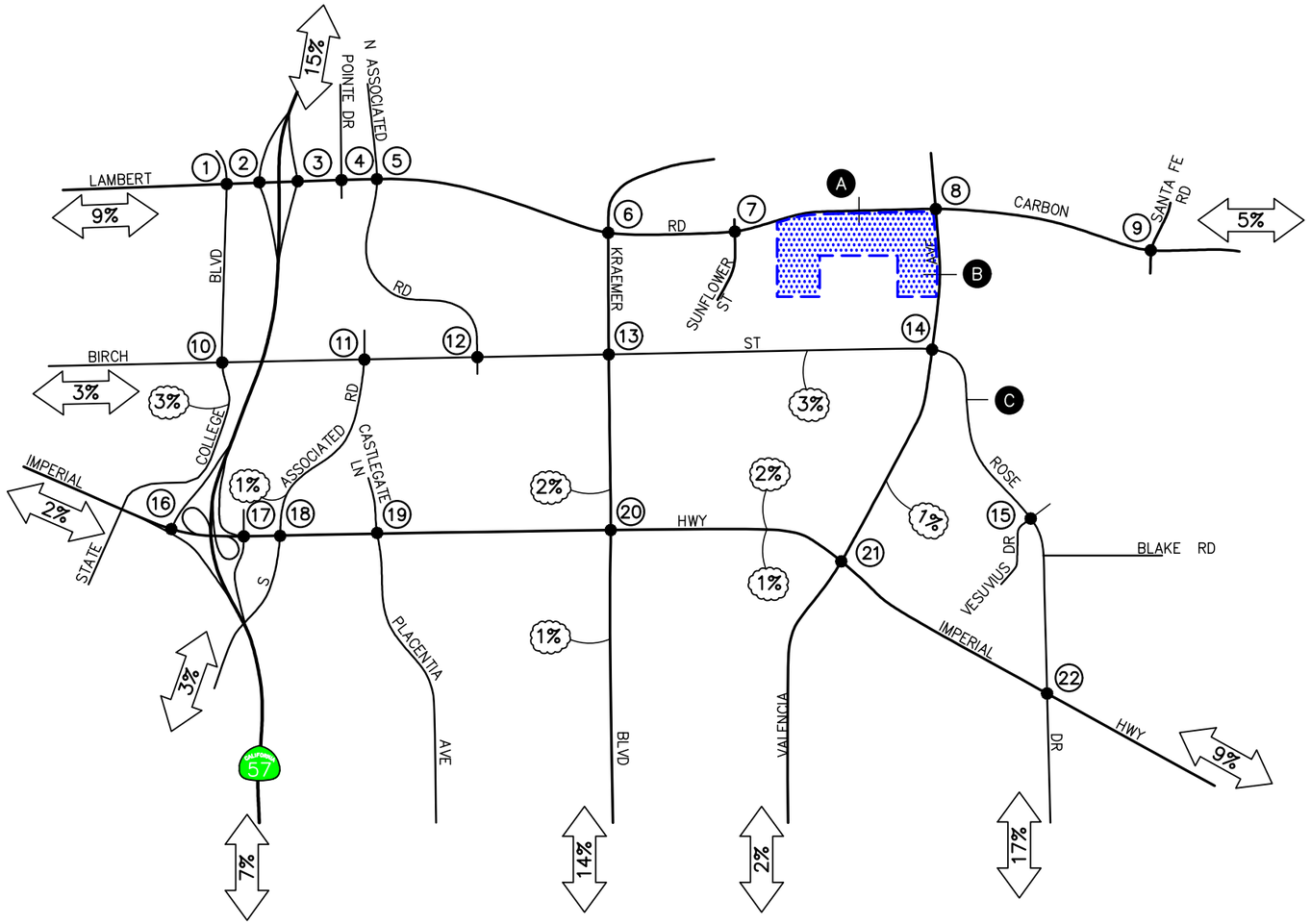
KEY

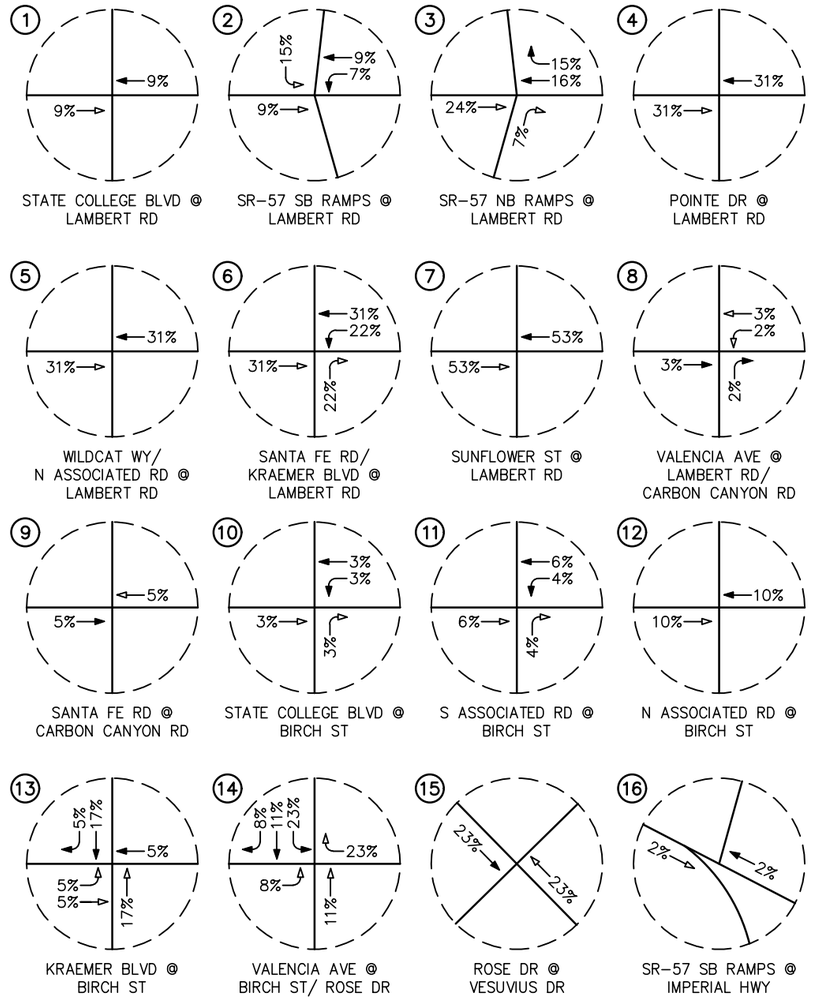
(#) = STUDY INTERSECTION
= INBOUND PERCENTAGE
= OUTBOUND PERCENTAGE
ZONE 1

FIGURE 5-1

PROJECT TRIP DISTRIBUTION PATTERN – ZONE 1

BREA 265 SPECIFIC PLAN, BREA





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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

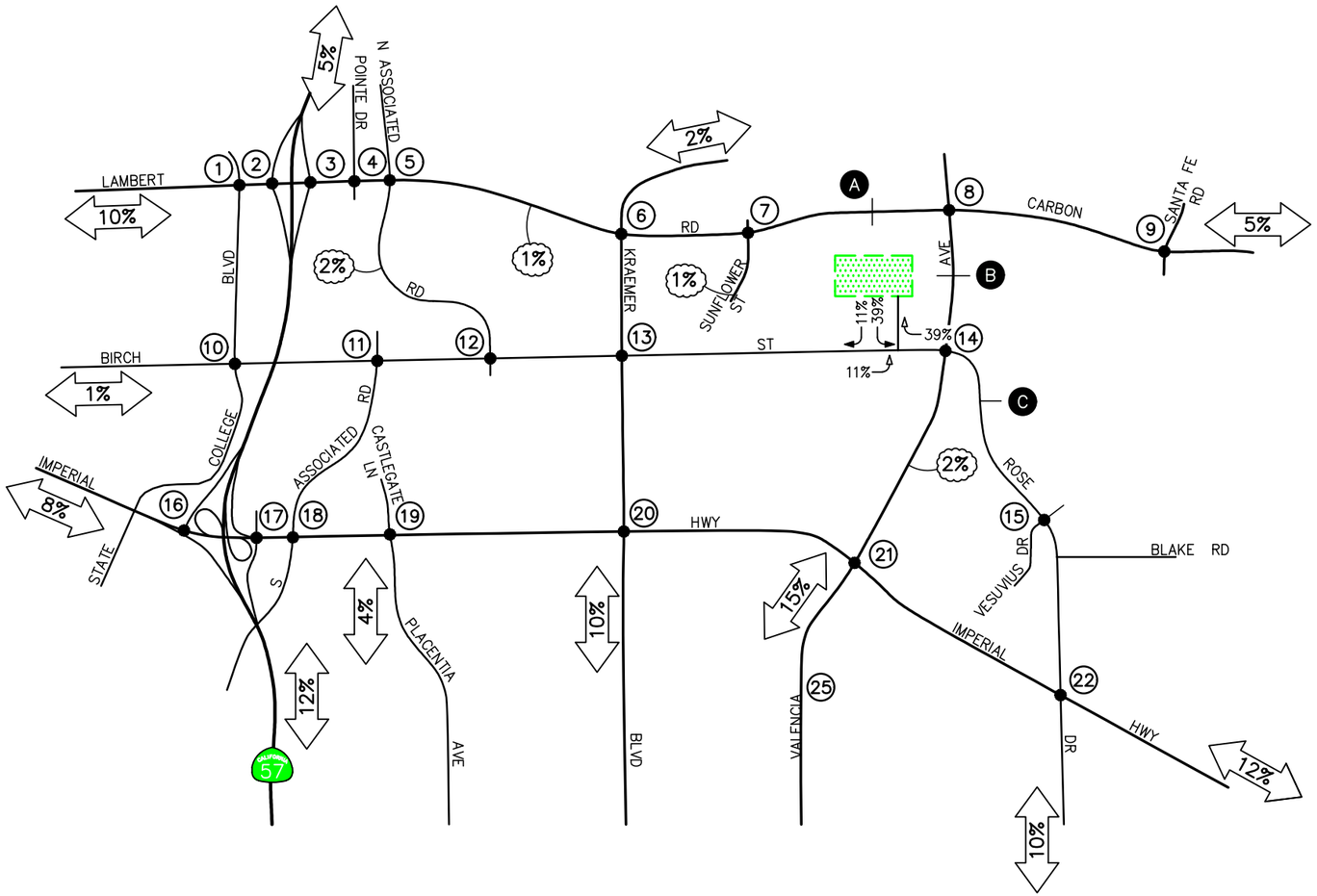
KEY

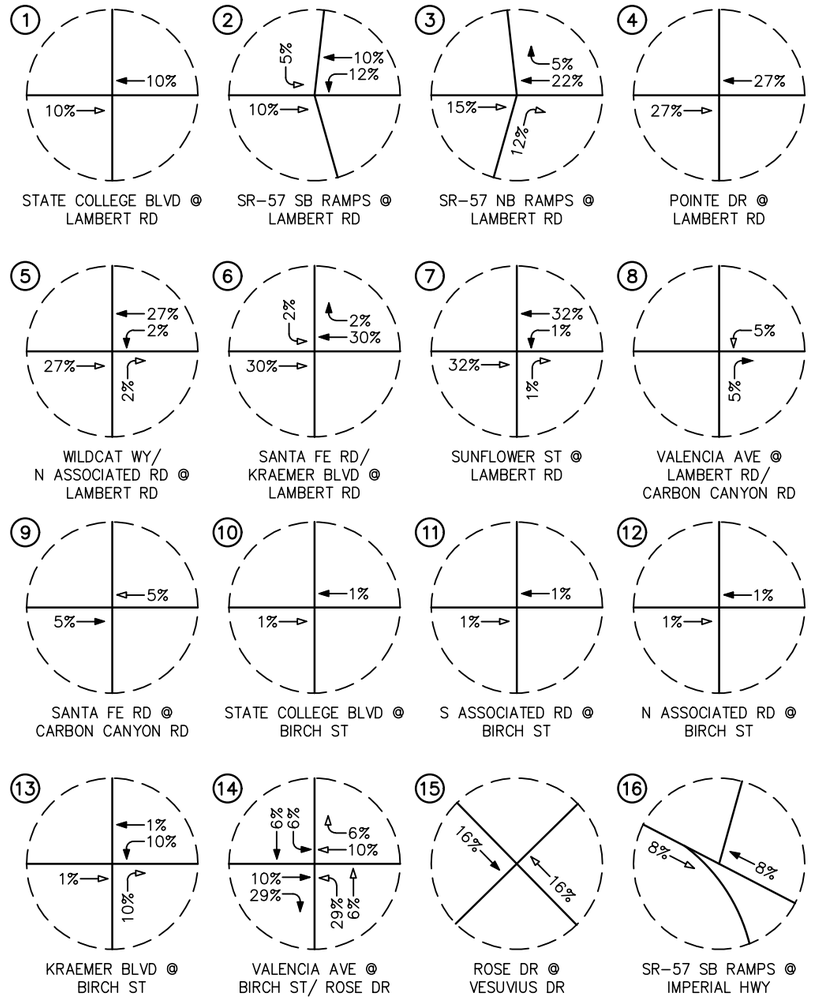
(#) = STUDY INTERSECTION
= INBOUND PERCENTAGE
= OUTBOUND PERCENTAGE
= ZONE 2A

FIGURE 5-2

PROJECT TRIP DISTRIBUTION PATTERN – ZONE 2A

BREA 265 SPECIFIC PLAN, BREA





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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

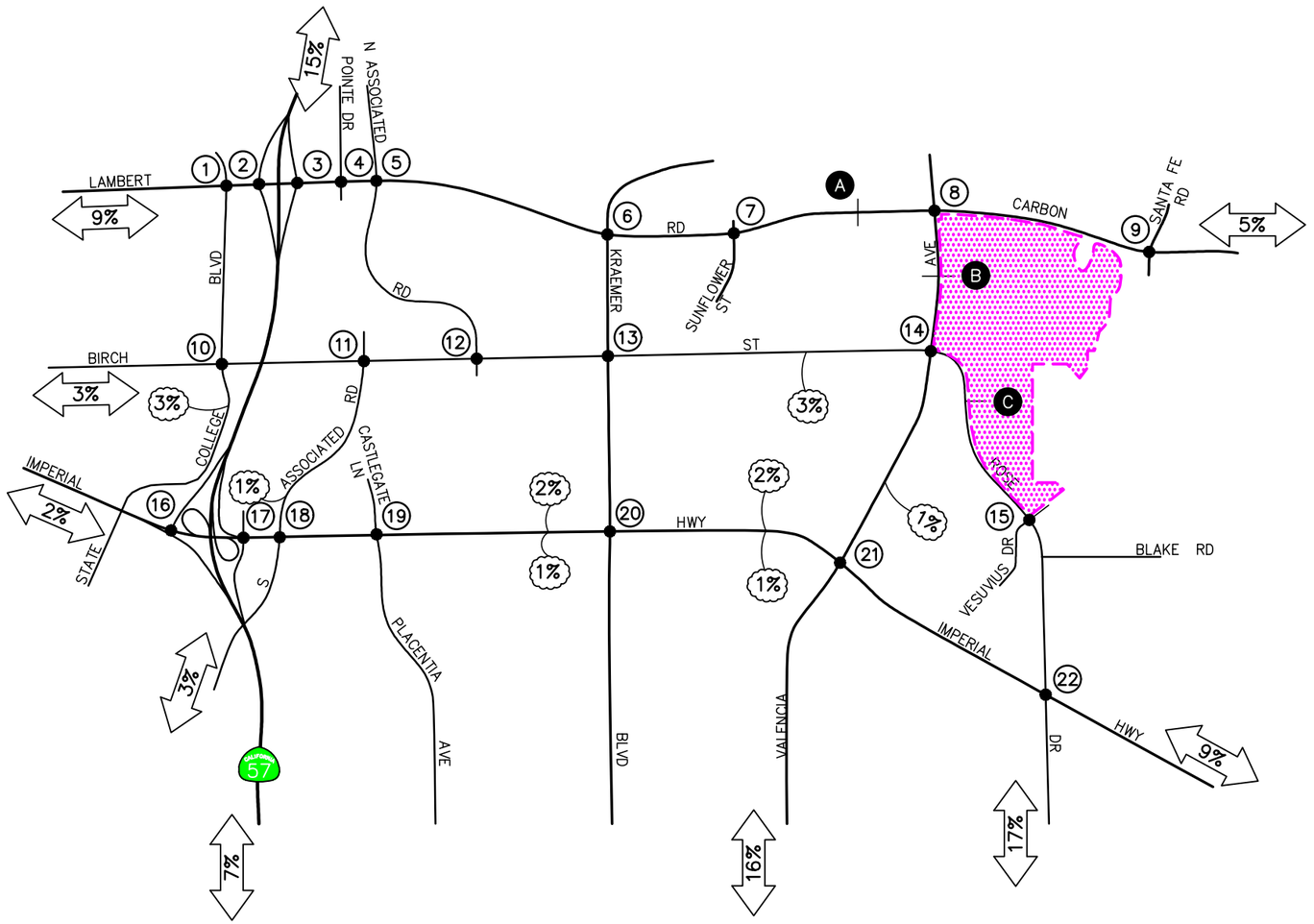
KEY

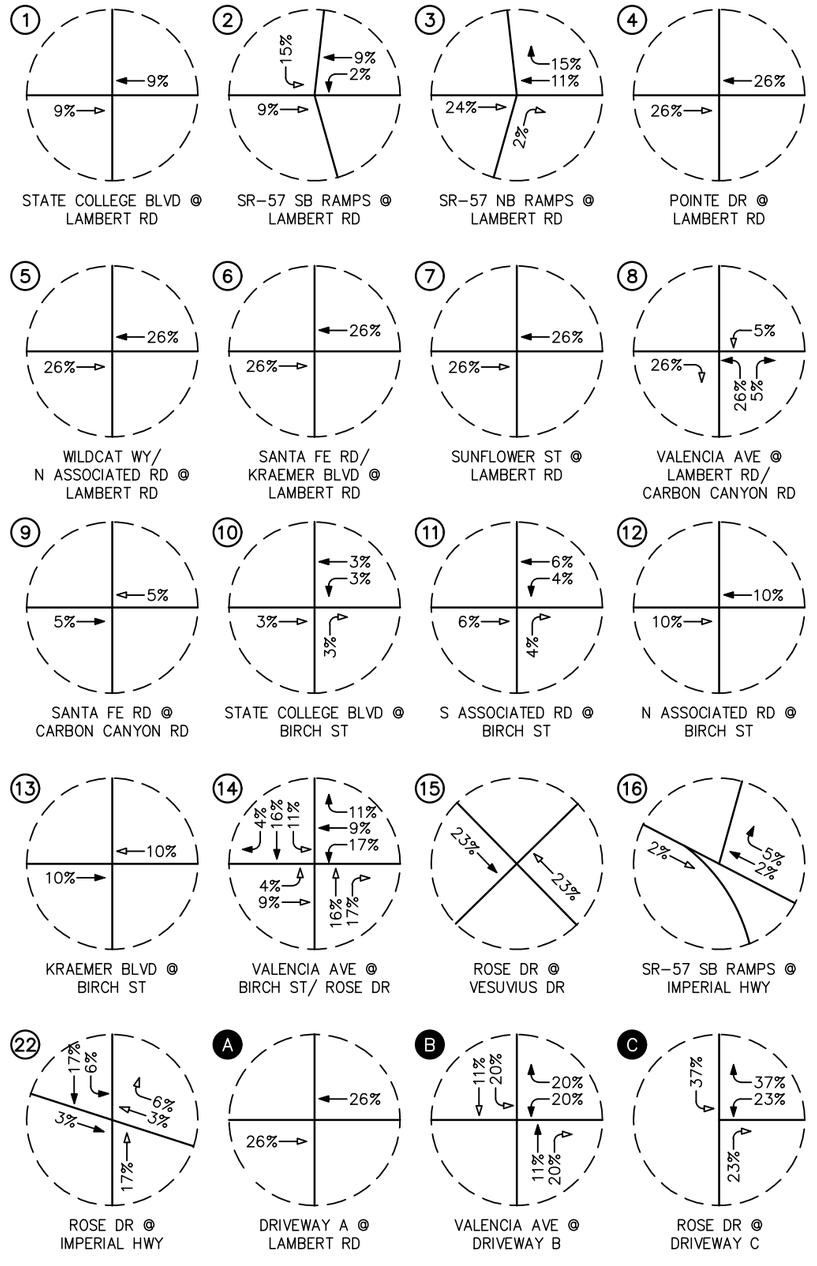
(#) = STUDY INTERSECTION
⟵ = INBOUND PERCENTAGE
⟵ = OUTBOUND PERCENTAGE
▭ = ZONE 2B

FIGURE 5-3

PROJECT TRIP DISTRIBUTION PATTERN – ZONE 2B

BREA 265 SPECIFIC PLAN, BREA





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N NO SCALE

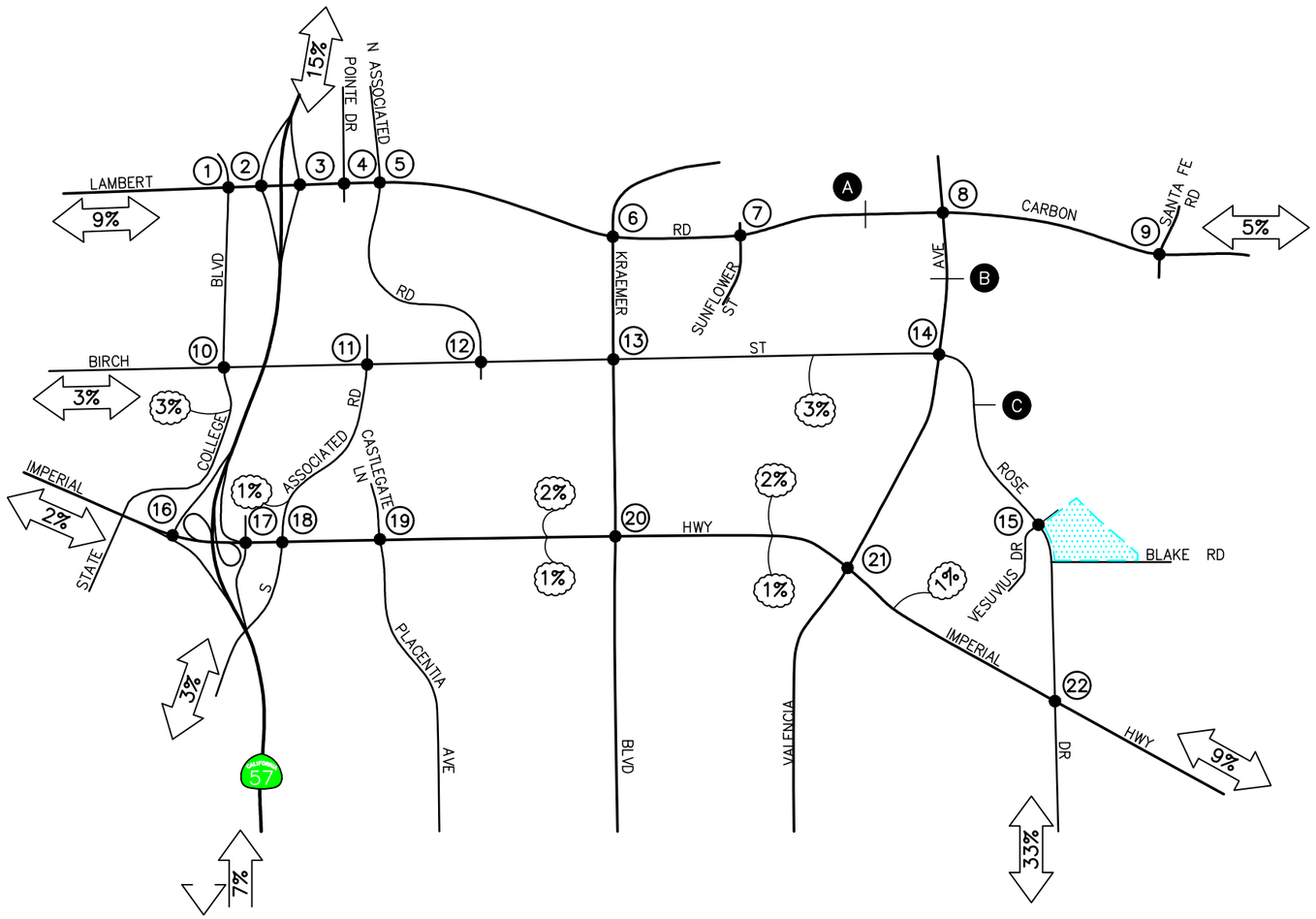
KEY

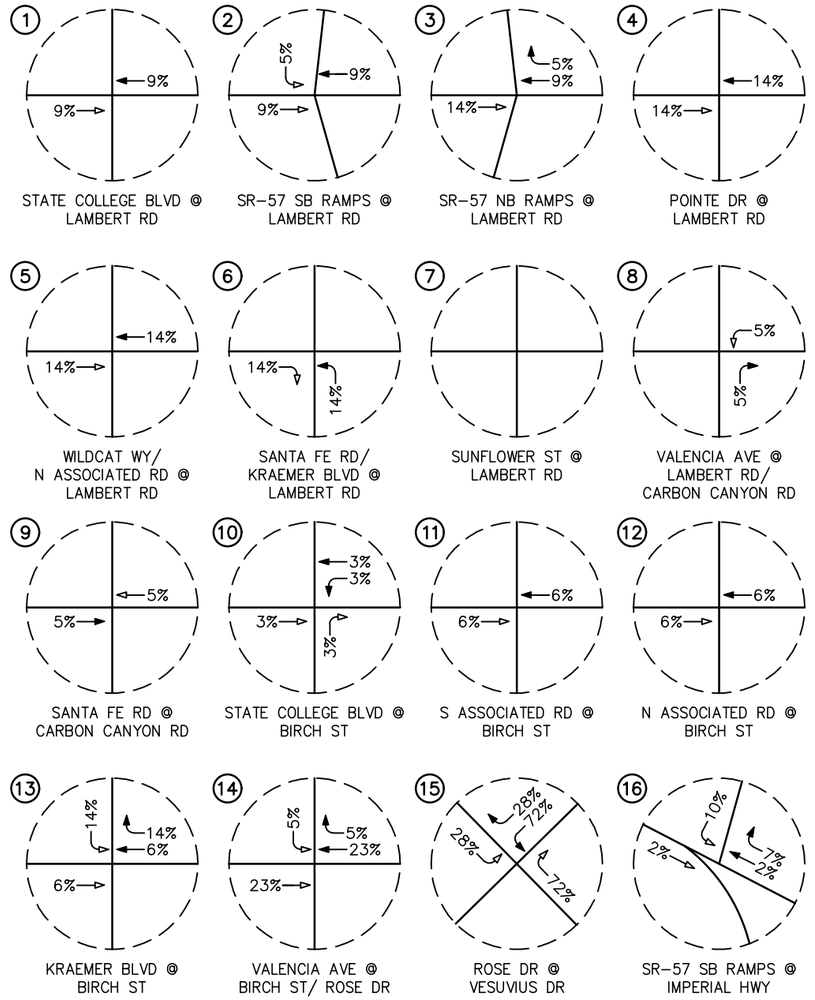
(#) = STUDY INTERSECTION
⟵ = INBOUND PERCENTAGE
⟵ = OUTBOUND PERCENTAGE
= ZONE 3A

FIGURE 5-4

PROJECT TRIP DISTRIBUTION PATTERN – ZONE 3A

BREA 265 SPECIFIC PLAN, BREA





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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

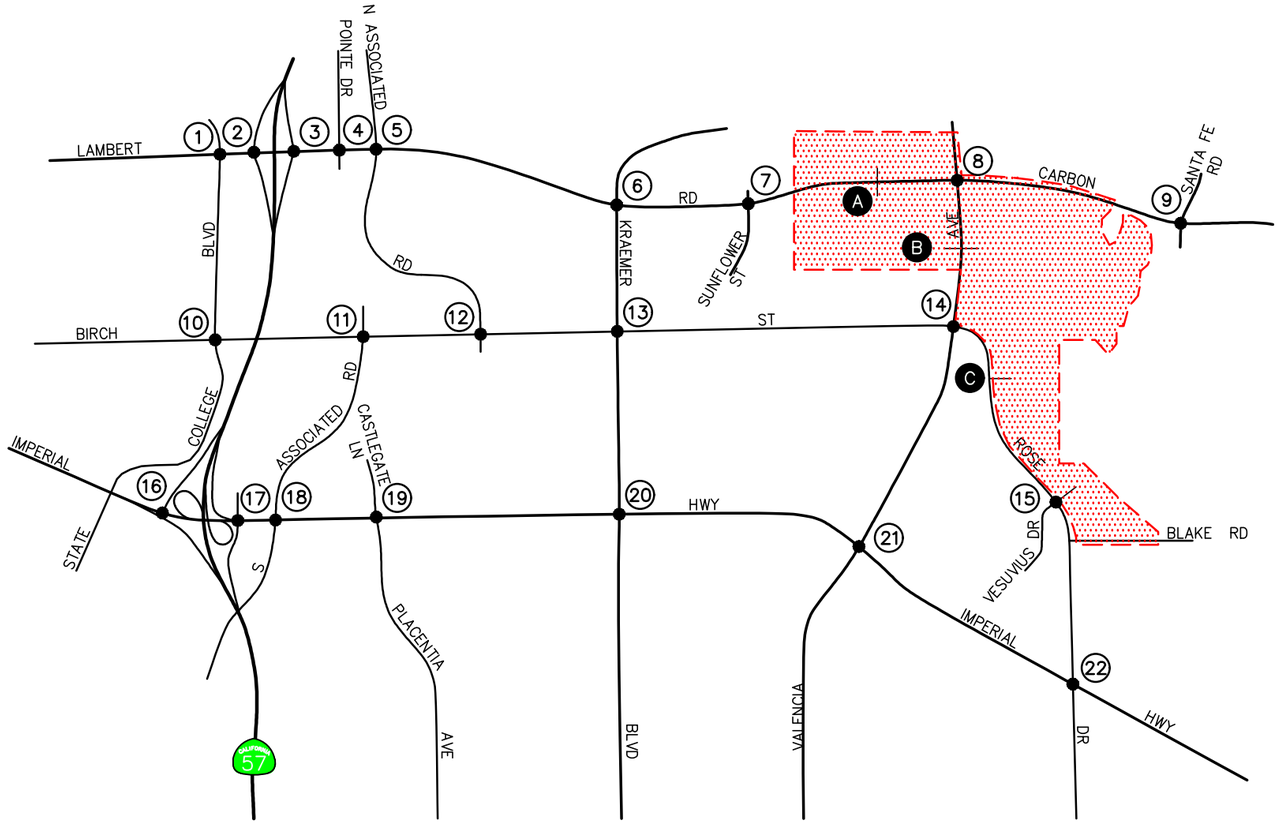
KEY

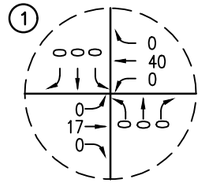
(#) = STUDY INTERSECTION
◁—— = INBOUND PERCENTAGE
——▶ = OUTBOUND PERCENTAGE
▒▒ = ZONE 3B

FIGURE 5-5

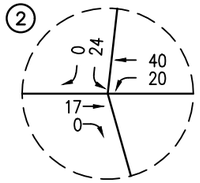
PROJECT TRIP DISTRIBUTION PATTERN – ZONE 3B

BREA 265 SPECIFIC PLAN, BREA

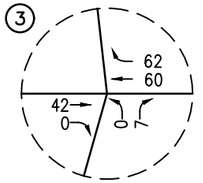




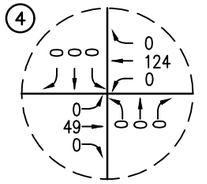
STATE COLLEGE BLVD @ LAMBERT RD



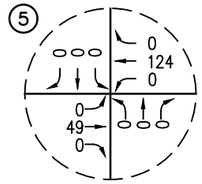
SR-57 SB RAMPS @ LAMBERT RD



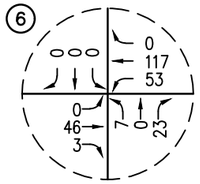
SR-57 NB RAMPS @ LAMBERT RD



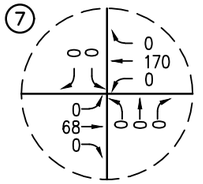
POINTE DR @ LAMBERT RD



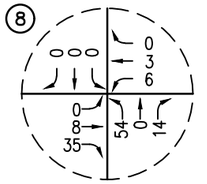
WILDCAT WY/ N ASSOCIATED RD @ LAMBERT RD



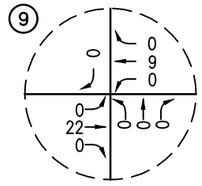
SANTA FE RD/ KRAEMER BLVD @ LAMBERT RD



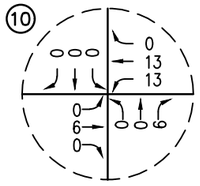
SUNFLOWER ST @ LAMBERT RD



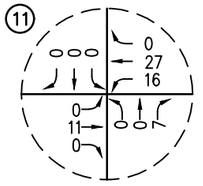
VALENCIA AVE @ LAMBERT RD/ CARBON CANYON RD



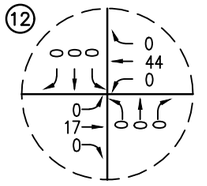
SANTA FE RD @ CARBON CANYON RD



STATE COLLEGE BLVD @ BIRCH ST



S ASSOCIATED RD @ BIRCH ST



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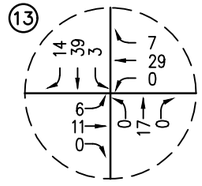
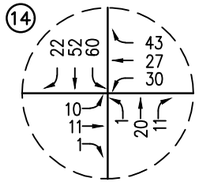
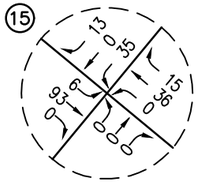


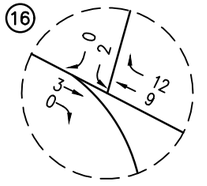
KRAEMER BLVD @ BIRCH ST



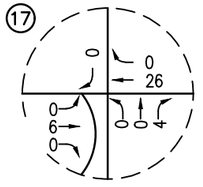
VALENCIA AVE @ BIRCH ST/ ROSE DR



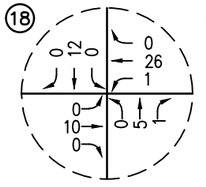
ROSE DR @ VESUVIUS DR



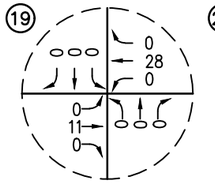
SR-57 SB RAMPS @ IMPERIAL HWY



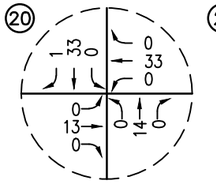
SR-57 NB RAMPS @ IMPERIAL HWY



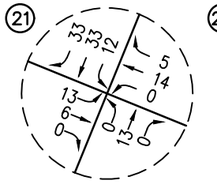
ASSOCIATED RD @ IMPERIAL HWY



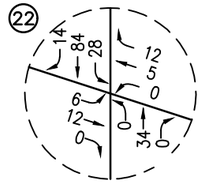
CASTLEGATE LN/ PLACENTIA AVE @



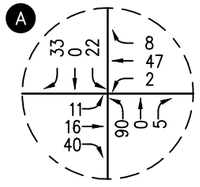
KRAEMER BLVD @ IMPERIAL HWY



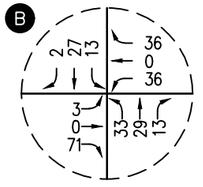
VALENCIA AVE @ IMPERIAL HWY



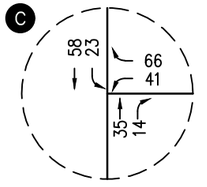
ROSE DR @ IMPERIAL HWY



DRIVEWAY A @ LAMBERT RD



VALENCIA AVE @ DRIVEWAY B



ROSE DR @ DRIVEWAY C

n:\4000\2184052 - brea 265 specific plan deir tia, brea\august 2021 update\dwg\4052 f5-6.dwg LDP 13:55:58 02-07-2022 aguilar

LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

KEY

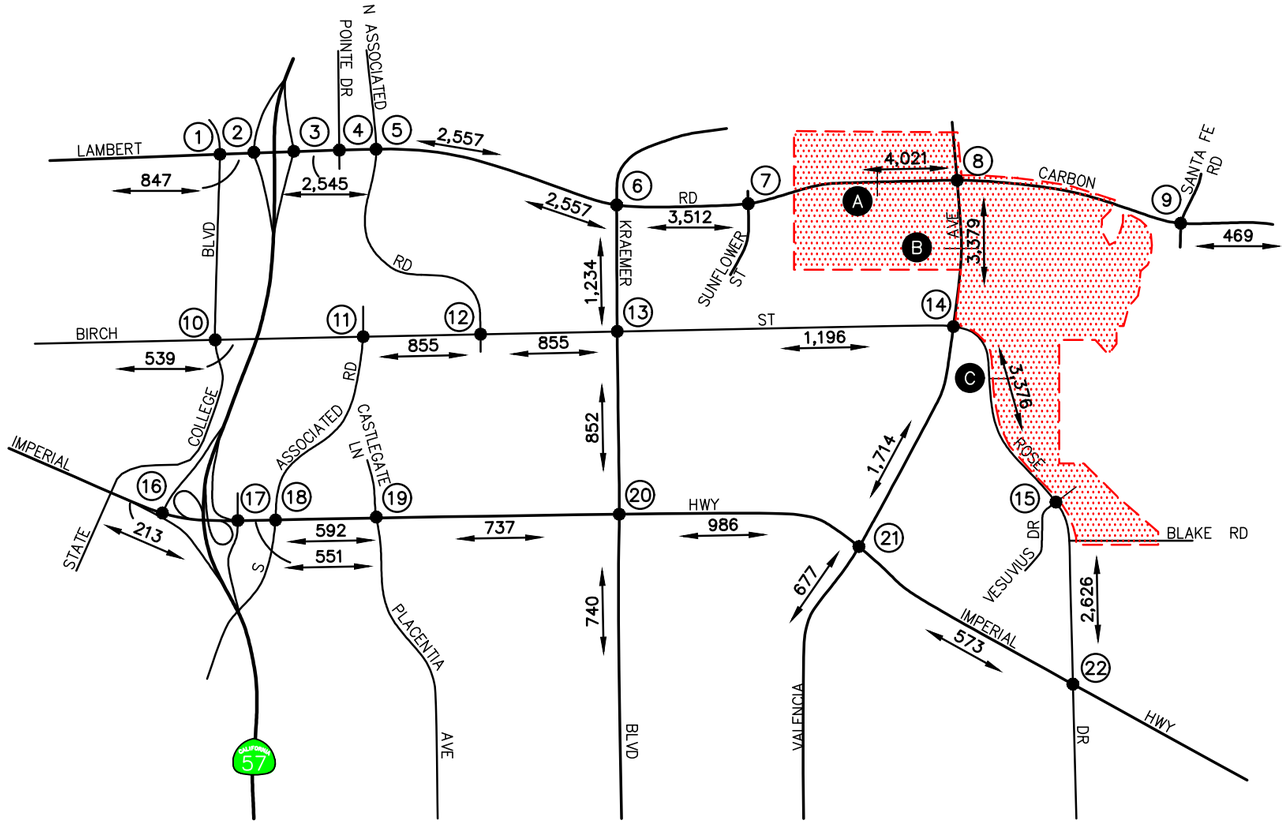
(#) = STUDY INTERSECTION

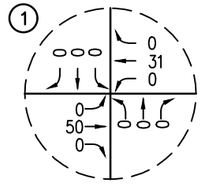
= PROJECT SITE

FIGURE 5-6

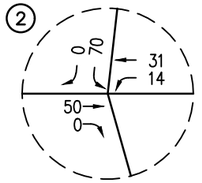
AM PEAK HOUR PROJECT TRAFFIC VOLUMES

BREA 265 SPECIFIC PLAN, BREA

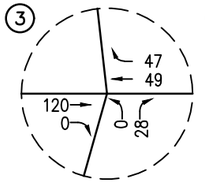




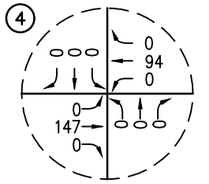
1 STATE COLLEGE BLVD @ LAMBERT RD



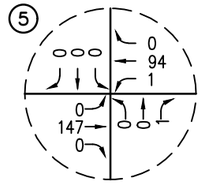
2 SR-57 SB RAMPS @ LAMBERT RD



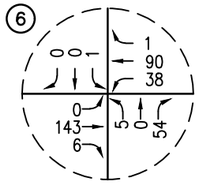
3 SR-57 NB RAMPS @ LAMBERT RD



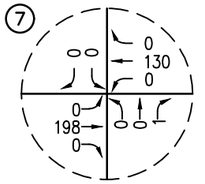
4 POINTE DR @ LAMBERT RD



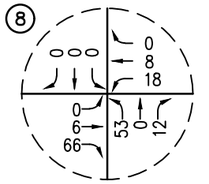
5 WILDCAT WY/ N ASSOCIATED RD @ LAMBERT RD



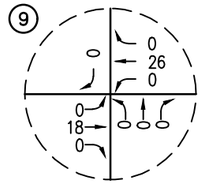
6 SANTA FE RD/ KRAEMER BLVD @ LAMBERT RD



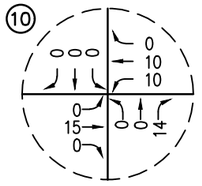
7 SUNFLOWER ST @ LAMBERT RD



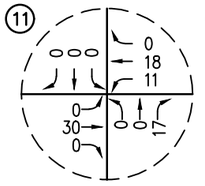
8 VALENCIA AVE @ LAMBERT RD/ CARBON CANYON RD



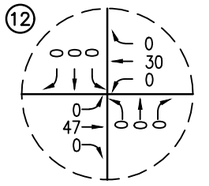
9 SANTA FE RD @ CARBON CANYON RD



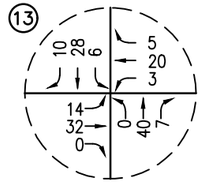
10 STATE COLLEGE BLVD @ BIRCH ST



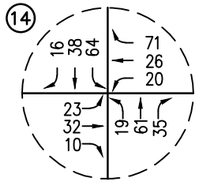
11 S ASSOCIATED RD @ BIRCH ST



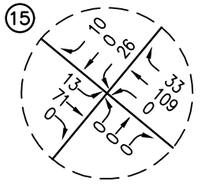
12 N ASSOCIATED RD @ BIRCH ST



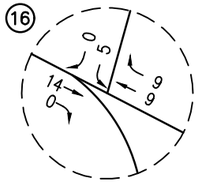
13 KRAEMER BLVD @ BIRCH ST



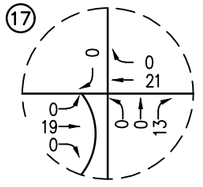
14 VALENCIA AVE @ BIRCH ST/ ROSE DR



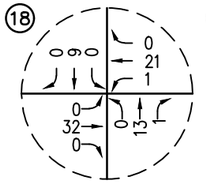
15 ROSE DR @ VESUVIUS DR



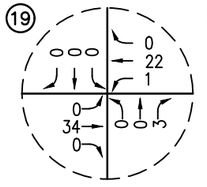
16 SR-57 SB RAMPS @ IMPERIAL HWY



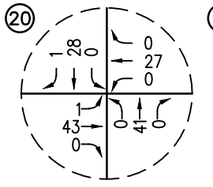
17 SR-57 NB RAMPS @ IMPERIAL HWY



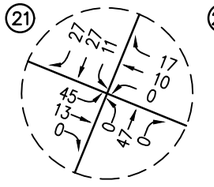
18 ASSOCIATED RD @ IMPERIAL HWY



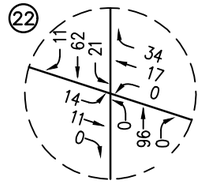
19 CASTLEGATE LN/ PLACENTIA AVE @



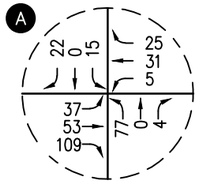
20 KRAEMER BLVD @ IMPERIAL HWY



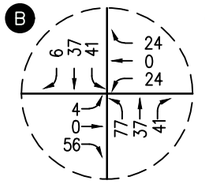
21 VALENCIA AVE @ IMPERIAL HWY



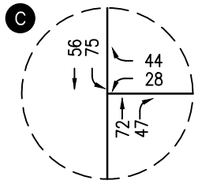
22 ROSE DR @ IMPERIAL HWY



A DRIVEWAY A @ LAMBERT RD



B VALENCIA AVE @ DRIVEWAY B



C ROSE DR @ DRIVEWAY C

LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

KEY

(#) = STUDY INTERSECTION

XX,XXX = DAILY TRAFFIC VOLUMES

= PROJECT SITE

FIGURE 5-7

PM PEAK HOUR AND DAILY PROJECT TRAFFIC VOLUMES

BREA 265 SPECIFIC PLAN, BREA

6.0 FUTURE TRAFFIC CONDITIONS

6.1 Ambient Traffic Growth

Horizon year, background traffic growth estimates have been calculated using an ambient traffic growth factor. The ambient traffic growth factor is intended to include unknown and future related projects in the study area, as well as account for regular growth in traffic volumes due to the development of projects outside the study area. The future growth in traffic volumes has been calculated at one percent (1.0%) per year. Applied to the Year 2021 existing traffic volumes, this factor results in an 14.0% growth in existing volumes to the near-term horizon year 2035.

6.2 Related Projects Traffic Characteristics

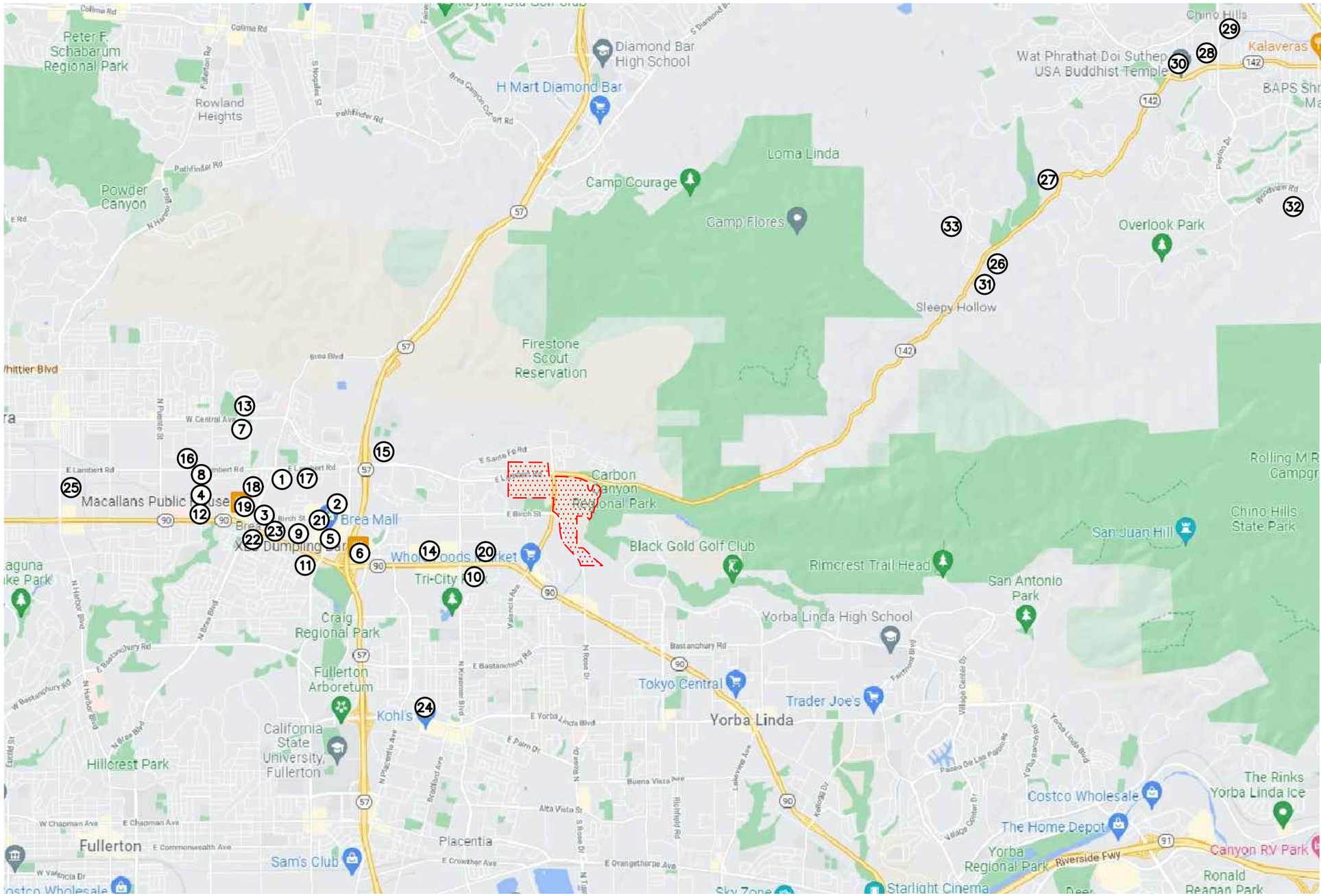
In order to make a realistic estimate of future on-street conditions prior to implementation of the proposed Project, the status of other known development projects (related projects) within the area of the proposed project has been researched at the City of Brea, City of Fullerton, City of Placentia, City of Yorba Linda, and City of Chino Hills. With this information, the proposed Project can be evaluated within the context of the cumulative setting.

Based on our research during the scoping process, there are twenty-three (23) related projects in the City of Brea, two (2) related projects in Fullerton, and eight (8) related projects in the City of Chino Hills that are being processed for approval. These thirty-three (33) related projects have been included as part of the cumulative background setting.

Table 6-1 provides a brief description for each of the thirty-three (33) related projects. ***Figure 6-1*** graphically illustrates the location of the thirty-three (33) related projects. These related projects are expected to generate vehicular traffic, which may affect the operating conditions of the study intersections.

Table 6-2 summarizes the trip generation potential for all thirty-three (33) related projects on a daily and peak hour basis for a typical weekday. As shown, the related projects are expected to generate 38,572 daily trips, with 3,006 trips (1,547 inbound, 1,459 outbound) anticipated during the AM peak hour and 3,517 trips (1,792 inbound, 1,725 outbound) produced during the PM peak hour.

The AM and PM peak hour traffic volumes associated with the thirty-three (33) related projects in the Year 2035 are presented in ***Figures 6-2*** and ***6-3***, respectively. *Figure 6-3* also presents the daily related project traffic volumes.



KEY

1. CVS
2. BREA PLACE
3. DOWNTOWN HOTEL
4. MERCURY APARTMENTS
5. BREA MALL MIXED-USE PROJECT
6. BREA PLAZA
7. CENTRAL PARK VILLAGE
8. NEW INDUSTRIAL BUILDING
9. ALVERO ASSISTED LIVING
10. EXTRA SPACE SELF STORAGE
11. BREA IMPERIAL CENTER
12. TRANSWESTERN
13. THE PHOENIX CLUB
14. ALDI GROCERY STORE
15. STARBUCKS WITH DRIVE-THRU
16. LAMBERT ROAD CONDOS
17. BREA METRO OFFICE CONDOS
18. FATHER'S HOUSE
19. CHA CHA'S EXPANSION
20. WESTERN REALCO
21. CAMP TRANSFORMATION
22. BREA EXPRESS WASH
23. RAISING CANE'S
24. 3105 YORBA LINDA BOULEVARD
25. BECKMAN BUSINESS CENTER
26. WOODBRIDGE PACIFIC GROUP (CANYON HILLS/HILLCREST)
27. STONEFIELD DEVELOPMENT
28. MORNINGFIELD ESTATES AND LOVING SAVIOR OF THE HILLS LUTHERAN CHURCH AN SCHOOL MASTER PLAN ADDENDUM
29. COPTIC ORTHODOX CHURCH
30. BUDDHIST TEMPLE OF CHINO HILLS
31. HIDDEN OAKS
32. GREENING LOS SERRANOS GOLF COURSE PROJECT
33. PARADISE RANCH

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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

SOURCE: GOOGLE

KEY

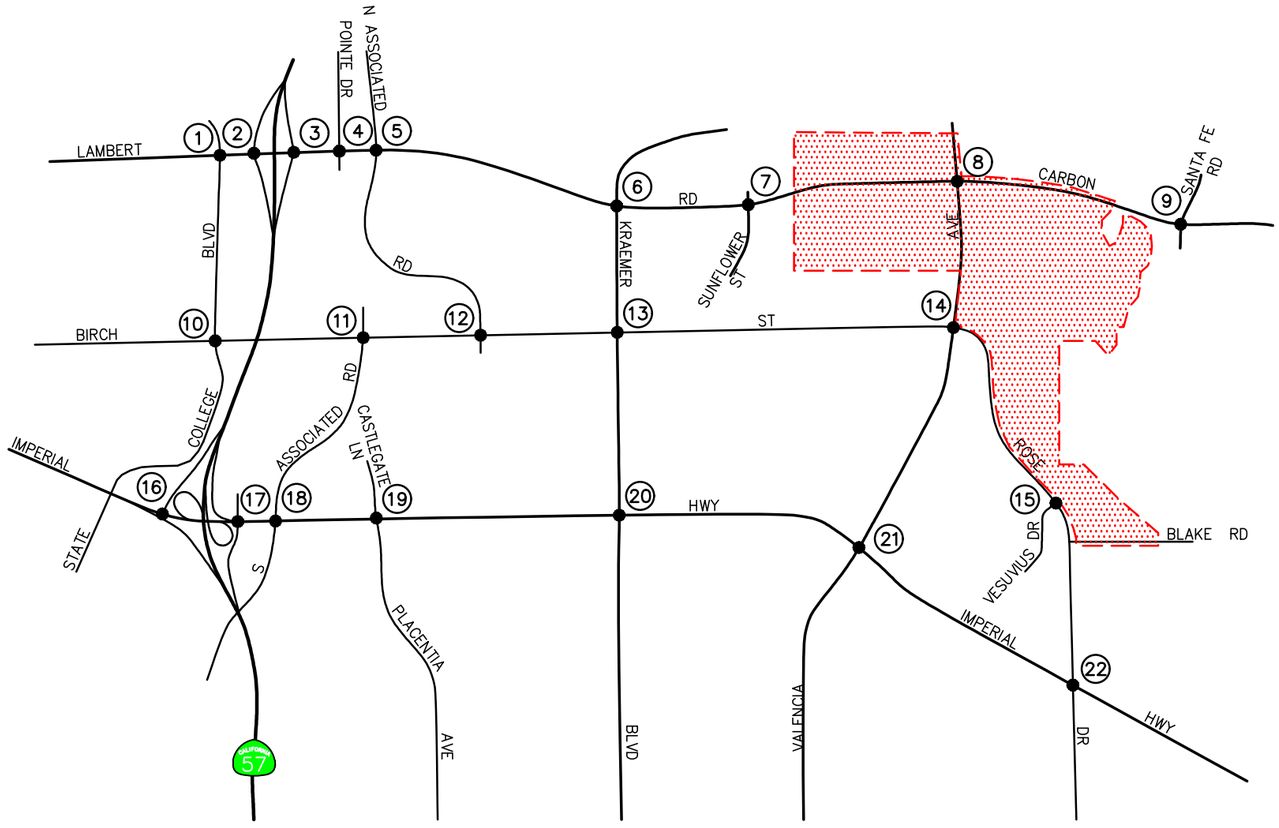
(#) = CUMULATIVE PROJECT LOCATION

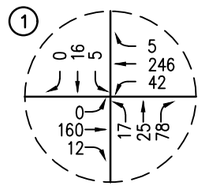
= PROJECT SITE

FIGURE 6-1

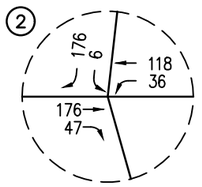
LOCATION OF CUMULATIVE PROJECTS

BREA 265 SPECIFIC PLAN, BREA

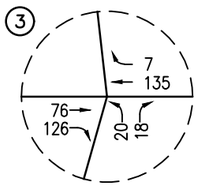




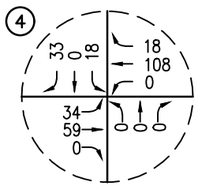
1 STATE COLLEGE BLVD @ LAMBERT RD



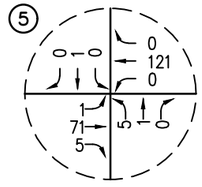
2 SR-57 SB RAMPS @ LAMBERT RD



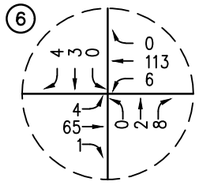
3 SR-57 NB RAMPS @ LAMBERT RD



4 POINTE DR @ LAMBERT RD



5 WILDCAT WY/ N ASSOCIATED RD @ LAMBERT RD



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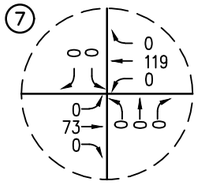

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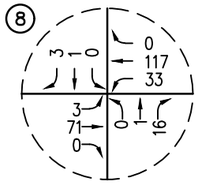

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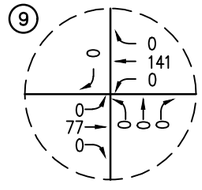

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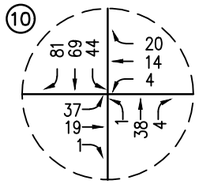

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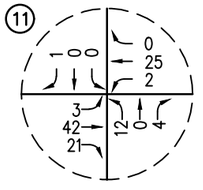

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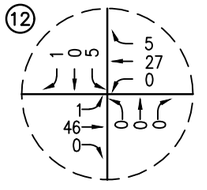

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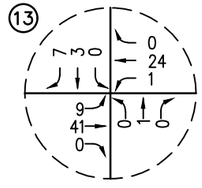

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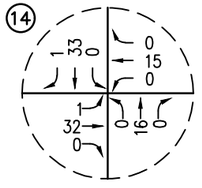

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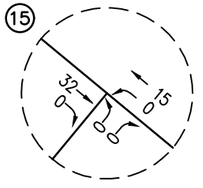

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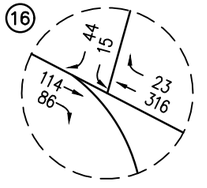

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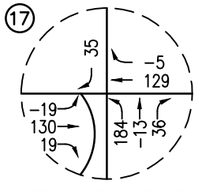

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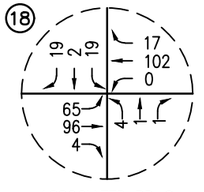

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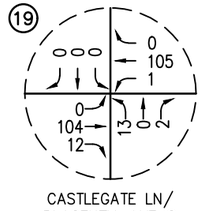

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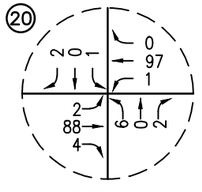

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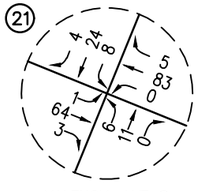

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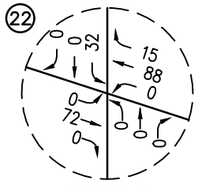

22 ROSE DR @ IMPERIAL HWY

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LINSCOTT LAW & GREENSPAN engineers

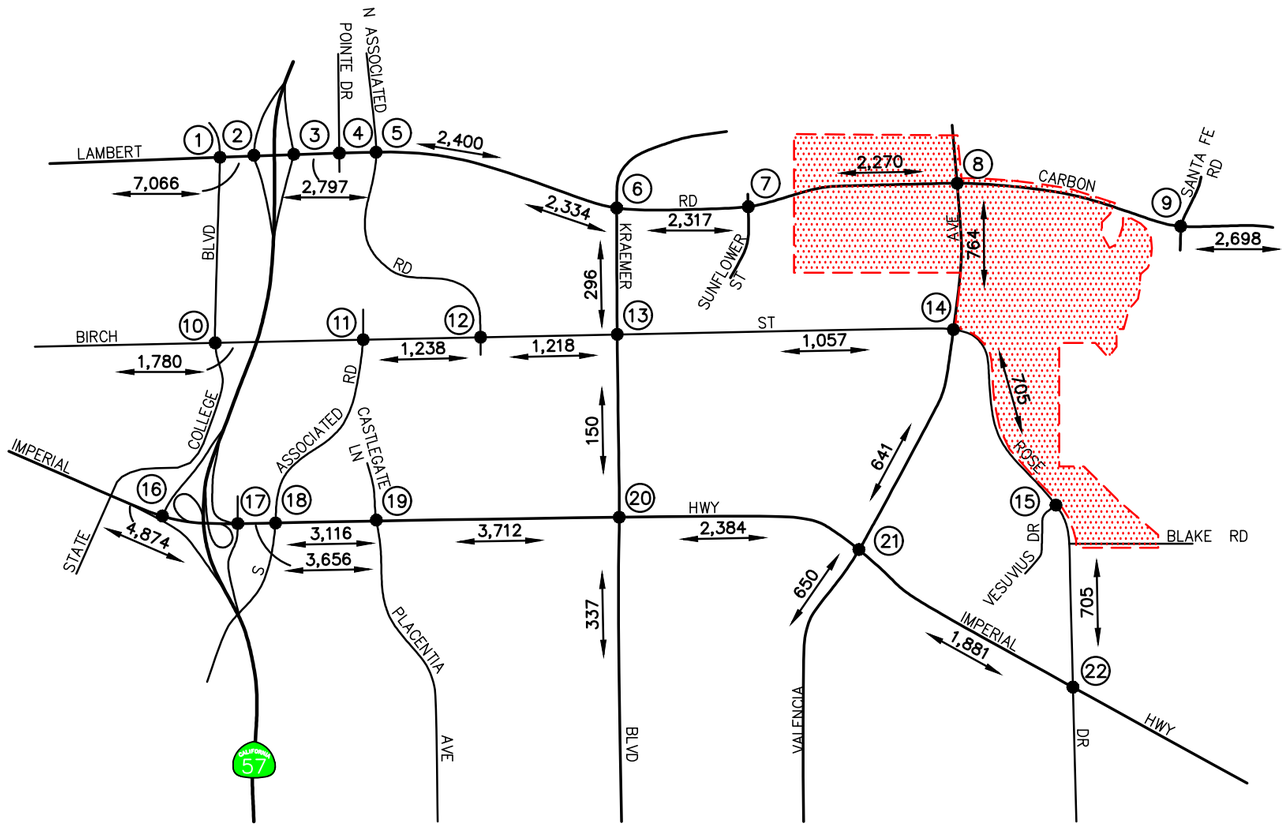
N NO SCALE

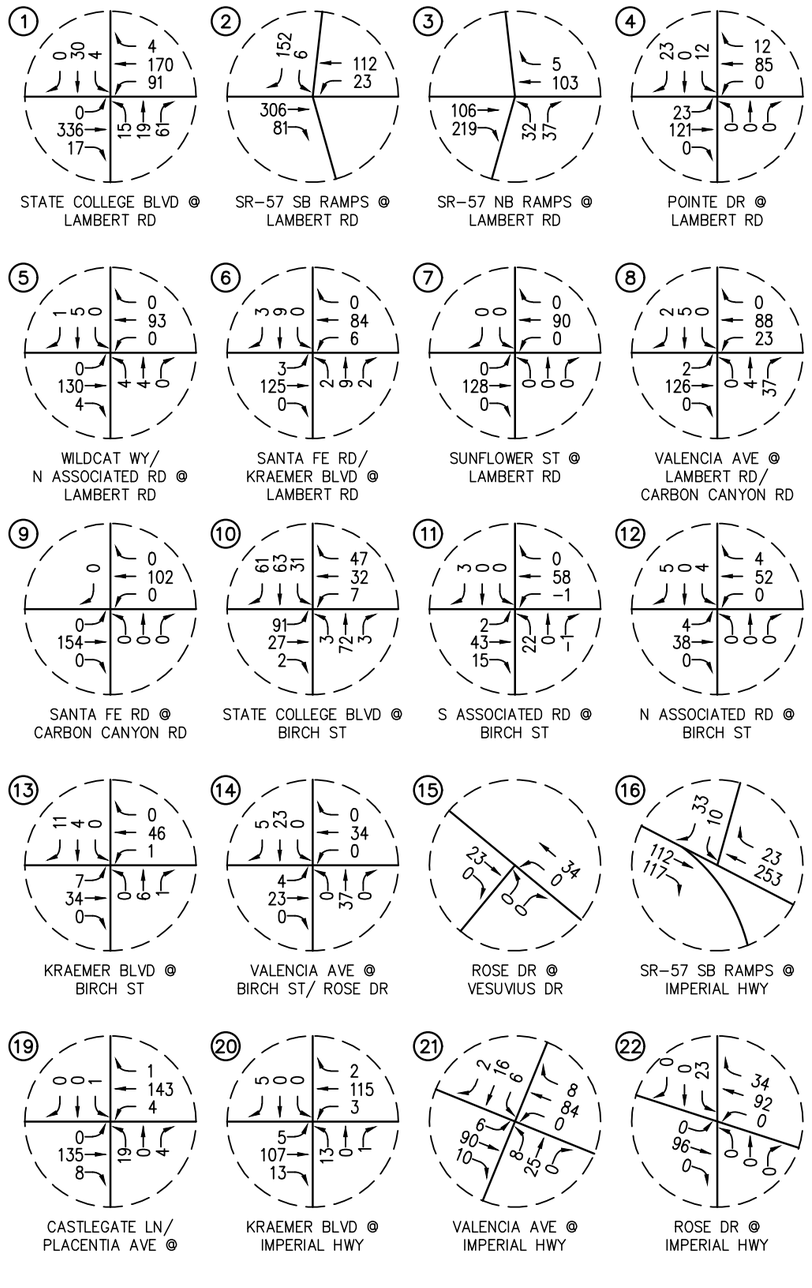
KEY
(#) = STUDY INTERSECTION
= PROJECT SITE

FIGURE 6-2

AM PEAK HOUR CUMULATIVE PROJECTS TRAFFIC VOLUMES

BREA 265 SPECIFIC PLAN, BREA





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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

KEY

(#) = STUDY INTERSECTION

XX,XXX = DAILY TRAFFIC VOLUMES

= PROJECT SITE

FIGURE 6-3

PM PEAK HOUR AND DAILY CUMULATIVE PROJECTS TRAFFIC VOLUMES

BREA 265 SPECIFIC PLAN, BREA

TABLE 6-1
LOCATION AND DESCRIPTION OF CUMULATIVE PROJECTS[10]

No.	Description	Location/Address	Size
City of Brea			
1.	CVS	390 N. Brea Boulevard	13,000 SF Pharmacy with Drive-Through, 1,700 SF Coffee Shop with Drive-through
2.	Brea Place	State College Boulevard at Birch Street	653 DU Apartments, 5,000 SF Office, 150 Room Hotel[11]
3.	Downtown Hotel	220 S. Brea Boulevard	116 Room Hotel, 4,000 SF High Turnover Sit Down Restaurant
4.	Mercury Apartments	Southeast corner of Berry Street at Mercury Lane	120 DU Apartments
5.	Brea Mall Mixed-Use Project	1065 Brea Mall	Demolish existing 161,990 SF Sears department store and construct 119,415 SF additional retail space, a 128,000 SF health club, and 383 DU medium density residential units
6.	Brea Plaza	409-477 S. Associated Road and 1555, 1609, 1623, 1643 E. Imperial Highway	Demolition of an existing 18,450 SF movie theater and the construction of a mixed-use development with 21,355 SF of office space and 229[12] apartment units
7.	Central Park Village	340-420 W. Central Avenue	62 DU townhomes and 20 DU apartments[13]
8.	New Industrial Building	201 N. Berry Street	109,125 SF warehouse
9.	Alvero Assisted Living	251 S. Randolph Avenue	80 rooms with 82 beds residential care facility
10.	Extra Space Self Storage	2700 E. Imperial Highway	126,546 self-storage facility
11.	Brea Imperial Center	391 S. State College Boulevard	5,000 SF restaurant, 2,300 SF bagel/coffee shop, 1,600 SF café, 3,867 SF In-N-Out, 28,145 SF retail, and 4,400 SF bank to replace existing land uses which include 4,050 SF food uses, 24,481 SF retail, 4,400 SF bank, 2,325 SF medical office, 10,074 SF health studio spa.
12.	Transwestern	285 S. Berry Street and 711 W. Imperial Highway	126,797 SF warehouse
13.	The Phoenix Club	375 W. Central Avenue	8,350 SF restaurant with banquet hall
14.	Aldi Grocery Store	2395 E. Imperial Highway	21,106 SF grocery store
15.	Starbucks with Drive-Thru	2 Pointe Drive	2,400 SF coffee shop with drive-thru
16.	Lambert Road Condos	700-800 W. Lambert Road	24 DU condominiums

10 Source: City of Brea, Fullerton, and Chino Hills Planning Departments.

11 The traffic impact analysis conservatively evaluated 790 units as originally planned, which would result in higher traffic volumes in the cumulative scenarios.

12 Fifteen (15) of the proposed apartments are considered co-living units, which include five (5) 3-bedroom units and ten (10) four-bedroom units, therefore, to provide a conservative assessment, the co-living unit bedrooms have been counted as individual units for a total apartment count of 229 units.

13 The project has already built and occupied 206 DU apartments and 83 DU townhomes.

TABLE 6-1(CONTINUED)
LOCATION AND DESCRIPTION OF CUMULATIVE PROJECTS[14]

No.	Description	Location/Address	Size
City of Brea (Continued)			
17.	Brea Metro Office Condos	330 E. Lambert Road	33 DU condominiums
18.	Father's House	245 W. Birch Street	299 seat religious assembly
19.	Cha Cha's Expansion	110 W. Birch Street	Existing restaurant expansion of 2,710 SF
20.	Western Realco	2929 E. Imperial Highway	131,500 SF industrial building
21.	CAMP Transformation	910 E. Birch Street, Suite 250	4,100 SF Fitness Center
22.	Brea Express Wash	300 S. Brea Boulevard	4,254 SF express car wash
23.	Raising Cane's	255 E. Imperial Highway	Demolish existing 9,588 SF office building and construction of a 4,047 SF fast food restaurant with drive-through
City of Fullerton			
24.	3105 Yorba Linda Boulevard	3105 Yorba Linda Boulevard	4,840 SF drive-through car wash
25.	Beckman Business Center	4300 North Harbor Boulevard	522,250 SF Warehousing, 166,185 SF General Light Industrial, 105,880 SF Manufacturing, 42,000 SF Office, and 142,350 SF fulfillment center
City of Chino Hills			
26.	Woodbridge Pacific Group (Canyon Hills/Hillcrest)	Northwest of Carbon Canyon Road and west of Canyon Hills Road	38 DU Single Family Detached
27.	Stonefield Development	Northwest of Carbon Canyon Road and east of Fairway Drive	28 DU single-family
28.	Morningfield Estates and Loving Savior of the Hills Lutheran Church and School Master Plan Addendum	South of Morningfield Drive, west of Peyton Drive, north of Chino Hills Parkway, adjacent to San Bernardino County Flood Channel	7-Lot Subdivision with semi-custom single-family homes, plus 3 classrooms/71 student addition to the Lutheran School
29.	Coptic Orthodox Church	East side of Peyton Drive, north of the Chino Creek Drainage Channel and south of the Chino Valley Community Church property	14,695 SF multi-purpose room, 8,645 SF Sanctuary and 555 SF Bookstore
30.	Buddhist Temple of Chino Hills	Northeast of Chino Hills Parkway and Rustic Drive	23,400 SF Buddhist temple expansion
31.	Hidden Oaks	East of Carbon Canyon Road at Canyon Hills Road	53 DU Single Family
32.	Greening Los Serranos Golf Course Project	15656 Yorba Avenue	124 DU single family, 532 DU multifamily
33.	Paradise Ranch	East of Canyon Hills Road and south of Esquilime Drive	51 DU single-family

[14] Source: City of Brea, Fullerton, and Chino Hills Planning Departments.

TABLE 6-2
CUMULATIVE PROJECTS TRAFFIC GENERATION FORECAST[15]

Cumulative Project Description	Weekday Daily 2-Way	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
1. CVS	1,948	59	58	117	59	58	117
2. Brea Place	6,364	122	271	393	300	199	499
3. Downtown Hotel	1,201	45	34	79	44	37	81
4. Mercury Apartments[16]	653	11	32	43	32	21	53
5. Brea Mall Mixed-Use Project[17]	4,487	176	172	348	303	158	461
6. Brea Plaza[18]	-1,680	39	61	100	-33	-27	-60
7. Central Park Village	553	8	25	33	26	16	42
8. New Industrial Building	247	22	5	27	9	22	31
9. Alvero Assisted Living	213	9	6	15	8	12	20
10. Extra Space Self Storage	183	6	5	11	9	10	19
11. Brea Imperial Center[19]	1,315	58	60	118	56	37	93
12. Transwestern	288	24	7	31	10	26	36
13. The Phoenix Club	805	40	32	72	26	17	43
14. Aldi Grocery Store	1,783	31	23	54	72	72	144
15. Starbucks with Drive-Thru	961	52	51	103	35	35	70
16. Lambert Road Condos	162	2	8	10	8	4	12
17. Brea Metro Office Condos	222	3	10	13	11	6	17
18. Father's House	269	13	8	21	14	16	30
19. Cha Cha's Expansion	262	13	10	23	9	5	14
20. Western Realco	299	25	8	33	10	27	37
21. CAMP Transformation	140	3	2	5	8	6	14
22. Brea Express Wash	600	16	16	32	30	30	60
23. Raising Cane's[20]	1,727	0	0	0	61	48	109
24. 3105 Yorba Linda Boulevard	690	18	18	36	35	34	69
25. Beckman Business Center[21]	7,564	583	172	755	253	599	852

15 Source: *Trip Generation*, 11th Edition, Institute of Transportation Engineers (ITE), Washington, D.C. (2021), unless otherwise noted.

