Santa Ana Transit Zoning Code (SD 84A & SD 84B) Traffic Study

April 2010

Prepared for:

PBS&J
625 the City Drive South
Suite 200
Orange, CA 92868

Prepared by:

KOA CORPORATION
PLANNING & ENGINEERING
1120 W La Veta Ave Suite 660
Orange, CA 92868
714/573-0317 Phone
714/573-9584 Fax

Project No: JA93181

KOA CORPORATION
PLANNING & ENGINEERING

1120 West La Veta Avenue, Suite 660
Orange, CA 92868
t: 714.573.0317 f: 714.573.9534
www.koacorporation.com

April 15, 2010

Mr. William Hoose
PBS&J
625 the City Drive South, Suite 200
Orange, CA 92868

Subject: (Revised) Santa Ana Transit Zoning Code (SD 84A and SD 84B) Traffic Study in City of Santa Ana

Dear Mr. Hoose:

KOA Corporation is pleased to present this (revised) traffic impact study report for the proposed Santa Ana Transit Zoning Code (SD 84A and SD 84B) project in the City of Santa Ana. The revision is based on changes to the land use projections received from the City in December, 2009. The project site consists of 440 acres of land uses and is generally bounded by Flower Street on the west, Civic Center Boulevard on the north, the Santa Ana Freeway to the northeast, Grand Avenue on the east and First Street to the south. The Transit Zoning Code (SD 84A and SD 84B) proposes a variety of land use policies and circulation improvements and allows considerable density in some of the Planning Areas with mixed-use characteristics for most of the areas.

The traffic study has been prepared in accordance with the *Santa Ana General Guidelines for Traffic Impact Studies* and *California Department of Transportation (Caltrans) Traffic Study Guidelines* to analyze the traffic effects upon the surrounding street system based upon land use and circulation changes identified in the Transit Zoning Code (SD 84A and SD 84B).

Please contact our office if you have any questions or comments about the report, or if you need additional information to complete your submittal. It has been a pleasure to prepare this study for PBS&J and the City of Santa Ana.

Sincerely,

Min Zhou, P.E.
Vice President

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1. INTRODUCTION

The proposed Transit Zoning Code (SD 84A and SD 84B) project is located within the City of Santa Ana, Orange County, California (Figure 1-1). The project site consists of 440 acres and is generally bounded by Flower Street on the west, Civic Center Drive on the north, the Santa Ana Freeway to the northeast, Grand Avenue on the east and First Street to the south.

The project site is currently urban and developed with a wide range of civic, commercial, industrial and residential land uses. Surrounding land uses vary, and include civic, commercial, industrial and residential uses. Proposed changes for the existing neighborhoods or districts located in the central area of the City include:

Civic Center

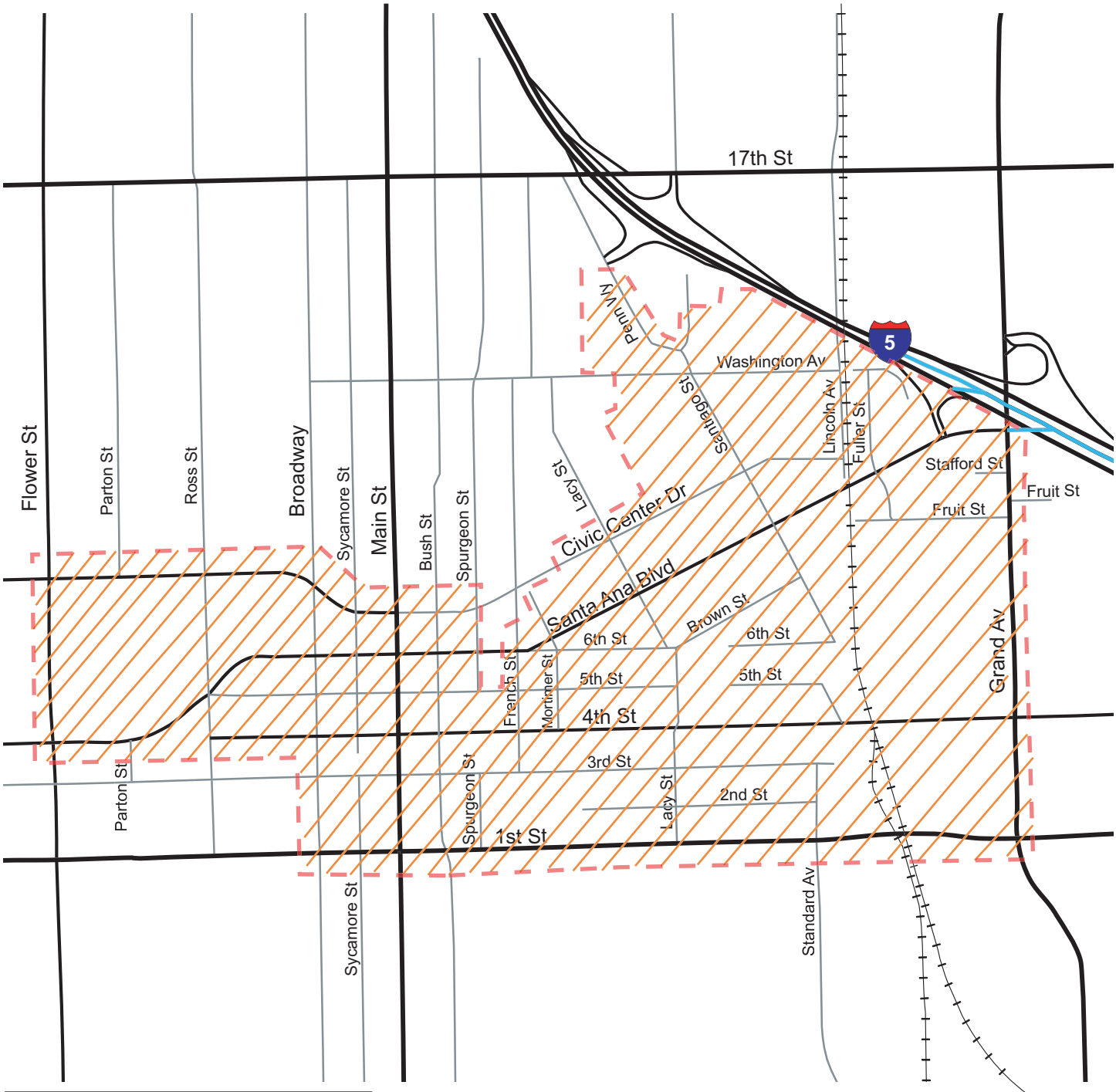
This district is the westernmost area in the plan and is characterized by "super" blocks that aggregated the historic street grid and have been developed over the past 50 years with primarily large federal, state and local government buildings. The proposed plan seeks to modify the street grid through potential reconfigurations and realignments of certain streets that result in a more balanced pedestrian environment and additional open space. Vacant land is limited in terms of actual lots. However, new building sites are created by treating the open spaces between the existing buildings as a series of quads to receive additional buildings that form the quads. New buildings proposed in this area are no more intense than those already present.

Downtown

The district connects the Civic Center to the Lacy and French Park neighborhoods to the east and consists of approximately 30 individual blocks. With the exception of a few super blocks and operational modifications such as one-way streets and the lack of on street parking, the historic street grid is largely intact. The proposed plan seeks to repair the street grid through limited re-establishment of street rights-of-way and the reestablishment of two-way streets and on-street parking throughout the district to appropriately recognize the commercial circulation and pedestrian nature of the district. Vacant land in the area is limited with redevelopment or rehabilitation of sites and/or existing buildings the primary opportunity for new activity. New buildings in this area are up to 10 stories, consisting of mixed-use with housing and/or office above retail.

Lacy Neighborhood

The neighborhood connects with downtown to the west and an industrial area to the east and is characterized by a variety of historic and relatively intense, post World War II multifamily development up to 4 stories. Two super blocks exist and disrupt the physical connections between the neighborhood and nearby areas. The proposed plan seeks to repair the street grid through limited re-establishment of street rights-of-way to improve access and the pedestrian environment along with new open space.



LEGEND

- Study Boundary
- Future Roadway
- Study Area

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City of Santa Ana

Figure 1-1

Santa Ana Transit Zoning Code Traffic Study

Study Location Map

Vacant land in the area is limited with redevelopment or rehabilitation of sites and/or existing buildings the primary opportunity for new activity. New buildings in this area are up to 3 stories, primarily residential with some mixed use and corridor development along First Street.

Logan Neighborhood

The neighborhood represents the northernmost area in the plan and is characterized by a variety of large and small industrial businesses interspersed with equally established residential uses and neighborhood-serving commercial. The proposed plan seeks to address community-wide traffic that uses the neighborhood as an alternate route to major streets through certain realignments of intersections to maintain access while discouraging longer distance commuting patterns from the neighborhood. In addition, the proposed plan seeks to improve the compatibility between the residential and industrial uses by enabling industrial activity that is in physical scale to the small scale residential in the area. Larger industrial activities are proposed for peripheral areas in the plan. New buildings in this area are up to 2 stories.

Industrial Area west of the Rail Line

The area is the east end of the lands west of the rail line between First Street and the Rail Station to the north. The area is characterized by industrial sheds, outdoor storage and activity with some recent, tilt-up single-story industrial buildings. The block structure is relatively intact with some super blocks. The proposed plan seeks to redevelop the area into an intense, residentially-oriented neighborhood strategically positioned near the rail station, with of a variety of multi-family building types ranging from 2 to 4.5 stories.

Rail Station

The district represents the eastern most area in the plan reaching Grand Avenue in one area and generally east of Santiago Street to approximately 4 blocks east of the rail line between First Street and Interstate 5. The area is characterized by vacant land, industrial sheds and outdoor storage/activity. The proposed plan seeks to address the opportunity that the Santa Ana Regional Transportation presents for these adjacent lands. The area west of the rail line currently used for at-grade parking is subdivided into new blocks that enable intensification of the station site with mixed use buildings up to 5 stories. The area east of the rail line (north and south of Santa Ana Boulevard) is redeveloped as well into a series of new blocks and open space that enable the most intense development in the plan area. Buildings are primarily residential ranging from 2-4 stories with mixed use towers up to 20 stories.

Traffic Impact Study Scope

This report presents a review of existing traffic conditions in the study area, including existing roadway segment conditions, and existing levels of service at 50 intersections. Freeway ramps have also been evaluated per Caltrans' requirements. Future intersection conditions including both 2030 project opening year conditions and 2035 General Plan conditions are also analyzed. The study also identifies the improvements necessary to attain or maintain the desired service levels throughout the future

conditions. Special issues such as neighborhood impacts and parking have been addressed during the study.

The study is conducted in accordance with *Santa Ana General Guidelines for Traffic Impact Studies* and *California Department of Transportation (Caltrans) Traffic Study Guidelines.*

2. PROJECT STUDY METHODOLOGY

This chapter documents the methodologies and assumptions used to conduct the analysis for the proposed project. This section contains the following background information:

- Study timeframes
- Study area description
- Analysis methodologies
- Future traffic volume forecast methodologies

2.1 Study Timeframes

This report presents an analysis of the intersection operating conditions during the morning and evening peak hours for the following anticipated timeframes:

- Existing Conditions (Year 2009)

Future conditions will analyze the following timeframes:

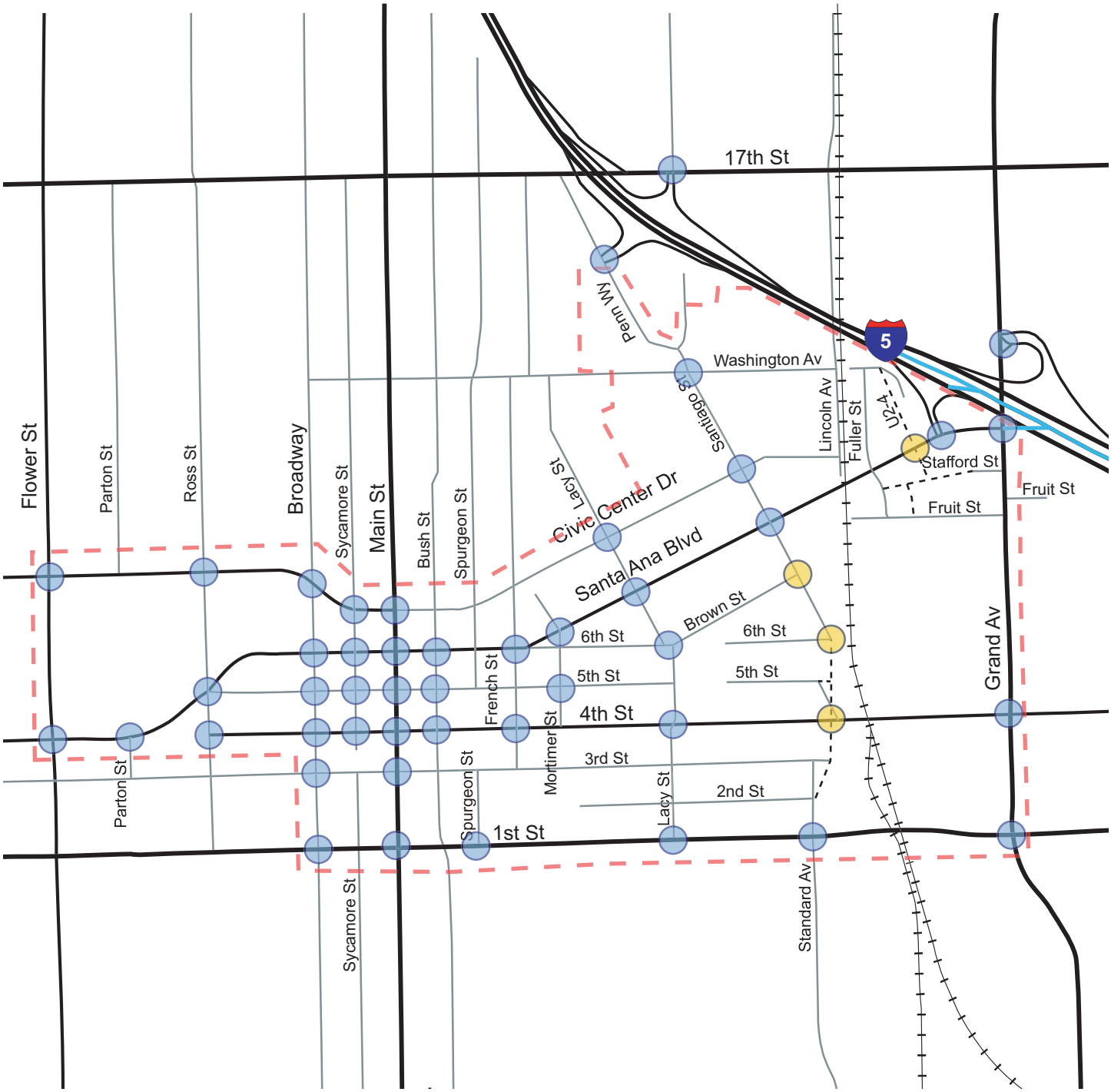
- Anticipated Project Buildout Year (2030) Without Project
- General Plan (2035) Without Project
- Anticipated Project Buildout Year (2030) With Project
- General Plan (2035) With Project

Since the Transit Zoning Code (SD 84A and SD 84B) includes a large group of small development sites, the phasing and timing of individual development components are not know, no phasing analysis is appropriate. Future traffic study for a specific development may be needed after the development is finalized.

2.2 Project Study Area

The study area was determined through initial consultation with the City of Santa Ana and the initial review of the Orange County Transportation Analysis Model (OCTAM) select link analysis. The study area consists of the following 50 intersections: All intersections are illustrated on Figure 2-1.

- Flower Street at Civic Center Drive
- Flower Street at Santa Ana Blvd.
- Parton Street at Santa Ana Blvd.
- Ross Street at Civic Center Drive
- Ross Street at Santa Ana Blvd.
- Ross Street at 4th Street
- Broadway at Civic Center Drive
- Broadway at Santa Ana Blvd.
- Broadway at 5th Street
- Broadway at 4th Street
- Broadway at 3rd Street
- Broadway at 1st Street
- Sycamore Street at Civic Center Drive
- Sycamore Street at Santa Ana Blvd.
- Sycamore Street at 5th Street
- Sycamore Street at 4th Street
- Main Street at Civic Center Drive
- Main Street at Santa Ana Blvd.
- Main Street at 5th Street
- Main Street at 4th Street



LEGEND

- Existing Study Intersection
- Future Study Intersection
- Future Roadway
- Study Boundary
- Future Roadway

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City of Santa Ana — Figure 2-1

Santa Ana Transit Zoning Code Traffic Study — Study Intersections

- Main Street at 3rd Street
- Main Street at 1st Street
- Bush Street at Santa Ana Blvd.
- Bush Street at 5th Street
- Bush Street at 4th Street
- Spurgeon Street at 1st Street
- French Street at Santa Ana Blvd.
- French Street at 4th Street
- Lacy Street at Civic Center Drive
- Lacy Street at Santa Ana Blvd.
- Lacy Street at 6th Street
- Lacy Street at 4th Street
- Lacy Street at 1st Street
- Santiago Street at Washington Avenue
- Santiago Street at Civic Center Drive
- Santiago Street at Santa Ana Blvd.
- Santiago Street at Brown Street (Future Intersection)
- Santiago Street at 6th Street (Future Intersection)
- Santiago Street at 4th Street (Future Intersection)
- Standard Street at 1st Street
- U2-4 at Santa St Blvd. (Future Intersection)
- Grand Avenue at Santa Ana Blvd.
- Grand Avenue at 4th Street
- Grand Avenue at 1st Street
- Penn Way (Santiago Street) at I-5 SB Ramps
- I-5 SB Ramps at Santa Ana Blvd.
- I-5 NB Ramps at 17th Street
- Grand Avenue at I-5 NB Ramps
- Mortimer Street at Santa Ana Blvd
- Mortimer Street at 5th Street

2.3 Analysis Methodologies

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are consistent with *City of Santa Ana General Guidelines* and *Caltrans' Guidelines for Traffic Impact Studies*.

Street system operating conditions are typically described in terms of "level of service." Level of service (LOS) is a report-card scale used to indicate the quality of traffic flow on roadway segments and at intersections. Level of service ranges from Level A (free flow, little congestion) to Level F (forced flow, extreme congestion). Intersection capacity analysis, roadway segment ADT analysis, and freeway ramp analysis methodologies are presented separated as below.

2.4 Intersection Capacity Analysis

Consistent with Orange County Congestion Management Program (2005 Orange County Congestion Management Program) requirements, the technique used to assess the operation of signalized intersections in Orange County is known as the intersection capacity utilization (ICU) method. To calculate the ICU value for an intersection, the volume of traffic using the intersection is compared with the capacity of the intersection.

The ICU value is usually expressed as a decimal percent (e.g., 0.861). The decimal percent represents that portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity.

A number of assumptions are required regarding specific input values to the ICU methodology for City of Santa Ana. The specific assumptions include the use of a saturation flow value of 1,700 vehicles per lane per hour (vphpl) for through lanes, 1,600 vphpl for turn lanes. A lost time factor of 5 percent is applied to the ICU calculations. Finally, no credit for "de facto" right turn lanes is allowed in the City of Santa Ana.

In addition to the above discussed ICU analysis method, the *2000 Highway Capacity Manual* (HCM) analysis procedures have been used to analyze the intersections which are related to Caltrans facilities (ramp intersections), based on Caltrans requirements. The following intersections have been analyzed by the HCM method:

- Penn Way (Santiago St.) at I-5 SB Ramps
- I-5 SB Ramps at Santa Ana Blvd.
- I-5 NB Ramps at 17th Street
- Grand Avenue at I-5 NB Ramps

The LOS for unsignalized intersections will be based upon the HCM methodology. The 2000 Highway Capacity Manual includes a detailed discussion of the procedures used to calculate the level of service based on delay per vehicle for all-way stop controlled intersections and minor road stop controlled intersections.

Table 2-1 includes the LOS definition for all intersection analysis.

Table 2-1 Levels of Service for Intersections

Level of Service	Signalized Intersection Volume/Capacity Ratio (ICU)	Signalized Intersection Total Delay (seconds) (HCM)	Unsignalized Intersection Control Delay (seconds) (HCM)
A	0.00 – 0.60	0 – 10	0 – 10
B	0.61 – 0.70	10 – 20	10 – 15
C	0.71 – 0.80	20 – 35	15 – 25
D	0.81 – 0.90	35 – 55	25 – 35
E	0.91 – 1.00	55 – 80	35 – 50
F	1.00 and up	80 or more	50 or more

2.5 Daily Roadway Segment Analysis

Road segment analysis is determined based on the methodology presented in the Orange County MPAH and the City of Santa Ana Circulation Element. V/C ratios are not used in segment analysis. Table 2-2 indicates the LOS ranges based on the capacity assumptions.

Table 2-2 Levels of Service for Arterial Street Segments Based upon Daily Traffic Volumes

Roadway Classification	Lanes/ Configuration	Level of Service A	Level of Service B	Level of Service C	Level of Service D	Level of Service E	Level of Service F
Principal Arterial	8 Lanes Divided	45,000	52,500	60,000	67,500	75,000	> 75,000
Major Arterial	6 Lanes Divided	33,900	39,400	45,000	50,600	56,300	> 56,300
Primary Arterial	4 Lanes Divided	22,500	26,300	30,000	33,800	37,500	> 37,500
Secondary Arterial	4 lanes Undivided	15,000	17,500	20,000	22,500	25,000	> 25,000
Commuter Street	2 Lanes Undivided	7,500	8,800	10,000	11,300	12,500	> 12,500

The daily capacity of a roadway correlates to a number of widely varying factors, including traffic peaking characteristics, traffic turning volumes, and the volume of traffic on crossing streets. The daily capacities are therefore most appropriately used as a screening tool to determine the need for more detailed peak hour analysis and to assist in determining the appropriate mitigation measures (i.e., whether additional through lanes may be a necessary or desirable mitigation).

2.6 Freeway Ramp Analysis

Peak hour freeway ramp traffic operations analysis is conducted by calculating a peak hour volume to capacity (V/C) ratio. Table 2-3 summarizes the peak hour ramp capacity assumptions. The freeway ramp performance criteria have been derived from the Caltrans Highway Design Manual (July, 1995) and the Caltrans Ramp Meter Design Manual (January, 2000). These criteria have been used previously in studies by other local jurisdictions. The Caltrans publication Guide for the Preparation of Traffic Impact Studies (State of California Department of Transportation, January, 2001) cites both of these resources as appropriate analysis methodology sources for ramp and ramp junction analysis. Potential impacts identified in this planning level analysis may yield different results from more detailed analysis procedures, such as those contained in the 2000 HCM.