16 Source: *Mercury Apartments TIA*, prepared by LLG Engineers, dated July 2019.

17 Source: *Brea Mall Mixed-Use Project Scope of Work*, prepared by LLG Engineers, dated December 2021.

18 Source: *Brea Plaza Expansion Revised TCA*, prepared by LLG Engineers, dated July 2021.

19 Source: *Brea Imperial Center TIA*, prepared by Wildan Engineering, dated July 2018.

20 Source: *Focused Transportation Assessment for Raising Cane's Projct,* prepared by Kimley Horn, dated December 2020.

21 Source: *Beckman Business Center Proposed Building 6 Tenant/Land Use Modification TIA Report Addendum,* prepared by LLG Engineers, dated September 2019. Although this development is completely constructed, it was only partially occupied during the time the existing traffic counts were collected. Hence to provide a conservative assessment, all buildings are assumed to be vacant.

TABLE 6-2 (CONTINUED)

CUMULATIVE PROJECTS TRAFFIC GENERATION FORECAST[22]

Cumulative Project Description	Weekday Daily 2-Way	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
26. Woodbridge Pacific Group (Canyon Hills/Hillcrest)	358	7	20	27	23	13	36
27. Stonefield Development	264	5	15	20	16	10	26
28. Morningfield Estates and Loving Savior of the Hills Lutheran Church and School Master Plan Addendum[23]	264	36	33	69	24	26	50
29. Coptic Orthodox Church	494	20	11	31	19	23	42
30. Buddhist Temple of Chino Hills[24]	200	7	5	12	6	6	12
31. Hidden Oaks	500	10	27	37	32	18	50
32. Greening Los Serranos Golf Course Project	4,755	74	226	300	245	143	388
33. Paradise Ranch[25]	481	10	28	38	32	18	50
Cumulative Projects Total Trip Generation Potential	**38,572**	**1,547**	**1,459**	**3,006**	**1,792**	**1,725**	**3,517**

[22] Source: *Trip Generation*, 11th Edition, Institute of Transportation Engineers (ITE), Washington, D.C. (2021), unless otherwise noted.

[23] Source: *Morningfield Estates and Loving Savior of the Hills Lutheran Church and School Master Plan Addendum Traffic Impact Analysis,* prepared by LLG Engineers, dated April 12, 2017.

[24] Source: *Buddhist Temple Traffic Impact Analysis,* prepared by LLG Engineers, dated January 23, 2017.

[25] Source: *Paradise Ranch Traffic Study,* prepared by LLG Engineers, dated August 2021.

6.3 Year 2045 Traffic Conditions

As coordinated with City staff, the Year 2045 General Plan Buildout traffic volume forecasts for this traffic study were developed via the utilization of the OCTAM 5.0 Year 2045 traffic model. Specifically, daily, AM peak period and PM peak period link traffic volumes were provided for the existing base year (i.e. Year 2016) and for the Year 2045. The AM peak period corresponds to a three-hour morning commute period while the PM peak period corresponds to a four-hour afternoon commute period. Using the peak period model runs and the approved peak hour factors (i.e. AM = 0.3566 and PM = 0.2662), the one-hour peak hour link traffic volumes were determined. These future year 2045 link traffic volumes were post-processed based on the relationship of the base year validation model run output to the base year ground traffic counts resulting in anticipated Year 2045 without project daily traffic volumes for the roadway segments and AM peak hour/PM peak hour turning movements for the study intersections.

It should be noted that the OCTAM model has entitlements included assumed for Brea 265. However, to provide a conservative assessment Year 2045 traffic conditions exclude these entitlements resulting in the proposed Project being compared to a vacant site as it now currently exists.

Copies of the model post-processing worksheets are contained in ***Appendix E***.

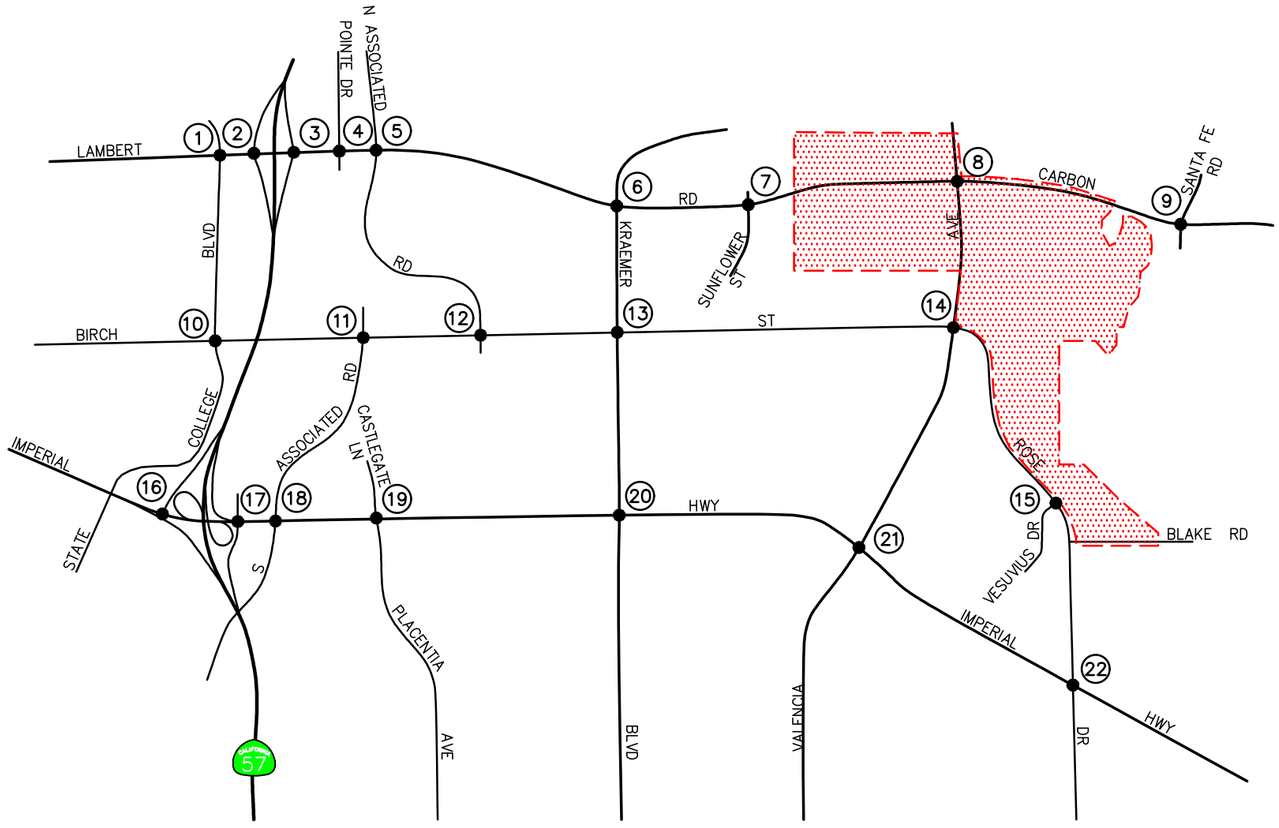
6.4 Year 2035 and Year 2045 Traffic Volumes

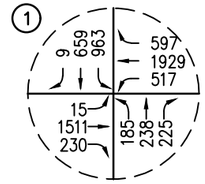
6.4.1 *Year 2035 Traffic Volumes*

Figures 6-4 and ***6-5*** present the AM and PM peak hour cumulative traffic volumes (existing traffic + ambient growth + related projects) at the twenty-two (22) key study intersections for the Year 2035, respectively. *Figure 6-5* also presents the Year 2035 daily cumulative traffic volumes. ***Figures 6-6*** and ***6-7*** illustrate the Year 2035 forecast AM and PM peak hour traffic volumes, with the inclusion of the trips generated by the proposed Project, respectively. *Figure 6-7* also presents the Year 2035 daily cumulative plus project traffic volumes.

6.4.2 *Year 2045 Traffic Volumes*

Figures 6-8 and ***6-9*** present the Year 2045 AM and PM peak hour buildout traffic volumes at the twenty-two (22) key study intersections, respectively. *Figure 6-9* also presents the Year 2045 daily buildout traffic volumes. ***Figures 6-10*** and ***6-11*** illustrate the Year 2045 forecast AM and PM peak hour traffic volumes, with the inclusion of the trips generated by the proposed Project, respectively. *Figure 6-11* also presents the Year 2045 daily buildout plus project traffic volumes.





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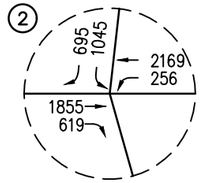

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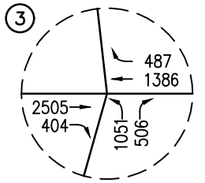

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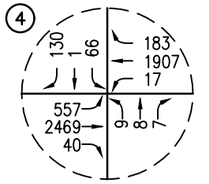

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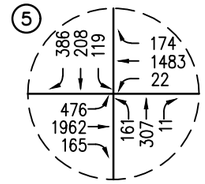

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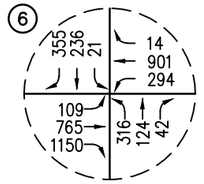

SANTA FE RD/
KRAEMER BLVD @
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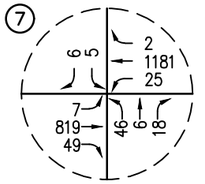

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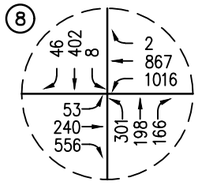
LAMBERT RD



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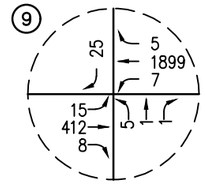

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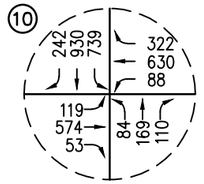
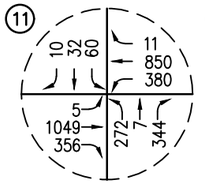
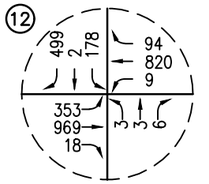


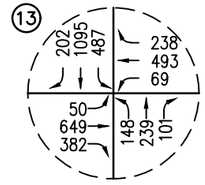
STATE COLLEGE BLVD @
BIRCH ST



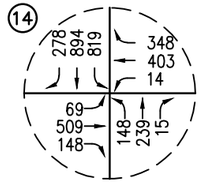
S ASSOCIATED RD @
BIRCH ST



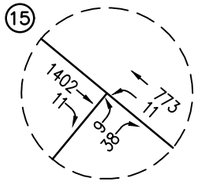
N ASSOCIATED RD @
BIRCH ST



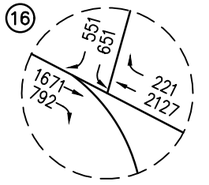
KRAEMER BLVD @
BIRCH ST



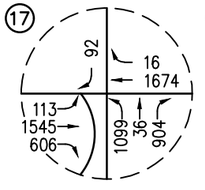
VALENCIA AVE @
BIRCH ST/ ROSE DR



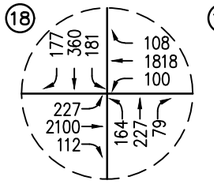
ROSE DR @
VESUVIUS DR



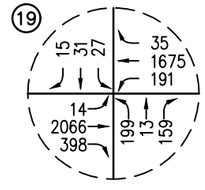
SR-57 SB RAMPS @
IMPERIAL HWY



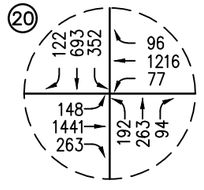
SR-57 NB RAMPS @
IMPERIAL HWY



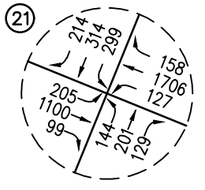
ASSOCIATED RD @
IMPERIAL HWY
IMPERIAL HWY



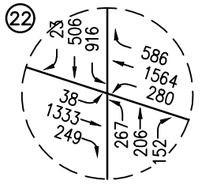
CASTLEGATE LN/
PLACENTIA AVE @



KRAEMER BLVD @
IMPERIAL HWY



VALENCIA AVE @
IMPERIAL HWY



ROSE DR @
IMPERIAL HWY

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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

KEY

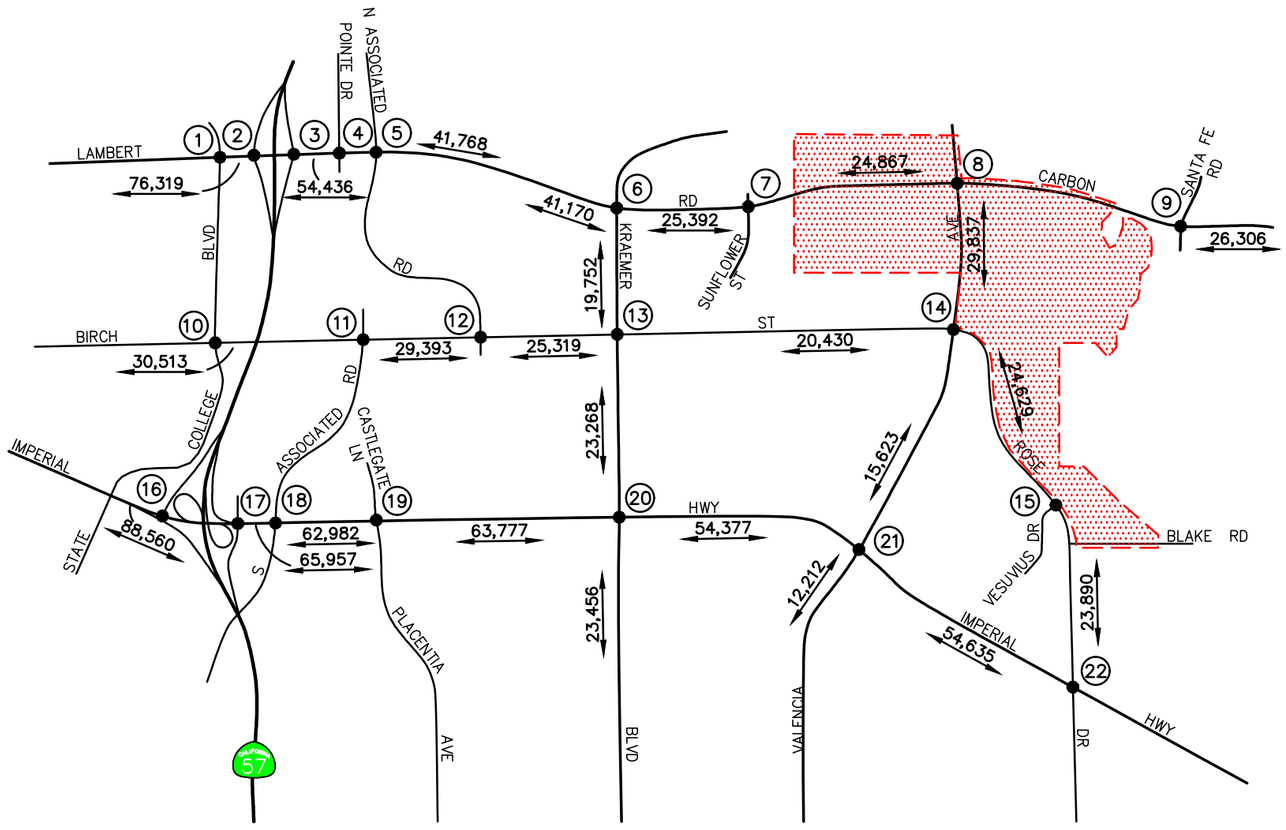
(#) = STUDY INTERSECTION

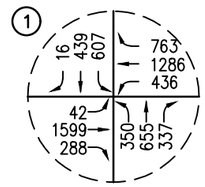
= PROJECT SITE

FIGURE 6-4

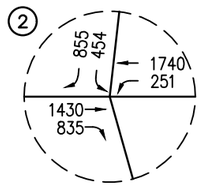
YEAR 2035 AM PEAK HOUR CUMULATIVE TRAFFIC VOLUMES

BREA 265 SPECIFIC PLAN, BREA

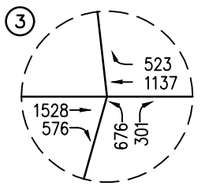




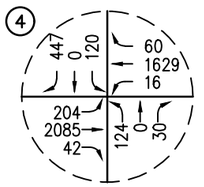
STATE COLLEGE BLVD @ LAMBERT RD



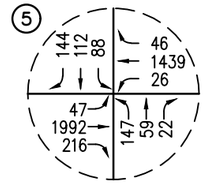
SR-57 SB RAMPS @ LAMBERT RD



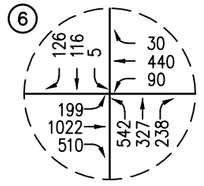
SR-57 NB RAMPS @ LAMBERT RD



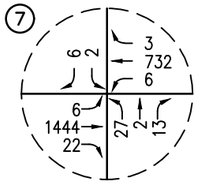
POINTE DR @ LAMBERT RD



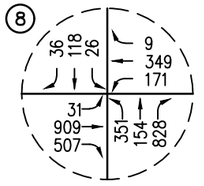
WILDCAT WY/ N ASSOCIATED RD @ LAMBERT RD



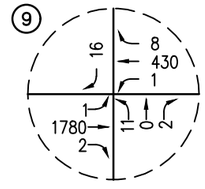
SANTA FE RD/ KRAEMER BLVD @ LAMBERT RD



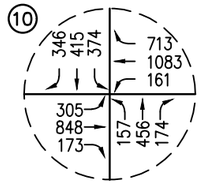
SUNFLOWER ST @ LAMBERT RD



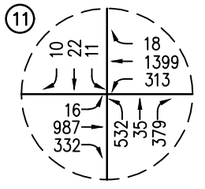
VALENCIA AVE @ LAMBERT RD/ CARBON CANYON RD



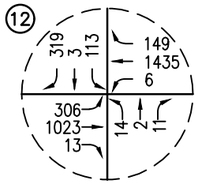
SANTA FE RD @ CARBON CANYON RD



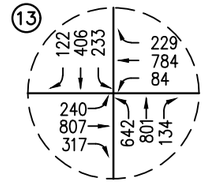
STATE COLLEGE BLVD @ BIRCH ST



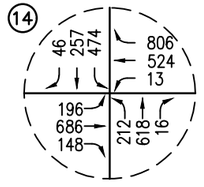
S ASSOCIATED RD @ BIRCH ST



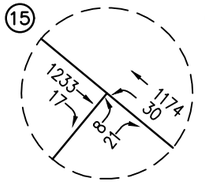
N ASSOCIATED RD @ BIRCH ST



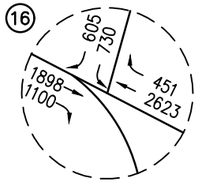
KRAEMER BLVD @ BIRCH ST



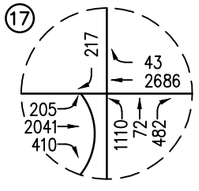
VALENCIA AVE @ BIRCH ST/ ROSE DR



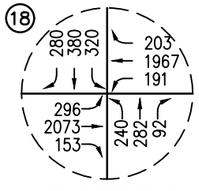
ROSE DR @ VESUVIUS DR



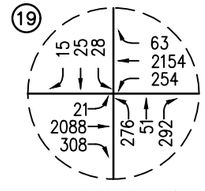
SR-57 SB RAMPS @ IMPERIAL HWY



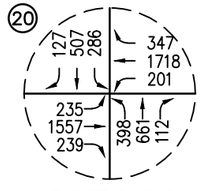
SR-57 NB RAMPS @ IMPERIAL HWY



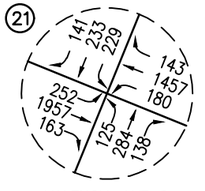
ASSOCIATED RD @ IMPERIAL HWY
IMPERIAL HWY



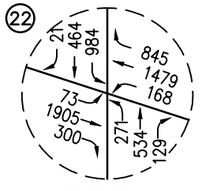
CASTLEGATE LN/ PLACENTIA AVE @



KRAEMER BLVD @ IMPERIAL HWY



VALENCIA AVE @ IMPERIAL HWY



ROSE DR @ IMPERIAL HWY

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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

KEY

(#) = STUDY INTERSECTION

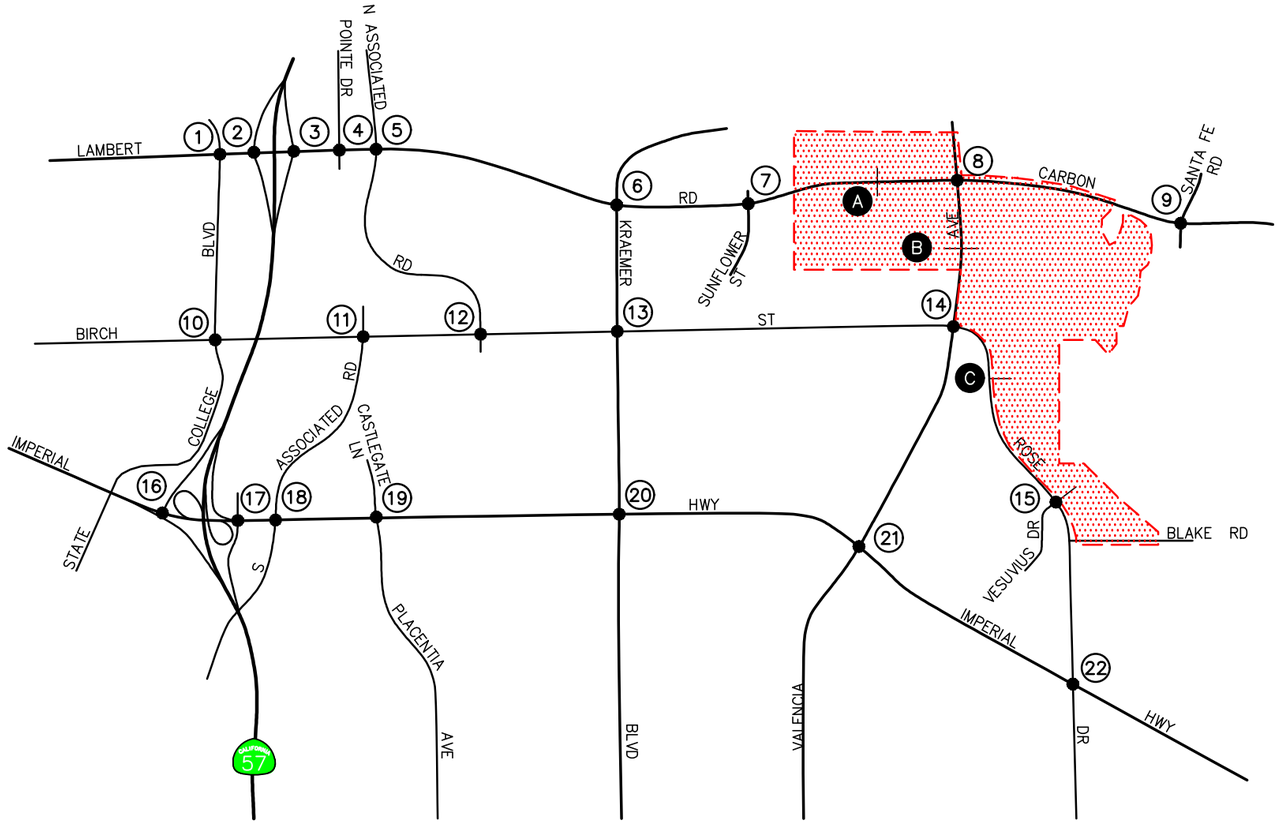
XX,XXX = DAILY TRAFFIC VOLUMES

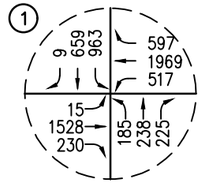
= PROJECT SITE

FIGURE 6–5

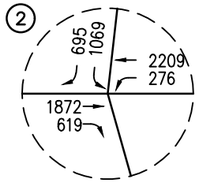
YEAR 2035 PM PEAK HOUR AND DAILY CUMULATIVE TRAFFIC VOLUMES

BREA 265 SPECIFIC PLAN, BREA

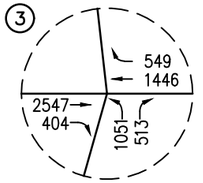




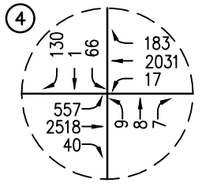
STATE COLLEGE BLVD @ LAMBERT RD



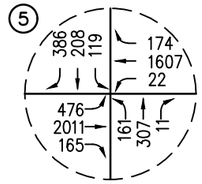
SR-57 SB RAMPS @ LAMBERT RD



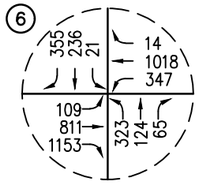
SR-57 NB RAMPS @ LAMBERT RD



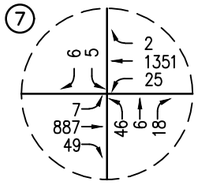
POINTE DR @ LAMBERT RD



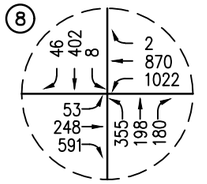
WILDCAT WY/ N ASSOCIATED RD @ LAMBERT RD



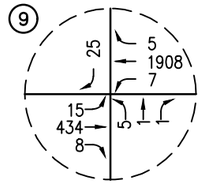
SANTA FE RD/ KRAEMER BLVD @ LAMBERT RD



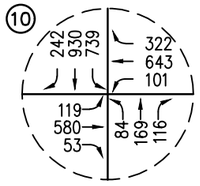
SUNFLOWER ST @ LAMBERT RD



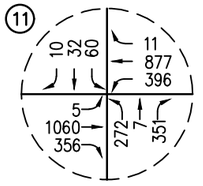
VALENCIA AVE @ LAMBERT RD/ CARBON CANYON RD



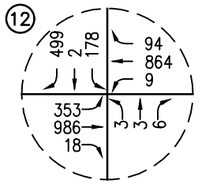
SANTA FE RD @ CARBON CANYON RD



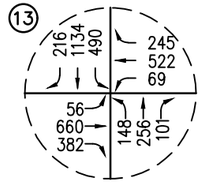
STATE COLLEGE BLVD @ BIRCH ST



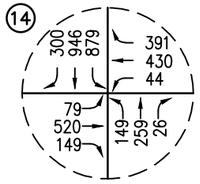
S ASSOCIATED RD @ BIRCH ST



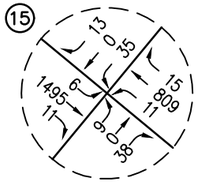
N ASSOCIATED RD @ BIRCH ST



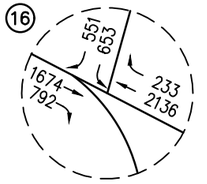
KRAEMER BLVD @ BIRCH ST



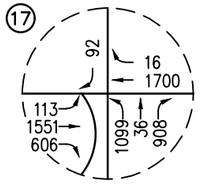
VALENCIA AVE @ BIRCH ST/ ROSE DR



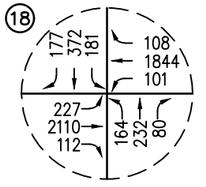
ROSE DR @ VESUVIUS DR



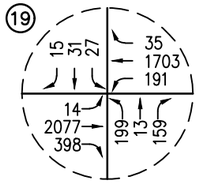
SR-57 SB RAMPS @ IMPERIAL HWY



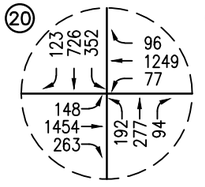
SR-57 NB RAMPS @ IMPERIAL HWY



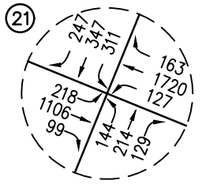
ASSOCIATED RD @ IMPERIAL HWY



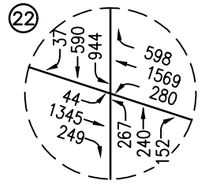
CASTLEGATE LN/ PLACENTIA AVE @



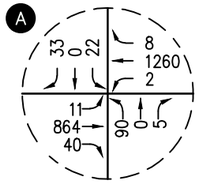
KRAEMER BLVD @ IMPERIAL HWY



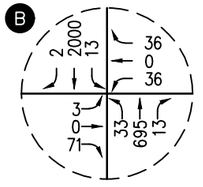
VALENCIA AVE @ IMPERIAL HWY



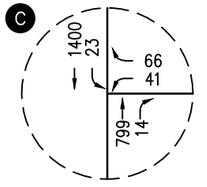
ROSE DR @ IMPERIAL HWY



DRIVEWAY A @ LAMBERT RD



VALENCIA AVE @ DRIVEWAY B



ROSE DR @ DRIVEWAY C

n:\4000\2184052 - brea 265 specific plan deir tia, brea\august 2021 update\dwg\4052 f6-6.dwg LDP 14:01:57 02-07-2022 aguilar

LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

KEY

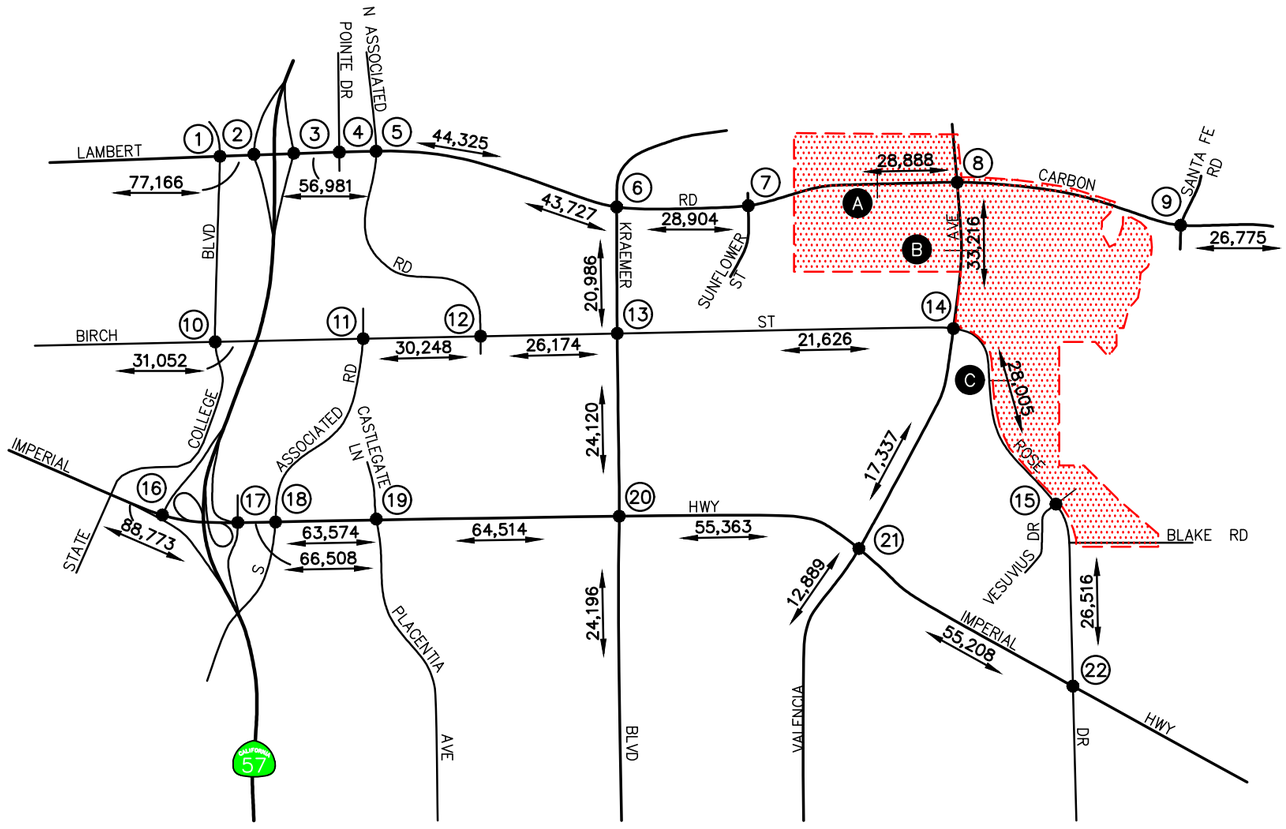
(#) = STUDY INTERSECTION

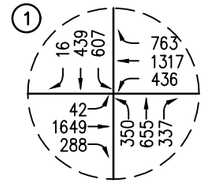
= PROJECT SITE

FIGURE 6-6

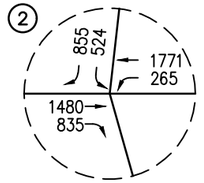
YEAR 2035 AM PEAK HOUR CUMULATIVE TRAFFIC VOLUMES WITH PROJECT

BREA 265 SPECIFIC PLAN, BREA

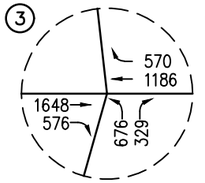




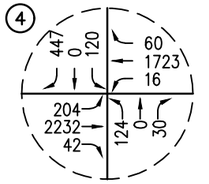
STATE COLLEGE BLVD @ LAMBERT RD



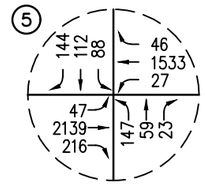
SR-57 SB RAMPS @ LAMBERT RD



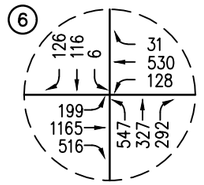
SR-57 NB RAMPS @ LAMBERT RD



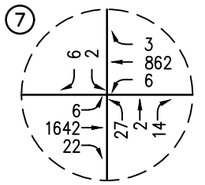
POINTE DR @ LAMBERT RD



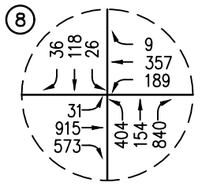
WILDCAT WY/ N ASSOCIATED RD @ LAMBERT RD



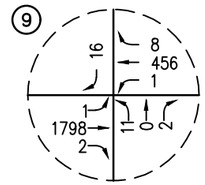
SANTA FE RD/ KRAEMER BLVD @ LAMBERT RD



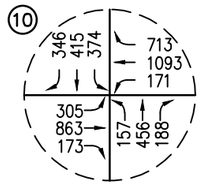
SUNFLOWER ST @ LAMBERT RD



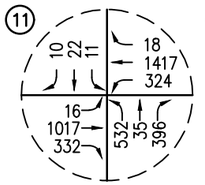
VALENCIA AVE @ LAMBERT RD/ CARBON CANYON RD



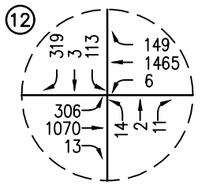
SANTA FE RD @ CARBON CANYON RD



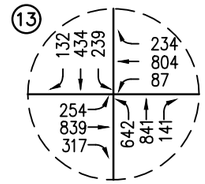
STATE COLLEGE BLVD @ BIRCH ST



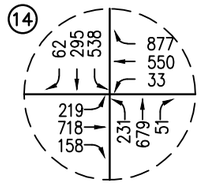
S ASSOCIATED RD @ BIRCH ST



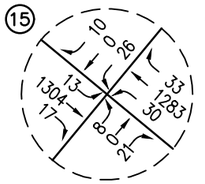
N ASSOCIATED RD @ BIRCH ST



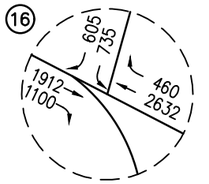
KRAEMER BLVD @ BIRCH ST



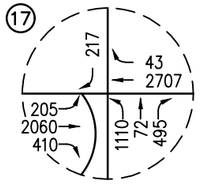
VALENCIA AVE @ BIRCH ST/ ROSE DR



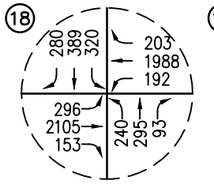
ROSE DR @ VESUVIUS DR



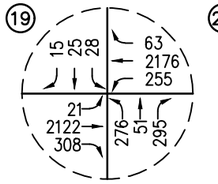
SR-57 SB RAMPS @ IMPERIAL HWY



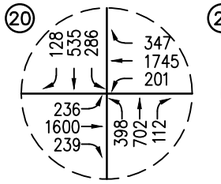
SR-57 NB RAMPS @ IMPERIAL HWY



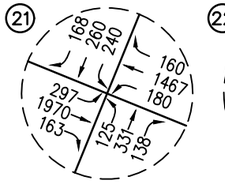
ASSOCIATED RD @ IMPERIAL HWY



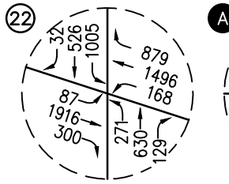
CASTLEGATE LN/ PLACENTIA AVE @



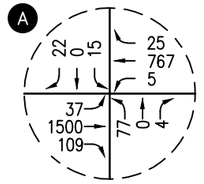
KRAEMER BLVD @ IMPERIAL HWY



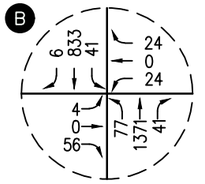
VALENCIA AVE @ IMPERIAL HWY



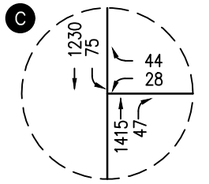
ROSE DR @ IMPERIAL HWY



DRIVEWAY A @ LAMBERT RD



VALENCIA AVE @ DRIVEWAY B



ROSE DR @ DRIVEWAY C

LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

KEY

(#) = STUDY INTERSECTION

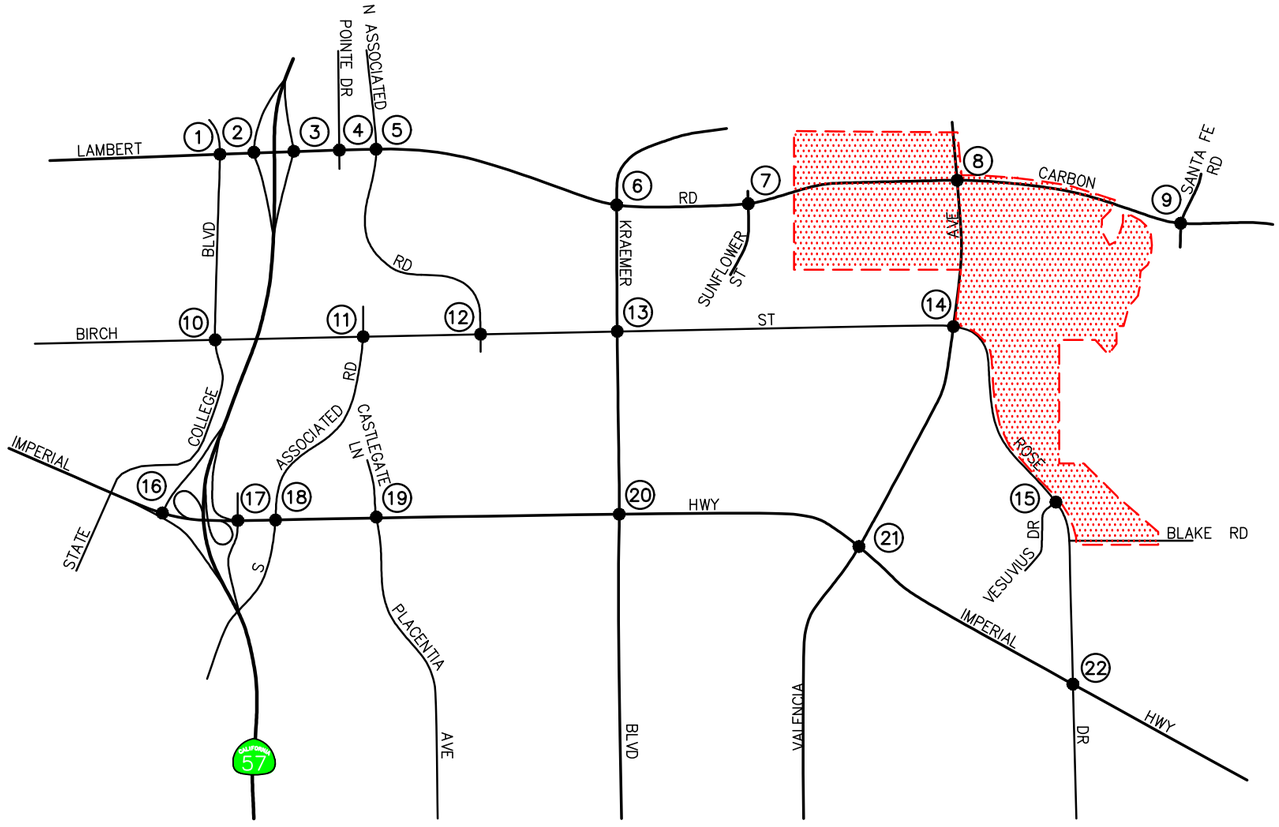
XX,XXX = DAILY TRAFFIC VOLUMES

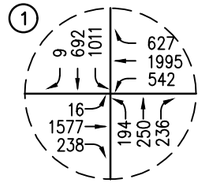
= PROJECT SITE

FIGURE 6-7

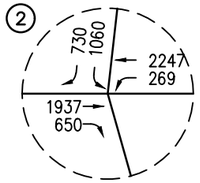
YEAR 2035 PM PEAK HOUR AND DAILY CUMULATIVE TRAFFIC VOLUMES WITH PROJECT

BREA 265 SPECIFIC PLAN, BREA

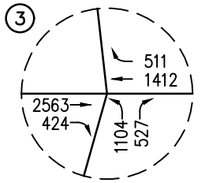




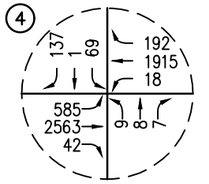
STATE COLLEGE BLVD @ LAMBERT RD



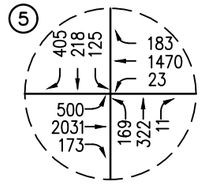
SR-57 SB RAMPS @ LAMBERT RD



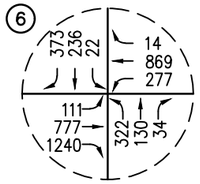
SR-57 NB RAMPS @ LAMBERT RD



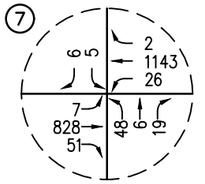
POINTE DR @ LAMBERT RD



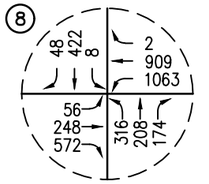
WILDCAT WY/ N ASSOCIATED RD @ LAMBERT RD



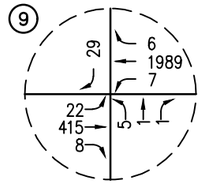
SANTA FE RD/ KRAEMER BLVD @ LAMBERT RD



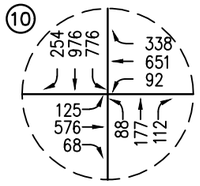
SUNFLOWER ST @ LAMBERT RD



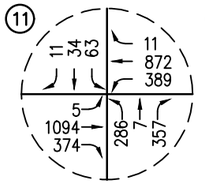
VALENCIA AVE @ LAMBERT RD/ CARBON CANYON RD



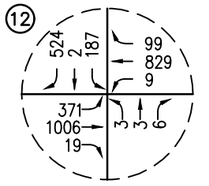
SANTA FE RD @ CARBON CANYON RD



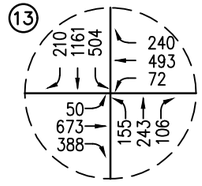
STATE COLLEGE BLVD @ BIRCH ST



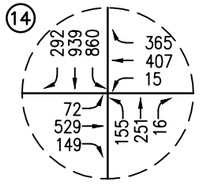
S ASSOCIATED RD @ BIRCH ST



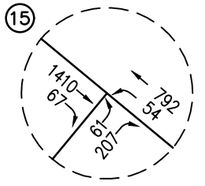
N ASSOCIATED RD @ BIRCH ST



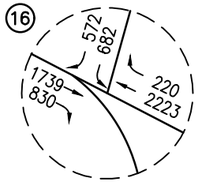
KRAEMER BLVD @ BIRCH ST



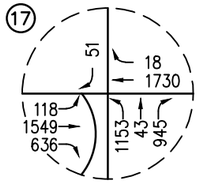
VALENCIA AVE @ BIRCH ST/ ROSE DR



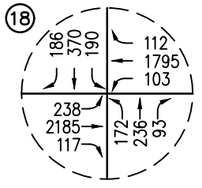
ROSE DR @ VESUVIUS DR



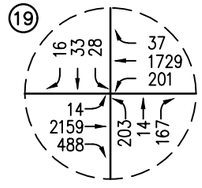
SR-57 SB RAMPS @ IMPERIAL HWY



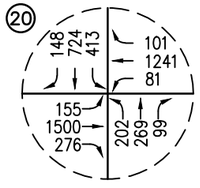
SR-57 NB RAMPS @ IMPERIAL HWY



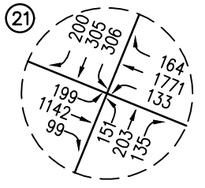
ASSOCIATED RD @ IMPERIAL HWY



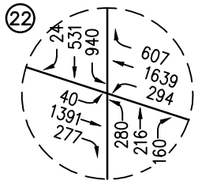
CASTLEGATE LN/ PLACENTIA AVE @



KRAEMER BLVD @ IMPERIAL HWY



VALENCIA AVE @ IMPERIAL HWY



ROSE DR @ IMPERIAL HWY

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N NO SCALE

KEY

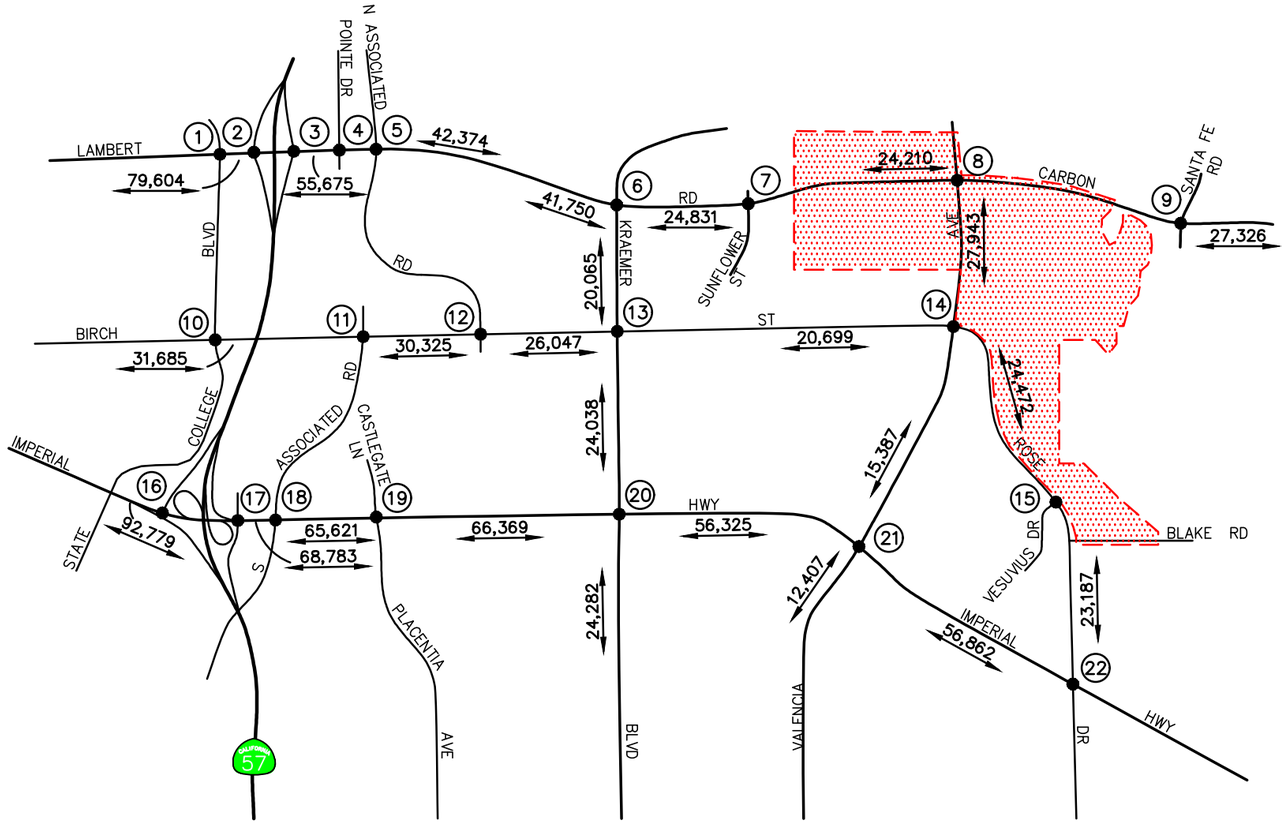
(#) = STUDY INTERSECTION

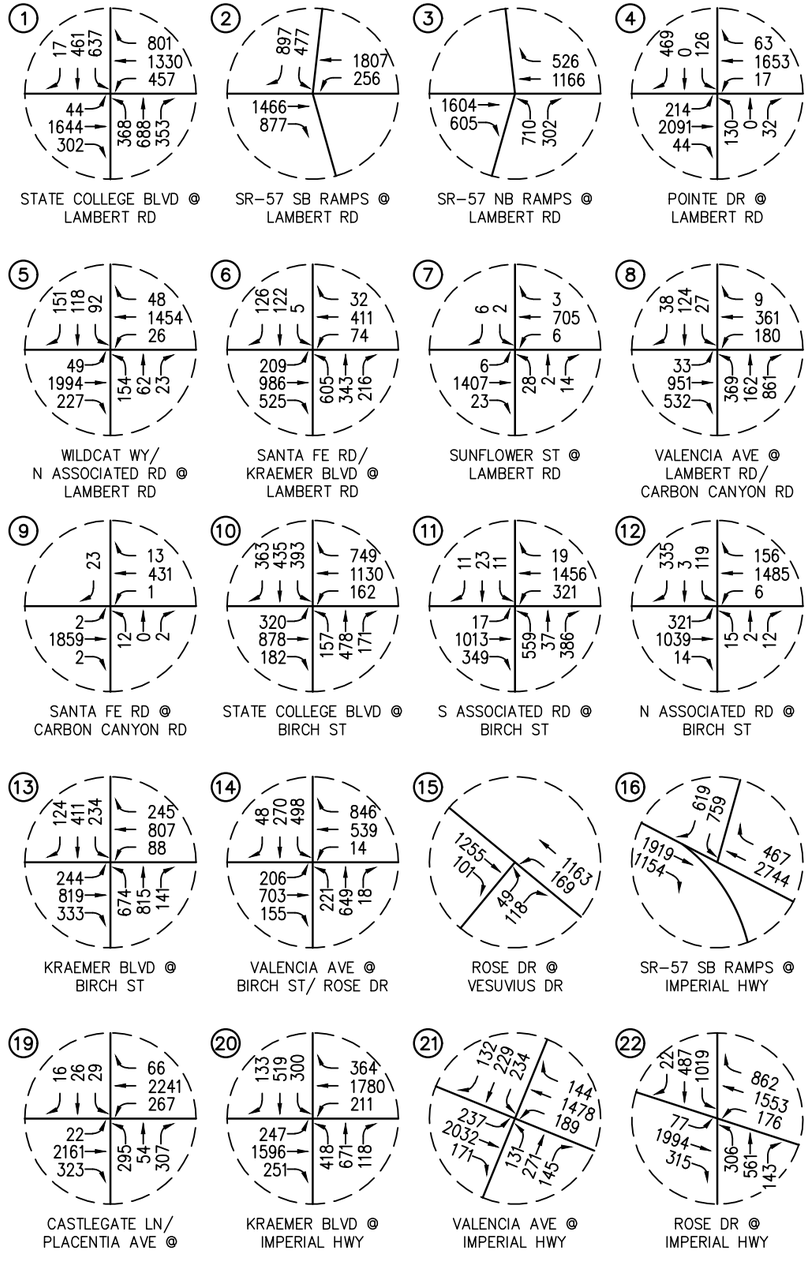
= PROJECT SITE

FIGURE 6-8

YEAR 2045 AM PEAK HOUR TRAFFIC VOLUMES

BREA 265 SPECIFIC PLAN, BREA





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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

KEY

(#) = STUDY INTERSECTION

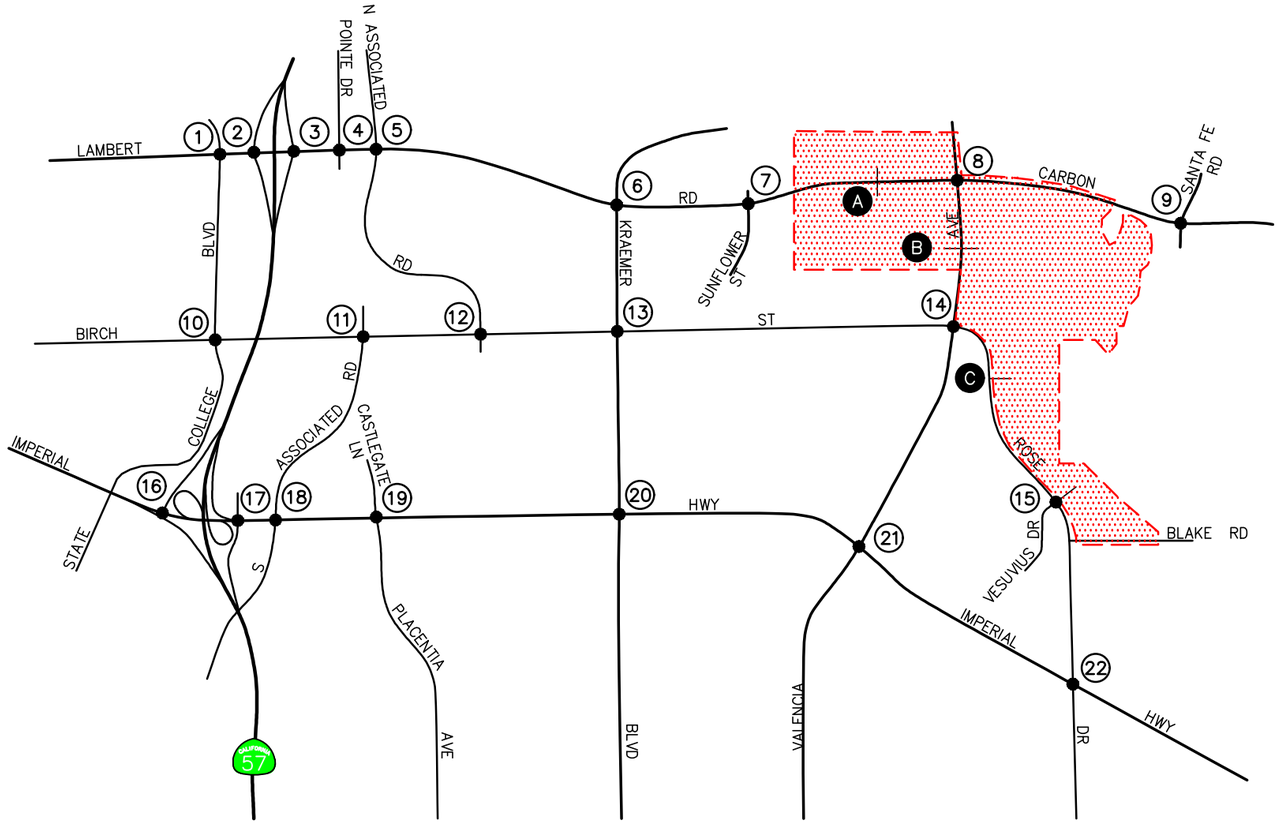
XX,XXX = DAILY TRAFFIC VOLUMES

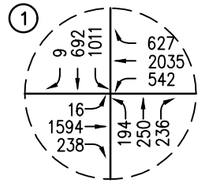
= PROJECT SITE

FIGURE 6-9

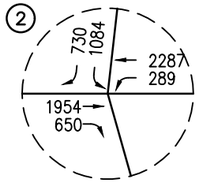
YEAR 2045 PM PEAK HOUR AND DAILY TRAFFIC VOLUMES

BREA 265 SPECIFIC PLAN, BREA

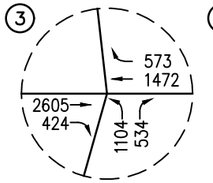




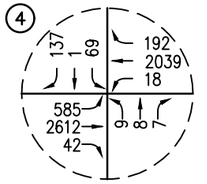
STATE COLLEGE BLVD @ LAMBERT RD



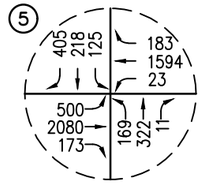
SR-57 SB RAMPS @ LAMBERT RD



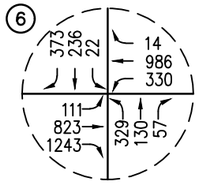
SR-57 NB RAMPS @ LAMBERT RD



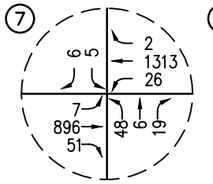
POINTE DR @ LAMBERT RD



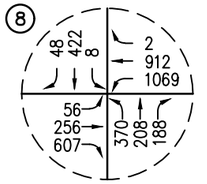
WILDCAT WY/ N ASSOCIATED RD @ LAMBERT RD



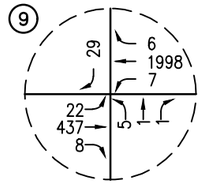
SANTA FE RD/ KRAEMER BLVD @ LAMBERT RD



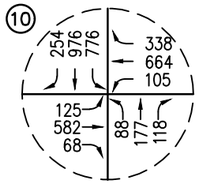
SUNFLOWER ST @ LAMBERT RD



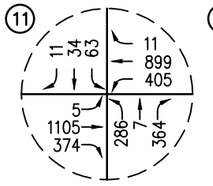
VALENCIA AVE @ LAMBERT RD/ CARBON CANYON RD



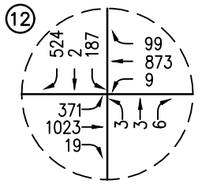
SANTA FE RD @ CARBON CANYON RD



STATE COLLEGE BLVD @ BIRCH ST



S ASSOCIATED RD @ BIRCH ST



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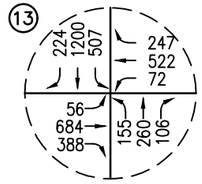
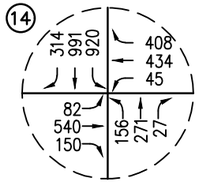
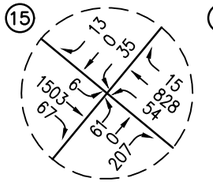


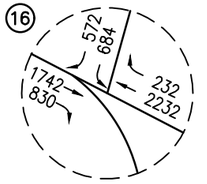
KRAEMER BLVD @ BIRCH ST



VALENCIA AVE @ BIRCH ST/ ROSE DR



ROSE DR @ VESUVIUS DR



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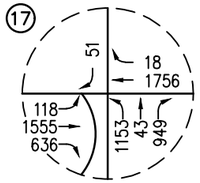
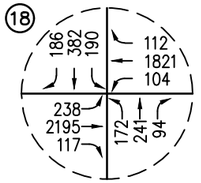
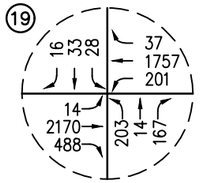


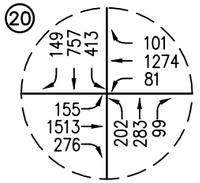
SR-57 NB RAMPS @ IMPERIAL HWY



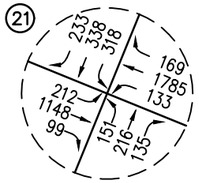
ASSOCIATED RD @ IMPERIAL HWY IMPERIAL HWY



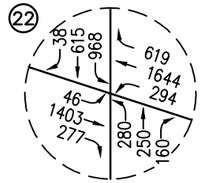
CASTLEGATE LN/ PLACENTIA AVE @



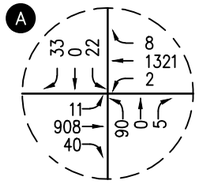
KRAEMER BLVD @ IMPERIAL HWY



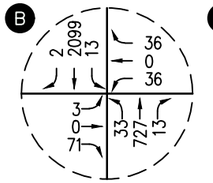
VALENCIA AVE @ IMPERIAL HWY



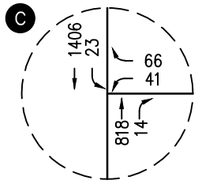
ROSE DR @ IMPERIAL HWY



DRIVEWAY A @ LAMBERT RD



VALENCIA AVE @ DRIVEWAY B



ROSE DR @ DRIVEWAY C

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N NO SCALE

KEY

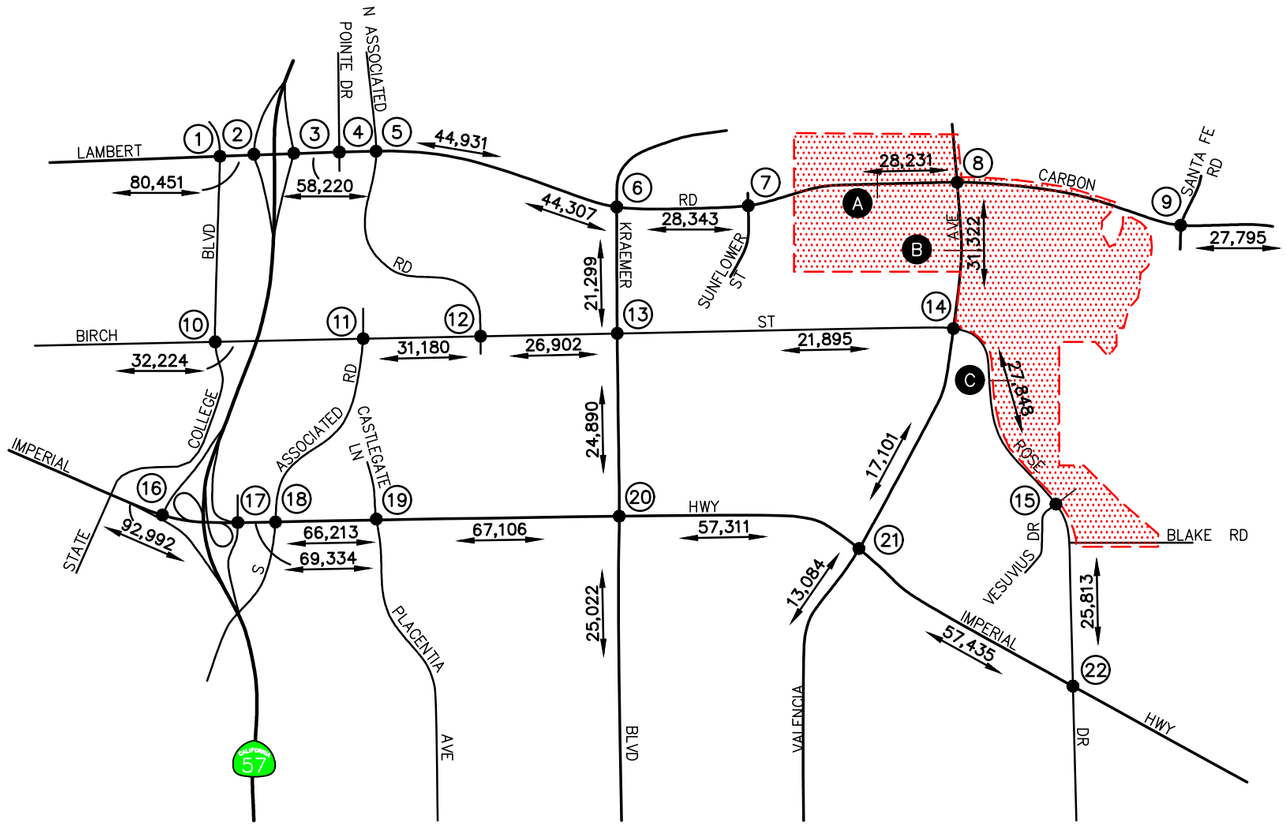
(#) = STUDY INTERSECTION

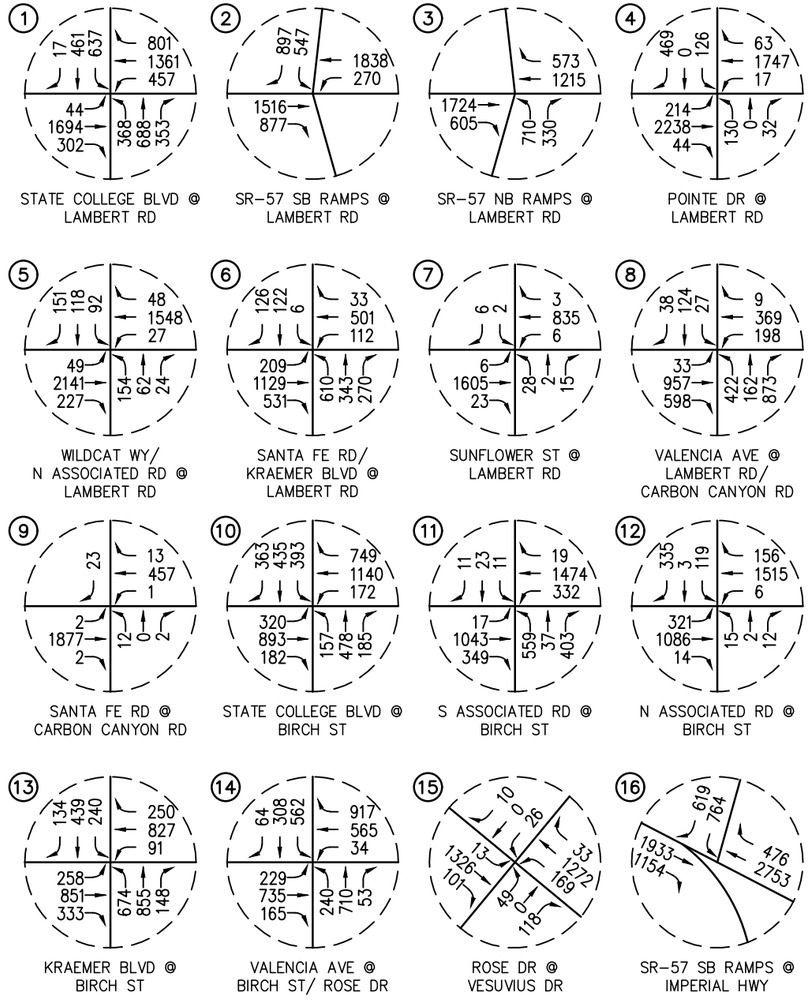
= PROJECT SITE

FIGURE 6-10

YEAR 2045 AM PEAK HOUR TRAFFIC VOLUMES WITH PROJECT

BREA 265 SPECIFIC PLAN, BREA





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LINSCOTT LAW & GREENSPAN engineers

N NO SCALE

KEY

(#) = STUDY INTERSECTION

XX,XXX = DAILY TRAFFIC VOLUMES

= PROJECT SITE

FIGURE 6-11

YEAR 2045 PM PEAK HOUR AND DAILY TRAFFIC VOLUMES WITH PROJECT

BREA 265 SPECIFIC PLAN, BREA

7.0 TRAFFIC ANALYSIS METHODOLOGY

7.1 Level of Service Consequences and Thresholds

The potential LOS consequences of the added project traffic volumes generated by the proposed Project during the weekday peak hours was evaluated based on analysis of future operating conditions at the twenty-two (22) study intersections, without, then with, the proposed Project. The previously discussed capacity analysis procedures were utilized to investigate the future volume-to-capacity relationships and service level characteristics at each study intersection. The consequence of added project-related peak hour traffic on the LOS at each study intersection then evaluated using the following criteria.

7.1.1 *City of Brea*

For the ICU analysis, the need for potential Project-related improvements will be assessed based on the following criteria:

- The Project causes an intersection operating at LOS D or better to degrade to LOS E or F, or
- The Project increases traffic demand at a signalized study intersection by 0.020 or greater and the intersection is forecast to operate at LOS E or F.

For the HCM analysis, the need for potential Project-related improvements will be assessed based on the following criteria:

- The Project causes one or more study intersections operating at LOS D or better to degrade to LOS E or F, or
- The Project causes a change in control delay of 4 seconds for intersections already operating at LOS E, or
- The Project causes a change in control delay of 2 seconds for intersections already operating at LOS F.

7.1.2 *City of Placentia*

For the ICU analysis, the need for improvements is identified if the Project causes an intersection at LOS D or better to degrade to LOS E or F, or if the Project increases traffic demand at a signalized study intersection by 0.010 or greater and the intersection is forecast to operate at LOS E or F.

7.2 Traffic Analysis Scenarios

The following scenarios are those for which volume/capacity calculations have been performed at the twenty-two (22) key intersections for existing plus project, near-term (Year 2035) and buildout (Year 2045) traffic conditions:

1. Existing (Year 2021) Traffic Conditions;
2. Near-Term (Year 2035) Background Traffic Conditions (Existing plus Ambient Growth plus Related Projects);
3. Near-Term (Year 2035) Background Plus Project Traffic Conditions;
4. Scenario (3) with improvements to be implemented as conditions of approval (COA), if necessary;
5. General Plan Buildout[26] (Year 2045) Traffic Conditions;
6. General Plan Buildout (Year 2045) Plus Project Traffic Conditions; and
7. Scenario (6) with improvements to be implemented as conditions of approval (COA), if necessary.

7.3 City of Brea Nexus Program

To satisfy the AB 1600 legislative requirement, development impact fees have been established for future traffic improvements within the City of Brea. Ensuring that every development project contributes a fair share of transportation improvements in the community, the City has introduced the "Transportation Improvement Nexus Program". In 2011, the Nexus Program was updated to reflect transportation needs and incorporate capacity improvements in an orderly fashion. The program ensures all future development with the City of Brea contributes on a fair share basis.

[26] It should be noted that the General Plan Buildout assessment has been included since the proposed Project would require an amendment to the General Plan to accommodate a change is Zoning to allow for residential uses.

8.0 PEAK HOUR INTERSECTION CAPACITY ANALYSIS

8.1 Year 2035 Traffic Conditions - ICU

Table 8-1 summarizes the peak hour Level of Service results at the twenty-two (22) study intersections for the Year 2035 horizon year. The first column (1) of ICU/LOS values in *Table 8-1* presents a summary of existing AM and PM peak hour traffic conditions. The second column (2) lists projected cumulative traffic conditions (existing plus ambient plus related projects traffic) based on existing intersection geometry, but without any traffic generated from the proposed Project. The third column (3) presents forecast Year 2035 near-term traffic conditions with the addition of Project traffic. The fourth column (4) shows the increase in ICU value due to the added peak hour Project trips and indicates whether the traffic associated with the proposed Project will exceed the LOS thresholds defined in this report. The fifth column (5) presents the resultant level of service with the inclusion of recommended traffic improvements, where needed, to achieve an acceptable level of service.

It should be noted that the SR-57 Ramps at Lambert Road (Intersections No. 2 and 3) include planned improvements as part of the Year 2035 background traffic conditions which are currently under construction. Additionally, the intersection of Rose Drive at Vesuvius Drive/Driveway D (Intersection No. 15) includes Project design feature improvements.

8.1.1 *Year 2035 Cumulative Traffic Conditions - ICU*

Review of column (2) of *Table 8-1* indicates that four (4) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours under Year 2035 cumulative traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**ICU**	**LOS**	**ICU**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	0.985	E	--	--
14. Valencia Ave at Birch St/Rose Dr	--	--	1.047	F
15. Rose Dr at Vesuvius/Driveway D	0.909	E	--	--
22. Rose Dr at Imperial Hwy	--	--	1.036	F

8.1.2 *Year 2035 Cumulative Plus Project Conditions - ICU*

Review of column (3) of *Table 8-1* indicates that five (5) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours with the addition of proposed Project traffic to Year 2035 cumulative traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**ICU**	**LOS**	**ICU**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	1.039	F	--	--
14. Valencia Ave at Birch St/Rose Dr	0.904	E	1.161	F
15. Rose Dr at Vesuvius/Driveway D	0.984	E	--	--
18. Associated Rd at Imperial Hwy	--	--	0.905	E
22. Rose Dr at Imperial Hwy	--	--	1.099	F

Review of column (4) of *Table 8-1* indicates that all five (5) study intersections operating adversely require Project-related improvements based on the LOS thresholds defined in this report. As shown in column (5) of *Table 8-1*, the implementation of recommended improvements at the intersections will help offset the Project's increment. After implementation of the recommended improvements, the intersections are forecast to operate at acceptable service levels and/or operate at better service levels than pre-Project conditions.

Appendix C also presents the near-term ICU/LOS calculations for the twenty-two (22) key study intersections.