Table 2-3 Levels of Service for Freeway Ramps

	Roadway Type	Peak Hour Capacity at Los "E" (Vehicles per Hour)
1	One-lane Metered On-Ramp, 1 Mixed Flow Lane at Meter	900
2	One-lane Metered On-Ramp, 1 Mixed Flow + 1 HOV Lane at Meter	1,080
3	One-lane Metered On-Ramp, 2 Mixed Flow Lanes at Meter	1,500
4	Two-lane Metered On-Ramp, 2 Mixed Flow Lanes at Meter	1,800
5	One-lane Unmetered Ramp	1,500
6	Two-lane Unmetered On-Ramp, tapers to one merge lane at or beyond gore point	2,250
7	Two-lane Unmetered Off-Ramp, with only one auxiliary lane	2,250
8	Two-lane Unmetered On-Ramp, does not taper to one merge lane	3,000
9	Two-lane Unmetered Off-Ramp, with two auxiliary lanes	3,000

2.7 Standards of Significance

For intersections located outside of Major Development Areas (MDA), the Circulation and Land use Elements of the City of Santa Ana General Plan set Level of Service D as the threshold for an acceptable service level. The City of Santa Ana considers Level of Service E as the maximum acceptable service level for intersections located within an MDA. These criteria are consistent with Measure M target levels, and are either more stringent than, or meet Congestion Management Plan (CMP) criteria which designates LOS E as the minimum acceptable level of service. Figure 2-2 identifies the intersections within the MDA area.

For the purposes of traffic study preparation, a project is considered to have a significant traffic impact at an intersection if traffic level of service deteriorates to an unacceptable level of service (i.e., Level of Service E or F at intersections outside of an MDA, Level of Service F within an MDA with the addition of project traffic. For study intersections located outside of an MDA, if the intersection is expected to operate at an unacceptable level of service (Level of Service E or F) under base conditions (conditions without the project), measures to achieve acceptable levels of service at the intersections should be recommended. For study intersections located within an MDA, if the intersection is expected to operate at unacceptable Levels of Service (intersection Level of Service F at Santa Ana intersections within an MDA) under base conditions (conditions without the project), improvement and recommendations are requested to achieve acceptable levels of service.

In general, a traffic study will be required to provide measures to alleviate significant traffic impacts at intersections to achieve Level of Service D (at the minimum) for outside a "Major Development Area". Additionally a traffic study will be required to provide measures to alleviate the significant traffic impact at intersections located within "Major Development Areas" to achieve a Level of Service E (at the minimum). If the project contribution to the volume/capacity ratio at the intersection is greater than .01

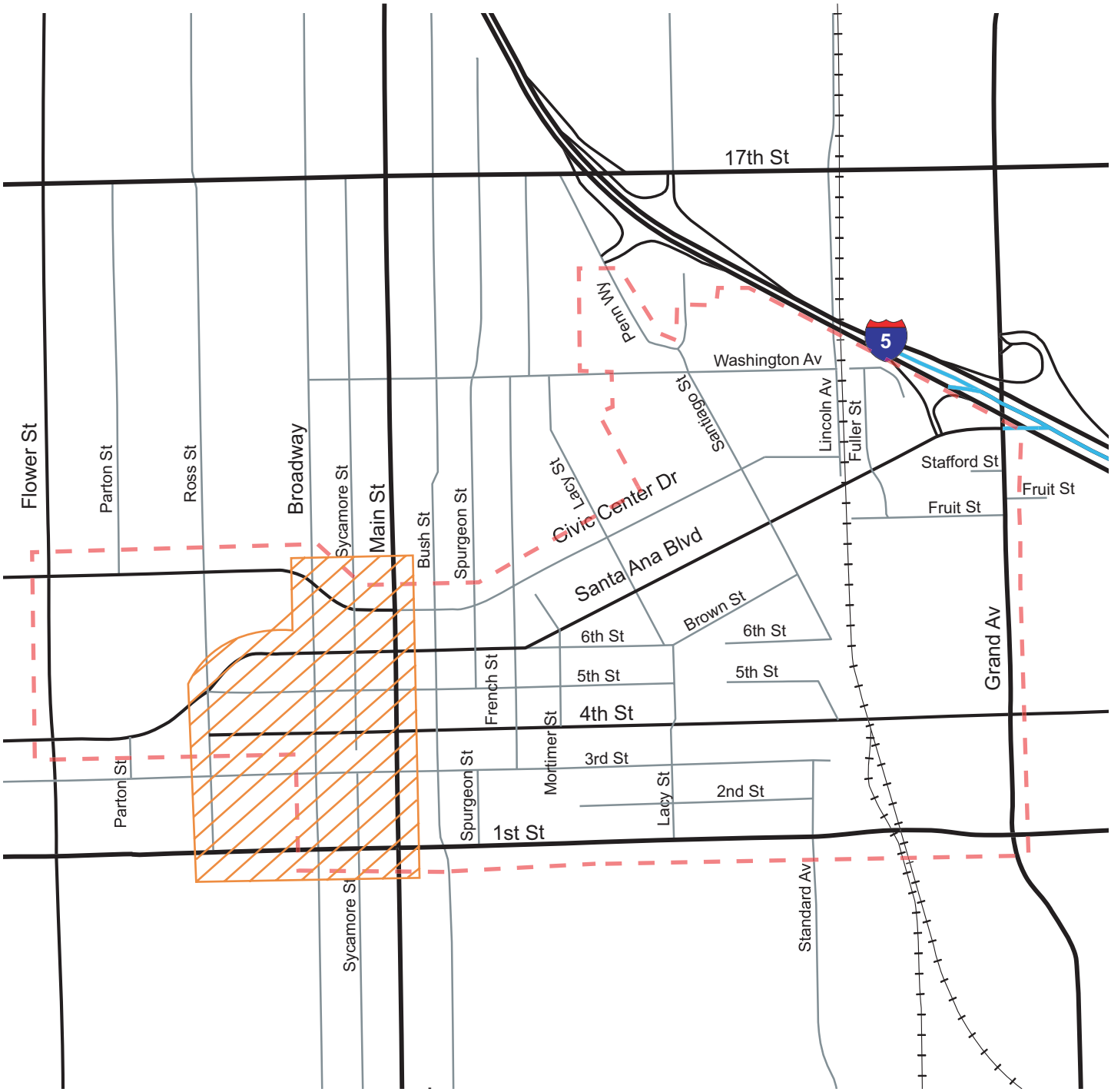
and if the location is at Level of Service E or poorer outside of an MDA or Level of Service F within an MDA, the impact is considered significant.

For those signalized intersections which may not contribute to 0.01 or greater ICU or V/C increases, the City requires a fair share contribution toward the expected cost of improvements at the subject intersection. The fair share is based upon the project's relative contribution toward the total future added traffic, which consists of traffic from the project, other cumulative project traffic, and growth of ambient background traffic.

Improvements are required for locations that operate at acceptable level of service without the project, but which operate at an unacceptable level of service with the project. For locations that are forecast to operate worse than the acceptable level even without the project, the traffic study must include improvements to achieve acceptable levels of service per the City of Santa Ana's criteria. Those mitigation measures/ improvements will be described as well as graphically illustrated as per the City of Santa Ana General Guidelines for the preparation of traffic studies.

Caltrans endeavors to maintain a target Level of Service (LOS) at the transition between LOS C and LOS D on State highway facilities. Any degradation of the level of service past this threshold should be mitigated to bring the facility back to the baseline/existing condition based on standard measures of effectiveness (MOE's), such as delay, v/c, and LOS.

For the purposes of this study, the Orange County CMP guidelines which define changes in operating conditions based on a change in volume/capacity ratio (v/c) have been applied to the freeway system to define the freeway ramp impacts when level of service falls below the minimum LOS D standard. Changes in v/c have been used as the measure of effectiveness in evaluating potential mitigation measures in these cases.



LEGEND

- Study Boundary
- Future Roadway
- LOS "E" ok

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City of Santa Ana — Figure 2-2

Santa Ana Transit Zoning Code Traffic Study — Major Development Area

2.8 Existing Traffic Count Data

Existing daily and peak hour traffic data was obtained from the City, other technical sources and recent counts conducted by KOA Corporation. Traffic data collected by KOA Corporation in Orange County in 2009 indicated that 2009 traffic levels were lower than 2007 traffic levels. For this reason 2007 counts were used for this study where available, as they are more conservative from an impact/mitigation point of view. All traffic count data used in this study is compiled in Appendix A of this report.

Traffic flow conservation was evaluated and applied to ensure the continuity of traffic flow. Minor adjustments were applied to a few intersection volumes. Per evaluation of the historical traffic count data, a 0.5% annual growth rate was applied to counts older than 2007 in order to generate the 2009 existing conditions volumes. This rate was approved by the city staff during the course of the study.

2.9 Future Traffic Volume Forecasts

Separate methodologies were applied to develop the background traffic forecasts for near-term anticipated project buildout (2030) and long range (2035) conditions.

The 2030 background traffic is composed of existing traffic, 0.5% background growth per year and the traffic that is anticipated to occur based on known development projects within the vicinity of the study area that will contribute some (or all) of their traffic to the various study area roadways and intersections. The general methodology approach described for estimating the project traffic (trip generation, trip distribution, and traffic assignment) was applied for each of the cumulative projects used in this study.

The 2030 With Project traffic is composed of 2030 background traffic plus the project only traffic which was generated based on the trip generation, trip distribution, and traffic assignment methodology. The project trip generation is based on the most recent Institute of Transportation Engineers (ITE) Trip Generation, 8th Edition. OCTAM 3.2 was used to evaluate the distribution and likely travel routes of the project traffic. A series of select link (trip distribution) analyses were performed using the OCTAM 3.2 model 2030 horizon year scenario.

The long range (2035) analysis is based on future background traffic forecasts obtained from the OCTAM 3.2 travel demand forecasting model and modified to comply with the newly released OCTAM 3.3 model. OCTAM 3.2 and 3.3 are the Orange County Transportation Authority's (OCTA's) travel demand forecasting models. They are used to evaluate circulation and transit system needs throughout the County of Orange. The OCTAM models consist of a 2,940 traffic analysis zone (TAZ) system which encompasses the five (5) county Southern California region. The primary focus of the modeling area is Orange County.

The OCTAM 3.2 model uses the latest adopted demographic forecasts, commonly referred to as Orange County Projections, adopted in 2004 (OCP-2004). The OCP-2004 demographic forecasts include data in 5 year increments through 2030 and are the official Orange County forecasts. The growth in housing, population, and employment included in the OCP-2004 demographic projections is consistent with the anticipated growth that is expected in conjunction with buildout of the City of Santa Ana General Plan land uses and circulation element.

KOA Corporation worked closely with the OCTA staff to refine the OCTAM 3.2 highway network for the Santa Ana Transit Zoning Code (SD 84A and SD 84B) project. The modified traffic model was then used to produce link volume traffic forecasts in the study area at the AM, PM, and ADT levels, both for a base year model (2000) and a future year model (2030). The AM and PM link volume forecasts from the base and future year models, along with the existing turning movement traffic counts, were used as the basis for producing 2030 future traffic volumes. Since OCTAM 3.2 represents 2030 conditions, an annual growth factor (0.5%) has been applied to the model data in order to generate the 2035 conditions.

OCTA released the OCTAM 3.3 model as this study was being finalized. KOA conducted a screenline analysis comparing OCTAM 3.3 and OCTAM 3.2. The screenline analysis surrounding the City of Santa Ana indicates that OCTAM 3.3 represents an increase of about 11% higher traffic volumes forecast for both the AM and the PM peak hour models. In this update to the draft traffic study, KOA applied an 11% growth factor to the original OCTAM 3.2 traffic volume forecast to account for this increase.

The traffic model forecasts were used to predict 2035 Without Project intersection turning movement volumes at the study intersections using a proprietary methodology which adjusts existing turning movement volumes based on expected growth in approach volumes. The refined future intersection turning movement volumes are based on the algorithm obtained from the report Highway Traffic Data for Urbanized Area Project Planning and Design (National Cooperative Highway Research Program Report 255, Transportation Research Board, 1982, pp. 105-109), commonly referred to as NCHRP-255.

The General Plan (2035) Without Project traffic volumes developed using the updated OCTAM traffic forecasts were then compared with 2030 volumes to ensure that all cumulative projects and area-wide growth are captured within the General Plan conditions.

The 2035 With Project traffic is composed of 2035 background traffic plus the project only traffic which was generated based on the trip generation, trip distribution, and traffic assignment methodology. The project trip generation is based on the most recent Institute of Transportation Engineers (ITE) Trip Generation, 8th Edition. OCTAM 3.2 was used to evaluate the distribution and likely travel routes of the project traffic. A series of select link (trip distribution) analyses were performed using the OCTAM 3.2 model 2030 horizon year scenario.

3. Existing Conditions

This section documents existing conditions in the study area, including the roadway network conditions, study intersections, roadway segments, freeway ramp conditions, and existing transit conditions. The General Plan circulation element and the planned improvements in the study area have also been discussed.

3.1 Area Roadway Network

The following discusses the specific roadways in the Santa Ana Transit Zoning Code (SD 84A and SD 84B) project vicinity that are affected by project-related traffic. The project location is bounded by 17th Street on the north, 1st Street on the south, Flower Street on the west, and Grand Avenue on the east. The area of potential impact is larger than the project location, as determined by project traffic impact analysis.

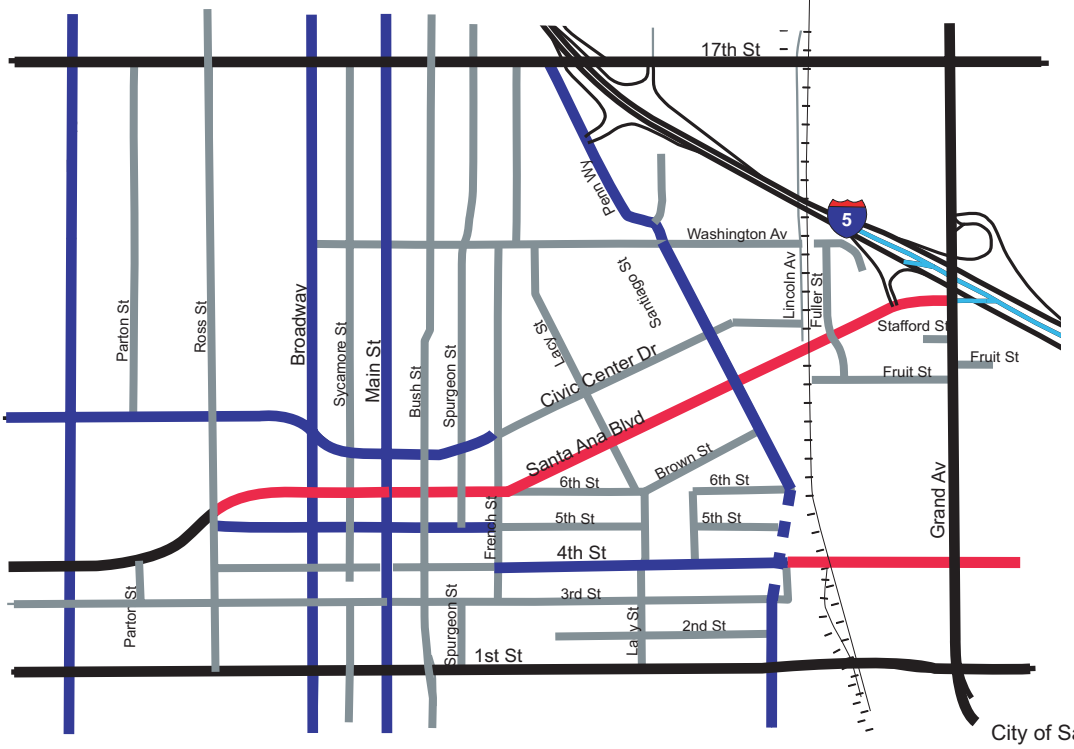
Figure 3-1 depicts the City of Santa Ana General Plan Circulation Element and county's Master Plan of Arterial Highway (MPAH) within the study area. The roadway cross-sections for the various classifications are depicted on Figure 3-2. As indicated, arterial roadways that will provide access to nearby areas and to the regional freeway system include 1st Street, 4th Street, 5th Street, Santa Ana Boulevard, Civic Center Drive, 17th Street, Flower Street, Broadway Avenue, Main Street, Santiago St., and Grand Avenue. Comparing the City's Circulation Element with the MPAH classification, discrepancy has been identified for a couple of roadways within the study area. Civic Center Drive from French to Lincoln is identified as Secondary and Santa Ana Boulevard has different designation based on the MPAH classification. The City is pursuing a cooperative agreement with OCTA to correct the discrepancies between the City Circulation element and the MPAH. A brief description of each roadway is provided as below:

1st Street

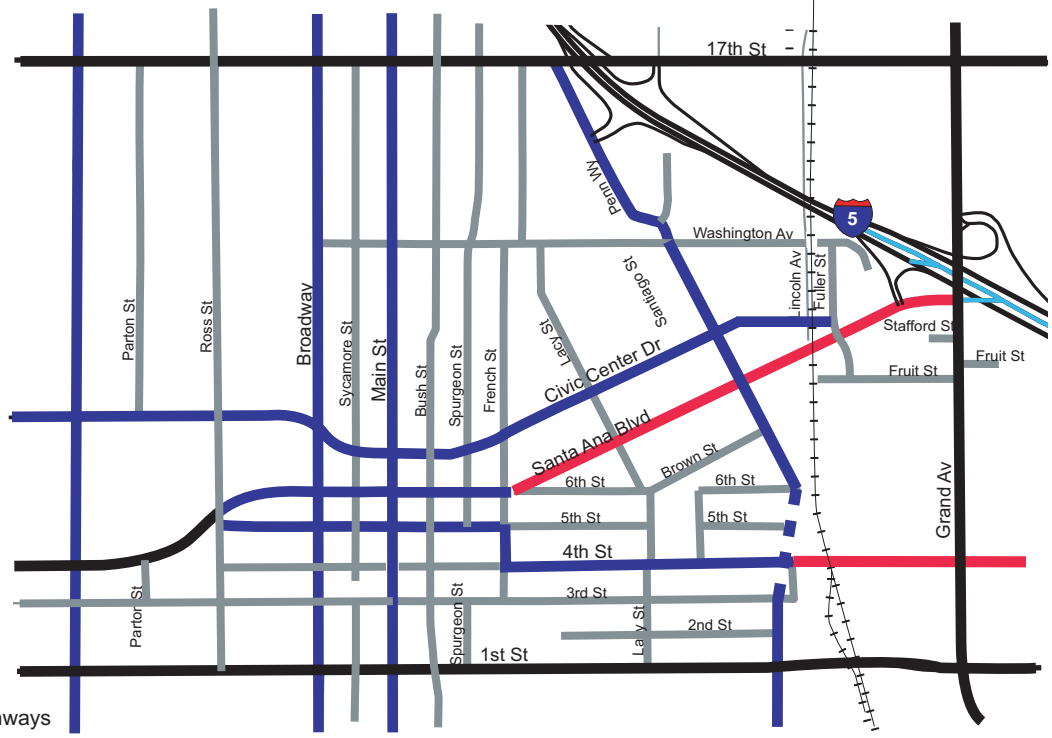
1st Street is an east-west six-lane divided road classified as a Major Arterial on the Circulation Element. 1st Street is designated as a Smart Street on the Orange County CMP Highway System. Within the study area, 1st Street has a curb-to-curb width of 84 feet with a 4- to 14-foot raised median. Parking is prohibited along 1st Street. The posted speed limit is 40 mph.

4th Street

4th Street is a two-lane undivided east-west road classified on the Circulation Element as a secondary Arterial between Main Street and Standard Avenue, and a Primary Arterial (six-lane) between Standard Avenue and I-5. In the study area, 4th Street has a 56-foot curb-to-curb width. Metered parking is allowed on both sides. The posted speed limit is 25 mph.



City of Santa Ana General Plan Circulation Element



Orange County Master Plan of Arteriral Highways

LEGEND

- Principal Arterial (none in plan area)
- Mayor Arterial
- Primary Arterial
- Secondary Arterial
- General Plan connection
- Local Street

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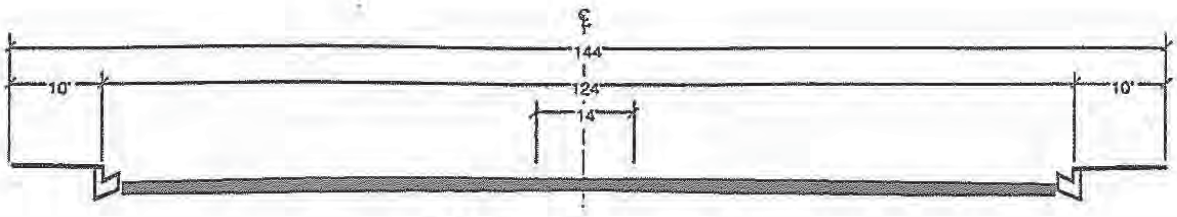
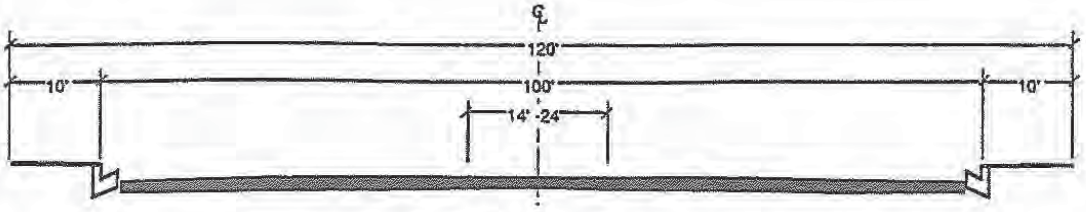
City of Santa Ana — Figure 3-1

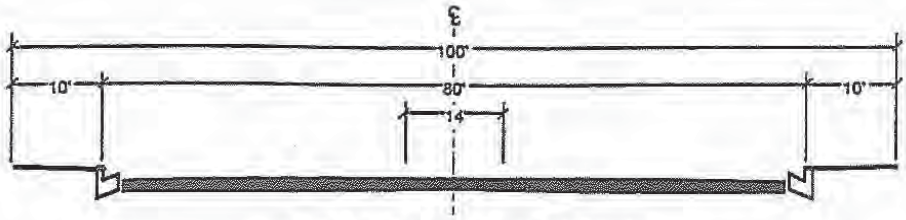
Santa Ana Transit Zoning Code Traffic Study — General Plan Roadway Classification



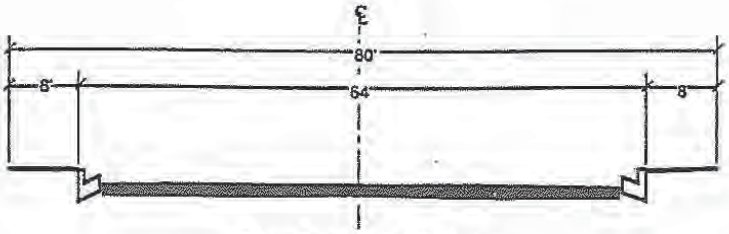
Eight-Lane Principal Arterial



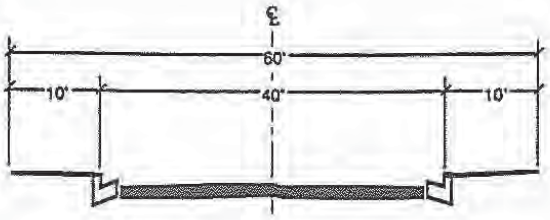
Six-Lane Major Arterial Street



Four-Lane Primary Arterial Street



Secondary Arterial Street



Commuter Street

5th Street

5th Street is a three-lane east-west road classified as a secondary Arterial on the Circulation Element between Ross Street and French Street. It is currently operated as a one-way street in the eastbound direction in tandem with the one-way westbound operation on Santa Ana Boulevard. Parking is generally prohibited, except for the segment west of Main Street where metered parking spaces are provided along the south side. The posted speed limit is 25 mph.

Santa Ana Boulevard

Santa Ana Boulevard is an east-west road classified on the Circulation Element as a Primary Arterial east of Ross Street up to I-5, and a Major Arterial west of Ross Street up to Raitt Street. The segment between Ross Street and French Street is operated as on-way westbound with three travel lanes and a pavement width of 40 feet. Beyond the one-way segment, the lane configuration varies from four lanes between Bristol Street and Flower Street, to six lanes east of Santiago Street and two lanes west of Santiago Street. Parking is generally prohibited along Santa Ana Boulevard. The posted speed limit is 30 mph.

Civic Center Drive

Civic Center Drive is a four-lane divided east-west road classified as a secondary Arterial on the Circulation Element from Fairview Street to French Street. In the study area, Civic Center Drive has a curb-to-curb width of 64 feet. Parking is prohibited along Civic Center Drive. The posted speed limit is 35 mph.

17th Street

17th Street is a six-lane divided east-west road classified as a Major Arterial on the Circulation Element. 17th Street has a curb-to-curb width of 80 to 88 feet and a 14-foot raised median. Parking is prohibited along 17th Street. The posted speed limit is 40 mph.

Flower Street

Flower Street is a four-lane divided north-south road classified as a secondary Arterial on the Circulation Element south of 17th Street. Parking is not allowed and the posted speed limit ranges from 30 to 35 mph south of 17th Street. North of 17th Street, Flower Street is a two-lane divided residential street, with parking on both sides and a 25-mph posted speed limit. Northbound through movement is prohibited at the intersection of 17th Street and Flower Street.

Broadway

Broadway is a north-south four-lane undivided road classified as a secondary Arterial on the Circulation Element between I-5 and 1st Street. In the study area, Broadway varies in width from 55 feet curb-to-curb north of 5th Street, to 60 feet between Civic Center Drive and 5th Street. Broadway Street has a 10-foot two-way center turn lane in the vicinity of the project site. Parking is prohibited along Broadway. The posted speed limit ranges from 35 mph south of 17th Street to 40 mph north of 17th Street.

Main Street

Main Street is a four-lane north-south road classified on the City of Santa Ana Circulation Element as a secondary Arterial in the vicinity of the project. In the vicinity of I-5, Main Street is designated as a Major Arterial. In the study area, the width of Main Street varies from 52 feet curb-to-curb south of Civic Center Drive, to 72 feet curb-to-curb from I-5 to Civic Center Drive. Main Street between I-5 and Civic Center has a 10-foot two-way center turn lane.

Metered parking spaces are provided on certain segments of Main Street between the I-5 southbound ramps/Buffalo Avenue and 5th Street. Main Street has a posted speed limit of 35 miles per hour (mph) north of 17th Street, and 30 miles per hour south of 17th Street.

Santiago Street

Santiago Street is a north-south 2-lane divided roadway. It is classified on the City of Santa Ana Circulation Element as a secondary Arterial and the roadway segment will be extended and connected through 1st Street.

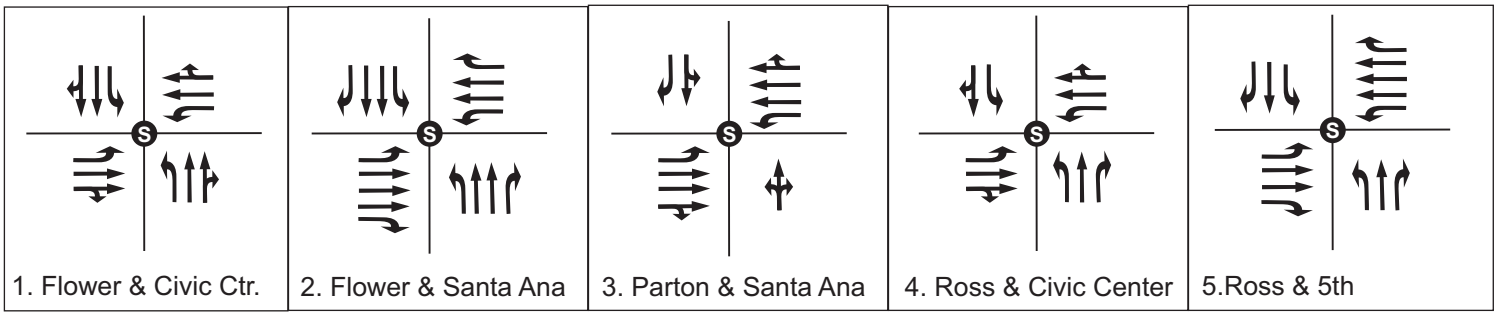
Grand Avenue

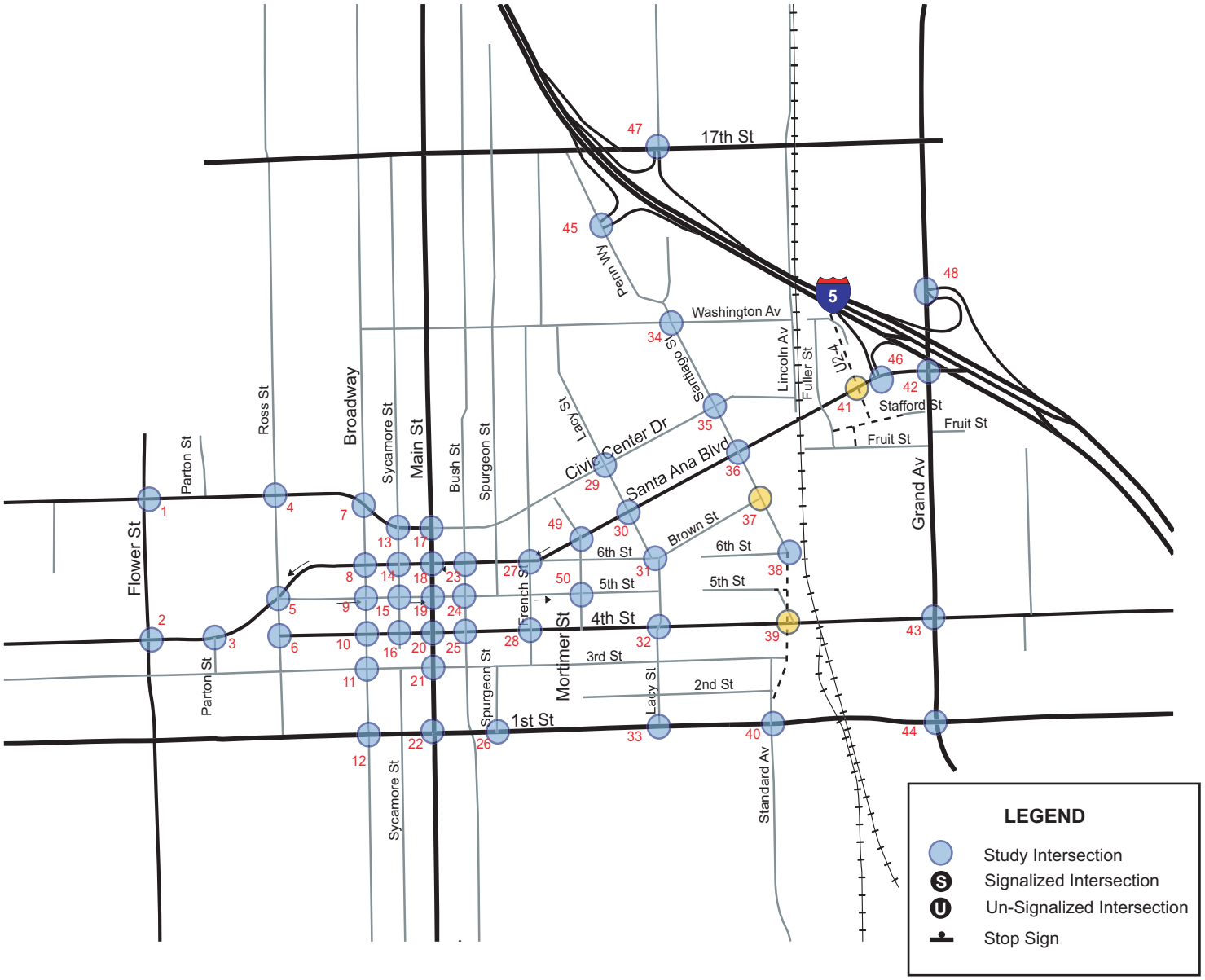
Grand Avenue is generally a four-lane divided north-south road classified as a Major Arterial on the Circulation Element. Parking is prohibited along Grand Avenue. The posted speed limit is 40 mph.

I-5 Freeway

Interstate 5 (Santa Ana Freeway) provides primary north-south regional access to this project. Interstate 5 interchanges that provide access to the site are at 17th Street and Santa Ana Boulevard. I-5 has an exclusive elevated High Occupancy Vehicle (HOV) facility for carpools and transit with access ramps at Main Street/Edgewood Road north of the site and at Grand Avenue/Santa Ana Boulevard east of the site.

Figures 3-3a through Figure 3-3d depict the existing intersection lane configurations, and intersection traffic control devices at the study area intersections being analyzed. Figure 3-4a through Figure 3-4j show the existing AM and PM peak hour intersection turning movement volumes respectively for all existing intersections.





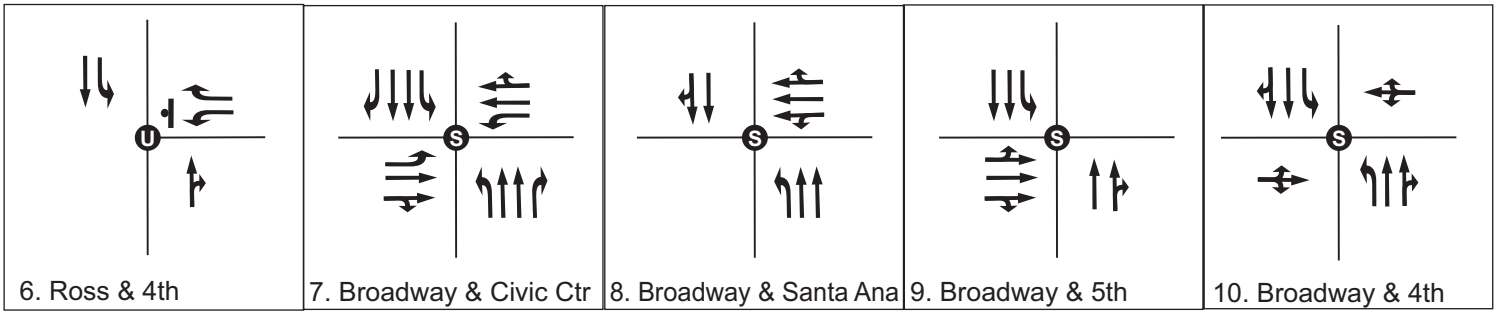


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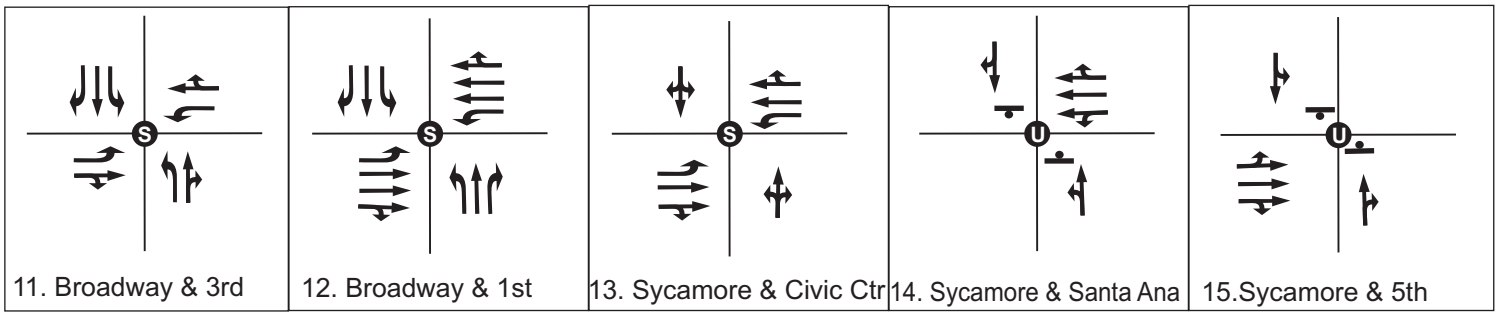
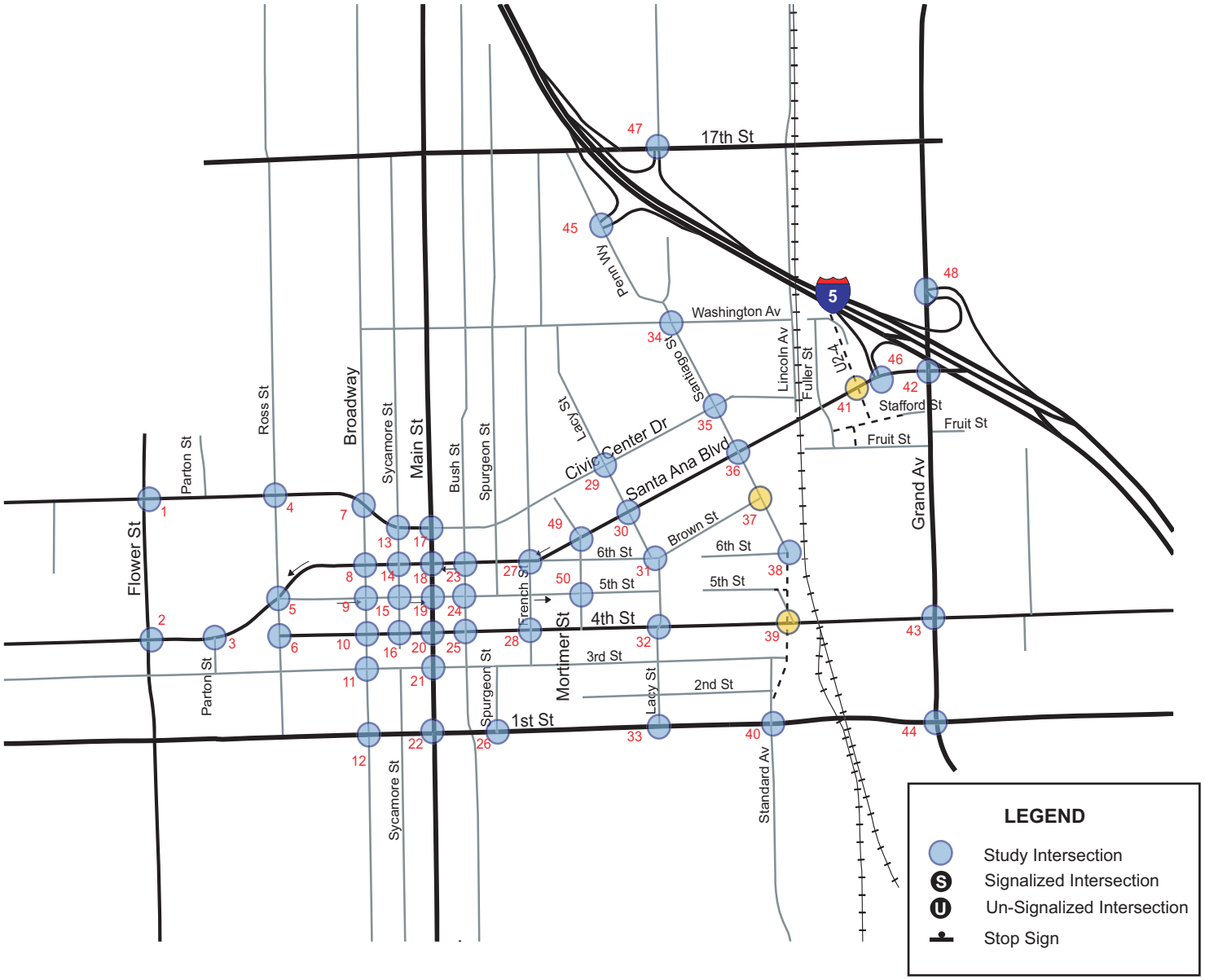
Figure 3-3a
Existing Intersection Geometry





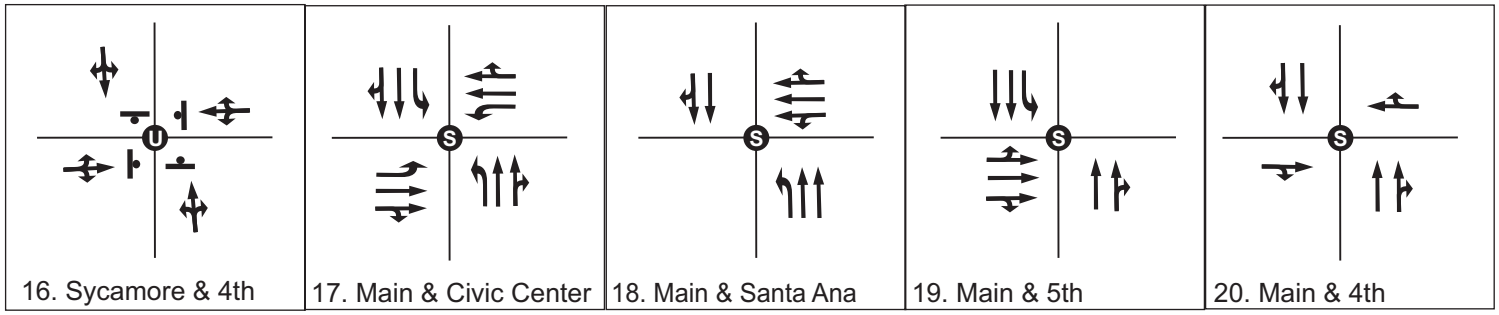


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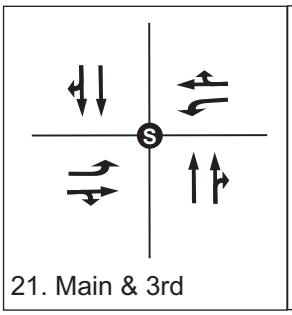
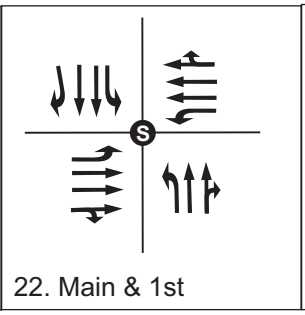
Figure 3-3b
Existing Intersection Geometry