TABLE 8-1

YEAR 2035 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - ICU

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2035 Traffic Conditions		(3) Year 2035 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2035 Plus Project with Improvements Traffic Conditions	
			ICU	LOS	ICU	LOS	ICU	LOS	Increase	Yes/No	ICU	LOS
1. State College Boulevard at Lambert Road	D	AM	0.684	B	0.832	D	0.835	D	0.003	No	--	--
		PM	0.657	B	0.829	D	0.836	D	0.007	No	--	--
2. SR-57 SB Ramps at Lambert Road	D	AM	0.729	C	0.796	C	0.813	D	0.017	No	--	--
		PM	0.596	A	0.656	B	0.670	B	0.014	No	--	--
3. SR-57 NB Ramps at Lambert Road	D	AM	0.798	C	0.850	D	0.859	D	0.009	No	--	--
		PM	0.552	A	0.558	A	0.576	A	0.018	No	--	--
4. Pointe Drive at Lambert Road	D	AM	0.560	A	0.677	B	0.701	C	0.024	No	--	--
		PM	0.539	A	0.638	B	0.666	B	0.028	No	--	--
5. Wildcat Way/N Associated Rd at Lambert Road	D	AM	0.671	B	0.784	C	0.809	D	0.025	No	--	--
		PM	0.522	A	0.618	B	0.647	B	0.029	No	--	--
6. Santa Fe Rd/Kraemer Blvd at Lambert Road	D	AM	0.602	B	0.684	B	0.700	C	0.016	No	--	--
		PM	0.506	A	0.611	B	0.665	B	0.054	No	--	--
7. Sunflower Street at Lambert Road	D	AM	0.291	A	0.347	A	0.367	A	0.020	No	--	--
		PM	0.412	A	0.501	A	0.559	A	0.058	No	--	--

Notes:

- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

TABLE 8-1 (CONTINUED)
YEAR 2035 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - ICU

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2035 Traffic Conditions		(3) Year 2035 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2035 Plus Project with Improvements Traffic Conditions	
			ICU	LOS	ICU	LOS	ICU	LOS	Increase	Yes/No	ICU	LOS
8. Valencia Avenue at Lambert Rd/Carbon Canyon Rd	D	AM	0.861	D	**0.985**	**E**	**1.039**	**F**	**0.054**	**Yes**	0.830	D
		PM	0.569	A	0.650	B	0.726	C	0.076	No	0.607	B
9. Santa Fe Road at Carbon Canyon Road	D	AM	0.515	A	0.621	B	0.624	B	0.003	No	--	--
		PM	0.478	A	0.582	A	0.588	A	0.006	No	--	--
10. State College Boulevard at Birch Street	D	AM	0.474	A	0.573	A	0.573	A	0.000	No	--	--
		PM	0.636	B	0.809	D	0.809	D	0.000	No	--	--
11. S Associated Road at Birch Street	D	AM	0.603	B	0.701	C	0.708	C	0.007	No	--	--
		PM	0.602	B	0.705	C	0.717	C	0.012	No	--	--
12. N Associated Road at Birch Street	D	AM	0.529	A	0.607	B	0.620	B	0.013	No	--	--
		PM	0.626	B	0.727	C	0.736	C	0.009	No	--	--
13. Kraemer Boulevard at Birch Street	D	AM	0.542	A	0.613	B	0.624	B	0.011	No	--	--
		PM	0.614	B	0.714	C	0.736	C	0.022	No	--	--
14. Valencia Avenue at Birch Street/Rose Drive	D	AM	0.731	C	0.831	D	**0.904**	**E**	**0.073**	**Yes**	0.727	C
		PM	**0.914**	**E**	**1.047**	**F**	**1.161**	**F**	**0.114**	**Yes**	0.845	D
15. Rose Drive at Vesuvius Drive/Driveway D	D	AM	0.787	C	**0.909**	**E**	**0.984**	**E**	**0.075**	**Yes**	0.548	A
		PM	0.704	C	0.810	D	0.867	D	0.057	No	0.489	A

Notes:
- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

TABLE 8-1 (CONTINUED)
YEAR 2035 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - ICU

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2035 Traffic Conditions		(3) Year 2035 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2035 Plus Project with Improvements Traffic Conditions	
			ICU	LOS	ICU	LOS	ICU	LOS	Increase	Yes/No	ICU	LOS
16. SR-57 SB Ramps at Imperial Highway	D	AM	0.558	A	0.703	C	0.705	C	0.002	No	--	--
		PM	0.680	B	0.826	D	0.829	D	0.003	No	--	--
17. SR-57 NB Ramps at Imperial Highway	D	AM	0.571	A	0.692	B	0.696	B	0.004	No	--	--
		PM	0.761	C	0.880	D	0.885	D	0.005	No	--	--
18. Associated Road at Imperial Highway	D	AM	0.691	B	0.803	D	0.812	D	0.009	No	0.755	C
		PM	0.763	C	0.893	D	**0.905**	**E**	**0.012**	**Yes**	0.873	D
19. Castlegate Ln/Placentia Ave at Imperial Highway	D	AM	0.590	A	0.688	B	0.690	B	0.002	No	--	--
		PM	0.684	B	0.804	D	0.813	D	0.009	No	--	--
20. Kraemer Boulevard at Imperial Highway	D	AM	0.574	A	0.667	B	0.679	B	0.012	No	--	--
		PM	0.717	C	0.835	D	0.853	D	0.018	No	--	--
21. Valencia Avenue at Imperial Highway	D	AM	0.526	A	0.613	B	0.639	B	0.026	No	--	--
		PM	0.546	A	0.638	B	0.657	B	0.019	No	--	--
22. Rose Drive at Imperial Highway	D	AM	0.688	B	0.801	D	0.812	D	0.011	No	0.800	D
		PM	0.891	D	**1.036**	**F**	**1.099**	**F**	**0.063**	**Yes**	**1.029**	**F**

Notes:

- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

8.2 Year 2035 Traffic Conditions - HCM

Table 8-2 summarizes the peak hour Level of Service results at the twenty-two (22) study intersections for the Year 2035 horizon year. The first column (1) of HCM/LOS values in *Table 8-2* presents a summary of existing AM and PM peak hour traffic conditions. The second column (2) lists projected cumulative traffic conditions (existing plus ambient plus related projects traffic) based on existing intersection geometry, but without any traffic generated from the proposed Project. The third column (3) presents forecast Year 2035 near-term traffic conditions with the addition of Project traffic. The fourth column (4) shows the increase in delay due to the added peak hour Project trips and indicates whether the traffic associated with the proposed Project will exceed the LOS thresholds defined in this report. The fifth column (5) presents the resultant level of service with the inclusion of recommended traffic improvements, where needed, to achieve an acceptable level of service.

It should be noted that the SR-57 Ramps at Lambert Road (Intersections No. 2 and 3) include planned improvements as part of the Year 2035 background traffic conditions which are currently under construction. Additionally, the intersection of Rose Drive at Vesuvius Drive/Driveway D (Intersection No. 15) includes Project design feature improvements.

8.2.1 *Year 2035 Cumulative Traffic Conditions - HCM*

Review of column (2) of *Table 8-2* indicates that three (3) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours under Year 2035 cumulative traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**Delay (s/v)**	**LOS**	**Delay (s/v)**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	144.0	F	--	--
14. Valencia Ave at Birch St/Rose Dr	109.5	F	64.7	E
22. Rose Dr at Imperial Hwy	237.6	F	228.9	F

8.2.2 *Year 2035 Cumulative Plus Project Conditions - HCM*

Review of column (3) of *Table 8-2* indicates that three (3) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours with the addition of proposed Project traffic to Year 2035 cumulative traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

Study Intersection	AM Peak Hour Delay (s/v)	AM Peak Hour LOS	PM Peak Hour Delay (s/v)	PM Peak Hour LOS
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	164.0	F	--	--
14. Valencia Ave at Birch St/Rose Dr	122.5	F	91.1	F
22. Rose Dr at Imperial Hwy	246.4	F	233.5	F

Review of column (4) of *Table 8-2* indicates that all three (3) study intersections operating adversely require Project-related improvements based on the LOS thresholds defined in this report. As shown in column (5) of *Table 8-2*, the implementation of recommended improvements at the intersections will help offset the Project's increment. After implementation of the recommended improvements, the intersections are forecast to operate at acceptable service levels and/or operate at better service levels than pre-Project conditions.

Appendix D also presents the near-term HCM/LOS calculations for the twenty-two (22) key study intersections.

TABLE 8-2

YEAR 2035 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - HCM

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2035 Traffic Conditions		(3) Year 2035 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2035 Plus Project with Improvements Traffic Conditions	
			Delay (s/v)	LOS	Delay (s/v)	LOS	Delay (s/v)	LOS	Increase	Yes/No	Delay (s/v)	LOS
1. State College Boulevard at Lambert Road	D	AM	33.3	C	38.0	D	38.1	D	0.1	No	--	--
		PM	34.7	C	40.0	D	40.2	D	0.2	No	--	--
2. SR-57 SB Ramps at Lambert Road	D	AM	26.3	C	23.5	C	24.9	C	1.4	No	--	--
		PM	19.1	B	18.5	B	18.8	B	0.3	No	--	--
3. SR-57 NB Ramps at Lambert Road	D	AM	25.4	C	19.8	B	20.0	C	0.2	No	--	--
		PM	23.4	C	13.2	B	13.3	B	0.1	No	--	--
4. Pointe Drive at Lambert Road	D	AM	13.0	B	13.9	B	14.1	B	0.2	No	--	--
		PM	14.8	B	14.7	B	14.7	B	0.0	No	--	--
5. Wildcat Way/N Associated Rd at Lambert Road	D	AM	**57.3**	**E**[27]	32.9	C	34.0	C	1.1	No	--	--
		PM	18.3	B	17.1	B	17.3	B	0.2	No	--	--
6. Santa Fe Rd/Kraemer Blvd at Lambert Road	D	AM	28.8	C	28.9	C	30.5	C	1.6	No	--	--
		PM	29.5	C	30.1	C	30.4	C	0.3	No	--	--
7. Sunflower Street at Lambert Road	D	AM	9.3	A	6.9	A	6.7	A	0.0[28]	No	--	--
		PM	6.7	A	5.6	A	5.9	A	0.3	No	--	--

Notes:

- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

[27] Intersection operates adversely under existing traffic conditions due to existing PHF. However, it is assumed that future traffic conditions will experience continuous flow and therefore PHF of 1.0 has been assumed for all future conditions, resulting in improved levels of service.

[28] Theoretical negative increase, which is possible with HCM calculations, are denoted as an increase of 0.0 s/v.

TABLE 8-2 (CONTINUED)

YEAR 2035 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - HCM

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2035 Traffic Conditions		(3) Year 2035 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2035 Plus Project with Improvements Traffic Conditions	
			Delay (s/v)	LOS	Delay (s/v)	LOS	Delay (s/v)	LOS	Increase	Yes/No	Delay (s/v)	LOS
8. Valencia Avenue at Lambert Rd/Carbon Canyon Rd	D	AM	**136.6**	**F**	**144.0**	**F**	**164.0**	**F**	**20.0**	**Yes**	**112.0**	**F**
		PM	31.8	C	31.6	C	37.1	D	5.5	No	22.2	C
9. Santa Fe Road at Carbon Canyon Road	D	AM	4.7	A	4.5	A	4.5	A	0.0	No	--	--
		PM	4.0	A	3.4	A	3.4	A	0.0	No	--	--
10. State College Boulevard at Birch Street	D	AM	40.3	D	43.6	D	43.6	D	0.0	No	--	--
		PM	30.2	C	35.8	D	35.9	D	0.1	No	--	--
11. S Associated Road at Birch Street	D	AM	25.6	C	25.8	C	25.9	C	0.1	No	--	--
		PM	25.1	C	27.6	C	27.9	C	0.3	No	--	--
12. N Associated Road at Birch Street	D	AM	25.4	C	24.9	C	25.1	C	0.2	No	--	--
		PM	23.0	C	23.7	C	23.8	C	0.1	No	--	--
13. Kraemer Boulevard at Birch Street	D	AM	36.1	D	35.9	D	36.0	D	0.1	No	--	--
		PM	41.9	D	44.2	D	47.3	D	3.1	No	--	--
14. Valencia Avenue at Birch Street/Rose Drive	D	AM	**105.1**	**F**	**109.5**	**F**	**122.5**	**F**	**13.0**	**Yes**	45.9	D
		PM	**57.7**	**E**	**64.7**	**E**	**91.1**	**F**	**26.4**	**Yes**	37.2	D
15. Rose Drive at Vesuvius Drive/Driveway D	D	AM	6.8	A	6.7	A	9.0	A	2.3	No	--	--
		PM	4.1	A	4.7	A	4.7	A	0.0	No	--	--

Notes:

- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

TABLE 8-2 (CONTINUED)

YEAR 2035 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - HCM

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2035 Traffic Conditions		(3) Year 2035 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2035 Plus Project with Improvements Traffic Conditions	
			Delay (s/v)	LOS	Delay (s/v)	LOS	Delay (s/v)	LOS	Increase	Yes/No	Delay (s/v)	LOS
16. SR-57 SB Ramps at Imperial Highway	D	AM	14.9	B	15.2	B	15.3	B	0.1	No	--	--
		PM	15.3	B	17.1	B	17.2	B	0.1	No	--	--
17. SR-57 NB Ramps at Imperial Highway	D	AM	26.7	C	29.2	C	29.3	C	0.1	No	--	--
		PM	29.9	C	37.6	D	38.0	D	0.4	No	--	--
18. Associated Road at Imperial Highway	D	AM	26.7	C	31.1	C	31.8	C	0.7	No	--	--
		PM	39.5	D	43.2	D	43.4	D	0.2	No	--	--
19. Castlegate Ln/Placentia Ave at Imperial Highway	D	AM	17.7	B	17.8	B	17.8	B	0.0	No	--	--
		PM	23.4	C	25.5	C	25.9	C	0.4	No	--	--
20. Kraemer Boulevard at Imperial Highway	D	AM	27.3	C	27.6	C	28.0	C	0.4	No	--	--
		PM	32.1	C	36.7	D	37.5	D	0.8	No	--	--
21. Valencia Avenue at Imperial Highway	D	AM	27.2	C	28.0	C	28.1	C	0.1	No	--	--
		PM	25.4	C	26.3	C	26.9	C	0.6	No	--	--
22. Rose Drive at Imperial Highway	D	AM	**205.0**	**F**	**237.6**	**F**	**246.4**	**F**	**8.8**	**Yes**	31.4	C
		PM	**204.8**	**F**	**228.9**	**F**	**233.5**	**F**	**4.6**	**Yes**	26.4	C

Notes:

- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

8.3 Year 2045 Traffic Conditions - ICU

Table 8-3 summarizes the peak hour Level of Service results at the twenty-two (22) key study intersections for the Year 2045. The first column (1) of ICU/LOS values in *Table 8-3* presents a summary of existing AM and PM peak hour traffic conditions. The second column (2) lists projected Year 2045 buildout traffic conditions based on existing intersection geometry, but without any traffic generated from the proposed Project. The third column (3) presents forecast Year 2045 buildout traffic conditions with the addition of Project traffic. The fourth column (4) shows the increase in ICU value due to the added peak hour Project trips and indicates whether the traffic associated with the proposed Project will exceed the LOS thresholds defined in this report. The fifth column (5) presents the resultant level of service with the inclusion of recommended traffic improvements, where needed, to achieve an acceptable level of service.

It should be noted that the SR-57 Ramps at Lambert Road (Intersections No. 2 and 3) include planned improvements as part of the Year 2045 background traffic conditions which are currently under construction. Additionally, the intersection of Rose Drive at Vesuvius Drive/Driveway D (Intersection No. 15) includes Project design feature improvements.

8.3.1 *Year 2045 Buildout Traffic Conditions - ICU*

Review of column (2) of *Table 8-3* indicates that five (5) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours under Year 2045 buildout traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**ICU**	**LOS**	**ICU**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	1.023	F	--	--
14. Valencia Ave at Birch St/Rose Dr	--	--	1.097	F
15. Rose Dr at Vesuvius/Driveway D	1.069	F	0.986	E
18. Associated Rd at Imperial Hwy	--	--	0.931	E
22. Rose Dr at Imperial Hwy	--	--	1.067	F

8.3.2 *Year 2045 Buildout Plus Project Traffic Conditions - ICU*

Review of column (3) of *Table 8-3* indicates that five (5) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours with the addition of proposed Project traffic to Year 2045 buildout traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**ICU**	**LOS**	**ICU**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	1.077	F	--	--
14. Valencia Ave at Birch St/Rose Dr	0.943	E	1.212	F
15. Rose Dr at Vesuvius/Driveway D	1.144	F	1.043	F
18. Associated Rd at Imperial Hwy	--	--	0.943	E
22. Rose Dr at Imperial Hwy	--	--	1.130	F

Review of column (4) of *Table 8-3* indicates that four (4) of the five (5) study intersections operating adversely require Project-related improvements based on the LOS thresholds defined in this report. Although the intersection of Associated Road at Imperial Highway (Intersection No. 18) operates adversely, review of column (4) indicates that the project increment adds less than 0.020 to the ICU value and hence Project-related improvements are not necessary. However, Project-related improvements at the study intersection have been included for informational purposes as well as to provide consistency with Year 2035 improvements.

As shown in column (5) of *Table 8-3*, the implementation of recommended improvements at the four (4) intersections will help offset the Project's increment. After implementation of the recommended improvements, the intersections are forecast to operate at acceptable service levels and/or operate at better service levels than pre-Project conditions.

Appendix C presents the buildout ICU/LOS calculations for the twenty-two (22) key study intersections.

TABLE 8-3

YEAR 2045 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - ICU

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2045 Traffic Conditions		(3) Year 2045 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2045 Plus Project with Improvements Traffic Conditions	
			ICU	LOS	ICU	LOS	ICU	LOS	Increase	Yes/No	ICU	LOS
1. State College Boulevard at Lambert Road	D	AM	0.684	B	0.869	D	0.871	D	0.002	No	--	--
		PM	0.657	B	0.862	D	0.869	D	0.007	No	--	--
2. SR-57 SB Ramps at Lambert Road	D	AM	0.729	C	0.821	D	0.837	D	0.016	No	--	--
		PM	0.596	A	0.677	B	0.690	B	0.013	No	--	--
3. SR-57 NB Ramps at Lambert Road	D	AM	0.798	C	0.877	D	0.885	D	0.008	No	--	--
		PM	0.552	A	0.584	A	0.601	B	0.017	No	--	--
4. Pointe Drive at Lambert Road	D	AM	0.560	A	0.690	B	0.714	C	0.024	No	--	--
		PM	0.539	A	0.648	B	0.677	B	0.029	No	--	--
5. Wildcat Way/N Associated Rd at Lambert Road	D	AM	0.671	B	0.804	D	0.828	D	0.024	No	--	--
		PM	0.522	A	0.626	B	0.655	B	0.029	No	--	--
6. Santa Fe Rd/Kraemer Blvd at Lambert Road	D	AM	0.602	B	0.716	C	0.732	C	0.016	No	--	--
		PM	0.506	A	0.614	B	0.669	B	0.055	No	--	--
7. Sunflower Street at Lambert Road	D	AM	0.291	A	0.352	A	0.372	A	0.020	No	--	--
		PM	0.412	A	0.491	A	0.549	A	0.058	No	--	--

Notes:

- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

TABLE 8-3 (CONTINUED)
YEAR 2045 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - ICU

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2045 Traffic Conditions		(3) Year 2045 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2045 Plus Project with Improvements Traffic Conditions	
			ICU	LOS	ICU	LOS	ICU	LOS	Increase	Yes/No	ICU	LOS
8. Valencia Avenue at Lambert Rd/Carbon Canyon Rd	D	AM	0.861	D	**1.023**	**F**	**1.077**	**F**	**0.054**	**Yes**	0.860	D
		PM	0.569	A	0.681	B	0.756	C	0.075	No	0.480	A
9. Santa Fe Road at Carbon Canyon Road	D	AM	0.515	A	0.652	B	0.655	B	0.003	No	--	--
		PM	0.478	A	0.606	B	0.611	B	0.005	No	--	--
10. State College Boulevard at Birch Street	D	AM	0.474	A	0.599	A	0.599	A	0.000	No	--	--
		PM	0.636	B	0.844	D	0.844	D	0.000	No	--	--
11. S Associated Road at Birch Street	D	AM	0.603	B	0.729	C	0.736	C	0.007	No	--	--
		PM	0.602	B	0.729	C	0.741	C	0.012	No	--	--
12. N Associated Road at Birch Street	D	AM	0.529	A	0.626	B	0.639	B	0.013	No	--	--
		PM	0.626	B	0.754	C	0.763	C	0.009	No	--	--
13. Kraemer Boulevard at Birch Street	D	AM	0.542	A	0.635	B	0.645	B	0.010	No	--	--
		PM	0.614	B	0.734	C	0.756	C	0.022	No	--	--
14. Valencia Avenue at Birch Street/Rose Drive	D	AM	0.731	C	0.870	D	**0.943**	**E**	**0.073**	**Yes**	0.755	C
		PM	**0.914**	**E**	**1.097**	**F**	**1.212**	**F**	**0.115**	**Yes**	0.881	D
15. Rose Drive at Vesuvius Drive/Driveway D	D	AM	0.787	C	**1.069**	**F**	**1.144**	**F**	**0.075**	**Yes**	0.722	C
		PM	0.704	C	**0.986**	**E**	**1.043**	**F**	**0.057**	**Yes**	0.683	B

Notes:
- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

TABLE 8-3 (CONTINUED)
YEAR 2045 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - ICU

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2045 Traffic Conditions		(3) Year 2045 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2045 Plus Project with Improvements Traffic Conditions	
			ICU	LOS	ICU	LOS	ICU	LOS	Increase	Yes/No	ICU	LOS
16. SR-57 SB Ramps at Imperial Highway	D	AM	0.558	A	0.732	C	0.734	C	0.002	No	--	--
		PM	0.680	B	0.858	D	0.861	D	0.003	No	--	--
17. SR-57 NB Ramps at Imperial Highway	D	AM	0.571	A	0.706	C	0.711	C	0.005	No	--	--
		PM	0.761	C	0.913	E	0.918	E	0.005	No	--	--
18. Associated Road at Imperial Highway	D	AM	0.691	B	0.830	D	0.840	D	0.010	No	0.782	C[29]
		PM	0.763	C	**0.931**	**E**	**0.943**	**E**	0.012	No	**0.911**	**E**[29]
19. Castlegate Ln/Placentia Ave at Imperial Highway	D	AM	0.590	A	0.719	C	0.721	C	0.002	No	--	--
		PM	0.684	B	0.836	D	0.845	D	0.009	No	--	--
20. Kraemer Boulevard at Imperial Highway	D	AM	0.574	A	0.694	B	0.707	C	0.013	No	--	--
		PM	0.717	C	0.863	D	0.881	D	0.018	No	--	--
21. Valencia Avenue at Imperial Highway	D	AM	0.526	A	0.625	B	0.644	B	0.019	No	--	--
		PM	0.546	A	0.658	B	0.672	B	0.014	No	--	--
22. Rose Drive at Imperial Highway	D	AM	0.688	B	0.834	D	0.845	D	0.011	No	0.793	C
		PM	0.891	D	**1.067**	**F**	**1.130**	**F**	**0.063**	**Yes**	**1.013**	**F**

Notes:

- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

[29] Although the intersection operates adversely, the project increment adds less than 0.020 to the ICU value and hence Project-related improvements are not necessary. However, Project-related improvements at the study intersection have been included for informational purposes as well as to provide consistency with Year 2035 improvements.

8.4 Year 2045 Traffic Conditions - HCM

Table 8-4 summarizes the peak hour Level of Service results at the twenty-two (22) key study intersections for the Year 2045. The first column (1) of HCM/LOS values in *Table 8-4* presents a summary of existing AM and PM peak hour traffic conditions. The second column (2) lists projected Year 2045 buildout traffic conditions based on existing intersection geometry, but without any traffic generated from the proposed Project. The third column (3) presents forecast Year 2045 buildout traffic conditions with the addition of Project traffic. The fourth column (4) shows the increase in delay due to the added peak hour Project trips and indicates whether the traffic associated with the proposed Project will exceed the LOS thresholds defined in this report. The fifth column (5) presents the resultant level of service with the inclusion of recommended traffic improvements, where needed, to achieve an acceptable level of service.

It should be noted that the SR-57 Ramps at Lambert Road (Intersections No. 2 and 3) include planned improvements as part of the Year 2045 background traffic conditions which are currently under construction. Additionally, the intersection of Rose Drive at Vesuvius Drive/Driveway D (Intersection No. 15) includes Project design feature improvements.

8.4.1 *Year 2045 Buildout Traffic Conditions - HCM*

Review of column (2) of *Table 8-4* indicates that three (3) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours under Year 2045 buildout traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**Delay (s/v)**	**LOS**	**Delay (s/v)**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	157.3	F	--	--
14. Valencia Ave at Birch St/Rose Dr	118.9	F	74.8	E
22. Rose Dr at Imperial Hwy	242.9	F	237.2	F

8.4.2 *Year 2045 Buildout Plus Project Traffic Conditions – HCM*

Review of column (3) of *Table 8-4* indicates that three (3) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours with the addition of proposed Project traffic to Year 2045 buildout traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**Delay (s/v)**	**LOS**	**Delay (s/v)**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	177.7	F	--	--
14. Valencia Ave at Birch St/Rose Dr	132.1	F	103.9	F
22. Rose Dr at Imperial Hwy	251.7	F	276.2	F

Review of column (4) of *Table 8-4* indicates that all three (3) study intersections operating adversely require Project-related improvements based on the LOS thresholds defined in this report. As shown in column (5) of *Table 8-4*, the implementation of recommended improvements at the intersections will help offset the Project's increment. After implementation of the recommended improvements, the intersections are forecast to operate at acceptable service levels and/or operate at better service levels than pre-Project conditions.

Appendix D presents the buildout HCM/LOS calculations for the twenty-two (22) key study intersections.

TABLE 8-4

YEAR 2045 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - HCM

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2045 Traffic Conditions		(3) Year 2045 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2045 Plus Project with Improvements Traffic Conditions	
			Delay (s/v)	LOS	Delay (s/v)	LOS	Delay (s/v)	LOS	Increase	Yes/No	Delay (s/v)	LOS
1. State College Boulevard at Lambert Road	D	AM	33.3	C	39.9	D	40.2	D	0.3	No	--	--
		PM	34.7	C	42.1	D	42.4	D	0.3	No	--	--
2. SR-57 SB Ramps at Lambert Road	D	AM	26.3	C	23.5	C	24.9	C	1.4	No	--	--
		PM	19.1	B	19.0	B	19.4	B	0.4	No	--	--
3. SR-57 NB Ramps at Lambert Road	D	AM	25.4	C	21.1	C	22.1	C	1.0	No	--	--
		PM	23.4	C	13.5	B	13.6	B	0.1	No	--	--
4. Pointe Drive at Lambert Road	D	AM	13.0	B	14.7	B	14.9	B	0.2	No	--	--
		PM	14.8	B	15.2	B	15.2	B	0.0	No	--	--
5. Wildcat Way/N Associated Rd at Lambert Road	D	AM	**57.3**	**E**[30]	34.5	C	38.2	D	3.7	No	--	--
		PM	18.3	B	17.7	B	17.9	B	0.2	No	--	--
6. Santa Fe Rd/Kraemer Blvd at Lambert Road	D	AM	28.8	C	29.1	C	30.9	C	1.8	No	--	--
		PM	29.5	C	31.2	C	31.3	C	0.1	No	--	--
7. Sunflower Street at Lambert Road	D	AM	9.3	A	7.1	A	6.9	A	0.0[31]	No	--	--
		PM	6.7	A	5.7	A	5.9	A	0.2	No	--	--

Notes:

- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

[30] Intersection operates adversely under existing traffic conditions due to existing PHF. However, it is assumed that future traffic conditions will experience continuous flow and therefore PHF of 1.0 has been assumed for all future conditions, resulting in improved levels of service.

[31] Theoretical negative increase, which is possible with HCM calculations, are denoted as an increase of 0.0 s/v.

TABLE 8-4 (CONTINUED)
YEAR 2045 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - HCM

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2045 Traffic Conditions		(3) Year 2045 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2045 Plus Project with Improvements Traffic Conditions	
			Delay (s/v)	LOS	Delay (s/v)	LOS	Delay (s/v)	LOS	Increase	Yes/No	Delay (s/v)	LOS
8. Valencia Avenue at Lambert Rd/Carbon Canyon Rd	D	AM	**136.6**	**F**	**157.3**	**F**	**177.7**	**F**	**20.4**	**Yes**	**124.3**	**F**
		PM	31.8	C	33.6	C	40.2	D	6.6	No	23.3	C
9. Santa Fe Road at Carbon Canyon Road	D	AM	4.7	A	5.2	A	5.2	A	0.0	No	--	--
		PM	4.0	A	4.0	A	4.0	A	0.0	No	--	--
10. State College Boulevard at Birch Street	D	AM	40.3	D	48.7	D	48.7	D	0.0	No	--	--
		PM	30.2	C	39.2	D	39.3	D	0.1	No	--	--
11. S Associated Road at Birch Street	D	AM	25.6	C	26.5	C	26.8	C	0.3	No	--	--
		PM	25.1	C	28.5	C	28.9	C	0.4	No	--	--
12. N Associated Road at Birch Street	D	AM	25.4	C	25.5	C	25.7	C	0.2	No	--	--
		PM	23.0	C	25.2	C	25.4	C	0.2	No	--	--
13. Kraemer Boulevard at Birch Street	D	AM	36.1	D	36.2	D	36.4	D	0.2	No	--	--
		PM	41.9	D	47.5	D	49.1	D	1.6	No	--	--
14. Valencia Avenue at Birch Street/Rose Drive	D	AM	**105.1**	**F**	**118.9**	**F**	**132.1**	**F**	**13.2**	**Yes**	50.7	D
		PM	**57.7**	**E**	**74.8**	**E**	**103.9**	**F**	**29.1**	**Yes**	38.6	D
15. Rose Drive at Vesuvius Drive/Driveway D	D	AM	6.8	A	24.5	C	33.5	C	9.0	No	--	--
		PM	4.1	A	11.3	B	10.4	B	0.0[32]	No	--	--

Notes:

- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.

[32] Theoretical negative increase, which is possible with HCM calculations, are denoted as an increase of 0.0 s/v.

TABLE 8-4 (CONTINUED)
YEAR 2045 PEAK HOUR INTERSECTION CAPACITY ANALYSIS - HCM

Study Intersection	Minimum Acceptable LOS	Time Period	(1) Existing Traffic Conditions		(2) Year 2045 Traffic Conditions		(3) Year 2045 Plus Project Traffic Conditions		(4) Exceed LOS Thresholds		(5) Year 2045 Plus Project with Improvements Traffic Conditions	
			Delay (s/v)	LOS	Delay (s/v)	LOS	Delay (s/v)	LOS	Increase	Yes/No	Delay (s/v)	LOS
16. SR-57 SB Ramps at Imperial Highway	D	AM	14.9	B	15.7	B	15.8	B	0.1	No	--	--
		PM	15.3	B	17.9	B	18.0	B	0.1	No	--	--
17. SR-57 NB Ramps at Imperial Highway	D	AM	26.7	C	28.7	C	28.8	C	0.1	No	--	--
		PM	29.9	C	39.8	D	40.3	D	0.5	No	--	--
18. Associated Road at Imperial Highway	D	AM	26.7	C	32.5	C	33.4	C	0.9	No	--	--
		PM	39.5	D	47.4	D	48.9	D	1.5	No	--	--
19. Castlegate Ln/Placentia Ave at Imperial Highway	D	AM	17.7	B	18.8	B	18.8	B	0.0	No	--	--
		PM	23.4	C	27.7	C	28.2	C	0.5	No	--	--
20. Kraemer Boulevard at Imperial Highway	D	AM	27.3	C	29.3	C	29.7	C	0.4	No	--	--
		PM	32.1	C	39.3	D	41.8	D	2.5	No	--	--
21. Valencia Avenue at Imperial Highway	D	AM	27.2	C	27.8	C	28.7	C	0.9	No	--	--
		PM	25.4	C	26.2	C	26.7	C	0.5	No	--	--
22. Rose Drive at Imperial Highway	D	AM	**205.0**	**F**	**242.9**	**F**	**251.7**	**F**	**8.8**	**Yes**	31.0	C
		PM	**204.8**	**F**	**237.2**	**F**	**276.2**	**F**	**39.0**	**Yes**	29.3	C

Notes:
- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

9.0 INTERSECTION VEHICLE QUEUEING EVALUATION

A queueing evaluation has been completed for the two (2) SR-57 Ramps on Lambert Road and the seven (7) study intersections along Imperial Highway to assess if the stacking requirements with the proposed Project are adequate. The queueing evaluation includes the following intersections:

Study Intersections:

2. SR-57 SB Ramps at Lambert Road (Brea/Caltrans)
3. SR-57 NB Ramps at Lambert Road (Brea/Caltrans)
16. SR-57 SB Ramps at Imperial Highway (Brea/Caltrans)
17. SR-57 NB Ramps at Imperial Highway (Brea/Caltrans)
18. Associated Road at Imperial Highway (Brea/Caltrans)
19. Castlegate Lane/Placentia Avenue at Imperial Highway (Brea/Caltrans)
20. Kraemer Boulevard at Imperial Highway (Brea/Caltrans)
21. Valencia Avenue at Imperial Highway (Brea/Caltrans)
22. Rose Drive at Imperial Highway (Placentia/Caltrans)

The queuing evaluation was conducted for Year 2035 cumulative and Year 2045 buildout traffic conditions based on the Average Queue methodology, which calculates the average queue value in terms of number of vehicles per lane. At signalized intersections, the storage length for left-turn and right-turn lanes may be based on one and one-half (1½) to two (2) times the average number of vehicles that would store per signal cycle[33]. For the purposes of this traffic analysis, the minimum storage requirement for left-turn lanes and right-turn lanes was calculated by taking 1½ times the average queue length. (Minimum required storage = Q_{av} (feet) x 1.5). The storage lengths at unsignalized intersection locations are based on 95th Percentile methodology.

It should be noted that the Synchro software takes into consideration traffic volume data, lane configurations, traffic signal phasing and potential weaving between intersections in order to calculate the queues for each movement. The existing storage lengths were determined based on a review of aerial maps of the subject intersections obtained from Google Earth and field reviews conducted by LLG Engineers. An average vehicle length of 25 feet is assumed for the purposes of this analysis.

9.1 Year 2035 Traffic Conditions

Table 9-1 presents the AM and PM peak hour queueing analyses results for the nine (9) study intersections for Year 2035. The first column (1) of *Table 9-1* presents the resultant queues for Year 2035 cumulative traffic conditions. The second column (2) presents the resultant queues for Year 2035 cumulative traffic conditions with the addition of Project traffic. The third column (3) presents the resultant queues with the inclusion of recommended traffic improvements, where needed.

[33] Source: Highway Design Manual, Intersections at Grade, page 400-9, CALTRANS

It should be noted that the SR-57 Ramps at Lambert Road (Intersections No. 2 and 3) include planned improvements as part of the Year 2035 background traffic conditions.

9.1.1 *Year 2035 Cumulative Traffic Conditions*

Review of column (1) of *Table 9-1* indicates that two (2) of the nine (9) study intersections have queues which exceed the provided storage capacity for one or more intersection approach under Year 2035 cumulative traffic conditions. The remaining study intersections have queues that are adequately accommodated by the provided storage space. The intersections/approaches with storage deficiencies include the following:

- Intersection No. 18: Associated Road at Imperial Highway
  - Eastbound Left-Turn: PM Peak Hour
  - Westbound Left-Turn: PM Peak Hour
- Intersection No. 22: Rose Drive at Imperial Highway
  - Southbound Left-Turn: AM Peak Hour and PM Peak Hour
  - Westbound Right-Turn: PM Peak Hour

9.1.2 *Year 2035 Cumulative Plus Project Traffic Conditions*

Review of column (2) of *Table 9-1* indicates that two (2) of the nine (9) study intersections have queues which exceed the provided storage capacity for one or more intersection approach with the addition of proposed Project traffic to Year 2035 cumulative traffic conditions. The remaining study intersections have queues that are adequately accommodated by the provided storage space. The intersections/approaches with storage deficiencies include the following:

- Intersection No. 18: Associated Road at Imperial Highway
  - Eastbound Left-Turn: PM Peak Hour
  - Westbound Left-Turn: PM Peak Hour
- Intersection No. 22: Rose Drive at Imperial Highway
  - Southbound Left-Turn: AM Peak Hour and PM Peak Hour
  - Westbound Right-Turn: PM Peak Hour

The addition of Project traffic does not contribute to the eastbound left-turn movement at the intersection of Associated Road at Imperial Highway (Intersection No. 18). Also, the addition of Project traffic adds less than one (1) vehicle to the westbound left-turn queue, which is considered nominal. Therefore, Project-related improvements at the intersection of Associated Road at Imperial Highway (Intersection No. 18) are not required to improve the queues.

Review of column (3) of *Table 9-1* indicates that the implementation of recommended improvements at the intersection of Rose Drive at Imperial Highway (Intersection No. 22) will help improve queues for the southbound left-turn and westbound right-turn. After implementation of the recommended improvements, the southbound left-turn and westbound right-turn queues operate better than pre-Project conditions.

Appendix F presents the Synchro queuing worksheets for the study intersections.

9.2 Year 2045 Traffic Conditions

Table 9-2 presents the AM and PM peak hour queueing analyses results for the nine (9) study intersections for Year 2045. The first column (1) of *Table 9-2* presents the resultant queues for Year 2045 buildout traffic conditions. The second column (2) presents the resultant queues for Year 2045 buildout traffic conditions with the addition of Project traffic. The third column (3) presents the resultant queues with the inclusion of recommended traffic improvements, where needed.

It should be noted that the SR-57 Ramps at Lambert Road (Intersections No. 2 and 3) include planned improvements as part of the Year 2035 background traffic conditions.