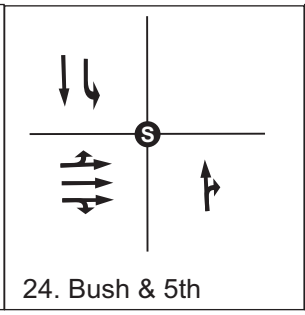


21. Main & 3rd

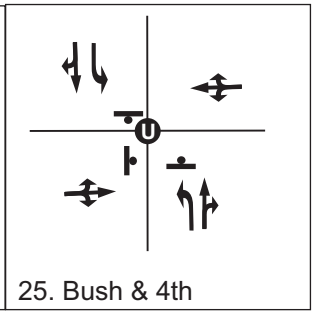


22. Main & 1st

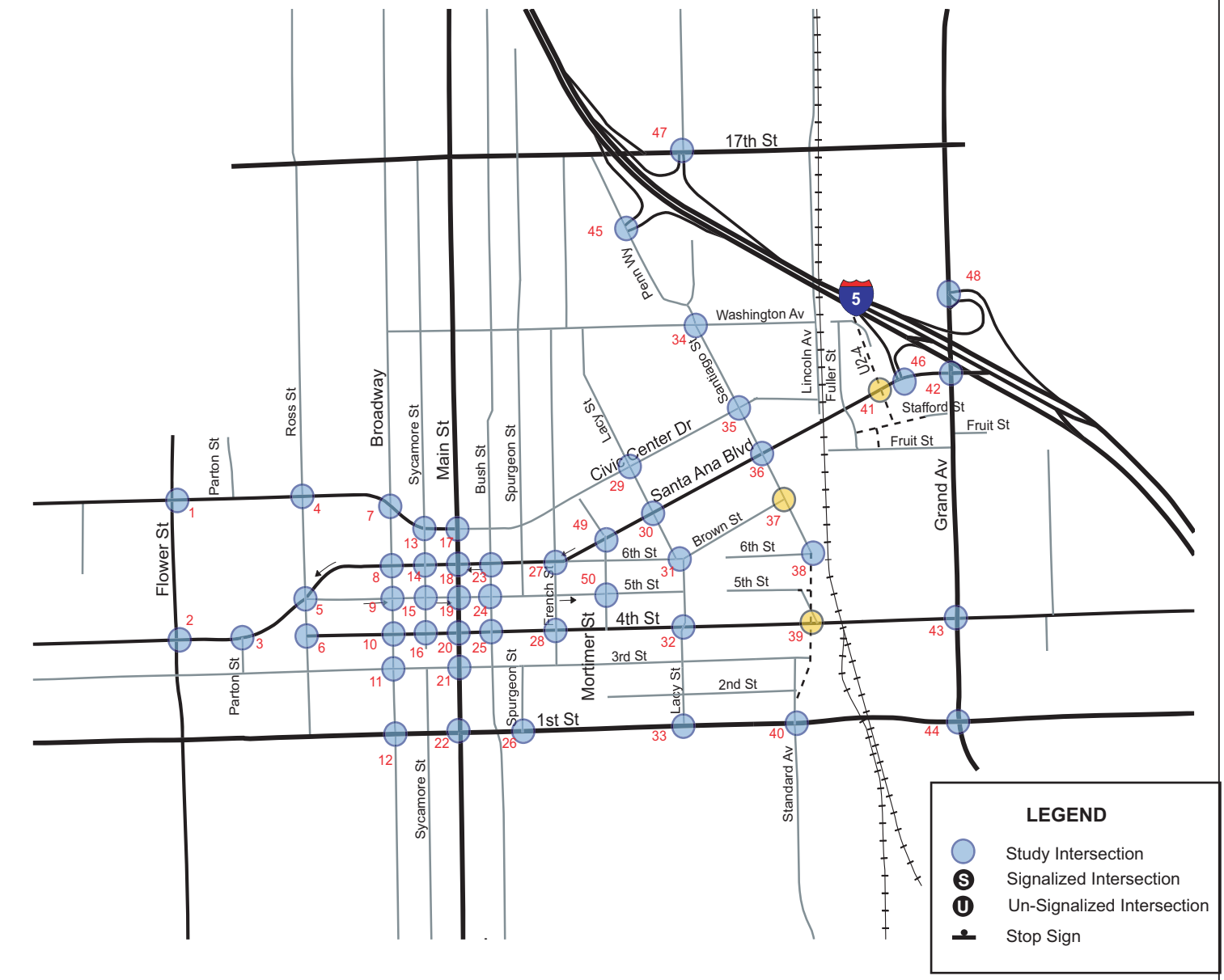
23. Bush & Santa Ana

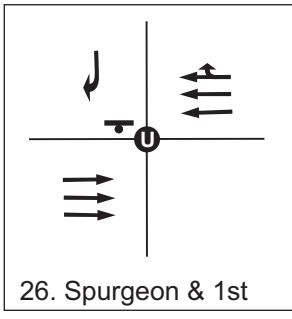


24. Bush & 5th

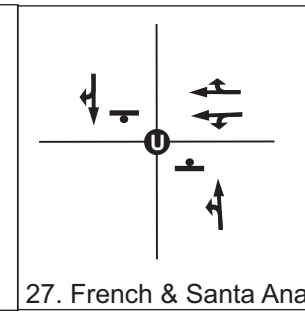


25. Bush & 4th

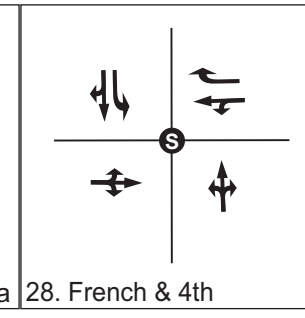




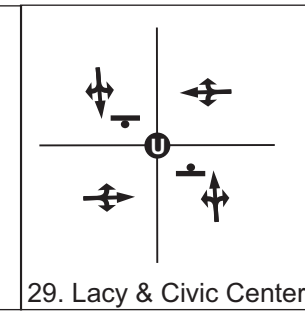
26. Spurgeon & 1st



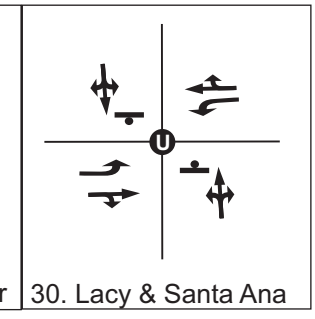
27. French & Santa Ana



28. French & 4th



29. Lacy & Civic Center



30. Lacy & Santa Ana

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Figure 3-3c

Existing Intersection Geometry

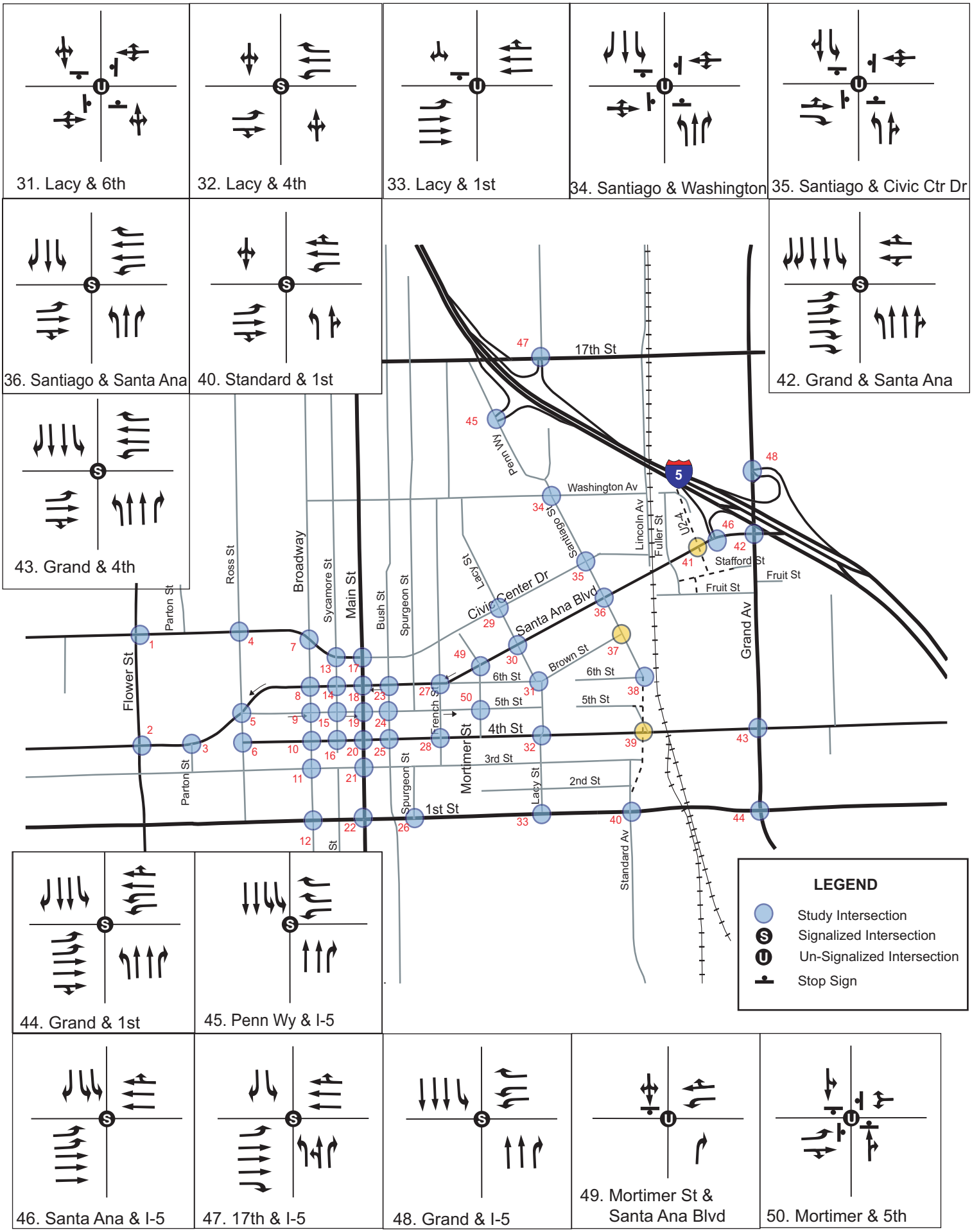

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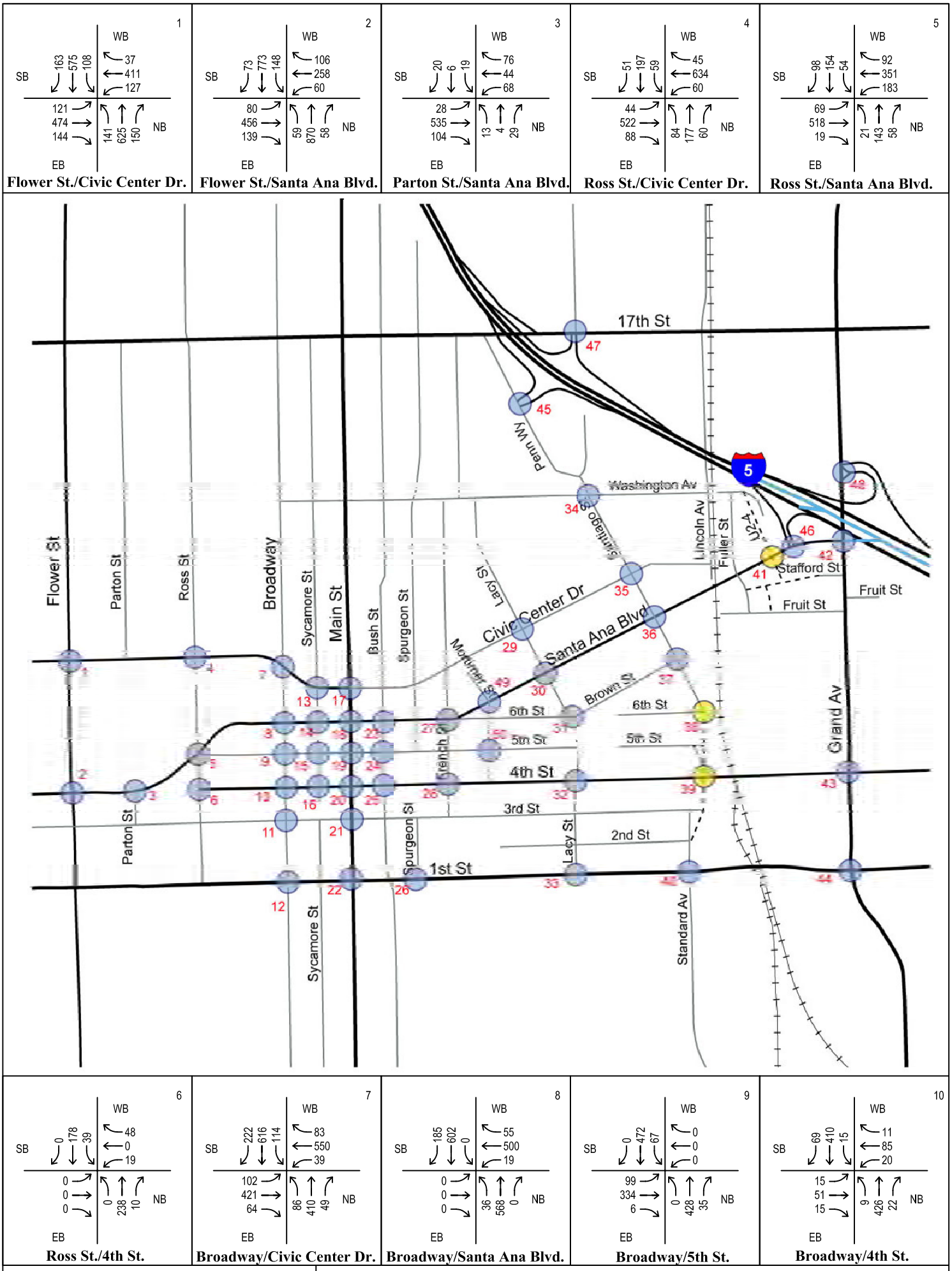
Figure 3-3d

Existing Intersection Geometry



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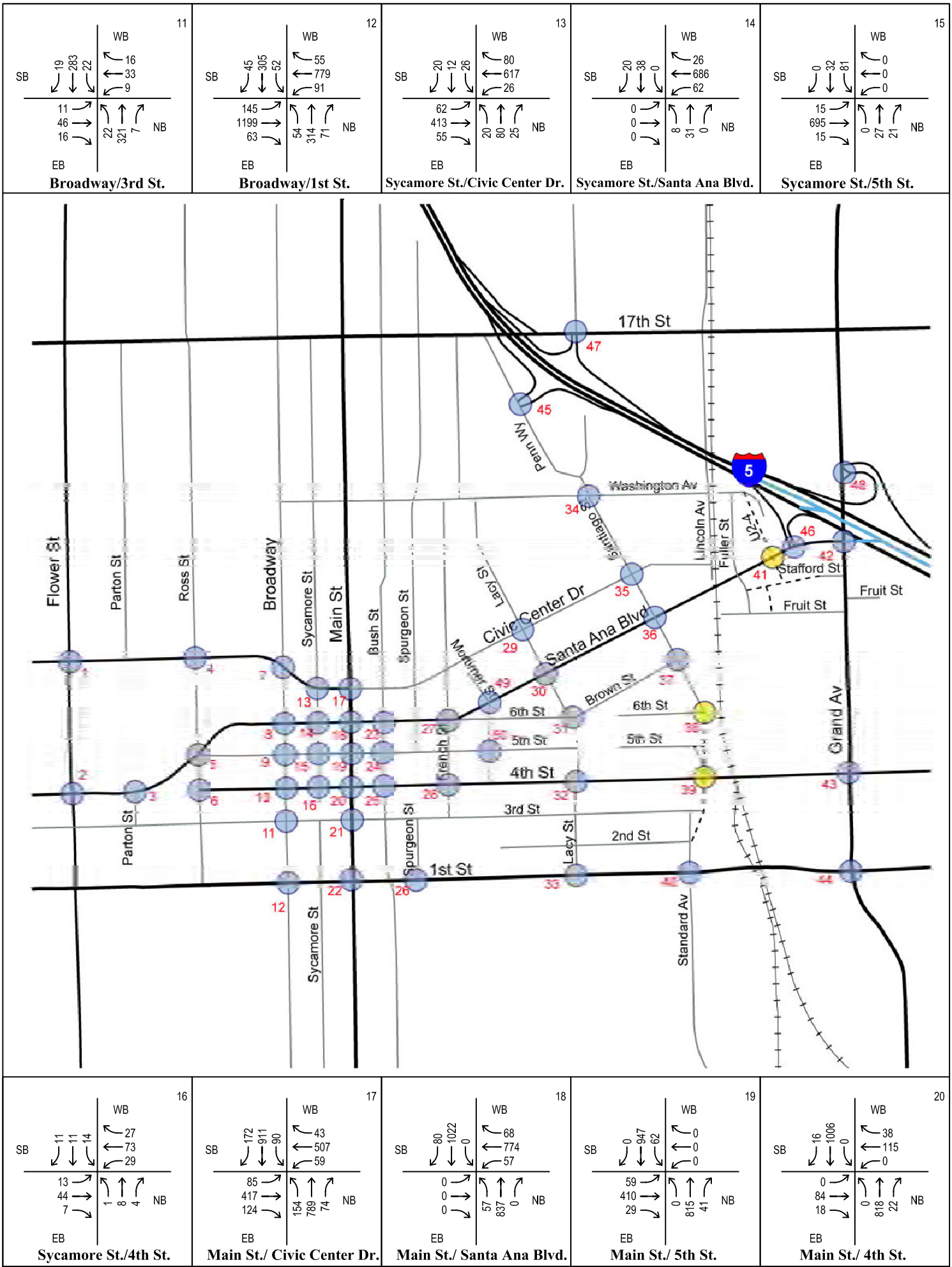
City of Santa Ana

Figure 3-4a

Santa Ana Transit Zoning Code Traffic Study

Existing AM Peak Hour Volumes



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City of Santa Ana — Figure 3-4b

Santa Ana Transit Zoning Code Traffic Study — Existing AM Peak Hour Volumes

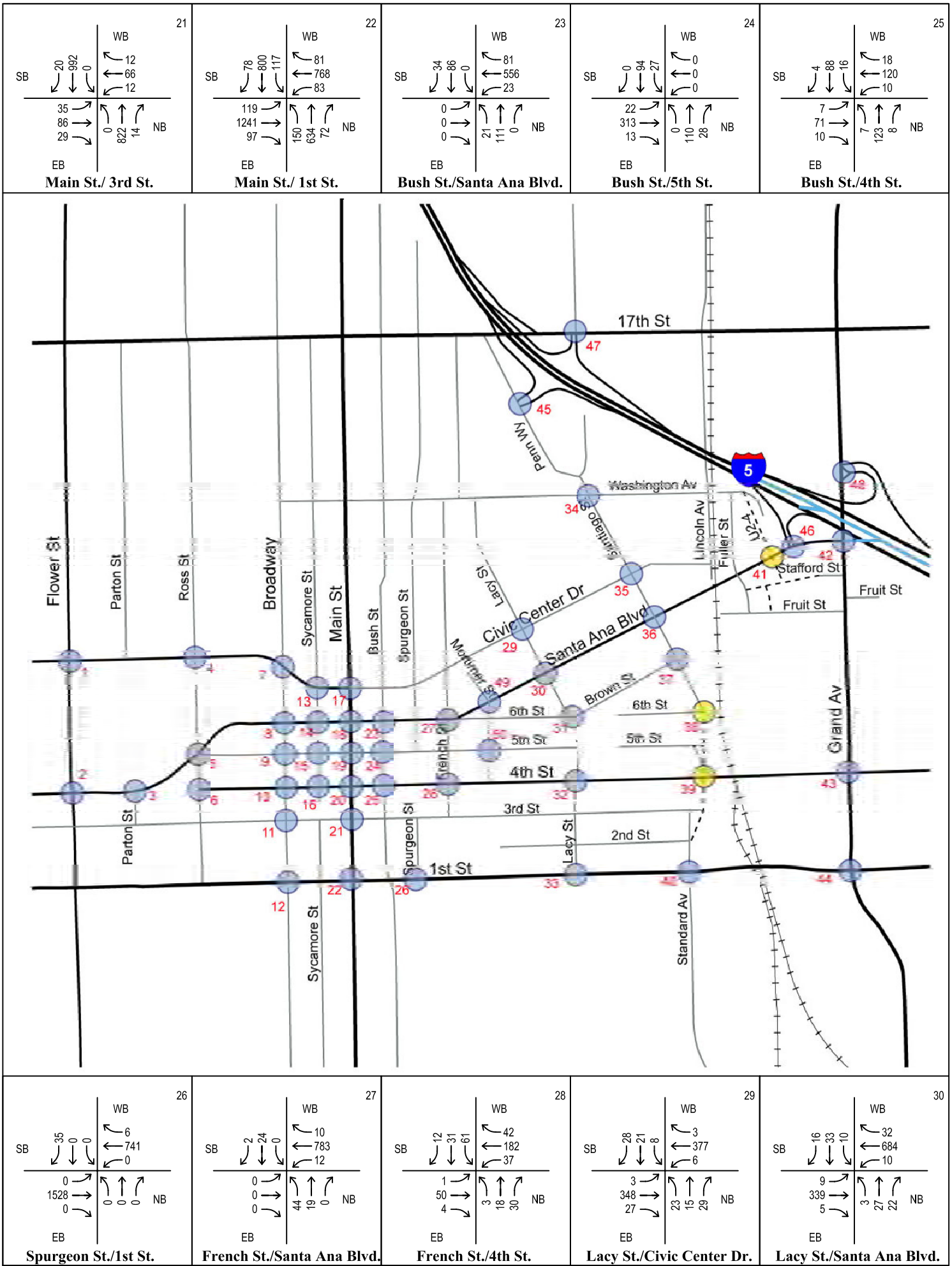

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Figure 3-4c

Santa Ana Transit Zoning Code Traffic Study

Existing AM Peak Hour Volumes

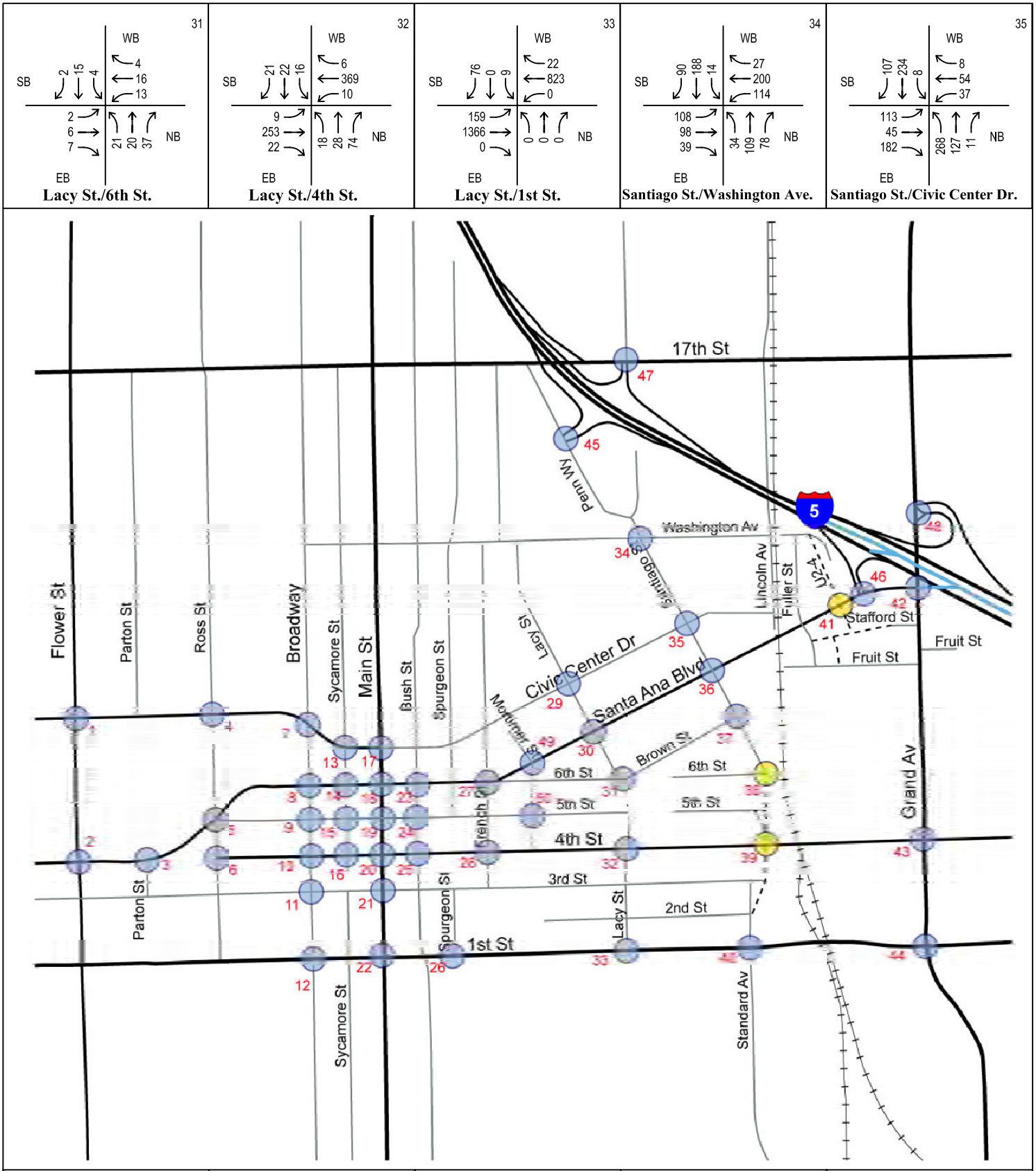

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Figure 3-4d

Santa Ana Transit Zoning Code Traffic Study

Existing AM Peak Hour Volumes

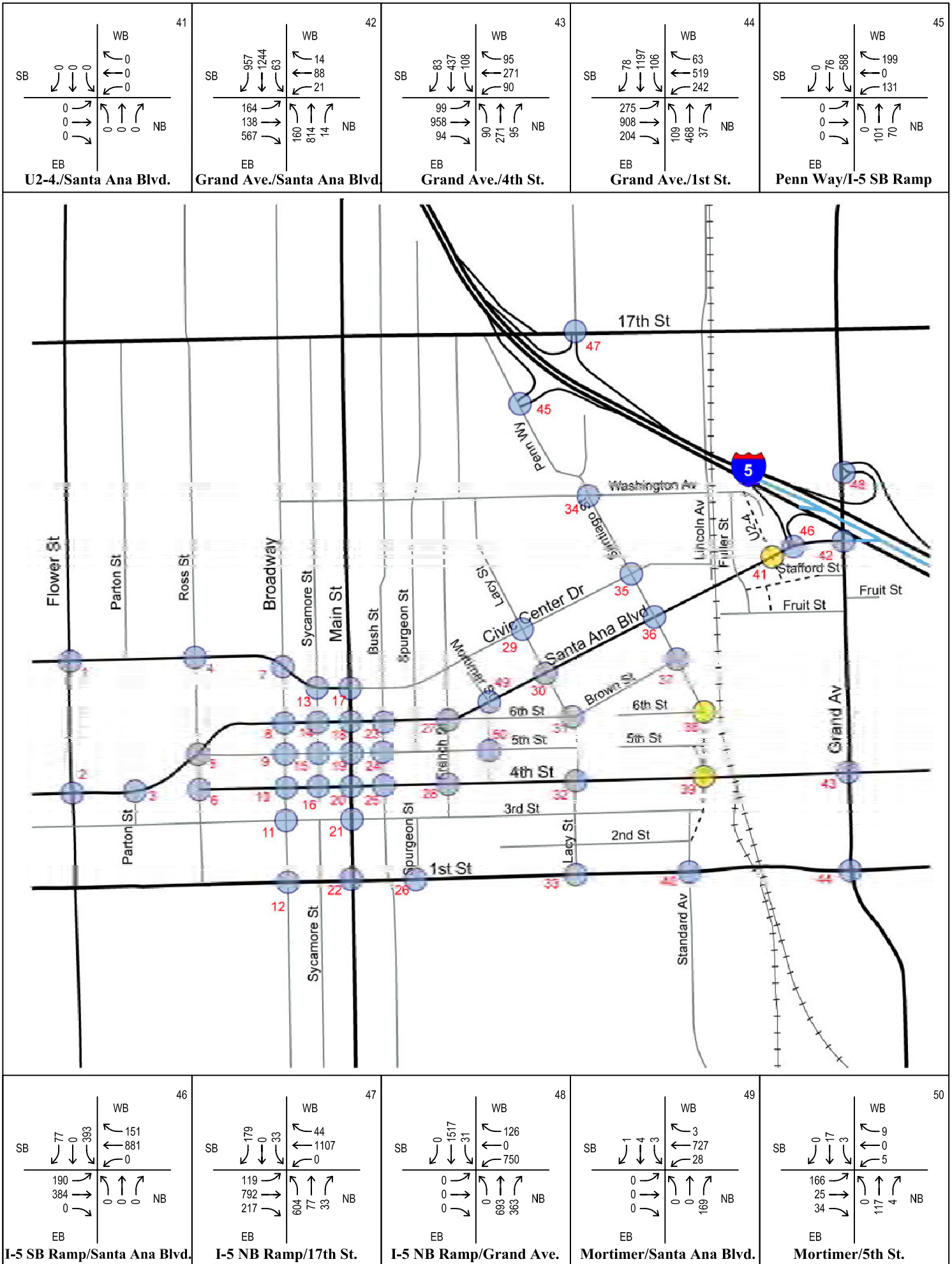

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Figure 3-4e

Santa Ana Transit Zoning Code Traffic Study

Existing AM Peak Hour Volumes

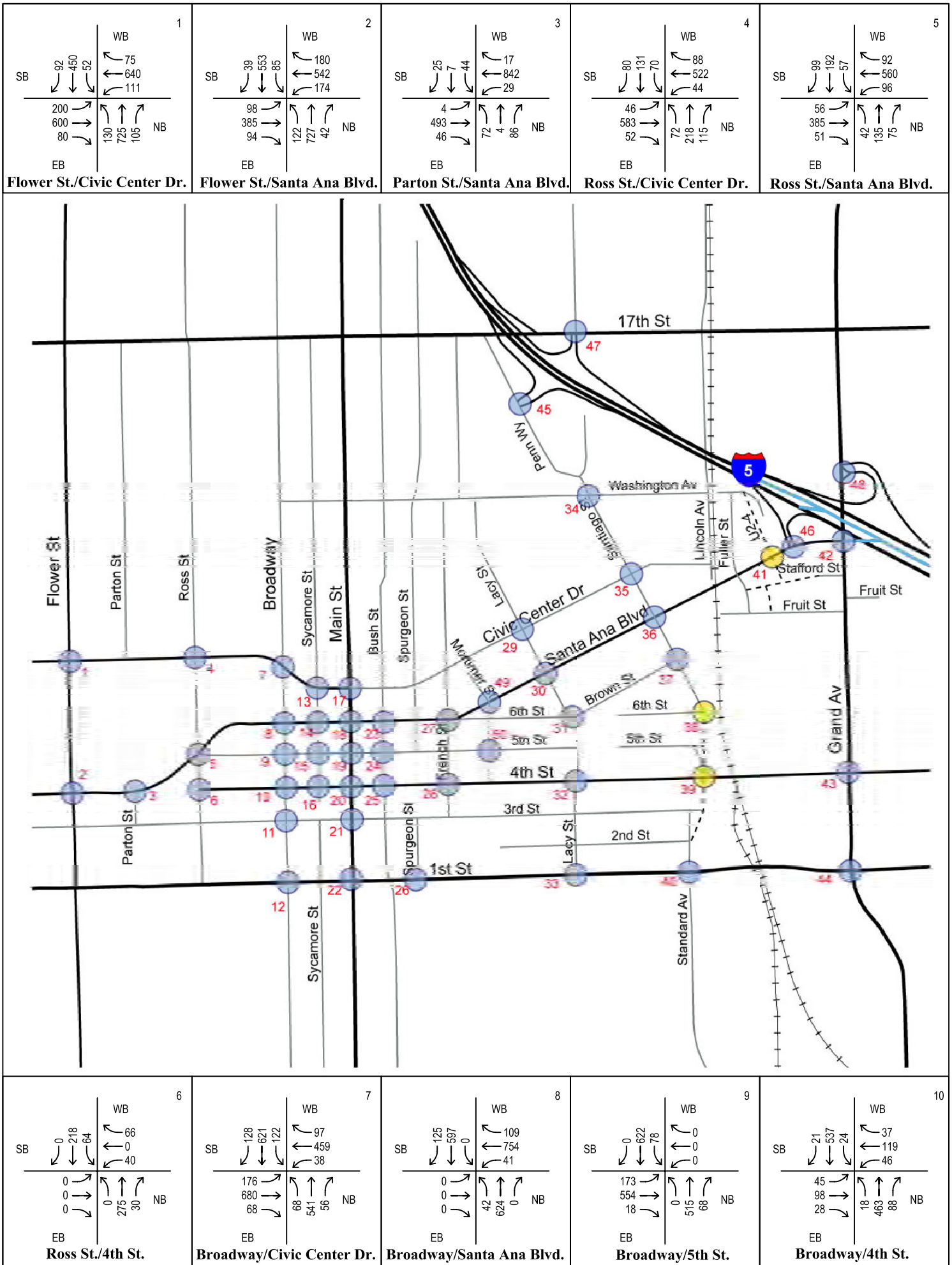

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Figure 3-4f

Santa Ana Transit Zoning Code Traffic Study

Existing PM Peak Hour Volumes

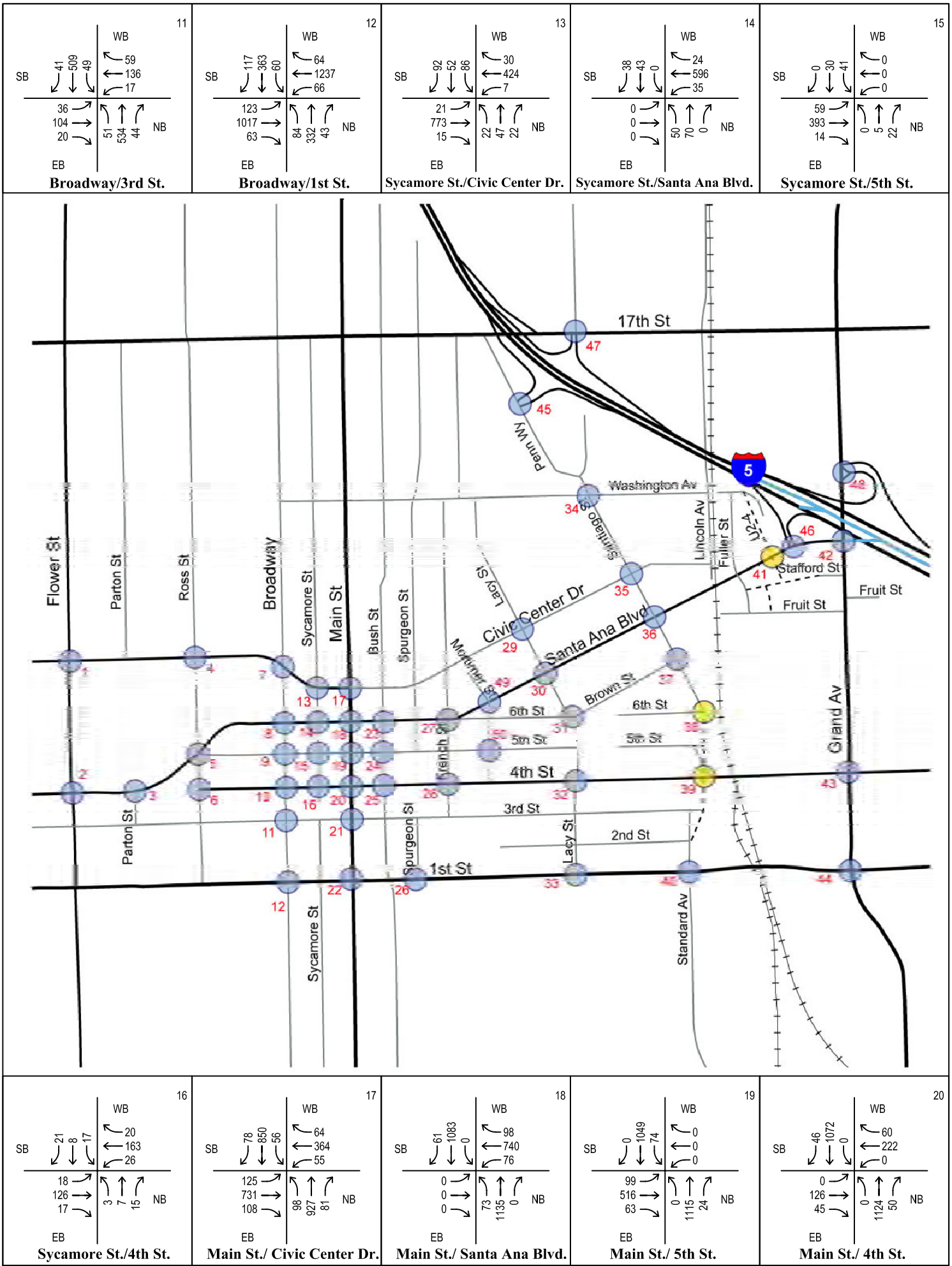

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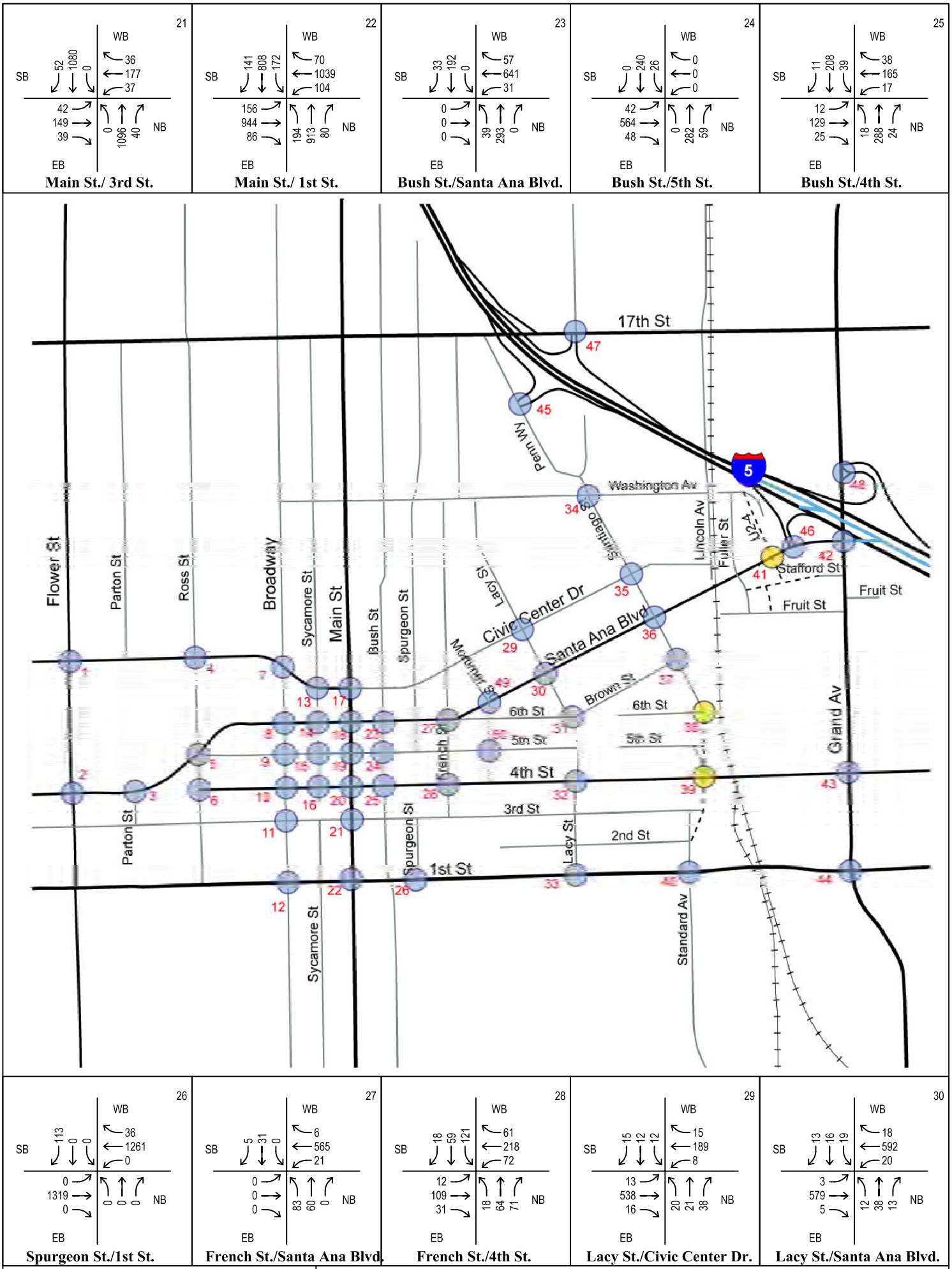
Figure 3-4g

Santa Ana Transit Zoning Code Traffic Study

Existing PM Peak Hour Volumes



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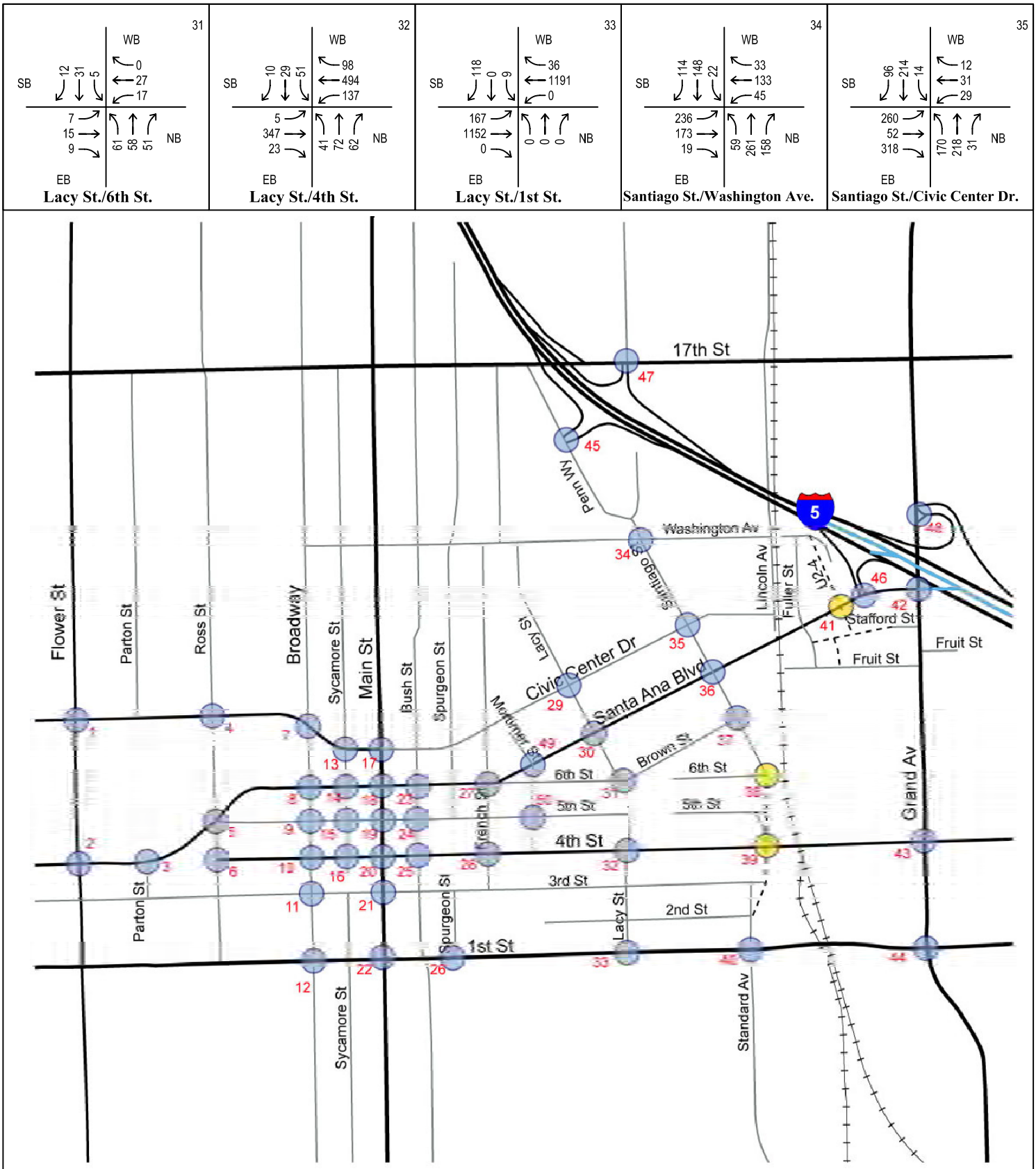
City of Santa Ana

Figure 3-4h

Santa Ana Transit Zoning Code Traffic Study

Existing PM Peak Hour Volumes



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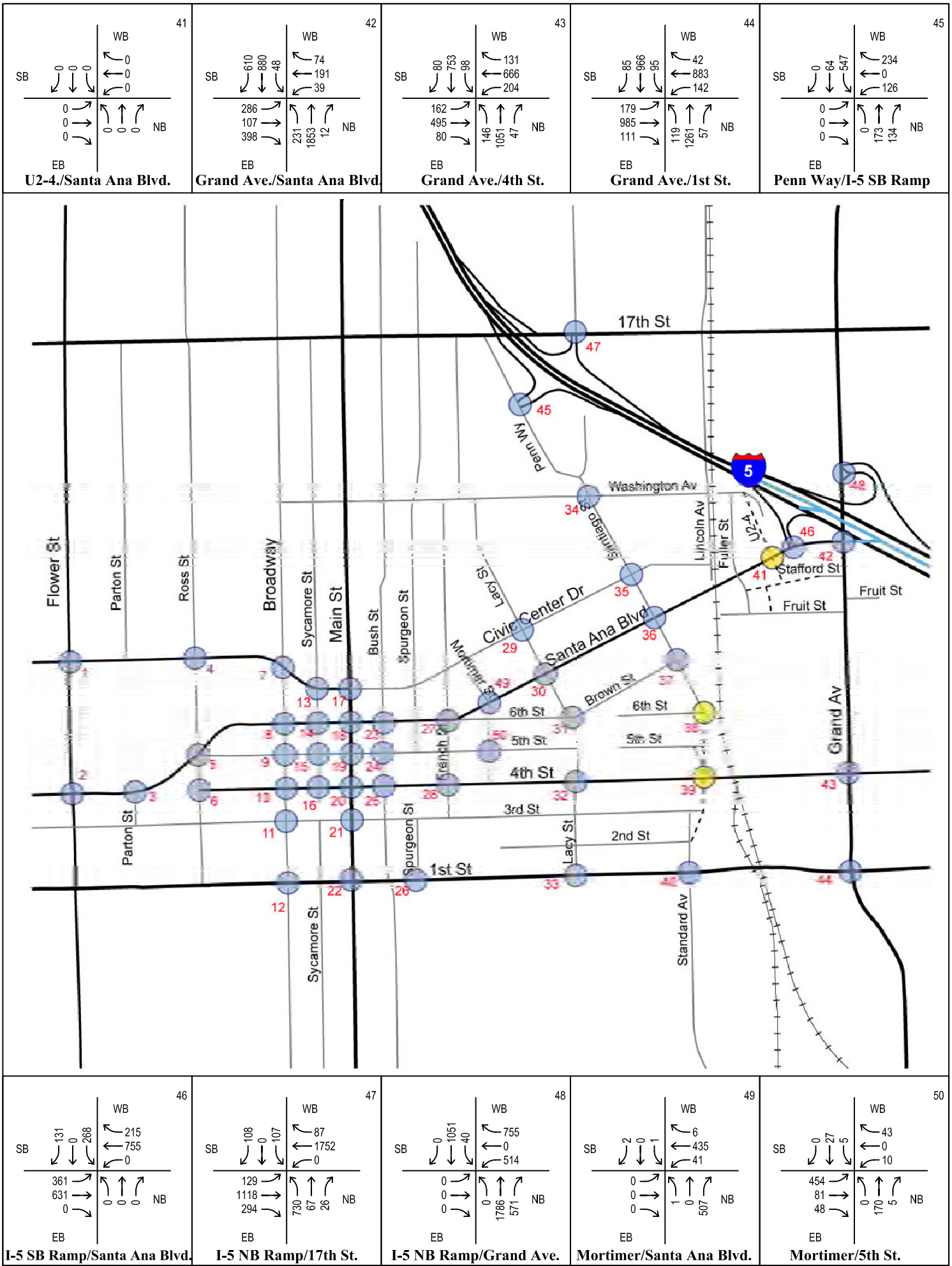
City of Santa Ana

Figure 3-4i

Santa Ana Transit Zoning Code Traffic Study

Existing PM Peak Hour Volumes



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City of Santa Ana — Figure 3-4j

Santa Ana Transit Zoning Code Traffic Study — Existing PM Peak Hour Volumes

3.2 Planned Improvements

Several funded or planned roadway improvements are included within the study area. The improvements identified below are consistent with the Long Range Improvement Program and the City's circulation element.

Grand Avenue Widening – the City of Santa Ana has proposed to widen the segment of Grand Avenue between Seventeenth Street on the north and First Street on the south, to the General Plan Circulation Element designation of Major Arterial, with six through lanes and enhanced features at intersections, including dedicated right and left turn lanes.

Santiago Street Widening – As part of the Santa Ana Transit Zoning Code (SD 84A and SD 84B) project, the City of Santa Ana has proposed to widen Santiago Street between Civic Center Drive and 1st Street, to the General Plan Circulation Element designation of secondary Arterial, with four through lanes and enhanced features at intersections, including dedicated right and left turn lanes.

Metrolink Extension – the City of Santa Ana has proposed preferred corridors for consideration in developing a local transit service to operate as an extension to the proposed Metrolink Commuter Rail enhancements outlined by the OCTA 2006 Long-Range Transportation Plan.

Santa Ana Fixed Guideway – the City of Santa Ana, in partnership with the city of Garden Grove, is proposing a fixed guideway system that will travel between the Santa Ana Regional Transportation Center (SARTC) and Bristol Street, with potential future extensions to Harbor Boulevard in Garden Grove. The system will travel along a major east-west corridor through central Orange County, providing access to Santa Ana's downtown area and the Santa Ana civic center, which houses County, State and Federal government offices and courthouses. The proposed fixed-guideway system will integrate into the existing urban environment and transfer riders from the train station directly to key activity centers along the three-mile route.

Santa Ana Regional Transportation Center – the Santa Ana Regional Transportation Center (SARTC) serves more than 200,000 rail passenger trips each year, making the train station one of the busiest along the Los Angeles to San Diego rail line. It's also a hub for regional, interstate and international bus service. Significant attractions in Santa Ana include Bowers Museum, Discovery Science Center, Santa Ana Zoo, and Main Place and South Coast Village shopping districts. Both Santa Ana College, which serves more than 48,000 students, and the Orange County High School for the Arts, which draws students from 92 cities in Southern California, are within walking distance of the proposed fixed-guideway system.