9.2.1 *Year 2045 Buildout Traffic Conditions*

Review of column (1) of *Table 9-2* indicates that three (3) of the nine (9) study intersections have queues which exceed the provided storage capacity for one or more intersection approach under Year 2045 buildout traffic conditions. The remaining study intersections have queues that are adequately accommodated by the provided storage space. The intersections/approaches with storage deficiencies include the following:

- Intersection No. 18: Associated Road at Imperial Highway
  - Eastbound Left-Turn: PM Peak Hour
  - Westbound Left-Turn: PM Peak Hour
- Intersection No. 19: Castlegate Lane/Placentia Avenue at Imperial Highway
  - Westbound Left-Turn: PM Peak Hour
- Intersection No. 22: Rose Drive at Imperial Highway
  - Southbound Left-Turn: AM Peak Hour and PM Peak Hour
  - Westbound Right-Turn: PM Peak Hour

9.2.2 *Year 2045 Buildout Plus Project Traffic Conditions*

Review of column (2) of *Table 9-2* indicates that four (4) of the nine (9) study intersections have queues which exceed the provided storage capacity for one or more intersection approach with the addition of proposed Project traffic to Year 2045 buildout traffic conditions. The remaining study

intersections have queues that are adequately accommodated by the provided storage space. The intersections/approaches with storage deficiencies include the following:

- Intersection No. 2: SR-57 SB Ramps at Lambert Road
  - Westbound Left-Turn: AM Peak Hour
- Intersection No. 18: Associated Road at Imperial Highway
  - Eastbound Left-Turn: PM Peak Hour
  - Westbound Left-Turn: PM Peak Hour
- Intersection No. 19: Castlegate Lane/Placentia Avenue at Imperial Highway
  - Westbound Left-Turn: PM Peak Hour
- Intersection No. 22: Rose Drive at Imperial Highway
  - Southbound Left-Turn: AM Peak Hour and PM Peak Hour
  - Westbound Right-Turn: PM Peak Hour

The addition of Project traffic adds less than one (1) vehicle to the westbound left-turn queue at the intersection of SR-57 SB Ramps at Lambert Road (Intersection No. 2), which is considered nominal. Therefore, Project-related improvements at the intersection are not required to improve the queues.

The addition of Project traffic does not contribute to the eastbound left-turn movement at the intersection of Associated Road at Imperial Highway (Intersection No. 18). Also, the addition of Project traffic adds less than one (1) vehicle to the westbound left-turn queue, which is considered nominal. Therefore, Project-related improvements at the intersection of Associated Road at Imperial Highway (Intersection No. 18) are not required to improve the queues.

The addition of Project traffic adds less than one (1) vehicle to the westbound left-turn queue at the intersection of Castlegate Lane/Placentia Avenue at Imperial Highway (Intersection No. 19), which is considered nominal. Therefore, Project-related improvements at the intersection are not required to improve the queues.

Review of column (3) of *Table 9-2* indicates that the implementation of recommended improvements at the intersection of Rose Drive at Imperial Highway (Intersection No. 22) will help improve queues for the southbound left-turn and westbound right-turn. After implementation of the recommended improvements, the southbound left-turn and westbound right-turn queues operate better than pre-Project conditions.

Appendix F presents the Synchro queuing worksheets for the study intersections.

TABLE 9-1
YEAR 2035 PEAK HOUR INTERSECTION QUEUING ANALYSIS

Study Intersection	Estimated Storage Provided (feet)	(1) Year 2035 Traffic Conditions				(2) Year 2035 Plus Project Traffic Conditions				(3) Year 2035 Plus Project Traffic Conditions with Improvements			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Max. Queue/ Min. Storage Required[34] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[34] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[34] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[34] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[34] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[34] (feet)	Adequate Storage (Yes / No)
2. SR-57 SB Ramps at Lambert Road													
Southbound Left-Turn	1,150[35,36]	582	Yes	197	Yes	603	Yes	234	Yes	--	--	--	--
Southbound Right-Turn	1,150[35,36]	359	Yes	485	Yes	359	Yes	485	Yes	--	--	--	--
Eastbound Right-Turn	375[35,36]	96	Yes	33	Yes	116	Yes	32	Yes	--	--	--	--
Westbound Left-Turn	70[35]	147	Yes[37]	146	Yes[37]	159	Yes[37]	155	Yes[37]	--	--	--	--
3. SR-57 NB Ramps at Lambert Road													
Northbound Left-Turn	1,300[35]	605	Yes	378	Yes	605	Yes	374	Yes	--	--	--	--
Northbound Right-Turn	1,300	560	Yes	294	Yes	572	Yes	336	Yes	--	--	--	--
Eastbound Right-Turn	100[36]	101	Yes[37]	56	Yes	69	Yes	81	Yes	--	--	--	--
16. SR-57 SB Ramps at Imperial Highway													
Southbound Left-Turn	1,300	173	Yes	296	Yes	171	Yes	300	Yes	--	--	--	--
Southbound Left/Right-Turn	1,300	173	Yes	296	Yes	171	Yes	300	Yes	--	--	--	--
Southbound Right-Turn	1,300[38]	170	Yes	302	Yes	173	Yes	302	Yes	--	--	--	--
17. SR-57 NB Ramps at Imperial Highway													
Northbound Left-Turn	955[39]	503	Yes	594	Yes	503	Yes	594	Yes	--	--	--	--
Northbound Left/Through/Right	1,300	455	Yes	630	Yes	455	Yes	654	Yes	--	--	--	--
Northbound Right-Turn	1,300[40]	363	Yes	342	Yes	368	Yes	350	Yes	--	--	--	--
Southbound Right-Turn	145[35]	25	Yes	25	Yes	25	Yes	25	Yes	--	--	--	--
Eastbound Left-turn	260	111	Yes	294	Yes[37]	111	Yes	294	Yes[37]	--	--	--	--

34 Maximum queue is calculated by multiplying the *Average Queue* by a factor of 1.5 for signalized intersections. Maximum queue is based on the 95th percentile for unsignalized intersections.

35 The turn-lane consists of dual lanes.

36 It should be noted that the intersection includes planned improvements and therefore the provided storage is approximated.

37 The remaining queue can be accommodated within the transition area of the turn-lane.

38 The southbound right-turn pocket consists of approximately 265 feet of storage; however, an additional 1,035 feet of storage from the shared left/right-turn lane can accommodate the remaining vehicles.

39 The northbound left-turn consists of dual lanes. The first lane consists of approximately 1,300 feet of storage and the second lane consists of approximately 610 feet of storage. The storage reported is the average of both lanes.

40 The northbound right-turn pocket consists of approximately 500 feet or storage; however, an additional 800 feet of storage from the shared left/thru/right lane can accommodate the remaining vehicles.

TABLE 9-1 (CONTINUED)
YEAR 2035 PEAK HOUR INTERSECTION QUEUING ANALYSIS

Study Intersection	Estimated Storage Provided (feet)	(1) Year 2035 Traffic Conditions				(2) Year 2035 Plus Project Traffic Conditions				(3) Year 2035 Plus Project Traffic Conditions with Improvements			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Max. Queue/ Min. Storage Required[41] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[41] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[41] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[41] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[41] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[41] (feet)	Adequate Storage (Yes / No)
18. Associated Road at Imperial Highway													
Northbound Left-Turn	170[42]	101	Yes	164	Yes	101	Yes	164	Yes	--	--	--	--
Southbound Left-Turn	210[43]	116	Yes	252	Yes[44]	116	Yes	254	Yes[44]	--	--	--	--
Southbound Right-Turn	215	84	Yes	29	Yes	87	Yes	29	Yes	--	--	--	--
Eastbound Left-turn	340	273	Yes	**477**	**No**	273	Yes	**477**	**No**	--	--	--	--
Westbound Left-Turn	200	119	Yes	**291**	**No**	120	Yes	**293**	**No**	--	--	--	--
19. Castlegate Ln/Placentia Ave at Imperial Highway													
Northbound Left-Turn	195	113	Yes	183	Yes	113	Yes	183	Yes	--	--	--	--
Northbound Right-Turn	195	25	Yes	25	Yes	25	Yes	25	Yes	--	--	--	--
Southbound Left-Turn	85	32	Yes	32	Yes	32	Yes	32	Yes	--	--	--	--
Eastbound Left-turn	140	25	Yes	26	Yes	25	Yes	26	Yes	--	--	--	--
Eastbound Right-Turn	200	25	Yes	25	Yes	25	Yes	25	Yes	--	--	--	--
Westbound Left-Turn	225	207	Yes	281	Yes[44]	207	Yes	282	Yes[44]	--	--	--	--
20. Kraemer Boulevard at Imperial Highway													
Northbound Left-Turn	150[43]	113	Yes	240	Yes[44]	113	Yes	240	Yes[44]	--	--	--	--
Southbound Left-Turn	205[43]	146	Yes	182	Yes	149	Yes	182	Yes	--	--	--	--
Southbound Right-Turn	125	25	Yes	25	Yes	25	Yes	30	Yes	--	--	--	--
Eastbound Left-turn	185[43]	80	Yes	134	Yes	80	Yes	134	Yes	--	--	--	--
Westbound Left-Turn	220[43]	45	Yes	126	Yes	45	Yes	126	Yes	--	--	--	--

41 Maximum queue is calculated by multiplying the *Average Queue* by a factor of 1.5 for signalized intersections. Maximum queue is based on the 95th percentile for unsignalized intersections.

42 The northbound left-turn consists of dual lanes. The first lane consists of approximately 240 feet of storage and the second lane consists of approximately 100 feet of storage. The storage reported is the average of both lanes.

43 The turn-lane consists of dual lanes.

44 The remaining queue can be accommodated within the transition area of the turn-lane.

TABLE 9-1 (CONTINUED)
YEAR 2035 PEAK HOUR INTERSECTION QUEUING ANALYSIS

Study Intersection	Estimated Storage Provided (feet)	(1) Year 2035 Traffic Conditions				(2) Year 2035 Plus Project Traffic Conditions				(3) Year 2035 Plus Project Traffic Conditions with Improvements			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Max. Queue/ Min. Storage Required[45] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[45] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[45] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[45] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[45] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[45] (feet)	Adequate Storage (Yes / No)
21. Valencia Avenue at Imperial Highway													
Northbound Left-Turn	150[46]	84	Yes	75	Yes	84	Yes	75	Yes	--	--	--	--
Northbound Right-Turn	150	25	Yes	25	Yes	25	Yes	25	Yes	--	--	--	--
Southbound Left-Turn	240[46]	185	Yes	150	Yes	201	Yes	162	Yes	--	--	--	--
Southbound Right-Turn	185	25	Yes	26	Yes	25	Yes	35	Yes	--	--	--	--
Eastbound Left-turn	190[46]	119	Yes	158	Yes	128	Yes	188	Yes	--	--	--	--
Eastbound Right-Turn	315	25	Yes	66	Yes	25	Yes	68	Yes	--	--	--	--
Westbound Left-Turn	260[46]	62	Yes	117	Yes	62	Yes	117	Yes	--	--	--	--
Westbound Right-Turn	305	25	Yes	25	Yes	25	Yes	25	Yes	--	--	--	--
22. Rose Drive at Imperial Highway													
Northbound Left-Turn	135[46]	159	Yes[47]	162	Yes[47]	159	Yes[47]	162	Yes[47]	216	Yes[47]	204	Yes[47]
Northbound Right-Turn	100	25	Yes	25	Yes	25	Yes	25	Yes	25	Yes	25	Yes
Southbound Left-Turn	185[46]	**1,074**	**No**	**1,134**	**No**	**1,089**	**No**	**1,163**	**No**	**408**	**No**	**414**	**No**
Southbound Right-Turn	50	25	Yes	25	Yes	25	Yes	25	Yes	25	Yes	25	Yes
Eastbound Left-turn	220	39	Yes	78	Yes	44	Yes	105	Yes	48	Yes	96	Yes
Westbound Left-Turn	230[46]	246	Yes[47]	108	Yes	246	Yes[47]	108	Yes	233	Yes[47]	98	Yes
Westbound Right-Turn	270	29	Yes	**959**	**No**	30	Yes	**1,121**	**No**	134	Yes	**434**	**No**

45 Maximum queue is calculated by multiplying the *Average Queue* by a factor of 1.5 for signalized intersections. Maximum queue is based on the 95th percentile for unsignalized intersections.

46 The turn-lane consists of dual lanes.

47 The remaining queue can be accommodated within the transition area of the turn-lane.

TABLE 9-2
YEAR 2045 PEAK HOUR INTERSECTION QUEUING ANALYSIS

Study Intersection	Estimated Storage Provided (feet)	(1) Year 2045 Traffic Conditions				(2) Year 2045 Plus Project Traffic Conditions				(3) Year 2045 Plus Project Traffic Conditions with Improvements			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Max. Queue/ Min. Storage Required[48] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[48] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[48] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[48] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[48] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[48] (feet)	Adequate Storage (Yes / No)
2. SR-57 SB Ramps at Lambert Road													
Southbound Left-Turn	1,150[49,50]	594	Yes	203	Yes	615	Yes	237	Yes	--	--	--	--
Southbound Right-Turn	1,150[49,50]	386	Yes	509	Yes	386	Yes	507	Yes	--	--	--	--
Eastbound Right-Turn	375[49,50]	116	Yes	38	Yes	117	Yes	38	Yes	--	--	--	--
Westbound Left-Turn	70[49]	156	Yes[51]	149	Yes[51]	**170**	**No**	158	Yes[51]	--	--	--	--
3. SR-57 NB Ramps at Lambert Road													
Northbound Left-Turn	1,300[49]	651	Yes	392	Yes	651	Yes	392	Yes	--	--	--	--
Northbound Right-Turn	1,300	596	Yes	294	Yes	621	Yes	336	Yes	--	--	--	--
Eastbound Right-Turn	100[50]	102	Yes[51]	62	Yes	101	Yes[51]	89	Yes	--	--	--	--
16. SR-57 SB Ramps at Imperial Highway													
Southbound Left-Turn	1,300	182	Yes	314	Yes	183	Yes	317	Yes	--	--	--	--
Southbound Left/Right-Turn	1,300	182	Yes	314	Yes	183	Yes	317	Yes	--	--	--	--
Southbound Right-Turn	1,300[52]	182	Yes	324	Yes	182	Yes	324	Yes	--	--	--	--
17. SR-57 NB Ramps at Imperial Highway													
Northbound Left-Turn	955[53]	540	Yes	633	Yes	540	Yes	633	Yes	--	--	--	--
Northbound Left/Through/Right	1,300	563	Yes	695	Yes	566	Yes	702	Yes	--	--	--	--
Northbound Right-Turn	1,300[54]	398	Yes	365	Yes	402	Yes	381	Yes	--	--	--	--
Southbound Right-Turn	145[49]	25	Yes	25	Yes	25	Yes	25	Yes	--	--	--	--
Eastbound Left-turn	260	116	Yes	299	Yes[51]	116	Yes	299	Yes[51]	--	--	--	--

48 Maximum queue is calculated by multiplying the *Average Queue* by a factor of 1.5 for signalized intersections. Maximum queue is based on the 95th percentile for unsignalized intersections.

49 The turn-lane consists of dual lanes.

50 It should be noted that the intersection includes planned improvements and therefore the provided storage is approximated.

51 The remaining queue can be accommodated within the transition area of the turn-lane.

52 The southbound right-turn pocket consists of approximately 265 feet of storage; however, an additional 1,035 feet of storage from the shared left/right-turn lane can accommodate the remaining vehicles.

53 The northbound left-turn consists of dual lanes. The first lane consists of approximately 1,300 feet of storage and the second lane consists of approximately 610 feet of storage. The storage reported is the average of both lanes.

54 The northbound right-turn pocket consists of approximately 500 feet or storage; however, an additional 800 feet of storage from the shared left/thru/right lane can accommodate the remaining vehicles.

TABLE 9-2 (CONTINUED)
YEAR 2045 PEAK HOUR INTERSECTION QUEUING ANALYSIS

Study Intersection	Estimated Storage Provided (feet)	(1) Year 2045 Traffic Conditions				(2) Year 2045 Plus Project Traffic Conditions				(3) Year 2045 Plus Project Traffic Conditions with Improvements			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Max. Queue/ Min. Storage Required[55] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[55] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[55] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[55] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[55] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[55] (feet)	Adequate Storage (Yes / No)
18. Associated Road at Imperial Highway													
Northbound Left-Turn	170[56]	113	Yes	179	Yes[57]	113	Yes	179	Yes[57]	--	--	--	--
Southbound Left-Turn	210[58]	122	Yes	272	Yes[57]	122	Yes	270	Yes[57]	--	--	--	--
Southbund Right-Turn	215	90	Yes	35	Yes	93	Yes	35	Yes	--	--	--	--
Eastbound Left-turn	340	306	Yes	**515**	**No**	306	Yes	**515**	**No**	--	--	--	--
Westbound Left-Turn	200	129	Yes	**333**	**No**	132	Yes	**338**	**No**	--	--	--	--
19. Castlegate Ln/Placentia Ave at Imperial Highway													
Northbound Left-Turn	195	116	Yes	197	Yes[57]	116	Yes	197	Yes[57]	--	--	--	--
Northbound Right-Turn	195	25	Yes	25	Yes	25	Yes	25	Yes	--	--	--	--
Southbound Left-Turn	85	32	Yes	33	Yes	32	Yes	33	Yes	--	--	--	--
Eastbound Left-turn	140	25	Yes	27	Yes	25	Yes	27	Yes	--	--	--	--
Eastbound Right-Turn	200	25	Yes	25	Yes	25	Yes	25	Yes	--	--	--	--
Westbound Left-Turn	225	221	Yes	**302**	**No**	221	Yes	**308**	**No**	--	--	--	--
20. Kraemer Boulevard at Imperial Highway													
Northbound Left-Turn	150[58]	120	Yes	267	Yes[57]	120	Yes	267	Yes[57]	--	--	--	--
Southbound Left-Turn	205[58]	191	Yes	194	Yes	194	Yes	192	Yes	--	--	--	--
Southbound Right-Turn	125	25	Yes	25	Yes	25	Yes	30	Yes	--	--	--	--
Eastbound Left-turn	185[58]	84	Yes	141	Yes	84	Yes	143	Yes	--	--	--	--
Westbound Left-Turn	220[58]	47	Yes	132	Yes	47	Yes	132	Yes	--	--	--	--

55 Maximum queue is calculated by multiplying the *Average Queue* by a factor of 1.5 for signalized intersections. Maximum queue is based on the 95th percentile for unsignalized intersections.

56 The northbound left-turn consists of dual lanes. The first lane consists of approximately 240 feet of storage and the second lane consists of approximately 100 feet of storage. The storage reported is the average of both lanes.

57 The remaining queue can be accommodated within the transition area of the turn-lane.

58 The turn-lane consists of dual lanes.

TABLE 9-2 (CONTINUED)
YEAR 2045 PEAK HOUR INTERSECTION QUEUING ANALYSIS

Study Intersection	Estimated Storage Provided (feet)	(1) Year 2045 Traffic Conditions				(2) Year 2045 Plus Project Traffic Conditions				(3) Year 2045 Plus Project Traffic Conditions with Improvements			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Max. Queue/ Min. Storage Required[59] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[59] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[59] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[59] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[59] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[59] (feet)	Adequate Storage (Yes / No)
21. Valencia Avenue at Imperial Highway													
Northbound Left-Turn	150[60]	89	Yes	78	Yes	89	Yes	78	Yes	--	--	--	--
Northbound Right-Turn	150	25	Yes	25	Yes	25	Yes	25	Yes	--	--	--	--
Southbound Left-Turn	240[60]	197	Yes	158	Yes	210	Yes	170	Yes	--	--	--	--
Southbound Right-Turn	185	25	Yes	26	Yes	25	Yes	36	Yes	--	--	--	--
Eastbound Left-turn	190[60]	116	Yes	147	Yes	123	Yes	177	Yes	--	--	--	--
Eastbound Right-Turn	315	25	Yes	72	Yes	25	Yes	74	Yes	--	--	--	--
Westbound Left-Turn	260[60]	66	Yes	128	Yes	66	Yes	129	Yes	--	--	--	--
Westbound Right-Turn	305	25	Yes	25	Yes	25	Yes	25	Yes	--	--	--	--
22. Rose Drive at Imperial Highway													
Northbound Left-Turn	135[60]	167	Yes[61]	185	Yes[61]	167	Yes[61]	185	Yes[61]	233	Yes[61]	213	Yes[61]
Northbound Right-Turn	100	25	Yes	25	Yes	25	Yes	25	Yes	25	Yes	25	Yes
Southbound Left-Turn	185[60]	**1,104**	**No**	**1,179**	**No**	**1,134**	**No**	**1,209**	**No**	**422**	**No**	**447**	**No**
Southbound Right-Turn	50	25	Yes	25	Yes	25	Yes	25	Yes	25	Yes	25	Yes
Eastbound Left-turn	220	33	Yes	84	Yes	47	Yes	114	Yes	51	Yes	102	Yes
Westbound Left-Turn	230[60]	264	Yes[61]	117	Yes	264	Yes[61]	117	Yes	249	Yes[61]	108	Yes
Westbound Right-Turn	270	50	Yes	**1,025**	**No**	59	Yes	**1,181**	**No**	147	Yes	**507**	**No**

59 Maximum queue is calculated by multiplying the *Average Queue* by a factor of 1.5 for signalized intersections. Maximum queue is based on the 95th percentile for unsignalized intersections.

60 The turn-lane consists of dual lanes.

61 The remaining queue can be accommodated within the transition area of the turn-lane.

10.0 SITE ACCESS AND INTERNAL CIRCULATION EVALUATION

10.1 Site Access

Access to the Project will be provided via one (1) full access signalized driveway on Lambert Road, one (1) full access signalized driveway on Valencia Avenue, one (1) full access signalized driveway on Rose Drive, and one (1) full access signalized driveway at the existing intersection of Rose Drive at Vesuvius Drive. *Figure 2-3* presents the assumed lane configurations and intersection controls at the Project driveways as a result of the Project Design Features summarized in *Section 2.3*.

10.2 Project Driveway Peak Hour Intersection Capacity Analysis – ICU

Table 10-1 summarizes the intersection level of service results for the four (4) proposed Project driveways under near-term (Year 2035) and buildout (Year 2045) traffic conditions at completion and full occupancy of the proposed Project. Please note the values presented for Rose Drive at Vesuvius Drive/Driveway D in this table reflect the values presented in *Tables 8-1 and 8-3.*

As shown, the driveway at the intersection of Rose Drive at Vesuvius Drive/Driveway D is forecast to operate adversely under both Year 2035 Plus Project and Year 2045 Plus Project traffic conditions. However, the implementation of recommended improvements at the driveway will help achieve acceptable service levels. The remaining two (2) signalized Project driveways are forecast to operate at LOS C or better during the AM peak hour and PM peak hour in all traffic conditions.

Appendix G presents the ICU/LOS calculations for the four (4) Project driveways.

10.3 Project Driveway Peak Hour Intersection Capacity Analysis – HCM

Table 10-2 summarizes the intersection level of service results for the four (4) proposed Project driveways under near-term (Year 2035) and buildout (Year 2045) traffic conditions at completion and full occupancy of the proposed Project. Please note the values presented for Rose Drive at Vesuvius Drive in this table reflect the values presented in *Tables 8-2 and 8-4.*

As shown, the driveway at the intersection of Rose Drive at Driveway C is forecast to operate adversely under both Year 2035 Plus Project and Year 2045 Plus Project traffic conditions. However, the implementation of recommended improvements at the driveway will help achieve acceptable service levels. The remaining three (3) Project driveways are forecast to operate at LOS C or better during the AM peak hour and PM peak hour in all traffic conditions.

Appendix H presents the HCM/LOS calculations for the four (4) Project driveways.

TABLE 10-1
PROJECT DRIVEWAY PEAK HOUR INTERSECTION CAPACITY ANALYSIS – ICU

Study Intersection	Time Period	(1) Year 2035 Plus Project Traffic Conditions		(2) Year 2035 Plus Project With Improvements		(3) Year 2045 Plus Project Traffic Conditions		(4) Year 2045 Plus Project With Improvements	
		ICU	LOS	ICU	LOS	ICU	LOS	ICU	LOS
15. Rose Drive at Vesuvius Drive/Driveway D	AM	**0.984**	**E**	0.548	A	**1.144**	**F**	0.722	C
	PM	0.867	D	0.489	A	**1.043**	**F**	0.683	B
A. Driveway A at Lambert Road	AM	0.377	A	--	--	0.389	A	--	--
	PM	0.427	A	--	--	0.441	A	--	--
B. Valencia Avenue at Driveway B	AM	0.721	C	--	--	0.750	C	--	--
	PM	0.536	A	--	--	0.556	A	--	--
C. Rose Drive at Driveway C	AM	0.501	A	--	--	0.502	A	--	--
	PM	0.550	A	--	--	0.549	A	--	--

Notes:

- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

TABLE 10-2
PROJECT DRIVEWAY PEAK HOUR INTERSECTION CAPACITY ANALYSIS – HCM

Study Intersection	Time Period	(1) Year 2035 Plus Project Traffic Conditions		(2) Year 2035 Plus Project With Improvements		(3) Year 2045 Plus Project Traffic Conditions		(4) Year 2045 Plus Project With Improvements	
		Delay (s/v)	LOS	Delay (s/v)	LOS	Delay (s/v)	LOS	Delay (s/v)	LOS
15. Rose Drive at Vesuvius Drive/Driveway D	AM	9.0	A	--	--	33.5	C	--	--
	PM	4.7	A	--	--	10.4	B	--	--
A. Driveway A at Lambert Road	AM	5.7	A	--	--	5.7	A	--	--
	PM	5.6	A	--	--	5.6	A	--	--
B. Valencia Avenue at Driveway B	AM	9.0	A	--	--	9.3	A	--	--
	PM	8.5	A	--	--	8.5	A	--	--
C. Rose Drive at Driveway C	AM	3.8	A	--	--	3.8	A	--	--
	PM	3.1	A	--	--	3.1	A	--	--

Notes:
- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

10.4 Project Driveway Recommended Improvements

10.4.1 *Year 2035 Plus Project – ICU*

The results of the intersection capacity analyses presented previously in *Table 10-1* show that the proposed Project will require additional improvements at one (1) Project driveway under Year 2035 Plus Project traffic conditions based on ICU analysis. As such, the following intersection improvements are recommended to help achieve acceptable service levels:

- **Rose Drive at Vesuvius Drive/Driveway D:** Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Widen to provide a second southbound departure lane. Modify the existing traffic signal.

10.4.2 *Year 2035 Plus Project – HCM*

The results of the intersection capacity analysis presented previously in *Table 10-2* show that the four (4) signalized Project driveways are forecast to operate at acceptable levels of service under Year 2035 Plus Project traffic conditions based on HCM analysis. As such, no intersection improvements are recommended under these conditions.

10.4.3 *Year 2045 Plus Project – ICU*

The results of the intersection capacity analyses presented previously in *Table 10-1* show that the proposed Project will require additional improvements at one (1) Project driveway under Year 2045 Plus Project traffic conditions based on ICU analysis. As such, the following intersection improvements are recommended to help achieve acceptable service levels:

- **Rose Drive at Vesuvius Drive/Driveway D:** *Same as those identified in Section 10.4.1.* Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Widen to provide a second southbound departure lane. Modify the existing traffic signal.

10.4.4 *Year 2045 Plus Project – HCM*

The results of the intersection capacity analysis presented previously in *Table 10-2* show that the four (4) signalized Project driveways are forecast to operate at acceptable levels of service under Year 2045 Plus Project traffic conditions based on HCM analysis. As such, no intersection improvements are recommended under these conditions.

10.5 Internal Circulation Evaluation

The on-site circulation was evaluated in terms of vehicle-pedestrian conflicts. Based on our review of the preliminary site plan, the overall layout does not create any unsafe vehicle-pedestrian conflict points and the driveway throating is sufficient such that access to parking spaces is not impacted by internal vehicle queuing/stacking. The on-site circulation is very good based on our review of the proposed site plan, whereas the alignment, spacing, and throating of the Project driveways is adequate.

As part of the finalization of Project Design Features, it is recommended that a line of sight analysis be completed at the intersection of Rose Drive at Driveway C, as well as all other project driveways to ensure adequate sight distance is provided.

10.6 Gate Queueing Analysis for Project Driveways B and C

As illustrated in *Figure 2-3,* Zone 3 of the proposed Project includes gated entries at Driveway B and Driveway C. Therefore, a gate queueing assessment has been prepared to identify the minimum distance the gate should be placed from the intersection to ensure that the queues do not affect the signal operations along Valencia Avenue and Rose Drive.

10.6.1 *Crommelin Methodology*

It has been assumed that residents of the Project will enter using an electronic gate opener/transponder, similar to that used to access garages, and exit via a vehicle-actuated loop process or similar type technology. It has also been assumed that visitors will use a phone-actuated process (call box) to enter. In order to determine the required storage reservoir for "visitors/guests" at Project Driveways B and C, a queuing analysis has been performed using the Crommelin Methodology.

The Crommelin Methodology determines the minimum storage reservoir required to provide adequate access and control at gated entries. Experience has proven that poorly designed gated entries with inadequate storage capacities often times create an adverse effect on the operating characteristics of street network. The Crommelin Methodology virtually eliminates this scenario as it ensures the design of an efficient, well-working access system with minimum impacts upon the surrounding street system. The methodology is based on a Poisson distribution, peak hour traffic volumes, gate control strategies, processing rates at a control point, and the number of travel lanes. These characteristics are used to calculate a traffic intensity factor value (IF), which is derived by dividing the peak hour traffic volumes by the design processing rate. The IF value is then plotted on the 99% confidence level curve (where storage capacity will not be exceeded 99 times of 100) per the Crommelin Reservoir Needs nomograph. This process ultimately estimates the maximum number of queuing vehicles that will store behind the service position vehicle at the control point. This number is rounded up to the nearest vehicle and added to the single service position vehicle, resulting in the total number of vehicles stored behind the control point.

The required storage capacity, in vehicles, is converted into a length (feet) by multiplying the number of expected vehicles by an average vehicle length of 20 feet. It is noted that typically a minimum of 40 feet of storage is provided between the gate and the back of right of way, thereby ensuring if two (2) vehicles queue on the proposed driveway, pedestrian and vehicular access on the sidewalk and street, respectively, is not blocked.

10.6.2 *Gate Entry Stacking Requirements*

Table 10-3 presents a summary of the vehicular stacking analysis for inbound residents and visitor traffic at the two gated entrances located at Project Driveways B and C. Please note that this queueing analysis conservatively assumes that 25% of the project inbound traffic during the AM and PM peak hours will be visitors. In addition, a conservative design service/processing rate of 60 vehicles per hour was assumed (which is equivalent to a processing rate of one vehicle every 60 seconds) for visitors to the site.

As shown in *Table 10-3,* Driveway B is expected to have a visitor inbound vehicle flow of 7 vehicles and 21 vehicles during the AM and PM peak hour, respectively. Driveway C is expected to have a visitor inbound vehicle flow of 10 vehicles and 31 vehicles during the AM and PM peak hour, respectively. This will require a storage reservoir length of 40 feet between the front of the gate to the Project's right-of-way/property line to satisfy both the AM and PM peak hour traffic at both of the project entrances.

10.6.3 *Gate Exit Stacking Requirements*

Table 10-4 presents a summary of the vehicular stacking requirements for outbound residents and visitor traffic at Project Driveways B and C, which is based on Average Queue methodology. As shown, Project Driveway B will require a storage length of 36 feet between the front of the gate to crosswalk in order for the outbound vehicles to not queue past the gate. Project Driveway C will require a minimum storage length of 59 feet between the front of the gate to the crosswalk in order for the outbound vehicles to not queue past the gate.

Appendix H includes the HCM queueing analysis at the two (2) Project driveways.

TABLE 10-3

PROJECT GATE ENTRY STACKING REQUIREMENTS

Study Intersection	Time Period	(1) Entering Traffic Volumes	(2) Service Rate (veh/hr)	(3) Intensity Factor (I)	(4) Max # of Stacked Vehicles	(5) Required Storage Capacity
B. Valencia Avenue at Driveway B	AM	7	60	0.12	1 vehicle	20 ft
	PM	21	60	0.35	1 vehicle	20 ft
C. Rose Drive at Driveway C	AM	10	60	0.17	1 vehicle	20 ft
	PM	31	60	0.52	2 vehicles	40 ft

TABLE 10-4

PROJECT GATE EXIT STACKING REQUIREMENTS

Study Intersection	(1) Year 2045 Plus Project Traffic Conditions	
	AM Peak Hour	PM Peak Hour
	Max. Queue/ Min. Storage Required[62] (feet)	Max. Queue/ Min. Storage Required[62] (feet)
B. Valencia Avenue at Driveway B		
Westbound Left-Turn	36	25
Westbound Through/Right	35	25
C. Rose Drive at Driveway C		
Westbound Left-Turn	35	27
Westbound Right-Turn	59	44

[62] Maximum queue is calculated by multiplying the *Average Queue* by a factor of 1.5 for signalized intersections. Maximum queue is based on the 95th percentile for unsignalized intersections.

10.7 Project Driveway B Phased Analysis

As previously noted, Valencia Avenue at Project Driveway B is planned to be a full access signalized driveway that provides access to both Zones 2 and 3. However, it is our understanding that Caltrans may have concerns regarding the installation of a traffic signal at that location. Furthermore, it is also our understanding that the proposed Project may be build out in phases, in which case it is anticipated that Zones 1 and 2 would be completed and occupied prior to the build out of Zone 3. Therefore, a phased LOS analysis has been completed for Valencia Avenue at Driveway B both with and without a traffic signal. This phased analysis includes the following alternatives:

- Zone 2 Only – One-Way Stop Control
- Zone 2 Only – Traffic Signal
- Zones 2 and 3 – Two-Way Stop Control
- Zones 2 and 3 – Traffic Signal *(Consistent with the analysis completed in Sections 10.2 and 10.3)*

Additionally, a traffic signal warrant analysis has also been completed for the Valencia Avenue at Project Driveway B phased assessment to determine the need for signalization at the intersection.

10.7.1 *Peak Hour Intersection Capacity Analysis – ICU*

Table 10-5 summarizes the intersection level of service results for the phased analysis at Valencia Avenue at Driveway B under near-term (Year 2035) and buildout (Year 2045) traffic conditions based on ICU methodology.

Review of columns (1) and (2) of *Table 10-5* indicates that Valencia Avenue at Driveway B is anticipated to operate at acceptable service levels with the installation of a traffic signal for both Zone 2 Only and Zones 2 and 3.

Appendix I presents the ICU/LOS calculations for the Project Driveway B phased analyses.

10.7.2 *Peak Hour Intersection Capacity Analysis – HCM*

Table 10-6 summarizes the intersection level of service results for the phased analysis at Valencia Avenue at Driveway B under near-term (Year 2035) and buildout (Year 2045) traffic conditions based on HCM methodology.

Review of column (1) of *Table 10-6* indicates that Valencia Avenue at Driveway B is anticipated to operate adversely under Year 2035 Plus Project traffic conditions during both the AM and PM peak hours for Zones 2 and 3 with two-way stop control. The intersection is forecast to operate at acceptable service levels for the remaining analysis phases.

Review of column (2) of *Table 10-6* indicates that Valencia Avenue at Driveway B is anticipated to operate adversely under Year 2045 Plus Project traffic conditions during the AM and/or PM peak hours for Zone 2 with one-way stop control and Zones 2 and 3 with two-way stop control. The intersection is forecast to operate at acceptable service levels for the remaining analysis phases.

Appendix I also presents the HCM/LOS calculations for the Project Driveway B phased analyses.

10.7.3 *Traffic Signal Warrant Analysis*

A traffic signal warrant analysis was completed for Valencia Avenue at Driveway B to determine the need for signalization at the intersection. This assessment is made on the basis of signal warrant criteria adopted by Caltrans. For this study, the need for signalization is assessed on the basis of the peak-hour traffic signal warrant, Warrant #3, described in the *California Manual on Uniform Traffic Control Devices (MUTCD).*

Warrant #3 has two parts:

1. *Part A* evaluates peak hour vehicle delay for traffic on the minor street approach with the highest delay, and
2. *Part B* evaluates peak-hour traffic volumes on the major and minor streets.

This method provides an indication of whether peak-hour traffic conditions or peak-hour traffic volume levels are, or would be, sufficient to justify installation of a traffic signal. Other traffic signal warrants are available, however, they cannot be checked under future conditions because they rely on data for which forecasts are not available (such as accidents, pedestrian volume, and four- or eight-hour vehicle volumes).

The decision to install a traffic signal should not be based purely on the warrants alone. Instead, the installation of a signal should be considered and further analysis performed when one or more of the warrants are met. Additionally, engineering judgment is exercised on a case-by-case basis to evaluate the effect a traffic signal will have on certain types of accidents and traffic conditions at the subject intersection as well as at adjacent intersections.

The results of the peak-hour traffic signal warrant analysis for Year 2035 Plus Project and Year 2045 Plus Project traffic conditions are summarized in ***Table 10-7***. The results indicate that Valencia Avenue at Driveway B does not satisfy the criteria for a traffic signal for both Zone 2 only and Zones 2 and 3. However, review of the level of service results presented in *Table 10-6* indicates that the installation of a traffic signal is recommended in order to help achieve acceptable service levels at the Project driveway.

Appendix I also presents the traffic signal warrant worksheets for the Project Driveway B phased analyses.

10.7.4 *Signal Requirements*

Based on the information above, it can be concluded that Zone 2 could be constructed without requiring the installation of a traffic signal at Driveway B under Year 2035 traffic conditions and still operate with acceptable service levels. However, upon completion of Zones 2 and 3 a signal would be required. If desired by Caltrans and the City of Brea the installation of the traffic signal at Driveway B could be deferred to Year 2045 if Zone 3 has yet to be constructed/occupied.