The Santa Ana Regional Transportation Center (SARTC) Master Plan envisions a range of transportation services to be provided at SARTC, including the following travel modes:

- Metrolink Rail
- Amtrak Rail
- Santa Ana Fixed Guideway
- OCTA Fixed-Route Bus
- OCTA Stationlink
- OCTA Bus Rapid Transit (BRT)
- High Speed Rail
- Greyhound Bus
- International Tour Bus
- Los Angeles World Airports FlyAway Bus
- Carpool

The SARTC Master Plan is also intended to provide improved pedestrian and bicycle access, commercial, retail and/or residential uses as feasible, and provide efficient parking and support facilities for each of these services.

Completion of the SARTC Master Plan is expected to occur in phases which are anticipated to be completed in three planning horizons: 2014, 2020, and 2040 (buildout).

3.3 Existing Intersection Conditions

Based on the existing traffic volumes, level of service analyses were conducted for the 50 study intersections. The results of these analyses are summarized in Table 3-1 using ICU methodology for signalized intersections and in Table 3-2 using the HCM methodology for unsignalized intersections and Caltrans' signalized intersections. The analysis worksheets for all intersections are included in Appendix B of this report. As shown, all of the 50 intersections operate at Level of Service D or better under the existing conditions scenario.

A preliminary signal warrant study was conducted for unsignalized intersections. The following two intersections currently have 4-way stop control but may warrant a traffic signal under existing conditions. The signal warrant worksheets are included in Appendix C of this report.

- Santiago Street at Washington Avenue
- Santiago Street at Civic Center Drive

Table 3-1
Existing Peak Hour Intersection Conditions
(ICU Method)

Intersection	AM Peak Hour		PM Peak Hour	
	ICU	Level of Service	ICU	Level of Service
Signalized Intersections (Using ICU Method)				
Flower St. at Civic Center Dr.	0.617	B	0.662	B
Flower St. at Santa Ana Blvd.	0.524	A	0.538	A
Parton St. at Santa Ana Blvd.	0.256	A	0.436	A
Ross St. at Civic Center Dr.	0.476	A	0.436	A
Ross St. at Santa Ana Blvd.	0.435	A	0.363	A
Broadway at Civic Center Dr.	0.535	A	0.559	A
Broadway at Santa Ana Blvd.	0.417	A	0.466	A
Broadway at 5th St.	0.314	A	0.416	A
Broadway at 4th St.	0.274	A	0.372	A
Broadway at 3rd St.	0.299	A	0.558	A
Broadway at 1st St.	0.568	A	0.648	B
Sycamore St. at Civic Center Dr.	0.383	A	0.434	A
Main St. at Civic Center Dr.	0.680	B	0.663	B
Main St. at Santa Ana Blvd.	0.586	A	0.611	B
Main St. at 5th St.	0.438	A	0.564	A
Main St. at 4th St.	0.441	A	0.561	A
Main St. at 3rd St.	0.423	A	0.535	A
Main St. at 1st St.	0.693	B	0.765	C
Bush St. at Santa Ana Blvd.	0.263	A	0.365	A
Bush St. at 5th St.	0.216	A	0.395	A
Bush St. at 4th St.	0.228	A	0.394	A
French St. at 4th St.	0.248	A	0.393	A
Lacy St. at 4th St.	0.353	A	0.486	A
Santiago St. at Santa Ana Blvd.	0.481	A	0.579	A
Standard St. at 1st St.	0.723	C	0.719	C
Grand Ave. at Santa Ana Blvd.	0.792	C	0.888	D
Grand Ave. at 4th St.	0.601	B	0.717	C
Grand Ave. at 1st St.	0.764	C	0.808	D

Table 3-2
Existing Peak Hour Intersection Conditions
(HCM Method)

Intersection	AM Peak Hour		PM Peak Hour	
	Average/Worst Case Delay	Level of Service	Average/Worst Case Delay	Level of Service
Unsignalized Intersections				
Ross St. at 4th St.	10.7	A	11.8	B
Sycamore St. at Santa Ana Blvd.	18.3	C	17.0	C
Sycamore St. at 5th St.	14.3	B	12.8	B
Sycamore St. at 4th St.	7.5	A	8.3	A
Spurgeon St. at 1st St.	10.0	A	12.8	B
French St. at Santa Ana Blvd.	17.1	C	15.6	C
Lacy St. at Civic Center Dr.	15.8	C	16.8	C
Lacy St. at Santa Ana Blvd.	25.3	D	33.4	D
Lacy St. at 6th St.	7.1	A	7.7	A
Lacy St. at 1st St.	16.6	C	23.2	C
Santiago St. at Washington Ave.	12.7	B	18.1	C
Santiago St. at Civic Center Dr.	14.5	B	17.4	C
Mortimer St. at 5th St	8.7	A	15.5	C
Mortimer St. at Santa Ana Blvd.	17.5	C	15.0	B
Signalized Intersections (Caltrans, Using HCM)				
Penn Way at I-5 SB	18.6	B	21.6	C
Santa Ana Blvd. at I-5 SB	26.7	C	27.4	C
17t St. at I-5 NB	31.3	C	32.3	C
Grand Ave at I-5 NB	19.8	B	62.3	E

3.4 Existing Roadway Segment Conditions

The existing roadway segment ADT analysis is presented in Table 3-3. As indicated, a majority of the arterial roadways are operating at acceptable levels. The daily V/C ratio screening analysis indicates that the following locations are potentially experiencing capacity deficiencies under existing conditions:

- Main Street from South of 1st Street to Santa Ana Boulevard
- Santa Ana Boulevard West of the I-5 SB Ramps
- Grand Avenue from South of 1st Street to 17th Street

The daily volume-to-capacity ratios provide a screening level analysis of daily traffic flows and potential operational problems within the study area. The peak hour analysis for intersections, presented previously, provides a more definitive analysis of the operation of the arterial roadways in the project area. Although a few roadway segments indicate deficiencies, the proposed mitigation should be based on the intersection analysis recommendations.

Table 3-3 Existing Roadway Segment Daily Traffic Condition

Road	Segment	Existing ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
Flower Street	Santa Ana Blvd to Civic	17,950	4D	37,500	A	
Flower Street	17th St to Civic Center	17,470	4D	37,500	A	
Civic Center Dr	West of Flower St	17,912	4D	37,500	A	
Civic Center Dr	Flower St to Ross St	16,943	4D	37,500	A	
Flower Street	Santa Ana Blvd to 1st St	18,152	4D	37,500	A	
Santa Ana Blvd	West of Flower St	10,068	4D	37,500	A	
Santa Ana Blvd	Flower St to Parton St	12,363	4D	37,500	A	
Santa Ana Blvd	Parton St to Ross St	12,363	4D	37,500	A	
Civic Center Dr	Ross St to Broadway	15,024	4D	37,500	A	
Santa Ana Blvd	Ross St to Broadway	12,000	3D	28,150	A	
Broadway	Civic Center Dr to Santa Ana Blvd	18,453	4D	37,500	A	
Broadway	Civic Center Dr to Washington Ave	23,755	4D	37,500	B	
Civic Center Dr	Broadway to Sycamore St	14,602	4D	37,500	A	
Broadway	Santa Ana Blvd to 5th St	15,994	4D	37,500	A	
Santa Ana Blvd	Broadway to Sycamore St	10,055	3D	28,150	A	
Broadway	5th St to 4th St	15,755	4D	37,500	A	
5th St	Broadway to Ross St	8,166	3D	28,150	A	
5th St	Broadway to Main St	8,166	3D	28,150	A	
Broadway	3rd St to 4th St	15,755	4U	25,000	B	
Broadway	3rd St to 1st St	15,755	4U	25,000	B	
Broadway	South of 1st St	11,180	4U	25,000	A	
1st St.	Broadway to Ross St	38,541	6D	56,300	B	
1st St	Main St to Broadway	37,162	6D	56,300	B	
Civic Center Dr	Sycamore St to Main St	14,602	4D	37,500	A	
Santa Ana Blvd	Sycamore St to Main St	10,055	3D	28,150	A	
5th St	Sycamore St to Broadway	8,166	3D	28,150	A	
5th St	Sycamore St to Main St	8,166	3D	28,150	A	

Road	Segment	Existing ADT	#of Exist Lanes	LOS E Capacity	LOS	LOS E OK
Main St	Civic Center to Santa Ana	31,571	4D	37,500	E	E ok
Main St	Civic Center to 9th St	32,104	4D	37,500	E	E ok
Civic Center Dr	Main St to Bush St	11,483	4D	37,500	A	
Main St	Santa Ana Blvd to 5th St	31,571	4D	37,500	F	
Santa Ana Blvd	Main St to Bush St	10,094	3D	28,150	A	
Main St	5th St to 4th St	31,571	4U	25,000	F	
5th St	Main St to Bush St	5,881	3D	28,150	A	
Main St	3rd St to 4th St	27,791	4U	25,000	F	
Main St	1st St to 3rd St	27,791	4U	25,000	F	
Santa Ana Blvd	Bush St to Spurgeon St	10,094	3D	28,150	A	
5th St	Bush St to French St	5,881	2U	12,500	A	
1st St	Spurgeon St to Main St	37,667	6D	56,300	B	
Santa Ana Blvd	Lacy St to Standard Ave	14,350	4D	37,500	A	
Civic Center Dr	French St to Lacy St	11,483	4D	37,500	A	
Santa Ana Blvd	Lacy St to French St	14,350	2D	18,750	C	
4th St	Lacy St to French St	11,974	2D	18,750	B	
1st St	Lacy St to Spurgeon St	37,667	6D	56,300	B	
1st St	Lacy St to Standard Ave	37,667	6D	56,300	B	
Santiago St	Washington Ave to Civic	9,931	2U	12,500	C	
Santiago St	Washington Ave to 17th St	9,527	2U	12,500	C	
Santiago St	Santa Ana Blvd. to Civic	9,044	2U	12,500	C	
Civic Center Dr	Santiago St to Lacy St	11,910	2U	12,500	E	E ok
Civic Center Dr	Lincoln Ave to Santiago St	11,483	2U	12,500	E	E ok
Santiago St	Santa Ana Blvd to Brown St	6,751	2U	12,500	A	
Santa Ana Blvd	Santiago St to Lacy St	14,350	4D	37,500	A	
Santa Ana Blvd	Santiago St to U-24	19,413	6D	56,300	A	
4th St	Santiago St to Lacy St	17,626	4U	25,000	C	
Grand Ave	4th St to Santa Ana Blvd	36,377	4D	37,500	E	
Grand Ave	Santa Ana Blvd to 17th St	31,111	4D	37,500	E	
Santa Ana Blvd	East of Grand Ave	7,660	4D	37,500	A	
Grand Ave	1st St to 4th St	31,391	4D	37,500	E	
4th St	Grand Ave to Santiago St	17,626	4D	37,500	A	
4th St	East of Grand Ave	19,984	4D	37,500	A	
Grand Ave	South of 1st St	39,273	4D	37,500	F	
1st St	Standard Ave to Grand Ave	39,273	6D	56,300	B	
1st St	East of Grand Ave	36,393	6D	56,300	B	

Road	Segment	Existing ADT	#of Exist Lanes	LOS E Capacity	LOS	LOS E OK
Penn Way	South of I-5 SB Ramps	8,000	2U	12,500	B	
Penn Way	North of I-5 SB Ramps	14,000	4D	37,500	A	
Santa Ana Blvd	West of I-5 SB Ramps	36,200	4D	37,500	E	
Santa Ana Blvd	East of I-5 SB Ramps	23,000	4D	37,500	B	
17th St	West of I-5 NB Ramps	44,504	6D	56,300	C	
17th St	East of I-5 NB Ramps	35,341	6D	56,300	B	
Grand Ave	South of I-5 NB Ramps	45,235	4D	37,500	F	
Grand Ave	North of I-5 NB Ramps	42,211	4D	37,500	F	

3.5 Existing Freeway Ramp Conditions

Existing peak hour ramp analysis results are presented on Table 3-4. All ramps operate at LOS D or better during the AM and/or PM peak hour time periods:

Table 3-4 Existing Freeway Ramp Analysis

INTER-CHANGE	RAMP	RAMP TYPE CODE[1]	LANES	PEAK HOUR CAPACITY	AM PEAK HOUR			PM PEAK HOUR		
					VOL	V/C	LOS	VOL	V/C	LOS
I-5 at 17th St.	SB On	4	2	1,800	658	0.37	A	681	0.38	A
	NB Loop On	4	2	1,800	217	0.12	A	294	0.16	A
	SB Off	5	1	1,500	330	0.22	A	360	0.24	A
	NB Off	5	1	1,500	714	0.48	A	823	0.55	A
I-5 at Santa Ana Blvd.	SB Direct On (HOV)	6	2	2,250	215	0.10	A	167	0.07	A
	SB Loop On	4	2	1,800	341	0.19	A	576	0.32	A
	NB Loop On	4	2	1,800	394	0.22	A	611	0.34	A
	SB Off	5	1	1,500	470	0.31	A	399	0.27	A
	NB Off	5	1	1,500	876	0.58	A	1,269	0.85	D

Note 1: Reference to Freeway Ramp Capacity Assumptions Table

4 - Two-lane Metered On-Ramp, 2 Mixed Flow Lanes at Meter

5 - One-lane Unmetered Ramp

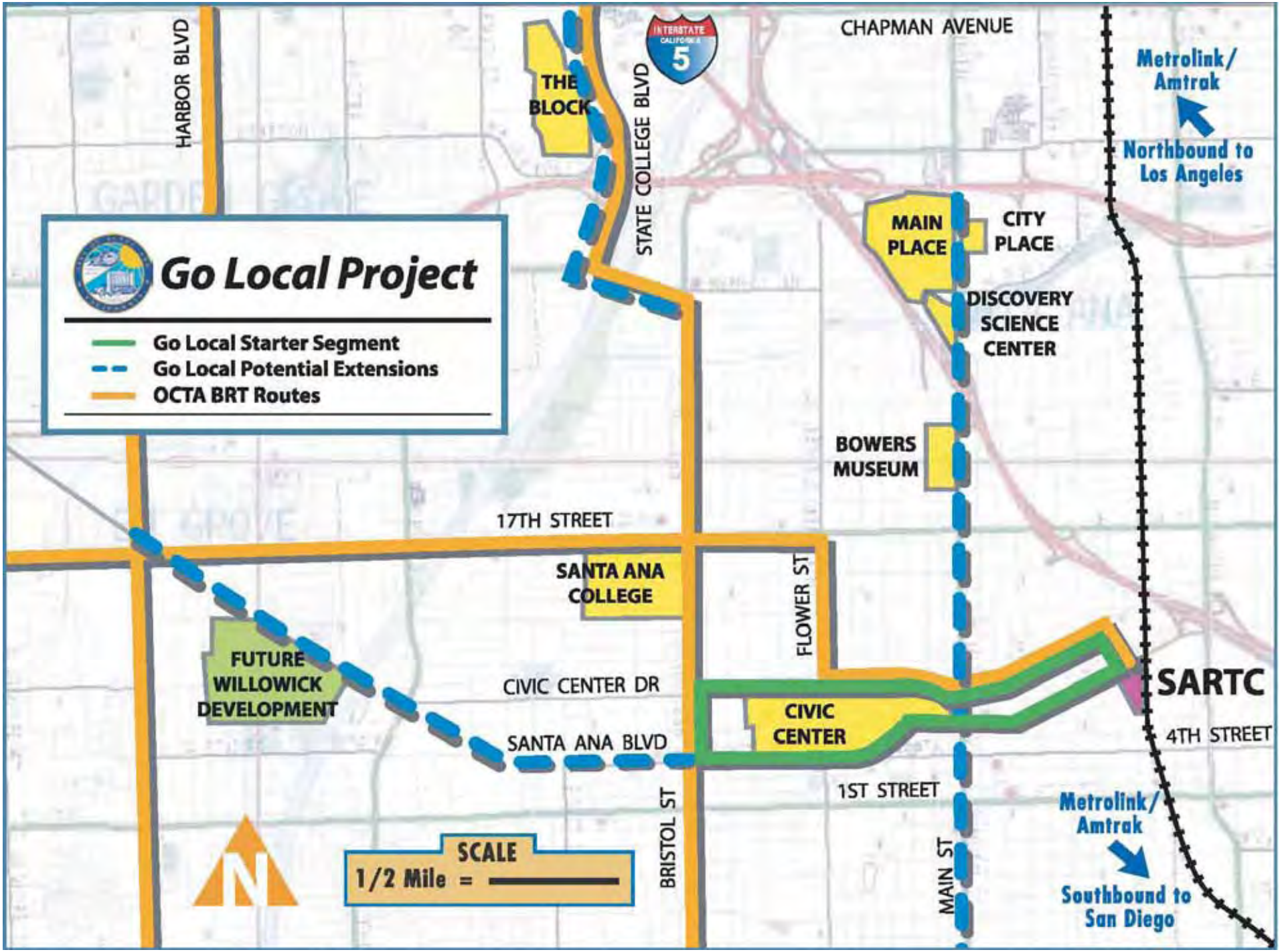
6 - Two-lane Unmetered On-Ramp, tapers to one merge lane at or beyond gore point

3.6 Transit System

The study area is currently served by buses and commuter rail service. The commuter rail service is provided at the Santa Ana Regional Transportation Center (SARTC), which is located within the study area. Transit service for the study area is generally provided by local bus service with the exception of the SARTC, where commuter rail service and express bus service connections are provided to the local bus system.

Figure 3-6 illustrates the conceptual plan for the Metrolink Extension Study (Go Local Concept/Santa Ana Fixed-Guideway). It is expected that the Transit Zoning Code (SD 84A and SD 84B) with mixed-use land uses will take advantage of the transit improvement in the area. The project trip generation calculation discussed in Chapter 6 will take credit for mode choices. However, the detailed intersection capacity analysis will not consider the capacity impact of the transit improvement in the area. KOA considers the detail analysis to be deferred to the future Metrolink Extension Traffic Study.

Source: Orange County Transportation Authority



KOA CORPORATION PLANNING & ENGINEERING	City of Santa Ana	Figure 3-6
	Santa Ana Transit Zoning Code Traffic Study	Metrolink Extension Alignment Concept

4. ANTICIPATED PROJECT BUILDOUT (2030) WITHOUT PROJECT CONDITIONS

This section documents the future (2030) traffic conditions without the addition of project-related traffic to the surrounding street system. To forecast the near-term growth conditions for the year 2030, the existing peak hour background traffic volumes were increased by a factor of 0.5% per year. Also considered are future traffic increases that may be generated by other developments that have been approved in the study area.

4.1 Cumulative Projects

KOA Corporation has collected the active project lists from the City of Santa Ana, the City of Tustin, and the City of Orange in order to identify the relevant projects near the Santa Ana Transit Zoning Code (SD 84A and SD 84B) area. Per discussion with the project team, all cumulative projects within a 1.5 miles radius from the project boundary are considered as relevant to this project. As illustrated on Figure 4-1, a total of 21 projects are included as cumulative projects. The recently added project #44 (11 units of live/work) is not included in the cumulative project trip generation calculation as it provides minimum trip growth (about 6 peak hour trips and should be covered by the 0.5% annual ambience growth incorporated in the future volume forecasts. The added cumulative project #45 (30 units development) was included in both 2030 and 2035 conditions analysis.

Table 4-1 lists the cumulative projects within a 1.5 mile radius. The trip generation and trip distribution for all cumulative projects are included in Appendix D. The assumptions for the trip generation and trip distribution are primarily based on the traffic study reports provided by the City of Santa Ana. Appendix D also includes the cumulative project only volumes for both AM and PM peak hours which are generated based on the trip generation and trip distribution for the cumulative projects.

Table 4-1 Cumulative Projects List

Project ID	Project Name	Land Use Description	Quantity	Unit
1	**One Broadway Plaza**	Office	508.2	TSF
		Office (Rehab Structures)	9.803	TSF
		Retail [2]	8.525	TSF
		Casual Dining	2.681	TSF
		Formal Dining	15.915	TSF
3	**Santiago Street Lofts**	Proposed Live-work Loft (Apartment)	108	DU
		Existing Manufacture	2.1	TSF
		Existing out-reach Educational (R&D)	19	TSF

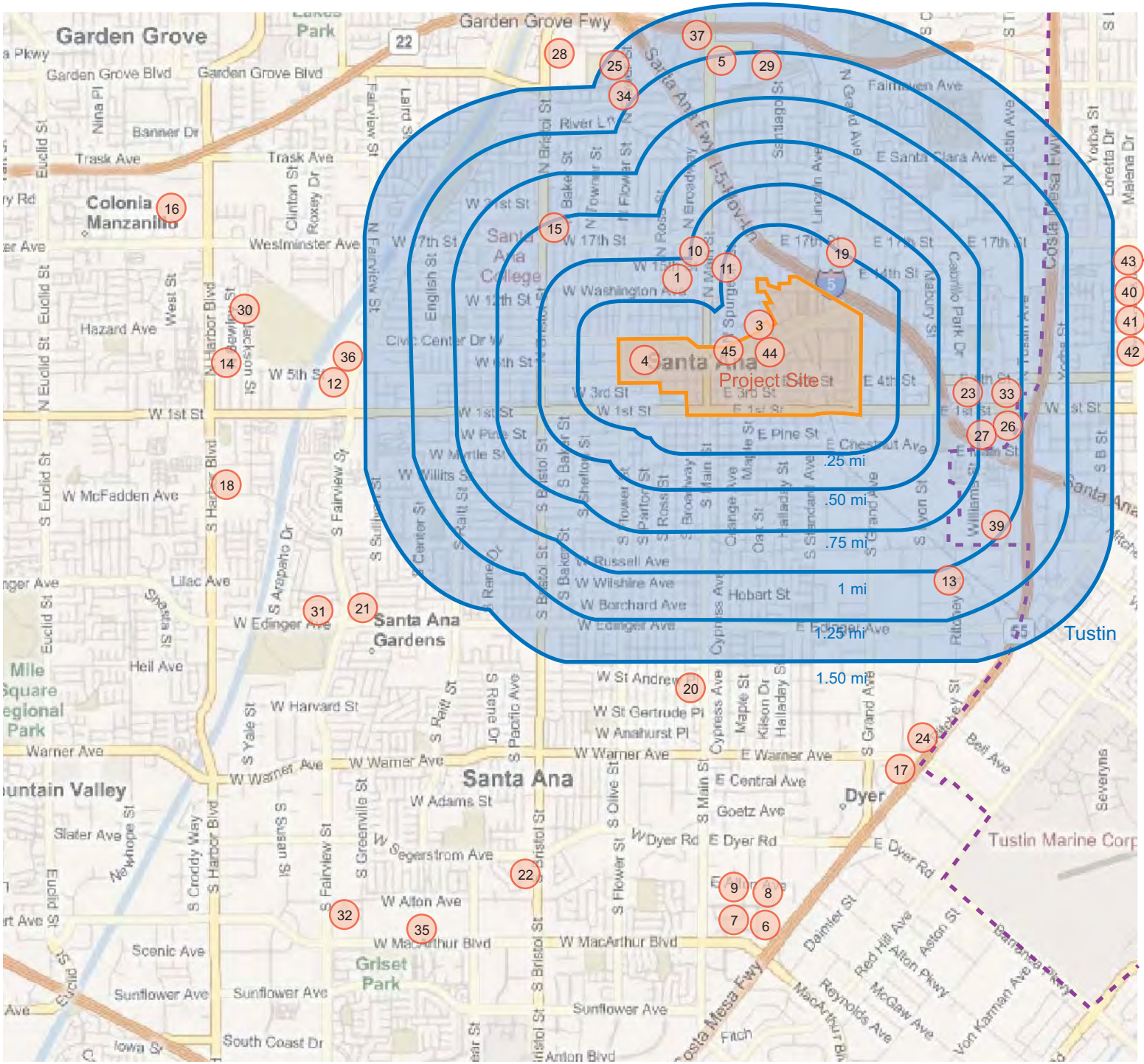
Project ID	Project Name	Land Use Description	Quantity	Unit
10	**Bower's Museum**	Museum Expansion	33.1	TSF
15	**Walgreen's**	Proposed Shopping Center	12.4	TSF
19	**Cobblestone**	Shopping Center	11	TSF
23	**Xerox Tower II**	General Office Building	210	TSF
27	**1st & Cabrillo Towers**	High Rise Resid. Condo./Townhouse	374	DU
		Specialty Retail Center	8.97	TSF
		Health / Fitness Club	-5.5	TSF
26	**Metro East Overlay Zone**	High Rise Resid. Condo./Townhouse	5,551	DU
33	**Olen Properties**	General Office Building	2.5	TSF
13	**Santa Ana Industrial**	General Light Industrial	31	TSF
29	**Town & Country Manor**	Residential Condo/Townhouse	174	DU
5	**City Place**	Residential Condo/Townhouse	185	DU
		Shopping Center	60	TSF
34	**River View Villas**	Residential Condo/Townhouse	41	DU
37	**City Place Sky Lofts**	Apartment	355	DU
25	**Shea Homes**	Single Family Detached	36	DU
39	**Retail (Tustin)**	Replacement of Commercial Building	15	TSF

SOURCES: City of Santa Ana, City of Tustin, and City of Orange
Project ID is consistent with the index on Figure 4-1.