TABLE 10-5
VALENCIA AVENUE AT PROJECT DRIVEWAY B PEAK HOUR INTERSECTION CAPACITY ANALYSIS – ICU

Study Intersection	Time Period	(1) Year 2035 Plus Project Traffic Conditions		(2) Year 2045 Plus Project Traffic Conditions	
		ICU	LOS	ICU	LOS
Zone 2 Only (One-Way Stop Control)					
B. Valencia Avenue at Driveway B	AM	--	--	--	--
	PM	--	--	--	--
Zone 2 Only (Traffic Signal)					
B. Valencia Avenue at Driveway B	AM	0.698	B	0.727	C
	PM	0.482	A	0.501	A
Zones 2 and 3 (Two-Way Stop Control)					
B. Valencia Avenue at Driveway B	AM	--	--	--	--
	PM	--	--	--	--
Zones 2 and 3 (Traffic Signal)					
B. Valencia Avenue at Driveway B	AM	0.721	C	0.750	C
	PM	0.536	A	0.556	A

Notes:
- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

TABLE 10-6
VALENCIA AVENUE AT PROJECT DRIVEWAY B PEAK HOUR INTERSECTION CAPACITY ANALYSIS – HCM

Study Intersection	Time Period	(1) Year 2035 Plus Project Traffic Conditions		(2) Year 2045 Plus Project Traffic Conditions	
		Delay (s/v)	LOS	Delay (s/v)	LOS
Zone 2 Only (One-Way Stop Control)					
B. Valencia Avenue at Driveway B	AM	31.7	D	**35.6**	**E**
	PM	14.3	B	15.0	B
Zone 2 Only (Traffic Signal)					
B. Valencia Avenue at Driveway B	AM	7.6	A	7.9	A
	PM	5.3	A	5.3	A
Zones 2 and 3 (Two-Way Stop Control)					
B. Valencia Avenue at Driveway B	AM	**196.5**	**F**	**262.2**	**F**
	PM	**195.5**	**F**	**248.3**	**F**
Zones 2 and 3 (Traffic Signal)					
B. Valencia Avenue at Driveway B	AM	9.0	A	9.3	A
	PM	8.5	A	8.5	A

Notes:
- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

TABLE 10-7

VALENCIA AVENUE AT PROJECT DRIVEWAY B TRAFFIC SIGNAL WARRANT ANALYSIS SUMMARY[63]

Study Intersection	Time Period	(1) Year 2035 Plus Project Traffic Conditions		(2) Year 2045 Plus Project Traffic Conditions	
		Part A of Warrant 3 Satisfied?	Part B of Warrant 3 Satisfied?	Part A of Warrant 3 Satisfied?	Part B of Warrant 3 Satisfied?
Zone 2 Only (One-Way Stop Control)					
B. Valencia Avenue at Driveway B	AM	No	No	No	No
	PM	No	No	No	No
Zones 2 and 3 (Two-Way Stop Control)					
B. Valencia Avenue at Driveway B	AM	No	No	No	No
	PM	No	No	No	No

63 Signal Warrant checks based on Warrant 3, Part A – Peak Hour Delay Warrant and Part B – Peak Hour Volume Warrant combined in the California MUTCD.

11.0 AREA-WIDE TRAFFIC IMPROVEMENTS

For those intersections where projected traffic volumes are expected to exceed the LOS criteria thresholds, this report recommends traffic improvements that change the intersection geometry to increase capacity. These capacity improvements involve roadway widening and/or re-striping to reconfigure roadways to specific approaches of a study intersection. The identified improvements are expected to improve levels of service at the location which exceed the LOS criteria thresholds.

Figures 11-1 and ***11-2*** present the recommended improvements and intersection controls at the key study intersections for the Year 2035 and Year 2045 traffic conditions per ICU analysis and HCM analysis, respectively. These are discussed in more detail in the sections below.

Table 11-1 identifies the incremental intersection improvements needed by the relevant study years to maintain, where possible, acceptable service levels based on the LOS standards defined in this report, as detailed in the sections below.

11.1 Planned Improvements

The following improvements listed below are part of the SR-57 Lambert Interchange improvement project, now under construction, that have been included in the Year 2035 and Year 2045 background traffic conditions:

- **No. 2 – SR-57 SB Ramps at Lambert Road:** Widen the off-ramp to provide a second exclusive southbound left-turn lane. Restripe the shared southbound left-turn/through/right-turn lane to a second exclusive right-turn lane. Widen to provide a second exclusive eastbound right-turn lane. Modify the existing traffic signal.

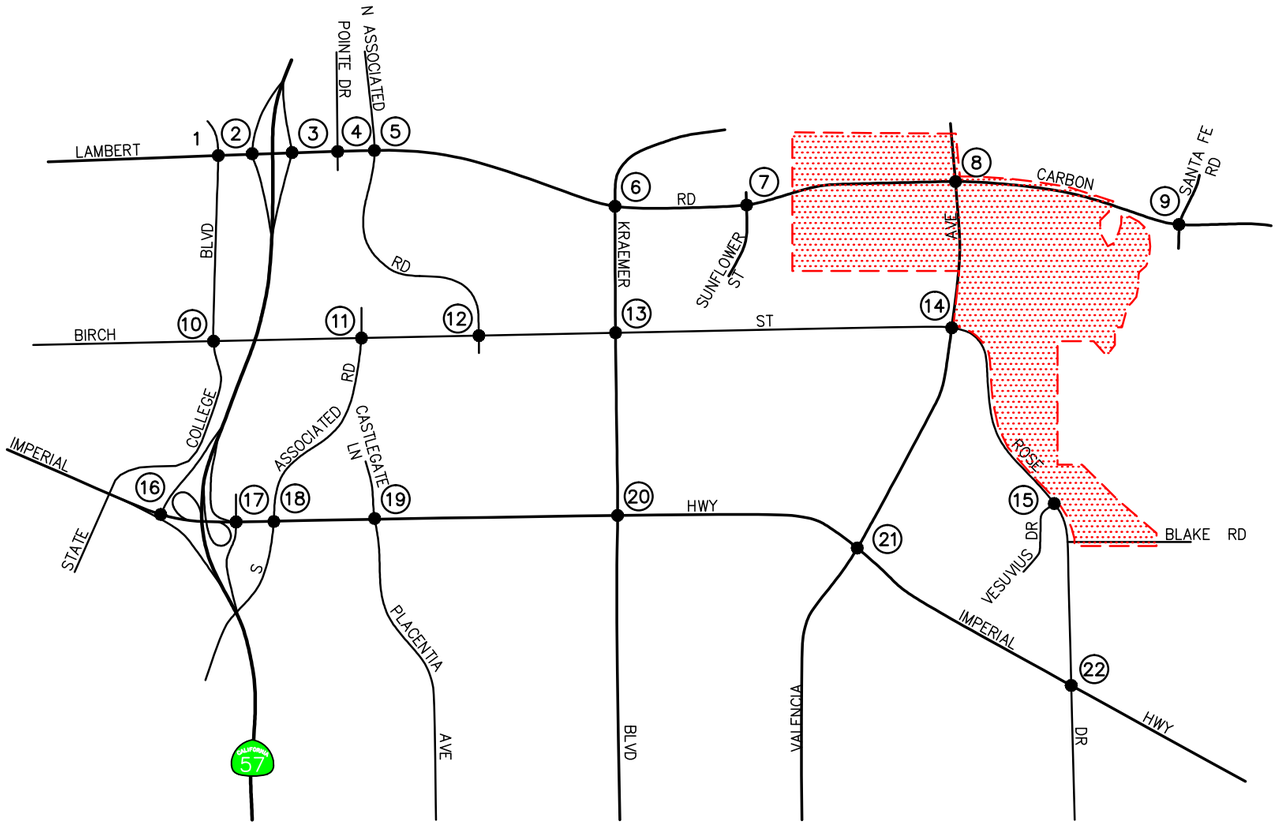
- **No. 3 – SR-57 NB Ramps at Lambert Road:** Construct a loop on-ramp on the south leg. Remove dual eastbound exclusive left-turn lanes. Widen and restripe to provide a shared eastbound through/right-turn lane and an exclusive eastbound right-turn lane. Reconstruct the existing on-ramp for a free westbound right-turn lane. Modify the existing traffic signal.

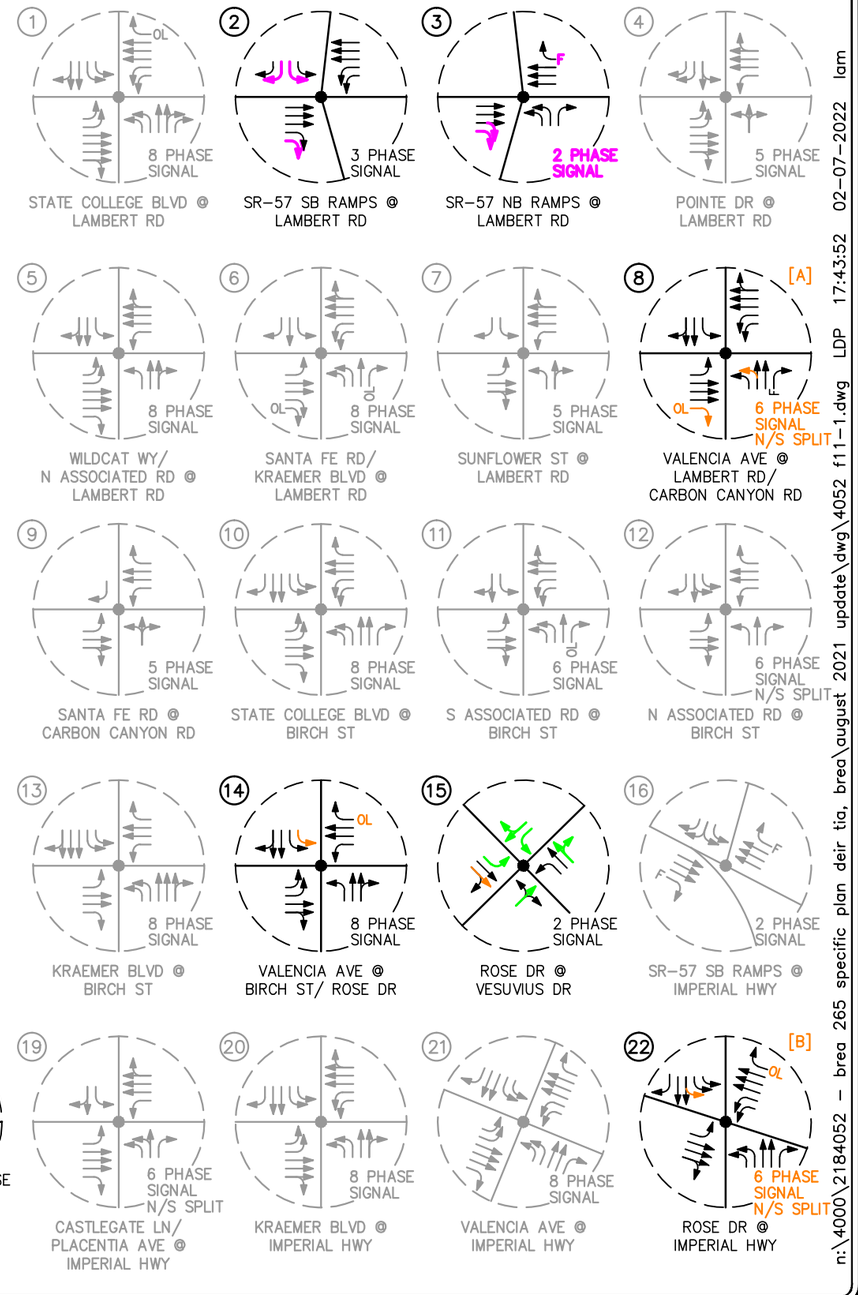
11.2 Year 2035 Plus Project Traffic Conditions Recommended Improvements

11.2.1 *Year 2035 Plus Project – ICU*

The results of the intersection capacity analyses presented previously in *Table 8-1* show that five (5) of the twenty-two (22) study intersections require Project-related improvements under Year 2035 Plus Project traffic conditions based on ICU analysis. As such, the following intersection improvements are recommended. Per City requirements, the Project may be expected to pay a fair-share/local fee to cover the Project's fair share of the full construction costs needed to implement these improvements.

- **No. 8 – Valencia Avenue at Lambert Road/Carbon Canyon Road:** Restripe the first northbound through lane to provide a shared left/through lane. Widen and/or restripe the eastbound approach to provide an exclusive eastbound right-turn lane. Remove the existing pedestrian crosswalk on the west leg of the intersection. Modify the existing traffic signal





NOTES:
[A] = REMOVE CROSSWALK ON WEST LEG
[B] = REMOVE CROSSWALK ON EAST LEG

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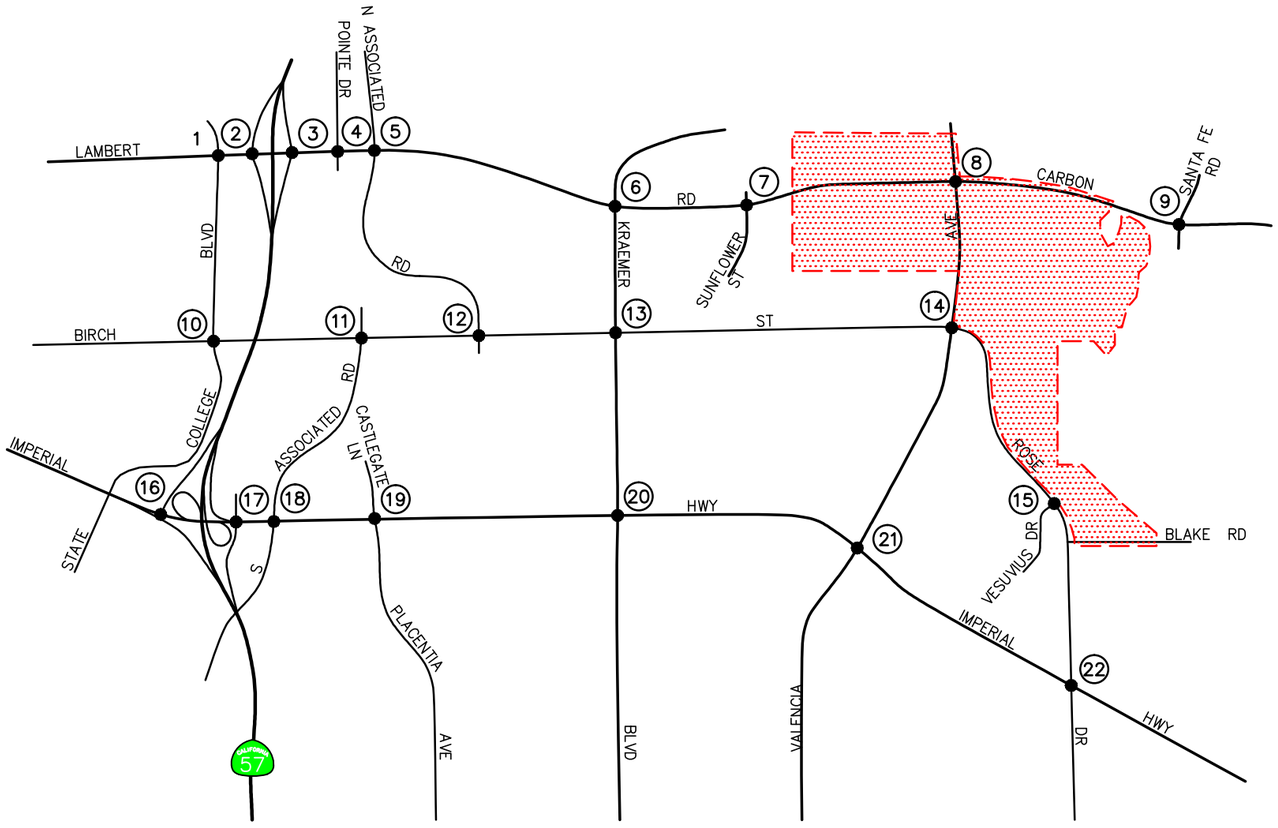
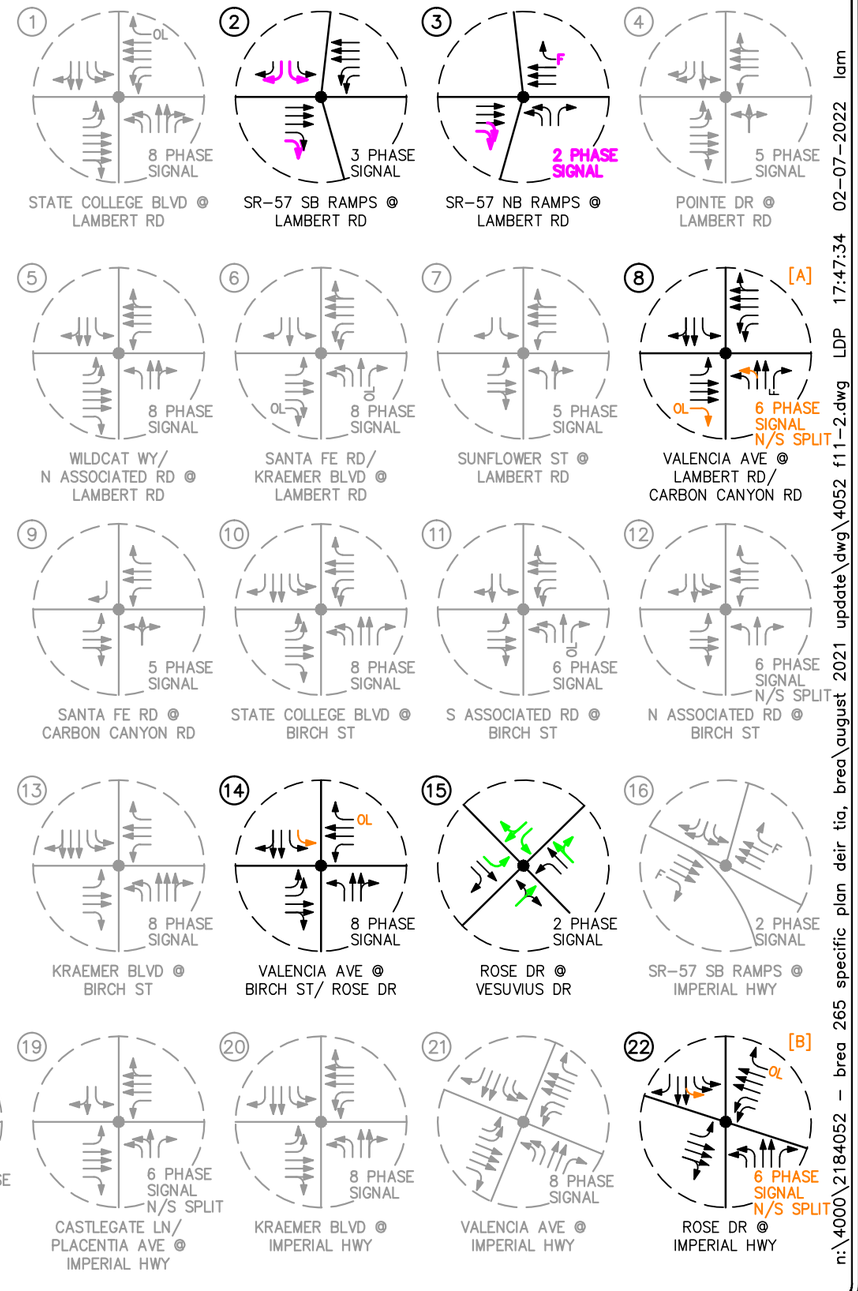
KEY
= APPROACH LANE ASSIGNMENT
= PLANNED IMPROVEMENTS
= RECOMMENDED IMPROVEMENTS
= PROJECT SPECIFIC IMPROVEMENTS
= TRAFFIC SIGNAL, = STOP SIGN
= PROJECT SITE

FIGURE 11-1

PLANNED AND RECOMMENDED IMPROVEMENTS – ICU

BREA 265 SPECIFIC PLAN, BREA





NOTES:
[A] = REMOVE CROSSWALK ON WEST LEG
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KEY
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= RECOMMENDED IMPROVEMENTS
= PROJECT SPECIFIC IMPROVEMENTS
= TRAFFIC SIGNAL, = STOP SIGN
= PROJECT SITE

FIGURE 11-2

PLANNED AND RECOMMENDED IMPROVEMENTS - HCM

BREA 265 SPECIFIC PLAN, BREA

and provide split phasing in the northbound and southbound directions and an eastbound right-turn overlap phase. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 14 – Valencia Avenue at Birch Street/Rose Drive:** Widen and/or restripe the southbound approach to provide a second exclusive southbound left-turn lane. Modify the existing traffic signal and provide westbound right-turn overlap phasing. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 15 – Rose Drive at Vesuvius Drive/Driveway D:** *Same as those identified in Sections 10.4.1 and 10.4.3.* Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Widen to provide a second southbound departure lane. Modify the existing traffic signal.

- **No. 18 – Associated Road at Imperial Highway:** Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Modify the existing traffic signal. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 22 – Rose Drive at Imperial Highway:** Restripe the second southbound through lane as a shared southbound left/through lane. Modify the existing traffic signal and provide northbound and southbound split phasing and westbound right-turn overlap phasing. Remove crosswalk on the east leg. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

11.2.2 *Year 2035 Plus Project – HCM*

The results of the intersection capacity analyses presented previously in *Table 8-2* show that three (3) of the twenty-two (22) study intersections require Project-related improvements under Year 2035 Plus Project traffic conditions based on HCM analysis. As such, the following intersection improvements are recommended. Per City requirements, the Project may be expected to pay a fair-share/local fee to cover the Project's fair share of the full construction costs needed to implement these improvements.

- **No. 8 – Valencia Avenue at Lambert Road/Carbon Canyon Road:** *Same as those identified in Section 11.2.1.* Restripe the first northbound through lane to provide a shared left/through lane. Widen and/or restripe the eastbound approach to provide an exclusive eastbound right-turn lane. Remove the existing pedestrian crosswalk on the west leg of the intersection. Modify the existing traffic signal and provide split phasing in the northbound and southbound directions and an eastbound right-turn overlap phase. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 14 – Valencia Avenue at Birch Street/Rose Drive:** *Same as those identified in Section 11.2.1.* Widen and/or restripe the southbound approach to provide a second exclusive southbound left-turn lane. Modify the existing traffic signal and provide westbound right-turn overlap phasing. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 22 – Rose Drive at Imperial Highway:** *Same as those identified in Section 11.2.1.* Restripe the second southbound through lane as a shared southbound left/through lane. Modify the existing traffic signal and provide northbound and southbound split phasing and westbound right-turn overlap phasing. Remove crosswalk on the east leg. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

11.3 Year 2045 Plus Project Traffic Conditions Recommended Improvements

11.3.1 *Year 2045 Plus Project – ICU*

The results of the intersection capacity analyses presented previously in *Table 8-3* show that four (4) of the twenty-two (22) study intersections require Project-related improvements under Year 2045 Plus Project traffic conditions based on ICU analysis. As such, the following intersection improvements are recommended. Per City requirements, the Project may be expected to pay a fair-share/local fee to cover the Project's fair share of the full construction costs needed to implement these improvements. It should be noted that although the intersection of Associated Road at Imperial Highway (Intersection No. 18) does not require Project-related improvements, improvements at the intersection have been included to provide consistency with Year 2035 improvements.

- **No. 8 – Valencia Avenue at Lambert Road/Carbon Canyon Road:** *Same as those identified in Sections 11.2.1 and 11.2.2.* Restripe the first northbound through lane to provide a shared left/through lane. Widen and/or restripe the eastbound approach to provide an exclusive eastbound right-turn lane. Remove the existing pedestrian crosswalk on the west leg of the intersection. Modify the existing traffic signal and provide split phasing in the northbound and southbound directions and an eastbound right-turn overlap phase. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 14 – Valencia Avenue at Birch Street/Rose Drive:** *Same as those identified in Sections 11.2.1 and 11.2.2.* Widen and/or restripe the southbound approach to provide a second exclusive southbound left-turn lane. Modify the existing traffic signal and provide westbound right-turn overlap phasing. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 15 – Rose Drive at Vesuvius Drive/Driveway D:** *Same as those identified in Sections 10.4.1 and 10.4.3 and 11.2.1.* Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Widen to provide a second southbound departure lane. Modify the existing traffic signal.

- **No. 18 – Associated Road at Imperial Highway:** *Same as those identified in Section 11.2.1.* Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Modify the existing traffic signal. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 22 – Rose Drive at Imperial Highway:** *Same as those identified in Sections 11.2.1 and 11.2.2.* Restripe the second southbound through lane as a shared southbound left/through lane. Modify the existing traffic signal and provide northbound and southbound split phasing and westbound right-turn overlap phasing. Remove crosswalk on the east leg. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

11.3.2 *Year 2045 Plus Project – HCM*

The results of the intersection capacity analyses presented previously in *Table 8-4* show that three (3) of the twenty-two (22) study intersections require Project-related improvements under Year 2045 Plus Project traffic conditions based on HCM analysis. As such, the following intersection improvements are recommended. Per City requirements, the Project may be expected to pay a fair-share/local fee to cover the Project's fair share of the full construction costs needed to implement these improvements.

- **No. 8 – Valencia Avenue at Lambert Road/Carbon Canyon Road:** *Same as those identified in Sections 11.2.1 and 11.2.2 and 11.2.3.* Restripe the first northbound through lane to provide a shared left/through lane. Widen and/or restripe the eastbound approach to provide an exclusive eastbound right-turn lane. Remove the existing pedestrian crosswalk on the west leg of the intersection. Modify the existing traffic signal and provide split phasing in the northbound and southbound directions and an eastbound right-turn overlap phase. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 14 – Valencia Avenue at Birch Street/Rose Drive:** *Same as those identified in Sections 11.2.1 and 11.2.2 and 11.2.3.* Widen and/or restripe the southbound approach to provide a second exclusive southbound left-turn lane. Modify the existing traffic signal and provide westbound right-turn overlap phasing. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 22 – Rose Drive at Imperial Highway:** *Same as those identified in Sections 11.2.1 and 11.2.2 and 11.2.3.* Restripe the second southbound through lane as a shared southbound left/through lane. Modify the existing traffic signal and provide northbound and southbound split phasing and westbound right-turn overlap phasing. Remove crosswalk on the east leg. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

TABLE 11-1
SUMMARY OF RECOMMENDED IMPROVEMENTS BY SCENARIO

Study Intersection	Jurisdiction (City Location)	Improvement Description	Improvements by Scenario			
			Year 2035 Plus Project		Year 2045 Plus Project	
			ICU Impact	HCM Impact	ICU Impact	HCM Impact
8. Valencia Avenue at Lambert Road/Carbon Canyon Road	Caltrans (Brea)	▪ Restripe the first NB through lane to provide a shared left/through lane. ▪ Widen and/or restripe to provide an exclusive EB right-turn lane. ▪ Remove crosswalk on west leg. ▪ Modify existing traffic signal and provide NB and SB split phasing and an EB right-turn overlap phase.	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	X X X X	X X X X
14. Valencia Avenue at Birch Street/Rose Drive	Caltrans (Brea)	▪ Widen and/or restripe to provide a second exclusive SB left-turn lane. ▪ Modify the existing traffic signal and provide WB right-turn overlap phasing.	✓ ✓	✓ ✓	X X	X X
15. Rose Drive at Vesuvius Drive/Driveway D	Brea	▪ Restripe the SB exclusive right-turn lane to a SB shared through/right-turn lane. ▪ Widen to provide second SB departure lane. ▪ Modify the existing traffic signal.	✓ ✓ ✓	-- -- --	X X X	-- -- --
18. Associated Road at Imperial Highway	Caltrans (Brea)	▪ Restripe the SB exclusive right-turn lane to a SB shared through/right-turn lane. ▪ Modify the existing traffic signal.	✓ ✓	-- --	X X	-- --
22. Rose Drive at Imperial Highway	Caltrans (Placentia)	▪ Restripe the second SB through lane as a SB shared left/through lane. ▪ Modify the existing traffic signal and provide NB and SB split phasing and WB right-turn overlap phasing. ▪ Remove crosswalk on east leg.	✓ ✓ ✓	✓ ✓ ✓	X X X	X X X

Notes:

✓ = Denotes that the improvement is implemented in the scenario.

X = Denotes that the improvement carries over from the previous scenario and is assumed to be already implemented.

11.4 Project-Related Fair-Share Contribution

The Project-related recommended improvements were determined based on the future conditions analysis with and without the proposed Project. The study locations forecast to operate at adverse levels of service are discussed below. As such, the proposed Project's "fair share" of the recommended improvements has been calculated for the study intersections that are forecast to operate at adverse levels of service in the Year 2045 Plus Project traffic conditions.

As such the Project may be expected to construct improvements and/or can be expected to pay a proportional "fair-share" of the improvement costs of the intersection to offset the Project's increment.

Table 11-2 presents Project's fair-share contribution to construct the recommended improvements at the five (5) study intersections projected to operate at an unacceptable LOS and/or inadequate queuing in the Year 2045 Plus Project traffic conditions.

As presented in this *Table 11-2,* the first column (1) presents a total of all intersection peak hour movements for existing conditions. The second column (2) presents project only traffic. The third column (3) presents Year 2045 buildout traffic conditions with Project traffic. The fourth column (4) represents what percentage of total intersection peak hour traffic is Project-related traffic.

TABLE 11-2
YEAR 2045 PROJECT FAIR-SHARE CONTRIBUTION

Study Intersection	City/ Jurisdiction	Time Period	(1) Existing Traffic	(2) Project Traffic	(3) Year 2045 Plus Project Traffic	(4) Project Fair-Share Percent[64]
8. Valencia Avenue at Lambert Rd/Carbon Canyon Rd	Brea/ Caltrans	AM	3,168	120	4,146	12.27%
		PM	--	--	--	--
14. Valencia Avenue at Birch Street/Rose Drive	Brea/ Caltrans	AM	3,320	288	4,338	28.29%
		PM	3,395	415	4,582	**34.96%**
15. Rose Drive at Vesuvius Drive/Driveway D	Brea	AM	1,928	198	2,789	23.00%
		PM	2,127	262	3,117	**26.46%**
18. Associated Road at Imperial Highway	Brea/ Caltrans	AM	--	--	--	--
		PM	5,351	77	6,762	5.46%
22. Rose Drive at Imperial Highway	Placentia/ Caltrans	AM	--	--	--	--
		PM	6,076	266	7,781	15.60%

[64] Project fair-share percentage Column (4) = [Column (2)] / [Column (3) – Column (1)].

11.5 City of Brea Traffic Impact Fees

Based on information published on the City of Brea website, the Brea City Council adopted Ordinance 966 in July 1995, establishing Traffic Impact Fees for all new development in Brea and annexed portions of its sphere-of-influence. Based on a Transportation Improvement Nexus Program study conducted in 2011, the City Council adopted Resolution 2011-096, which updated the impact fees, which became effective February 4, 2012. These fees are required, in part, by Orange County's Measure M, a transportation initiative passed by voters in 1990. More importantly, these are fair-share based fees that will serve to offset, or mitigate, the traffic impacts caused by new development.

Review of ***Table 11-3*** indicates that the City's Traffic Impact Fee rate for residential land uses range from $1,203 per dwelling unit to $1,974 per dwelling unit. For "all other uses", the City's Traffic Impact Fee is $89 per trip end.

Subject to confirmation by City staff, the proposed Project's Traffic Impact Fee (i.e. 450 low density residential units, 650 medium density residential units, and 6 soccer fields totaling 428 daily trips) total **$1,870,842.00**. The precise fee will be determined upon issuance of Project building permits by the City of Brea Community Development Department.

In some cases, a developer may be required to make certain traffic improvements in addition to, or in-lieu of paying traffic impact fees. In this case, however, the total cost of traffic improvements and/or fees will not exceed the development's fair-share toward mitigating its own impacts.

TABLE 11-3
CITY OF BREA TRAFFIC IMPACT FEE RATES [65]

Land Use Category	Unit of Development	Fee
▪ Low density residential	Per dwelling unit	$1,974
▪ Medium density residential	Per dwelling unit	$1,453
▪ High density residential	Per dwelling unit	$1,203
▪ Commercial, general, mixed use	Per gross square foot	$2.53
▪ Regional commercial	Per gross square foot	$2.24
▪ Office / industrial	Per gross square foot	$1.25
▪ School	Student	$0
▪ All other uses	Per trip end	$89

65 Source: City of Brea website - http://www.ci.brea.ca.us/162/Traffic-Impact-Fees

12.0 REDBAY AVENUE AT BIRCH STREET FOCUSED ASSESSMENT

It is our understanding that local residents have brought up concerns to the City regarding congestion at the intersection of Redbay Avenue at Birch Street, which is an existing unsignalized intersection. Residents have requested the installation of a traffic signal at the location. Therefore, this focused assessment for Redbay Avenue at Birch Street has been completed to determine existing service levels, with and without the project, as well as determine whether the installation of a traffic signal is justified. Included in this focused assessment are the following:

- Traffic Signal Warrant Analysis, and
- Weekday AM and PM peak hour capacity analysis for existing conditions, without and with the proposed Project.

12.1 Traffic Signal Warrant Analysis

A traffic signal warrant analysis was completed for Redbay Avenue at Birch Street to determine the need for signalization at the intersection. This assessment is made on the basis of signal warrant criteria adopted by Caltrans. For this study, the need for signalization is assessed on the basis of the peak-hour traffic signal warrant, Warrant #3, described in the *California Manual on Uniform Traffic Control Devices (MUTCD).*

Warrant #3 has two parts:

1. *Part A* evaluates peak hour vehicle delay for traffic on the minor street approach with the highest delay, and
2. *Part B* evaluates peak-hour traffic volumes on the major and minor streets.

This method provides an indication of whether peak-hour traffic conditions or peak-hour traffic volume levels are, or would be, sufficient to justify installation of a traffic signal. Other traffic signal warrants are available, however, they cannot be checked under future conditions because they rely on data for which forecasts are not available (pedestrian volume, and four- or eight-hour vehicle volumes).

The decision to install a traffic signal should not be based purely on the warrants alone. Instead, the installation of a signal should be considered and further analysis performed when one or more of the warrants are met. Additionally, engineering judgment is exercised on a case-by-case basis to evaluate the effect a traffic signal will have on certain types of accidents and traffic conditions at the subject intersection as well as at adjacent intersections.

The results of the peak-hour traffic signal warrant analysis for existing traffic conditions are summarized in ***Table 12-1***. The results indicate that Redbay Avenue at Birch Street does not satisfy the criteria for a traffic signal.

Appendix J presents the traffic signal warrant worksheets for the Redbay Avenue at Birch Street.

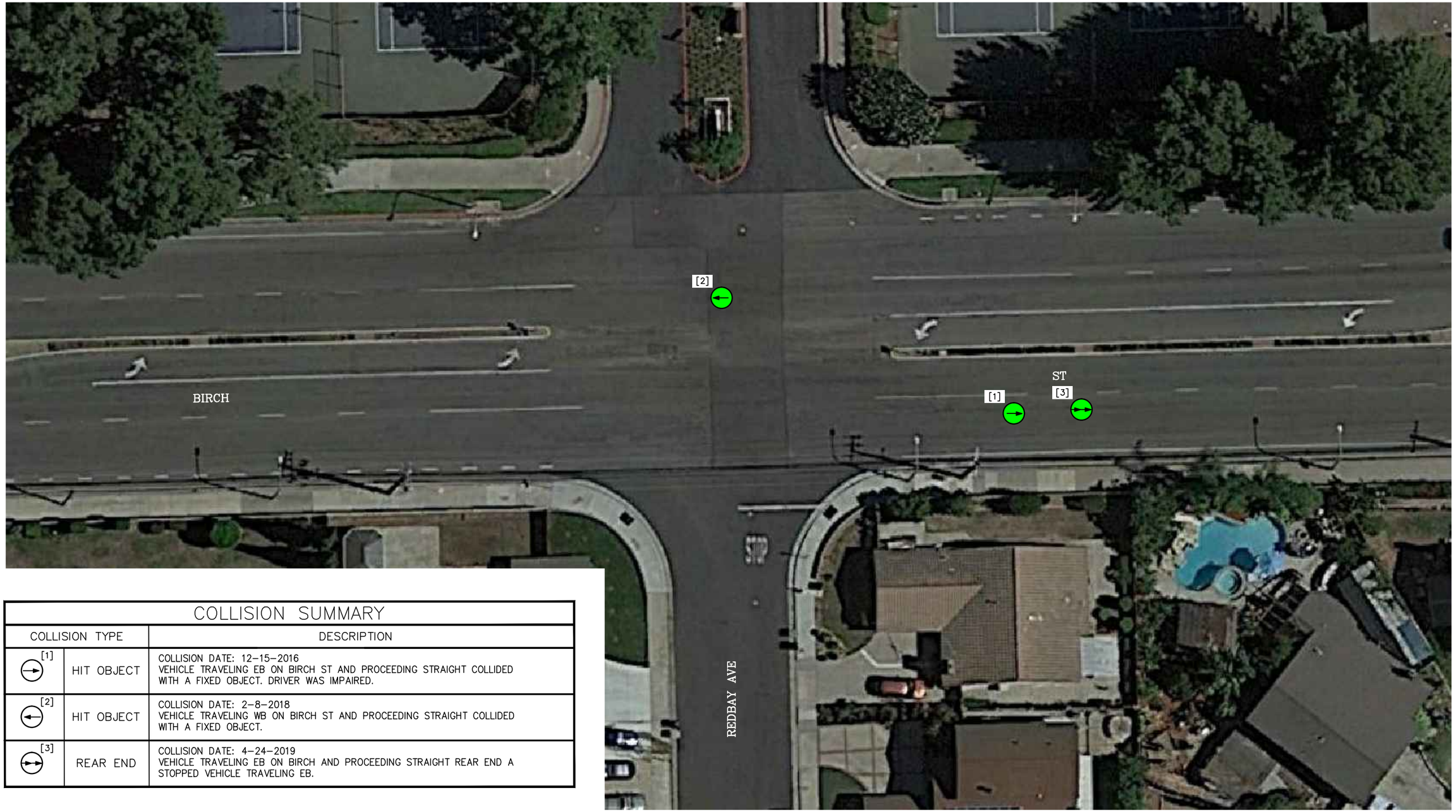
12.2 Peak Hour Intersection Capacity Analysis

Table 12-2 summarizes the peak hour Level of Service results at the intersection of Redbay Avenue at Birch Street for existing traffic conditions. The first column (1) of HCM/LOS values in *Table 12-2* presents a summary of existing AM and PM peak hour traffic conditions. The second column (2) presents existing traffic conditions with the addition of Project traffic. The third column (3) shows the increase in delay value due to the added peak hour Project trips and indicates whether the traffic associated with the proposed Project will exceed the LOS thresholds defined in this report. The fourth column (4) presents the resultant level of service with the inclusion of recommended traffic improvements, where needed, to achieve an acceptable level of service.