4.2 Anticipated Project Buildout (2030) Without Project Intersection Conditions

As indicated in the previous section, the Anticipated Project Buildout (2030) Without Project intersection volumes are composed of the existing volumes with 0.5% growth per year plus the cumulative project only volumes. Figures 4-2a through Figure 4-2e illustrate the AM peak hour volumes for the 50 intersections while Figures 4-2f through Figure 4-2j illustrate the PM peak hour volumes for 2030 Without Project conditions. Tables 4-2 and 4-3 illustrate the future without project intersection level of service conditions. Appendix E includes the analysis worksheets for all intersections under 2030 Without Project conditions. As shown in the table, all intersections are expected to operate at Level of Service D or better under the future without project condition for the year 2030 except the following:

- Grand Avenue at Santa Ana Boulevard (Signalized)
- Lacy Street at Santa Ana Boulevard (Two-way stop control)
- Lacy Street at 1st Street (Two-way stop control)



LEGEND

1 One Broadway Plaza
3 Santiago St. Lofts
4 West End Lofts
5 City Place
6 MacArthur Place
7 Skyline at MacArthur
8 Montage at MacArthur
9 Skyline Phase II
10 Bower's Museum
11 Cordoba
12 Goodwill Industries
13 Santa Ana Industrial
14 Harbor and 5th Plaza
15 Walgreen's
16 St. Gertrude Retail
17 Crazy Horse Square
18 Riverview West Marketplace
19 Cobblestone Plaza
20 Kelly's Body Shop
21 Edinger Avenue Retail
22 Werdin Commercial Center
23 Xerox Tower II
24 Brookhollow Office
25 Shea Homes
26 Metro East Overlay Zone
27 1st and Cabrillo Towers
28 Village Green
29 Town and Country Manor
30 Jackson Street Homes
31 John Laing Townhomes
32 Alton Court
33 Olen Properties
34 River View Villas
35 Christ Our Savior Cathedral
36 Templo Calvario
37 City Place Sky Lofts
39 Retail (Tustin)
40 Mixed use (Tustin)
41 Prospect Village (Tustin)
42 The Beach Pit BBQ (Tustin)
43 Commercial (Tustin)
44 Minter Court
45 Future Specific Plan

J:\cities\Santa Ana\JA73119 Spwgen EIR-TIS\Figures\Cumulative Studies

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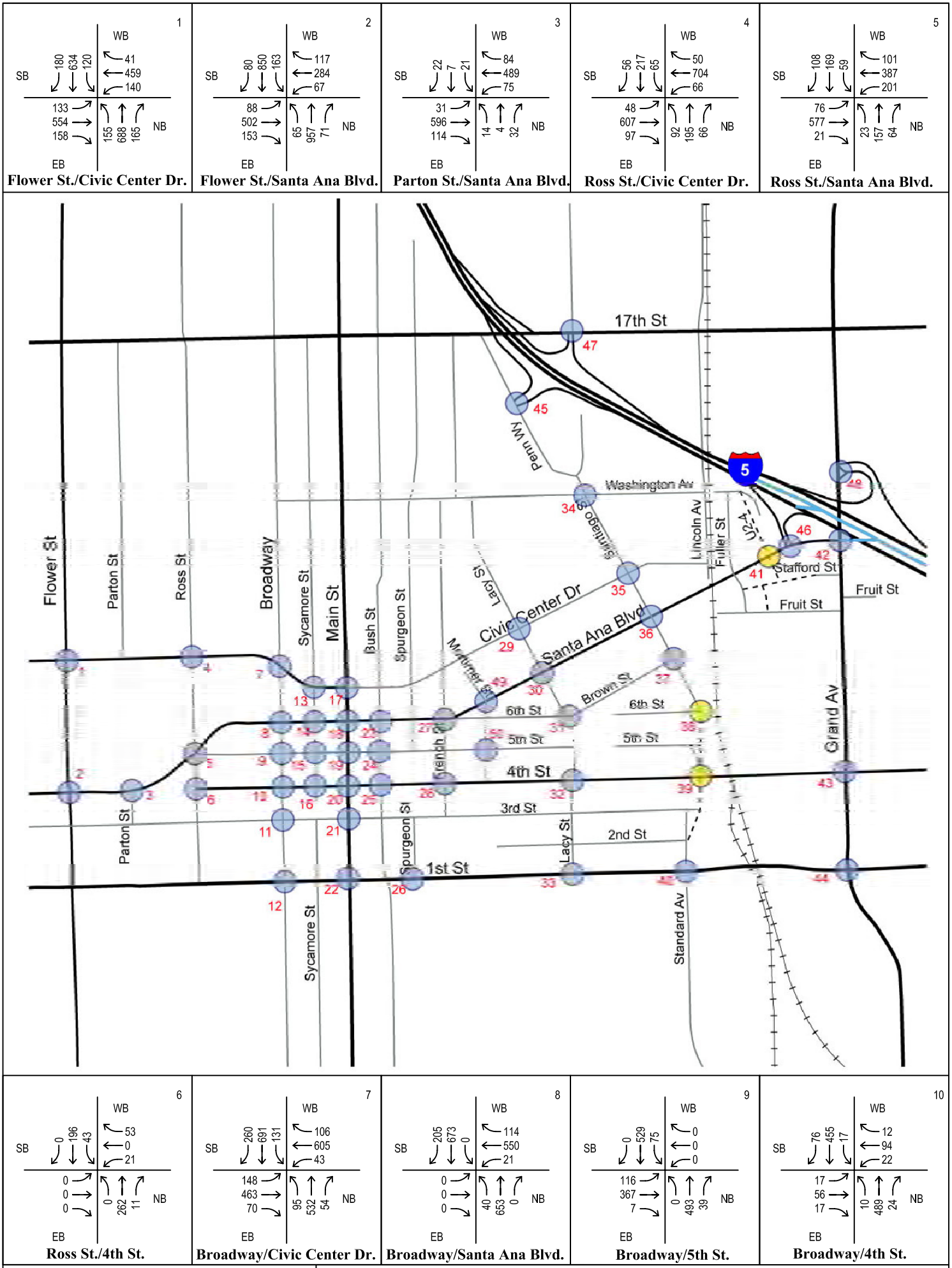
City of Santa Ana

Figure 4.1

Santa Ana Transit Zoning Code Traffic Study

Cumulative Projects Location Map



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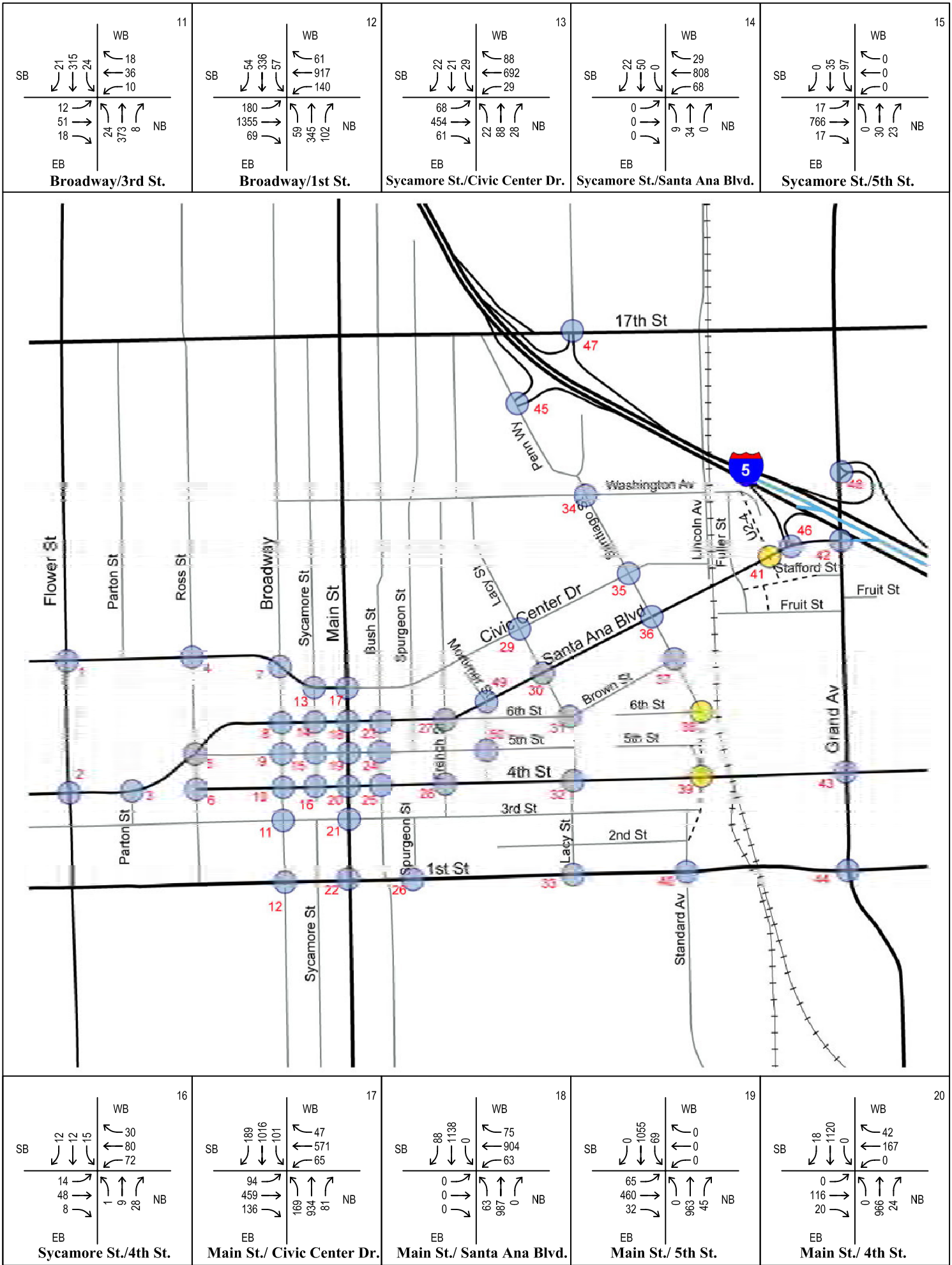
City of Santa Ana — Figure 4-2a

Santa Ana Transit Zoning Code Traffic Study — 2030 Without Project AM Peak Hour



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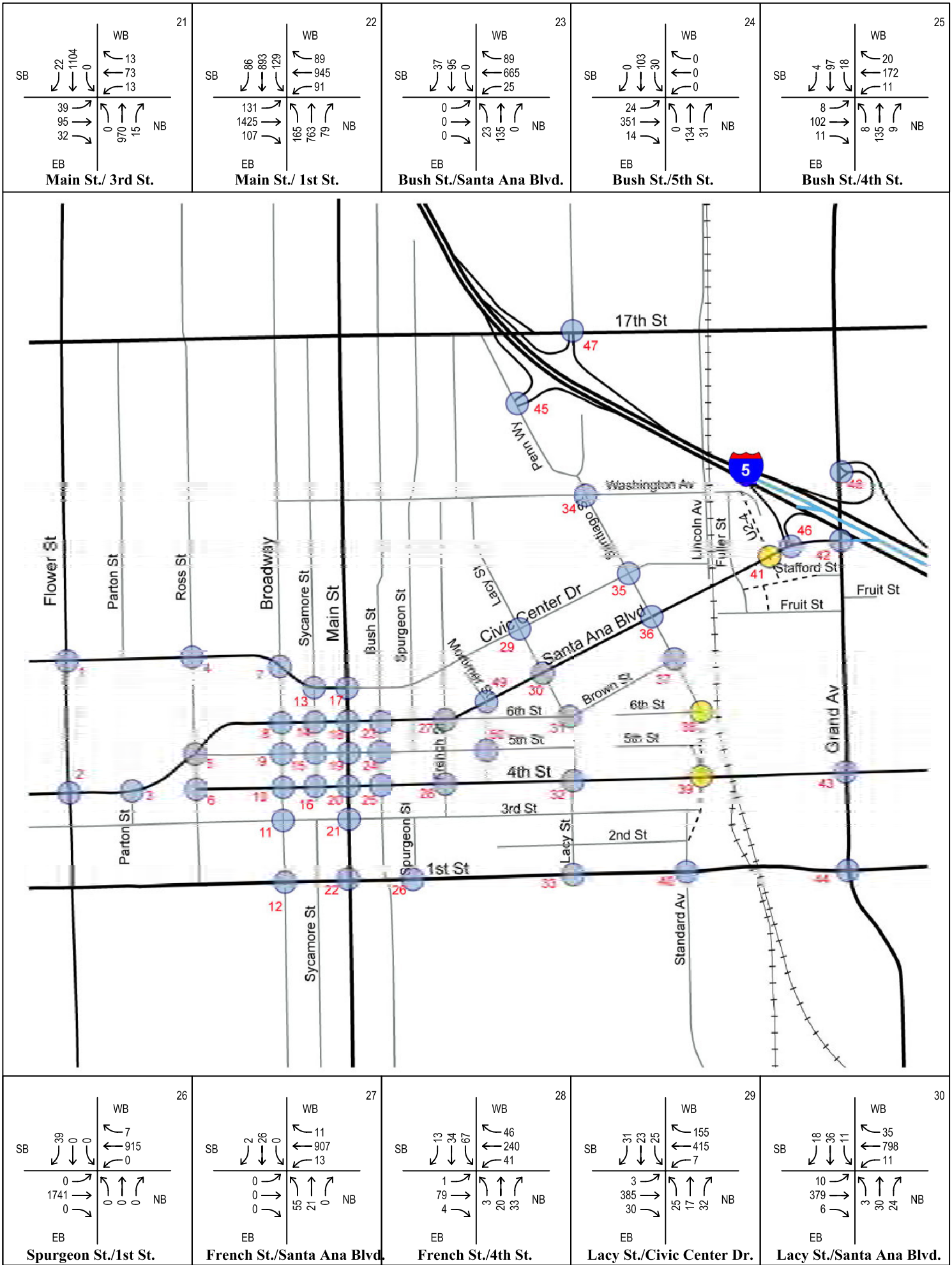
City of Santa Ana — Figure 4-2b

Santa Ana Transit Zoning Code Traffic Study — 2030 Without Project AM Peak Hour



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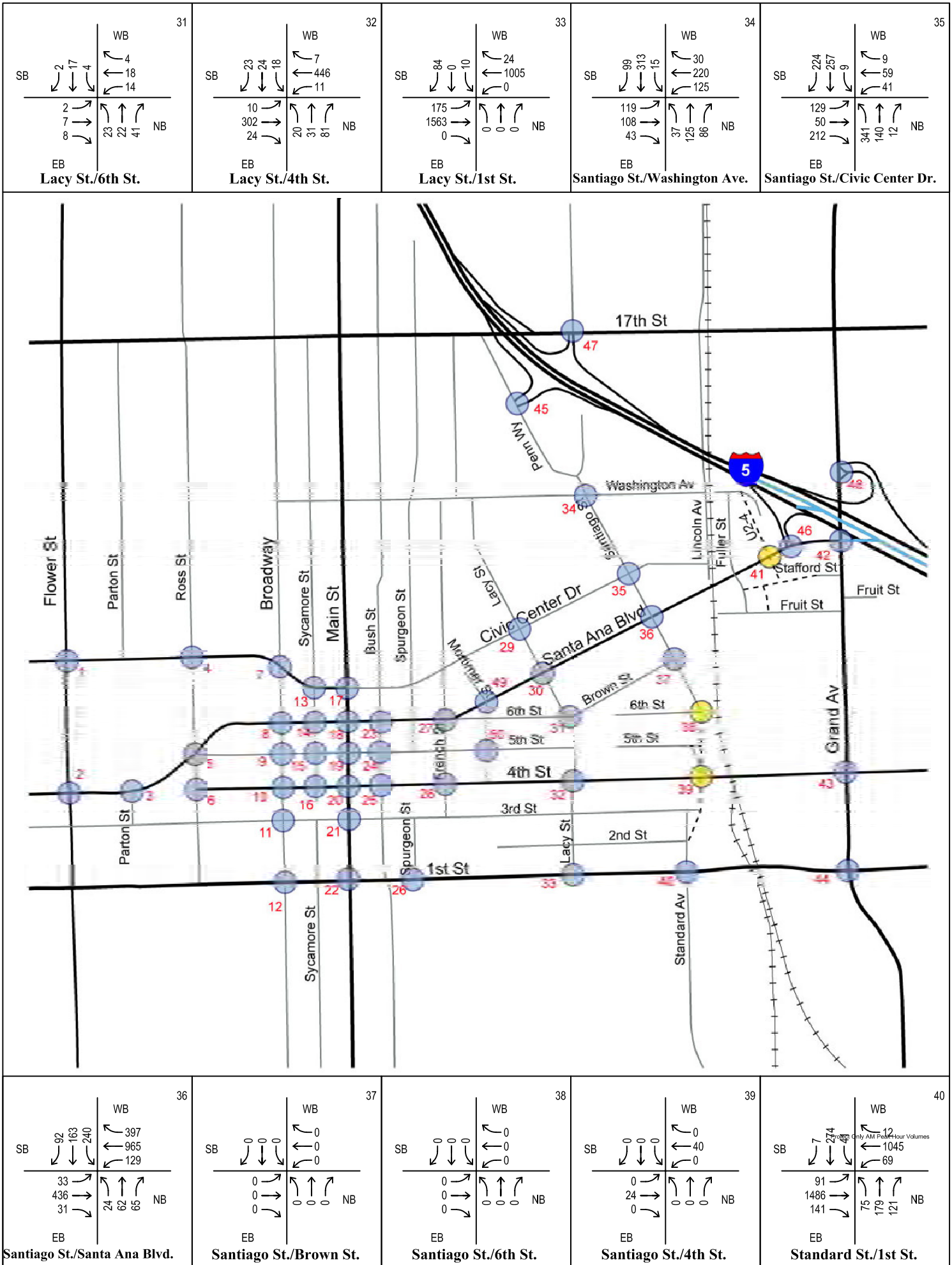
City of Santa Ana

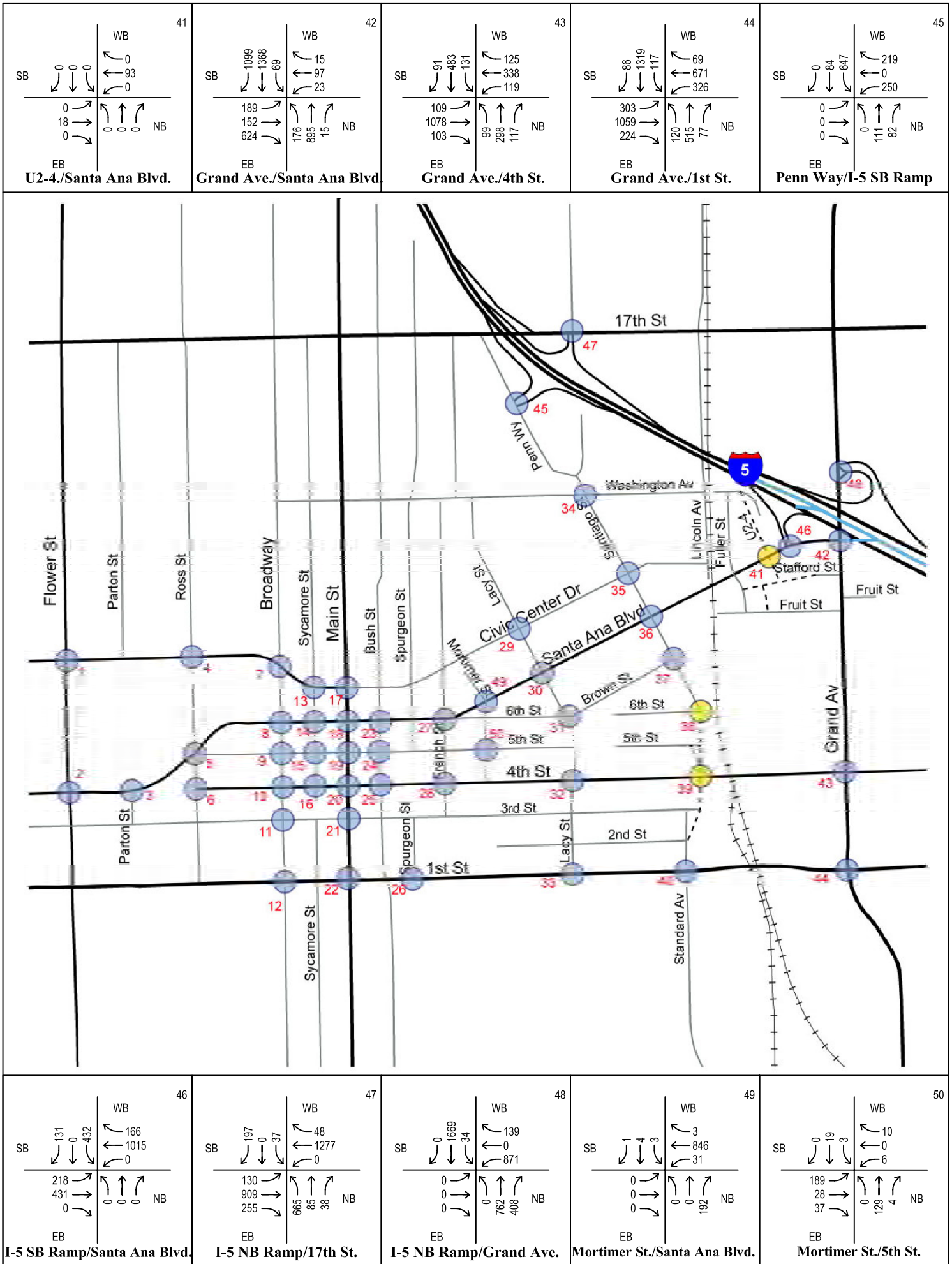
Figure 4-2c

Santa Ana Transit Zoning Code Traffic Study

2028 Without Project AM Peak Hour



KOA CORPORATION PLANNING & ENGINEERING	City of Santa Ana	Figure 4-2d
	Santa Ana Transit Zoning Code Traffic Study	2030 Without Project AM Peak Hour