Review of column (1) of *Table 12-2* indicates that the intersection of Redbay Avenue at Birch Street currently operates at unacceptable LOS F during both the AM and PM peak hours. Review of column (2) indicates that the intersection is forecast to continue to operate at unacceptable LOS F with the addition of Project traffic. However, although the intersection operates adversely, the intersection does not satisfy the criteria for the installation of a traffic signal and therefore improvements are not required at this location.

Furthermore, it should be noted that five-years of crash data was researched at the intersection of Redbay Avenue at Birch Street via SWITRS, which is a statewide traffic data system used for collecting traffic collisions. Review of the data shows that there have been three (3) crashes at the study intersection within the last five years, none of which are correctable with the installation of a traffic signal. ***Figure 12-1*** summarizes the accident history at the study intersection.

Appendix J also presents the HCM/LOS calculations for the intersection of Redbay Avenue at Birch Street.



COLLISION SUMMARY		
COLLISION TYPE		DESCRIPTION
[1]	HIT OBJECT	COLLISION DATE: 12-15-2016 VEHICLE TRAVELING EB ON BIRCH ST AND PROCEEDING STRAIGHT COLLIDED WITH A FIXED OBJECT. DRIVER WAS IMPAIRED.
[2]	HIT OBJECT	COLLISION DATE: 2-8-2018 VEHICLE TRAVELING WB ON BIRCH ST AND PROCEEDING STRAIGHT COLLIDED WITH A FIXED OBJECT.
[3]	REAR END	COLLISION DATE: 4-24-2019 VEHICLE TRAVELING EB ON BIRCH AND PROCEEDING STRAIGHT REAR END A STOPPED VEHICLE TRAVELING EB.

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FIGURE 12-1

REDBAY AVENUE AT BIRCH STREET ACCIDENT HISTORY

BREA 265 SPECIFIC PLAN, BREA

TABLE 12-1

REDBAY AVENUE AT BIRCH STREET TRAFFIC SIGNAL WARRANT ANALYSIS SUMMARY[66]

Study Intersection	Time Period	(1) Existing Traffic Conditions		(2) Existing Plus Project Traffic Conditions	
		Part A of Warrant 3 Satisfied?	Part B of Warrant 3 Satisfied?	Part A of Warrant 3 Satisfied?	Part B of Warrant 3 Satisfied?
A. Redbay Avenue at Birch Street	AM	No	No	No	No
	PM	No	No	No	No

[66] Signal Warrant checks based on Warrant 3, Part A – Peak Hour Delay Warrant and Part B – Peak Hour Volume Warrant combined in the California MUTCD.

TABLE 12-2
REDBAY AVENUE AT BIRCH STREET PEAK HOUR INTERSECTION CAPACITY ANALYSIS

Study Intersection	Time Period	(1) Existing Traffic Conditions		(2) Existing Plus Project Traffic Conditions		(3) Exceed LOS Thresholds		(4) Existing Plus Project Traffic Conditions with Improvements	
		Delay (s/v)	LOS	Delay (s/v)	LOS	Increase	Yes/No	Delay (s/v)	LOS
A. Redbay Avenue at Birch Street	AM	**546.2**	**F**	**609.7**	**F**	63.5	No[67]	--	--
	PM	**--**[68]	**F**	**--**[68]	**F**	--	No	--	--

Notes:
- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

[67] Although the intersection operates adversely, the intersection does not satisfy the criteria for the installation of a traffic signal. Therefore, improvements are not required.

[68] Intersection delay (sec/veh) calculation exceeded the capabilities of HCM 6th Edition, therefore only adverse LOS F was reported.

13.0 VOYAGER AVENUE AT BIRCH STREET AND N. ASSOCIATED ROAD AT BIRCH STREET FOCUSED ASSESSMENT

It is our understanding that local residents have brought up concerns to the City regarding traffic operations and congestion along Birch Street associated with Country Hills Elementary School and Olinda Elementary School. Therefore, this focused assessment will assess traffic flow at the intersections of Voyager Avenue at Birch Street and N. Associated Road at Birch Street (Intersection No. 12) based on the following:

- Weekday AM and PM peak hour capacity analysis for existing conditions, without and with the proposed Project, and
- Intersection queueing evaluation for existing conditions, without and with the proposed Project.

13.1 Peak Hour Intersection Capacity Analysis – ICU

Table 13-1 summarizes the peak hour Level of Service results at the two (2) study intersections for existing traffic conditions based on ICU methodology. The first column (1) of ICU/LOS values in *Table 13-1* presents a summary of existing AM and PM peak hour traffic conditions. The second column (2) presents existing traffic conditions with the addition of Project traffic. The third column (3) shows the increase in ICU value due to the added peak hour Project trips and indicates whether the traffic associated with the proposed Project will exceed the LOS thresholds defined in this report. The fourth column (4) presents the resultant level of service with the inclusion of recommended traffic improvements, where needed, to achieve an acceptable level of service.

Review of column (1) of *Table 13-1* indicates that intersections of Voyager Avenue at Birch Street and N. Associated Road at Birch Street (Intersection No. 12) currently operate at acceptable service levels during both the AM and PM peak hours. Review of column (2) indicates that the intersections are forecast to continue to operate at acceptable service levels with the addition of Project traffic. Therefore, it can be concluded that the Project will have little effect on Birch Street as it relates to Country Hills Elementary School and Olinda Elementary School, based on ICU methodology.

Appendix K presents the ICU/LOS calculations for the intersections of Voyager Avenue at Birch Street and N. Associated Road at Birch Street.

13.2 Peak Hour Intersection Capacity Analysis – HCM

Table 13-2 summarizes the peak hour Level of Service results at the two (2) study intersections for existing traffic conditions based on HCM methodology. The first column (1) of HCM/LOS values in *Table 13-2* presents a summary of existing AM and PM peak hour traffic conditions. The second column (2) presents existing traffic conditions with the addition of Project traffic. The third column (3) shows the increase in delay value due to the added peak hour Project trips and indicates whether the traffic associated with the proposed Project will exceed the LOS thresholds defined in this report. The four column (4) presents the resultant level of service with the inclusion of recommended traffic improvements, where needed, to achieve an acceptable level of service.

Review of column (1) of *Table 13-2* indicates that intersections of Voyager Avenue at Birch Street and N. Associated Road at Birch Street (Intersection No. 12) currently operate at acceptable service levels during both the AM and PM peak hours. Review of column (2) indicates that the intersections are forecast to continue to operate at acceptable service levels with the addition of Project traffic. Therefore, it can be concluded that the Project will have little effect on Birch Street as it relates to Country Hills Elementary School and Olinda Elementary School, based on HCM methodology.

Appendix K also presents the HCM/LOS calculations for the intersections of Voyager Avenue at Birch Street and N. Associated Road at Birch Street.

13.3 Intersection Queueing Evaluation

The queuing evaluation was conducted for existing traffic conditions based on the Average Queue methodology, which calculates the average queue value in terms of number of vehicles per lane. At signalized intersections, the storage length for left-turn and right-turn lanes may be based on one and one-half (1½) to two (2) times the average number of vehicles that would store per signal cycle[69]. For the purposes of this traffic analysis, the minimum storage requirement for left-turn lanes and right-turn lanes was calculated by taking 1½ times the average queue length. (Minimum required storage = Q_{av} (feet) x 1.5). The storage lengths at unsignalized intersection locations are based on 95th Percentile methodology.

It should be noted that the Synchro software takes into consideration traffic volume data, lane configurations, traffic signal phasing and potential weaving between intersections in order to calculate the queues for each movement. The existing storage lengths were determined based on a review of aerial maps of the subject intersections obtained from Google Earth and field reviews conducted by LLG Engineers. An average vehicle length of 25 feet is assumed for the purposes of this analysis.

Table 13-3 presents the AM and PM peak hour queueing analyses results for the two (2) study intersections for existing conditions. The first column (1) of *Table 13-3* presents the resultant queues for existing traffic conditions. The second column (2) presents the resultant queues for existing conditions with the addition of Project traffic.

Review of columns (1) and (2) of *Table 13-3* indicates that one (1) of the two (2) study intersections have queues which exceed the provided storage capacity for one intersection approach under both existing and existing plus project conditions. The remaining study intersection has queues that are adequately accommodated by the provided storage space. The intersection/approach with storage deficiencies include the following:

- Voyager Avenue at Birch Street
  - Southbound Left/Thru: AM Peak Hour

[69] Source: Highway Design Manual, Intersections at Grade, page 400-9, CALTRANS

Although the queues for the southbound left/through lane at the intersection of Voyager Avenue at Birch Street exceed the provided storage capacity, the remaining queues can be accommodated on-site of the Onlinda Elementary School. Therefore, it can be concluded that Project will have little effect on the queuing along Birch Street as it relates to Country Hills Elementary School and Olinda Elementary School.

Appendix K also presents the Synchro queuing worksheets for the intersections of Voyager Avenue at Birch Street and N. Associated Road at Birch Street.

TABLE 13-1
PEAK HOUR INTERSECTION CAPACITY ANALYSIS – ICU
VOYAGER AVENUE AT BIRCH STREET AND N. ASSOCIATED ROAD AT BIRCH STREET

Study Intersection	Time Period	(1) Existing Traffic Conditions		(2) Existing Plus Project Traffic Conditions		(3) Exceed LOS Thresholds		(4) Existing Plus Project Traffic Conditions with Improvements	
		ICU	LOS	ICU	LOS	Increase	Yes/No	ICU	LOS
12. N Associated Road at Birch Street	AM	0.529	A	0.542	A	0.013	No	--	--
	PM	0.626	B	0.635	B	0.009	No	--	--
A. Voyager Avenue at Birch Street	AM	0.330	A	0.336	A	0.006	No	--	--
	PM	0.334	A	0.351	A	0.017	No	--	--

Notes:
- **Bold ICU/LOS** values indicate adverse service levels based on the City LOS standards.

TABLE 13-2
PEAK HOUR INTERSECTION CAPACITY ANALYSIS – HCM
VOYAGER AVENUE AT BIRCH STREET AND N. ASSOCIATED ROAD AT BIRCH STREET

Study Intersection	Time Period	(1) Existing Traffic Conditions		(2) Existing Plus Project Traffic Conditions		(3) Exceed LOS Thresholds		(4) Existing Plus Project Traffic Conditions with Improvements	
		Delay (s/v)	LOS	Delay (s/v)	LOS	Increase	Yes/No	Delay (s/v)	LOS
12. N Associated Road at Birch Street	AM	25.4	C	25.5	C	0.1	No	--	--
	PM	23.0	C	23.1	C	0.1	No	--	--
A. Voyager Avenue at Birch Street	AM	17.3	B	17.6	B	0.3	No	--	--
	PM	7.1	A	7.1	A	0.0	No	--	--

Notes:
- **Bold HCM/LOS** values indicate adverse service levels based on the City LOS standards.
- s/v = seconds per vehicle (delay)

TABLE 13-3
EXISTING PEAK HOUR INTERSECTION QUEUING ANALYSIS
VOYAGER AVENUE AT BIRCH STREET AND N. ASSOCIATED ROAD AT BIRCH STREET

Study Intersection	Estimated Storage Provided (feet)	(1) Existing Traffic Conditions				(2) Existing Plus Project Traffic Conditions			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Max. Queue/ Min. Storage Required[70] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[70] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[70] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[70] (feet)	Adequate Storage (Yes / No)
12. N Associated Road at Birch Street									
Northbound Left-Turn	120	25	Yes	25	Yes	25	Yes	25	Yes
Northbound Through	220	25	Yes	25	Yes	25	Yes	25	Yes
Northbound Right-Turn	65	25	Yes	25	Yes	25	Yes	25	Yes
Southbound Left-Turn	205	80	Yes	56	Yes	80	Yes	56	Yes
Southbound Left/Through	1,240	80	Yes	54	Yes	80	Yes	54	Yes
Southbound Right-Turn	205	188	Yes	198	Yes	189	Yes	194	Yes
Eastbound Left-Turn	195	347	Yes[71]	369	Yes[71]	348	Yes[71]	369	Yes[71]
Westbound Left-Turn	200	25	Yes	25	Yes	25	Yes	25	Yes
Westbound Right-Turn	200	25	Yes	26	Yes	25	Yes	25	Yes
A. Voyager Avenue at Birch Street									
Northbound Left-Turn	120	38	Yes	54	Yes	38	Yes	54	Yes
Northbound Through/Right	565	32	Yes	25	Yes	32	Yes	25	Yes
Southbound Left/Through	95	**167**	**No**	25	Yes	**167**	**No**	25	Yes

[70] Maximum queue is calculated by multiplying the *Average Queue* by a factor of 1.5 for signalized intersections. Maximum queue is based on the 95th percentile for unsignalized intersections.

[71] The remaining queue can be accommodated within the transition area of the turn-lane.

TABLE 13-3 (CONTINUED)
EXISTING PEAK HOUR INTERSECTION QUEUING ANALYSIS
VOYAGER AVENUE AT BIRCH STREET AND N. ASSOCIATED ROAD AT BIRCH STREET

Study Intersection	Estimated Storage Provided (feet)	(1) Existing Traffic Conditions				(2) Existing Plus Project Traffic Conditions			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Max. Queue/ Min. Storage Required[72] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[72] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[72] (feet)	Adequate Storage (Yes / No)	Max. Queue/ Min. Storage Required[72] (feet)	Adequate Storage (Yes / No)
A. Voyager Avenue at Birch Street (Continued)									
Southbound Right-Turn	95	25	Yes	25	Yes	25	Yes	25	Yes
Eastbound Left-Turn	200	155	Yes	36	Yes	155	Yes	36	Yes
Westbound Left-Turn	140	48	Yes	25	Yes	48	Yes	25	Yes
Westbound Right-Turn	225	53	Yes	25	Yes	60	Yes	25	Yes

[72] Maximum queue is calculated by multiplying the *Average Queue* by a factor of 1.5 for signalized intersections. Maximum queue is based on the 95th percentile for unsignalized intersections.

14.0 SUMMARY OF FINDINGS AND CONCLUSIONS

- ***Project Description*** – The Brea 265 Specific Plan is a master planned residential community consisting of 260.7 acres located in the City of Brea and unincorporated Orange County. The proposed Project is generally located east of the State Route (SR) 57 Freeway and north of SR-90 (Imperial Highway), towards the eastern portion of the City. The proposed Project will include a mix of single family and multifamily residential units totaling 1,100 dwelling units along with a 13.0-acre sports park.. The Project is expected to be developed three (3) phases over the next several years, with the Year 2035 utilized to assess the Project's potential traffic impacts at full occupancy. Vehicular access to the Project will be provided via one (1) full access signalized driveway on Lambert Road, one (1) full access signalized driveway on Valencia Avenue, one (1) full access signalized driveway on Rose Drive, and one (1) full access signalized driveway at the existing intersection of Rose Drive at Vesuvius Drive.

- ***Study Scope*** – The following twenty-two (22) key study intersections were selected for detailed peak hour level of service analyses under Existing Traffic Conditions, Year 2035 Cumulative Traffic Conditions, Year 2035 Cumulative Plus Project, Year 2045 Traffic Conditions, and Year 2045 Plus Project Traffic Conditions.

Study Intersection	Applicable Jurisdiction (City Location)		
	Caltrans	City of Brea	City of Placentia
10. State College Boulevard at Lambert Road	--	Brea	--
11. SR-57 SB Ramps at Lambert Road	Caltrans (Brea)	--	--
12. SR-57 NB Ramps at Lambert Road	Caltrans (Brea)	--	--
13. Pointe Drive at Lambert Road	--	Brea	--
14. Wildcat Way/N Associated Road at Lambert Road	--	Brea	--
15. Santa Fe Road/Kraemer Boulevard at Lambert Road	--	Brea	--
16. Sunflower Street at Lambert Road	--	Brea	--
17. Valencia Avenue at Lambert Road/Carbon Canyon Road	Caltrans (Brea)	--	--
18. Santa Fe Road at Carbon Canyon Road	Caltrans (Brea)	--	--
19. State College Boulevard at Birch Street	--	Brea	--
20. S Associated Road at Birch Street	--	Brea	--
21. N Associated Road at Birch Street	--	Brea	--
22. Kraemer Boulevard at Birch Street	--	Brea	--
23. Valencia Avenue at Birch Street/Rose Drive	Caltrans (Brea)	--	--
24. Rose Drive at Vesuvius Drive		Brea	--
23. SR-57 SB Ramps at Imperial Highway	Caltrans (Brea)	--	--
24. SR-57 NB Ramps at Imperial Highway	Caltrans (Brea)	--	--
25. Associated Road at Imperial Highway	Caltrans (Brea)	--	--
26. Castlegate Lane/Placentia Avenue at Imperial Highway	Caltrans (Brea)	--	--
27. Kraemer Boulevard at Imperial Highway	Caltrans (Brea)	--	--
28. Valencia Avenue at Imperial Highway	Caltrans (Brea)	--	--
23. Rose Drive at Imperial Highway	--	--	Caltrans (Placentia)

- ***Existing Traffic Conditions ICU*** – One (1) of the twenty-two (22) study intersections currently operates at an unacceptable LOS during the PM peak hour. The remaining study intersections currently operate at an acceptable LOS D or better during the AM and PM peak hours. The locations identified below currently operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**ICU**	**LOS**	**ICU**	**LOS**
14. Valencia Ave at Birch St/Rose Dr	--	--	0.914	E

- ***Existing Traffic Conditions HCM*** – Four (4) of the twenty-two (22) study intersections currently operates at an unacceptable LOS during the AM and/or PM peak hours. The remaining study intersections currently operate at an acceptable LOS D or better during the AM and PM peak hours. The locations identified below currently operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**Delay (s/v)**	**LOS**	**Delay (s/v)**	**LOS**
5. Wildcat Way/N. Associated Rd at Lambert Rd	57.3	E	--	--
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	136.6	F	--	--
14. Valencia Ave at Birch St/Rose Dr	105.1	F	57.7	E
29. Rose Dr at Imperial Hwy	205.0	F	204.8	F

- ***Project Trip Generation*** – The proposed Project is forecast to generate approximately 9,351 daily trips, with 634 trips (182 inbound, 452 outbound) produced in the AM peak hour and 893 trips (542 inbound, 351 outbound) produced in the PM peak hour on a "typical" weekday.

- ***Related Projects Traffic Characteristics –*** Thirty-three (33) related projects were considered as part of the cumulative background setting. The thirty-three (33) related projects are forecast to generate 38,572 daily trips, with 3,006 trips (1,547 inbound, 1,459 outbound) anticipated during the AM peak hour and 3,517 trips (1,792 inbound, 1,725 outbound) produced during the PM peak hour.

- ***Year 2035 Cumulative Traffic Conditions Plus Project ICU*** – Five (5) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours with the addition of proposed Project traffic to Year 2035 cumulative traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**ICU**	**LOS**	**ICU**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	1.039	F	--	--
14. Valencia Ave at Birch St/Rose Dr	0.904	E	1.161	F
15. Rose Dr at Vesuvius/Driveway D	0.984	E	--	--

25. Associated Rd at Imperial Hwy	--	--	0.905	E
22. Rose Dr at Imperial Hwy	--	--	1.099	F

All five (5) study intersections operating adversely require Project-related improvements based on the LOS thresholds defined in this report. The implementation of recommended improvements at the intersections will help offset the Project's increment. After implementation of the recommended improvements, the intersections are forecast to operate at acceptable service levels and/or operate at better service levels than pre-Project conditions.

- ***Year 2035 Cumulative Traffic Conditions Plus Project HCM*** – Three (3) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours with the addition of proposed Project traffic to Year 2035 cumulative traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**Delay (s/v)**	**LOS**	**Delay (s/v)**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	164.0	F	--	--
14. Valencia Ave at Birch St/Rose Dr	122.5	F	91.1	F
22. Rose Dr at Imperial Hwy	246.4	F	233.5	F

All three (3) study intersections operating adversely require Project-related improvements based on the LOS thresholds defined in this report. The implementation of recommended improvements at the intersections will help offset the Project's increment. After implementation of the recommended improvements, the intersections are forecast to operate at acceptable service levels and/or operate at better service levels than pre-Project conditions.

- ***Year 2045 Traffic Conditions Plus Project ICU*** – Five (5) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours with the addition of proposed Project traffic to Year 2045 buildout traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**ICU**	**LOS**	**ICU**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	1.077	F	--	--
14. Valencia Ave at Birch St/Rose Dr	0.943	E	1.212	F
15. Rose Dr at Vesuvius/Driveway D	1.144	F	1.043	F
18. Associated Rd at Imperial Hwy	--	--	0.943	E
22. Rose Dr at Imperial Hwy	--	--	1.130	F

Four (4) of the five (5) study intersections operating adversely require Project-related improvements based on the LOS thresholds defined in this report. The implementation of recommended improvements at the four (4) intersections will help offset the Project's increment. After implementation of the recommended improvements, the intersections are forecast to operate at acceptable service levels and/or operate at better service levels than pre-Project conditions.

- ***Year 2045 Traffic Conditions Plus Project HCM*** – Three (3) of the twenty-two (22) study intersections are forecast to operate adversely during the AM and/or PM peak hours with the addition of proposed Project traffic to Year 2045 buildout traffic conditions. The remaining study intersections are forecast to operate at acceptable LOS D or better during the weekday AM and PM peak hours. The locations identified below are forecast to operate at unacceptable levels of service:

	AM Peak Hour		PM Peak Hour	
Study Intersection	**Delay (s/v)**	**LOS**	**Delay (s/v)**	**LOS**
8. Valencia Ave at Lambert Rd/Carbon Canyon Rd	177.7	F	--	--
14. Valencia Ave at Birch St/Rose Dr	132.1	F	103.9	F
22. Rose Dr at Imperial Hwy	251.7	F	276.2	F

All three (3) study intersections operating adversely require Project-related improvements based on the LOS thresholds defined in this report. The implementation of recommended improvements at the intersections will help offset the Project's increment. After implementation of the recommended improvements, the intersections are forecast to operate at acceptable service levels and/or operate at better service levels than pre-Project conditions.

- ***Year 2035 Cumulative Traffic Conditions Plus Project Queueing*** **–** Two (2) of the nine (9) study intersections have queues which exceed the provided storage capacity for one or more intersection approach with the addition of proposed Project traffic to Year 2035 cumulative traffic conditions. The remaining study intersections have queues that are adequately accommodated by the provided storage space. The intersections/approaches with storage deficiencies include the following:

  - Intersection No. 18: Associated Road at Imperial Highway
    - Eastbound Left-Turn: PM Peak Hour
    - Westbound Left-Turn: PM Peak Hour

  - Intersection No. 22: Rose Drive at Imperial Highway
    - Southbound Left-Turn: AM Peak Hour and PM Peak Hour
    - Westbound Right-Turn: PM Peak Hour

The addition of Project traffic does not contribute to the eastbound left-turn movement at the intersection of Associated Road at Imperial Highway (Intersection No. 18). Also, the addition of

Project traffic adds less than one (1) vehicle to the westbound left-turn queue, which is considered nominal. Therefore, Project-related improvements at the intersection of Associated Road at Imperial Highway (Intersection No. 18) are not required to improve the queues.

The implementation of recommended improvements at the intersection of Rose Drive at Imperial Highway (Intersection No. 22) will help improve queues for the southbound left-turn and westbound right-turn. After implementation of the recommended improvements, the southbound left-turn and westbound right-turn queues operate better than pre-Project conditions.

- ***Year 2045 Traffic Conditions Plus Project Queueing*** – Four (4) of the nine (9) study intersections have queues which exceed the provided storage capacity for one or more intersection approach with the addition of proposed Project traffic to Year 2045 buildout traffic conditions. The remaining study intersections have queues that are adequately accommodated by the provided storage space. The intersections/approaches with storage deficiencies include the following:

  - Intersection No. 2: SR-57 SB Ramps at Lambert Road
    - Westbound Left-Turn: AM Peak Hour
  - Intersection No. 18: Associated Road at Imperial Highway
    - Eastbound Left-Turn: PM Peak Hour
    - Westbound Left-Turn: PM Peak Hour
  - Intersection No. 19: Castlegate Lane/Placentia Avenue at Imperial Highway
    - Westbound Left-Turn: PM Peak Hour
  - Intersection No. 22: Rose Drive at Imperial Highway
    - Southbound Left-Turn: AM Peak Hour and PM Peak Hour
    - Westbound Right-Turn: PM Peak Hour

  The addition of Project traffic adds less than one (1) vehicle to the westbound left-turn queue at the intersection of SR-57 SB Ramps at Lambert Road (Intersection No. 2), which is considered nominal. Therefore, Project-related improvements at the intersection are not required to improve the queues.

  The addition of Project traffic does not contribute to the eastbound left-turn movement at the intersection of Associated Road at Imperial Highway (Intersection No. 18). Also, the addition of Project traffic adds less than one (1) vehicle to the westbound left-turn queue, which is considered nominal. Therefore, Project-related improvements at the intersection of Associated Road at Imperial Highway (Intersection No. 18) are not required to improve the queues.

The addition of Project traffic adds less than one (1) vehicle to the westbound left-turn queue at the intersection of Castlegate Lane/Placentia Avenue at Imperial Highway (Intersection No. 19), which is considered nominal. Therefore, Project-related improvements at the intersection are not required to improve the queues.

The implementation of recommended improvements at the intersection of Rose Drive at Imperial Highway (Intersection No. 22) will help improve queues for the southbound left-turn and westbound right-turn. After implementation of the recommended improvements, the southbound left-turn and westbound right-turn queues operate better than pre-Project conditions.

- ***Site Access Assessment*** **–** One (1) of the four (4) Project driveways require recommended improvements. After implementation of the recommended mitigation measures, all four (4) Project driveways are forecast to operate at acceptable service levels. Motorists entering and exiting the Project site will be able to do so comfortably, safely, and without undue congestion. The following intersection improvements are recommended to help achieve acceptable service levels:

  - **Rose Drive at Vesuvius Drive/Driveway D:** Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Widen to provide a second southbound departure lane. Modify the existing traffic signal.

- ***Project Driveway B and C Gate Queueing Analysis*** **–** A storage reservoir length of 40 feet between the front of the gate to the Project's right-of-way/property line is required to satisfy both the AM and PM peak hour traffic at both of the project entrances.

  Project Driveway B will require a storage length of 36 feet between the front of the gate to crosswalk in order for the outbound vehicles to not queue past the gate. Project Driveway C will require a minimum storage length of 59 feet between the front of the gate to the crosswalk in order for the outbound vehicles to not queue past the gate.

- ***Project Driveway B Phased Analysis*** **–** Zone 2 could be constructed without requiring the installation of a traffic signal at Driveway B under Year 2035 traffic conditions and still operate with acceptable service levels. However, upon completion of Zones 2 and 3 a signal would be required. If desired by Caltrans and the City of Brea the installation of the traffic signal at Driveway B could be deferred to Year 2045 if Zone 3 has yet to be constructed/occupied.

- ***Planned Improvements*** **–** The following improvements listed below are part of the SR-57 Lambert Interchange improvement project, now under construction, that have been included in the Year 2035 and Year 2045 background traffic conditions:

  - **No. 2 – SR-57 SB Ramps at Lambert Road:** Widen the off-ramp to provide a second exclusive southbound left-turn lane. Restripe the shared southbound left-turn/through/right-turn lane to a second exclusive right-turn lane. Widen to provide a second exclusive eastbound right-turn lane. Modify the existing traffic signal.

- **No. 3 – SR-57 NB Ramps at Lambert Road:** Construct a loop on-ramp on the south leg. Remove dual eastbound exclusive left-turn lanes. Widen and restripe to provide a shared eastbound through/right-turn lane and an exclusive eastbound right-turn lane. Reconstruct the existing on-ramp for a free westbound right-turn lane. Modify the existing traffic signal.

- ***Year 2035 Cumulative Plus Project Recommended Improvements (ICU)*** – Five (5) of the twenty-two (22) study intersections require Project-related improvements under Year 2035 Plus Project traffic conditions based on ICU analysis. As such, the following intersection improvements are recommended. Per City requirements, the Project may be expected to pay a fair-share/local fee to cover the Project's fair share of the full construction costs needed to implement these improvements.

  - **No. 8 – Valencia Avenue at Lambert Road/Carbon Canyon Road:** Restripe the first northbound through lane to provide a shared left/through lane. Widen and/or restripe the eastbound approach to provide an exclusive eastbound right-turn lane. Remove the existing pedestrian crosswalk on the west leg of the intersection. Modify the existing traffic signal and provide split phasing in the northbound and southbound directions and an eastbound right-turn overlap phase. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

  - **No. 14 – Valencia Avenue at Birch Street/Rose Drive:** Widen and/or restripe the southbound approach to provide a second exclusive southbound left-turn lane. Modify the existing traffic signal and provide westbound right-turn overlap phasing. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

  - **No. 15 – Rose Drive at Vesuvius Drive/Driveway D:** *Same as those previously identified.* Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Widen to provide a second southbound departure lane. Modify the existing traffic signal.

  - **No. 18 – Associated Road at Imperial Highway:** Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Modify the existing traffic signal. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

  - **No. 22 – Rose Drive at Imperial Highway:** Restripe the second southbound through lane as a shared southbound left/through lane. Modify the existing traffic signal and provide northbound and southbound split phasing and westbound right-turn overlap phasing. Remove crosswalk on the east leg. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- ***Year 2035 Cumulative Plus Project Recommended Improvements (HCM)*** – Three (3) of the twenty-two (22) study intersections require Project-related improvements under Year 2035 Plus Project traffic conditions based on HCM analysis. As such, the following intersection improvements are recommended. Per City requirements, the Project may be expected to pay a fair-share/local fee to cover the Project's fair share of the full construction costs needed to implement these improvements.

  - **No. 8 – Valencia Avenue at Lambert Road/Carbon Canyon Road:** *Same as those previously identified.* Restripe the first northbound through lane to provide a shared left/through lane. Widen and/or restripe the eastbound approach to provide an exclusive eastbound right-turn lane. Remove the existing pedestrian crosswalk on the west leg of the intersection. Modify the existing traffic signal and provide split phasing in the northbound and southbound directions and an eastbound right-turn overlap phase. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

  - **No. 14 – Valencia Avenue at Birch Street/Rose Drive:** *Same as those previously identified.* Widen and/or restripe the southbound approach to provide a second exclusive southbound left-turn lane. Modify the existing traffic signal and provide westbound right-turn overlap phasing. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

  - **No. 22 – Rose Drive at Imperial Highway:** *Same as those previously identified.* Restripe the second southbound through lane as a shared southbound left/through lane. Modify the existing traffic signal and provide northbound and southbound split phasing and westbound right-turn overlap phasing. Remove crosswalk on the east leg. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- ***Year 2045 Plus Project Recommended Improvements (ICU)*** **–** Four (4) of the twenty-two (22) study intersections require Project-related improvements under Year 2045 Plus Project traffic conditions based on ICU analysis. As such, the following intersection improvements are recommended. Per City requirements, the Project may be expected to pay a fair-share/local fee to cover the Project's fair share of the full construction costs needed to implement these improvements. It should be noted that although the intersection of Associated Road at Imperial Highway (Intersection No. 18) does not require Project-related improvements, improvements at the intersection have been included to provide consistency with Year 2035 improvements.

  - **No. 8 – Valencia Avenue at Lambert Road/Carbon Canyon Road:** *Same as those previously identified.* Restripe the first northbound through lane to provide a shared left/through lane. Widen and/or restripe the eastbound approach to provide an exclusive eastbound right-turn lane. Remove the existing pedestrian crosswalk on the west leg of the intersection. Modify the existing traffic signal and provide split phasing in the northbound and southbound directions and an eastbound right-turn overlap phase. This improvement will

require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 14 – Valencia Avenue at Birch Street/Rose Drive:** *Same as those previously identified.* Widen and/or restripe the southbound approach to provide a second exclusive southbound left-turn lane. Modify the existing traffic signal and provide westbound right-turn overlap phasing. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 15 – Rose Drive at Vesuvius Drive/Driveway D:** *Same as those previously identified.* Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Widen to provide a second southbound departure lane. Modify the existing traffic signal.

- **No. 18 – Associated Road at Imperial Highway:** *Same as those previously identified.* Restripe the southbound exclusive right-turn as a shared southbound through/right-turn lane. Modify the existing traffic signal. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 22 – Rose Drive at Imperial Highway:** *Same as those previously identified.* Restripe the second southbound through lane as a shared southbound left/through lane. Modify the existing traffic signal and provide northbound and southbound split phasing and westbound right-turn overlap phasing. Remove crosswalk on the east leg. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- ***Year 2045 Plus Project Recommended Improvements (HCM)*** – Three (3) of the twenty-two (22) study intersections require Project-related improvements under Year 2045 Plus Project traffic conditions based on HCM analysis. As such, the following intersection improvements are recommended. Per City requirements, the Project may be expected to pay a fair-share/local fee to cover the Project's fair share of the full construction costs needed to implement these improvements.

  - **No. 8 – Valencia Avenue at Lambert Road/Carbon Canyon Road:** *Same as those previously identified.* Restripe the first northbound through lane to provide a shared left/through lane. Widen and/or restripe the eastbound approach to provide an exclusive eastbound right-turn lane. Remove the existing pedestrian crosswalk on the west leg of the intersection. Modify the existing traffic signal and provide split phasing in the northbound and southbound directions and an eastbound right-turn overlap phase. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

  - **No. 14 – Valencia Avenue at Birch Street/Rose Drive:** *Same as those previously identified.* Widen and/or restripe the southbound approach to provide a second exclusive southbound left-turn lane. Modify the existing traffic signal and provide westbound right-turn overlap

phasing. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- **No. 22 – Rose Drive at Imperial Highway:** *Same as those previously identified.* Restripe the second southbound through lane as a shared southbound left/through lane. Modify the existing traffic signal and provide northbound and southbound split phasing and westbound right-turn overlap phasing. Remove crosswalk on the east leg. This improvement will require design concurrence from Caltrans and construction will occur under standard Caltrans permitting process.

- ***Project-Related Fair Share Contribution*** – The implementation of recommended improvements ensures acceptable operating conditions are achieved/maintained. The Project can be expected to pay a proportional "fair-share" of the recommended improvements, which is identified below.

Key Intersection	City/ Jurisdiction	Project Fair-Share Contribution
8. Valencia Avenue at Lambert Road/Carbon Canyon Road	Brea/Caltrans	12.27%
15. Valencia Avenue at Birch Street/Rose Drive	Brea/Caltrans	34.96%
16. Rose Drive at Vesuvius Drive	Brea	26.46%
20. Associated Road at Imperial Highway	Brea/Caltrans	5.46%
26. Rose Drive at Imperial Highway	Placentia/Caltrans	15.60%

- ***Traffic Impact Fees*** –Subject to confirmation by City staff, the proposed Project's Traffic Impact Fee (i.e. 450 low density residential units, 650 medium density residential units, and 6 soccer fields totaling 428 daily trips) total **$1,870,842.00**. The precise fee will be determined upon issuance of Project building permits by the City of Brea Community Development Department.

- ***Redbay Avenue at Birch Street Focused Assessment*** – The intersection of Redbay Avenue at Birch Street does not satisfy the criteria for the installation of a traffic signal. Furthermore, five-years of crash data was researched at the intersection; there have been three (3) crashes at the study intersection within the last five years, none of which are correctable with the installation of a traffic signal.

- ***Voyager Avenue at Birch Street and N. Associated Road at Birch Street Focused Assessment*** – The proposed Project will have little effect on the congestion and queueing along Birch Street as it relates to Country Hills Elementary School and Olinda Elementary School.