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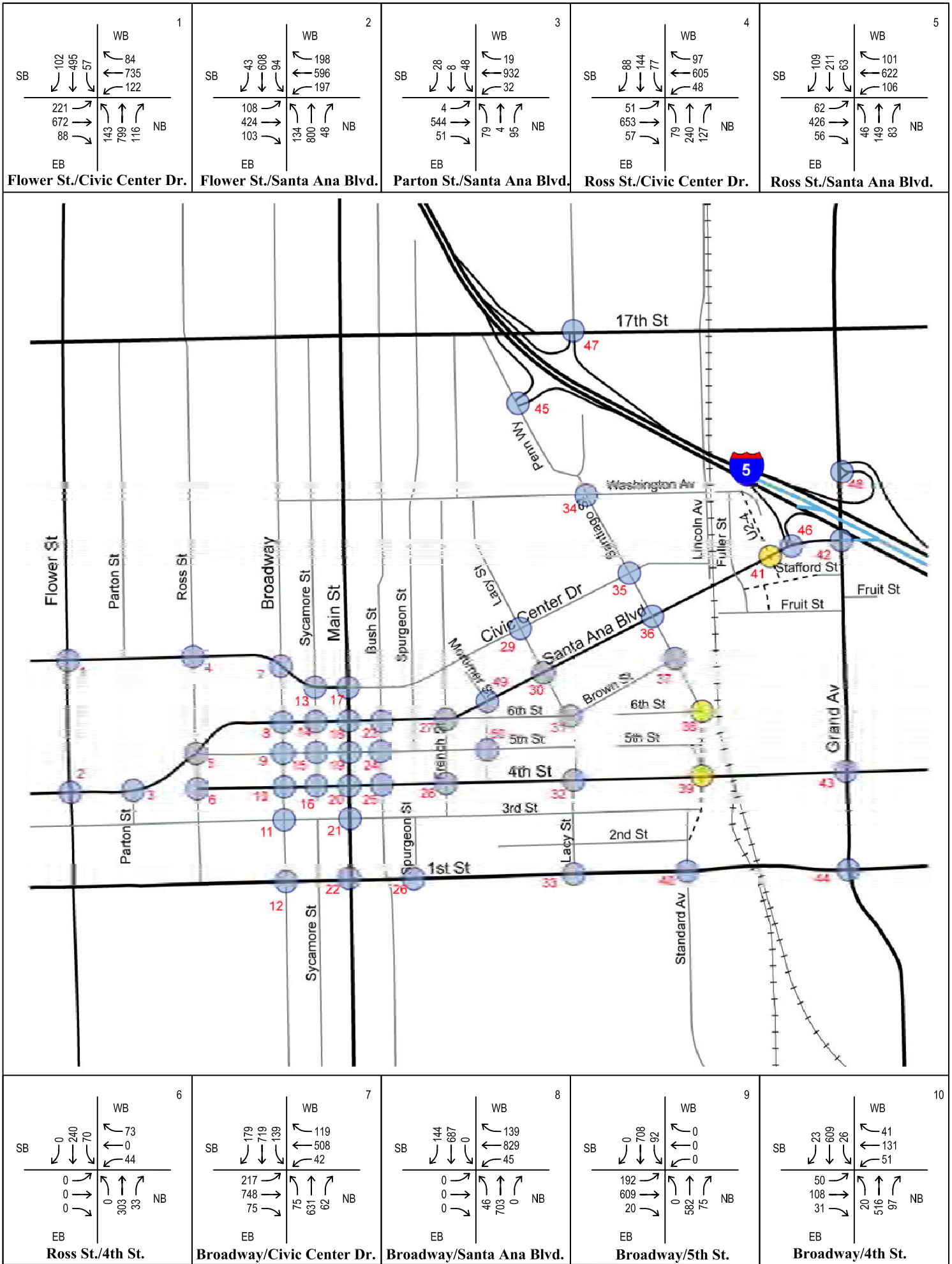
City of Santa Ana

Figure 4-2e

Santa Ana Transit Zoning Code Traffic Study

2030 Without Project AM Peak Hour



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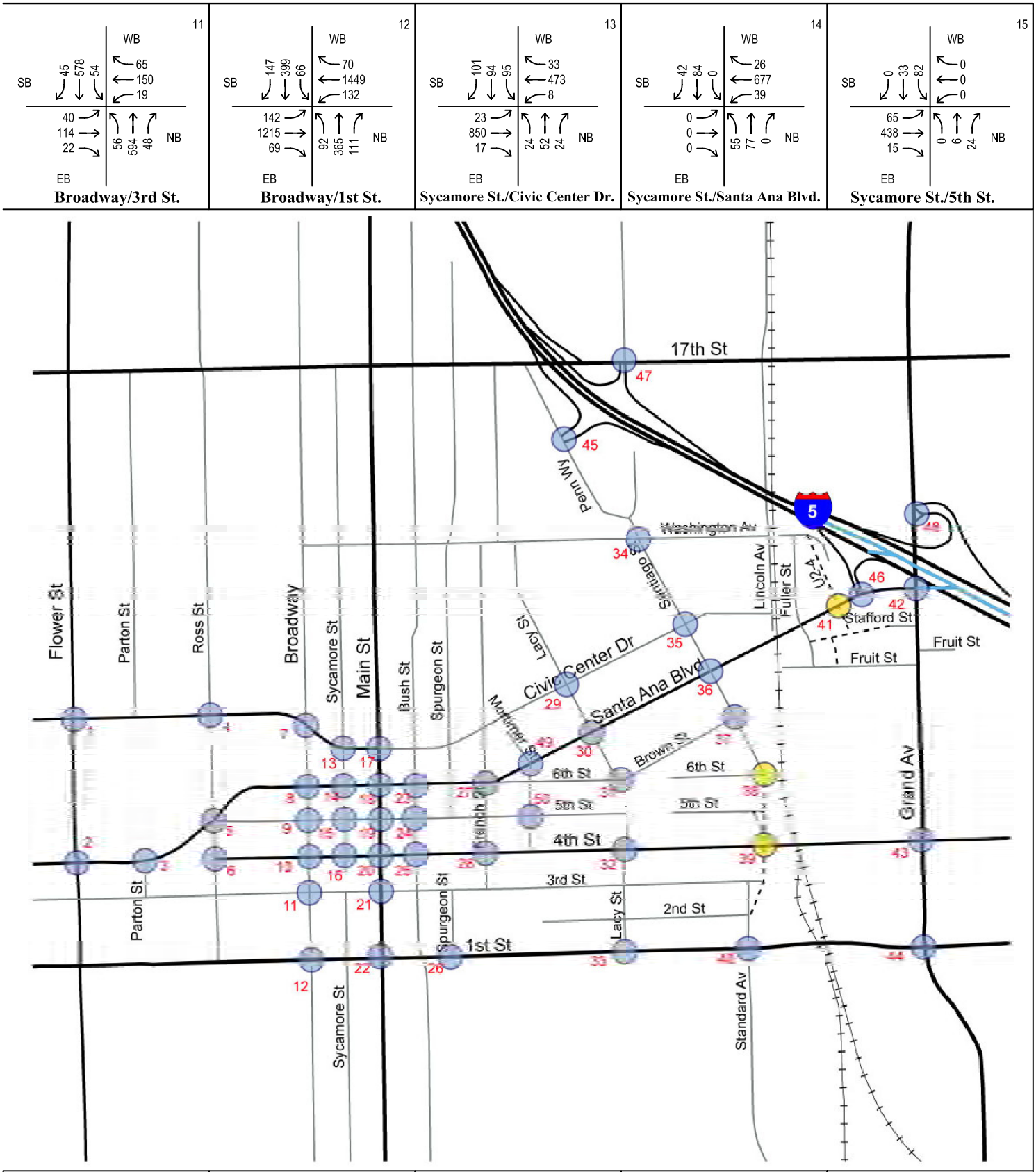
City of Santa Ana

Figure 4-2f

Santa Ana Transit Zoning Code Traffic Study

2030 Without Project PM Peak Hour



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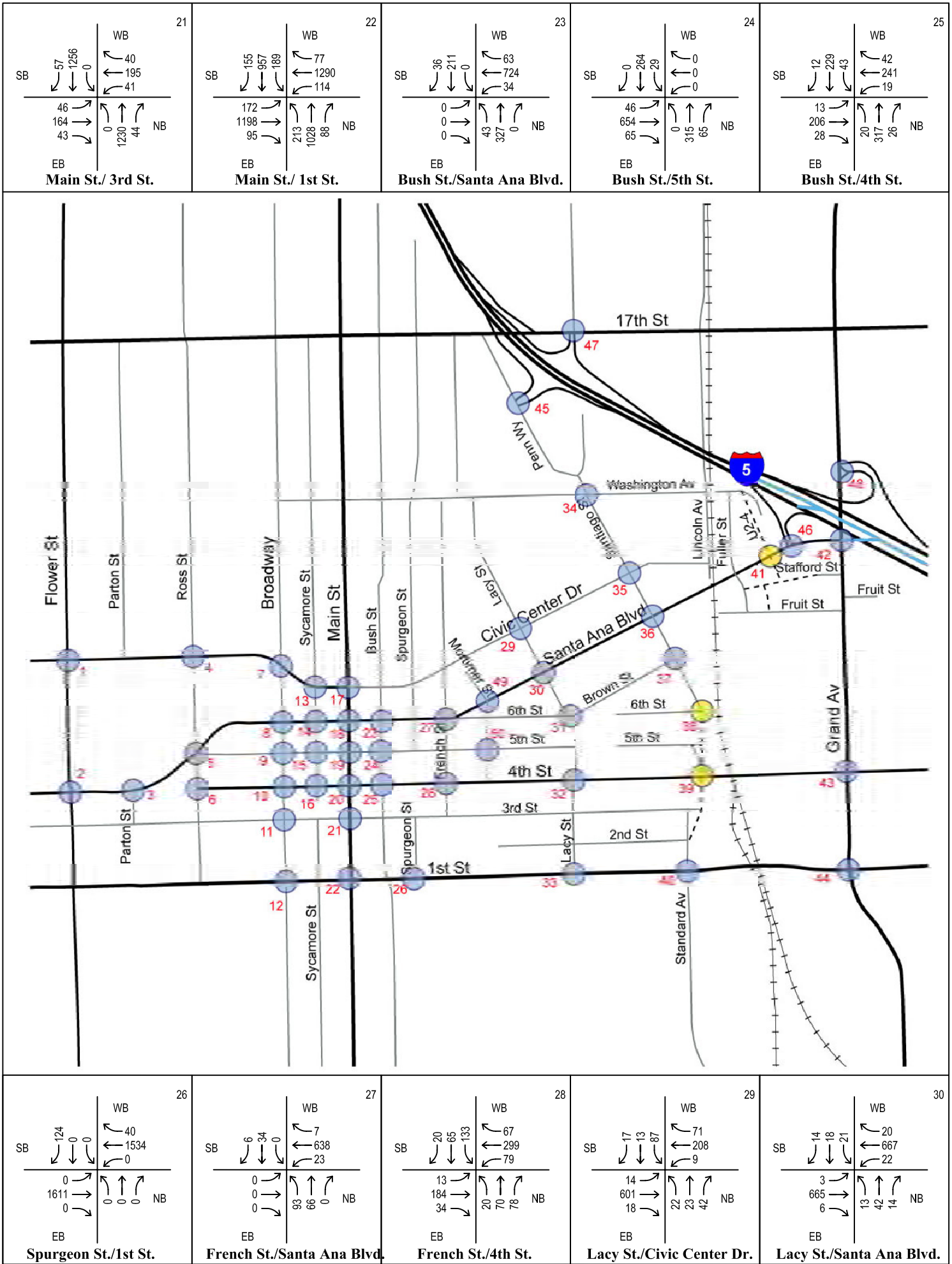
City of Santa Ana

Figure 4-2g

Santa Ana Transit Zoning Code Traffic Study

2030 Without Project PM Peak Hour



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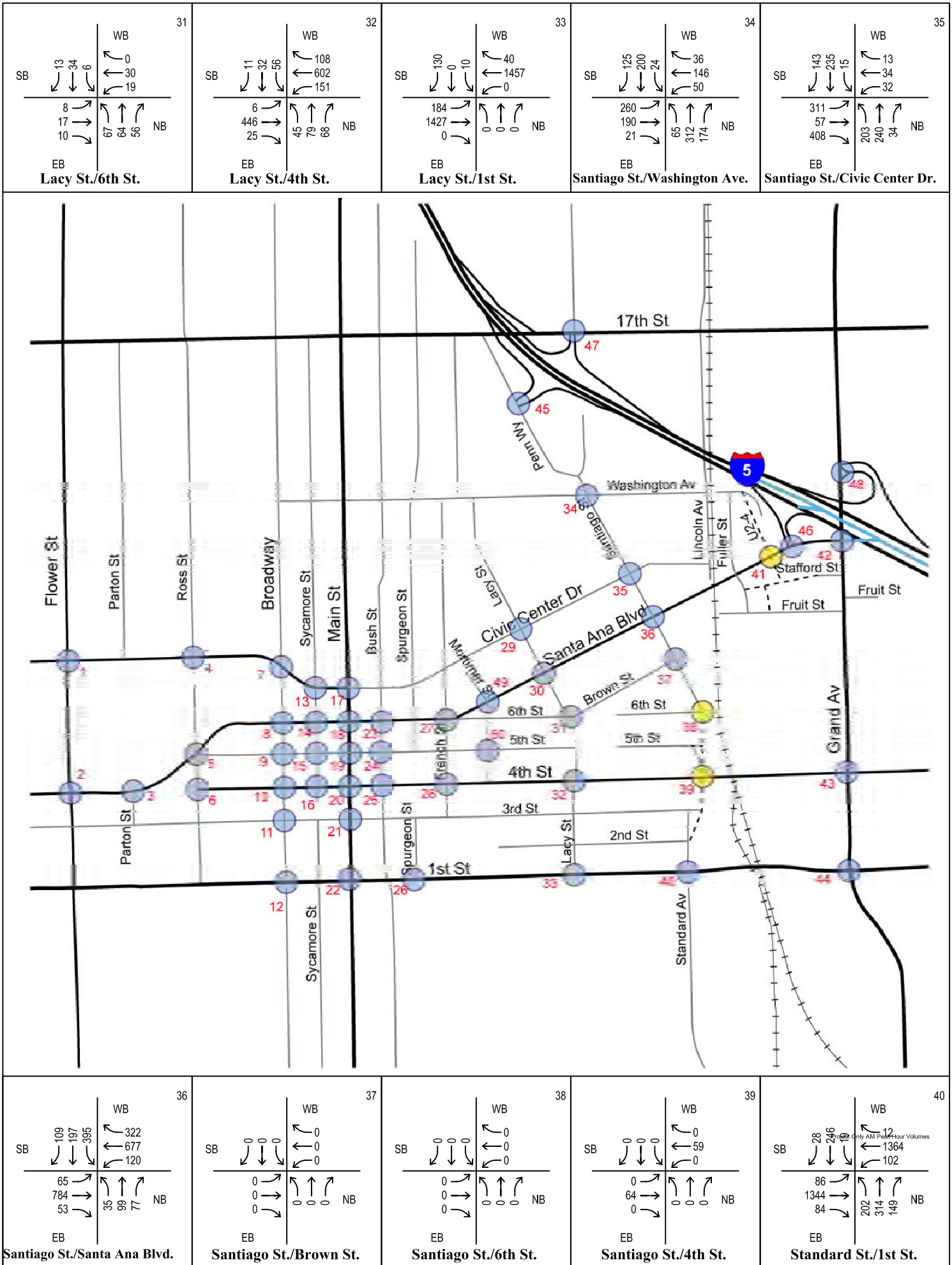
City of Santa Ana

Figure 4-2h

Santa Ana Transit Zoning Code Traffic Study

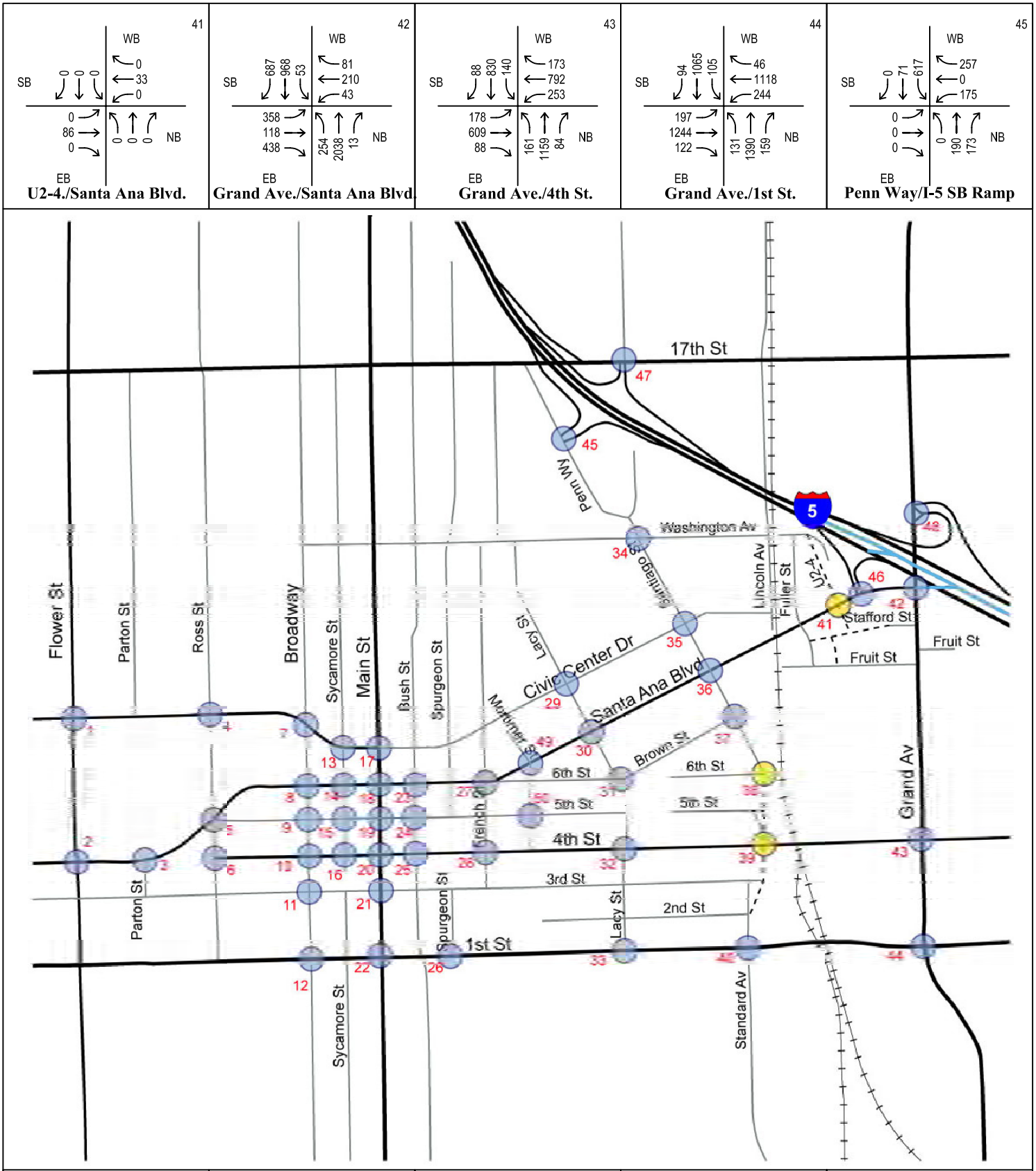
2030 Without Project PM Peak Hour



KOA CORPORATION
PLANNING & ENGINEERING

City of Santa Ana — Figure 4-2i

Santa Ana Transit Zoning Code Traffic Study — 2030 Without Project PM Peak Hour



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PLANNING & ENGINEERING

City of Santa Ana

Figure 4-2j

Santa Ana Transit Zoning Code Traffic Study

2030 Without Project PM Peak Hour

Table 4-2
2030 Without Project Peak Hour Intersection Conditions
(ICU Method)

Intersection	AM Peak Hour		PM Peak Hour	
	ICU	Level of Service	ICU	Level of Service
Signalized Intersections (Using ICU Method)				
Flower St. at Civic Center Dr.	0.683	B	0.734	C
Flower St. at Santa Ana Blvd.	0.572	A	0.587	A
Parton St. at Santa Ana Blvd.	0.278	A	0.372	A
Ross St. at Civic Center Dr.	0.517	A	0.474	A
Ross St. at Santa Ana Blvd.	0.475	A	0.395	A
Broadway at Civic Center Dr.	0.614	B	0.643	B
Broadway at Santa Ana Blvd.	0.468	A	0.522	A
Broadway at 5th St.	0.349	A	0.462	A
Broadway at 4th St.	0.298	A	0.409	A
Broadway at 3rd St.	0.336	A	0.613	B
Broadway at 1st St.	0.651	B	0.729	C
Sycamore St. at Civic Center Dr.	0.420	A	0.495	A
Main St. at Civic Center Dr.	0.751	C	0.750	C
Main St. at Santa Ana Blvd.	0.654	B	0.693	B
Main St. at 5th St.	0.499	A	0.633	B
Main St. at 4th St.	0.508	A	0.654	B
Main St. at 3rd St.	0.464	A	0.603	B
Main St. at 1st St.	0.773	C	0.872	D
Bush St. at Santa Ana Blvd.	0.295	A	0.403	A
Bush St. at 5th St.	0.242	A	0.442	A
Bush St. at 4th St.	0.270	A	0.464	A
French St. at 4th St.	0.291	A	0.462	A
Lacy St. at 4th St.	0.407	A	0.567	A
Santiago St. at Santa Ana Blvd.	0.541	A	0.677	B
Standard St. at 1st St.	0.808	D	0.833	D
Grand Ave. at Santa Ana Blvd.	0.807	D	0.902	E
Grand Ave. at 4th St.	0.646	B	0.728	C
Grand Ave. at 1st St.	0.700	C	0.777	D

Table 4-3
2030 Without Project Peak Hour Intersection Conditions
(HCM Method)

Intersection	AM Peak Hour		PM Peak Hour	
	Average/Worst Case Delay	Level of Service	Average/Worst Case Delay	Level of Service
Unsignalized Intersections				
Ross St. at 4th St.	10.8	B	12.3	B
Sycamore St. at Santa Ana Blvd.	21.8	C	20.8	C
Sycamore St. at 5th St.	15.7	C	13.7	B
Sycamore St. at 4th St.	7.9	A	9.1	A
Spurgeon St. at 1st St.	10.5	B	14.6	B
French St. at Santa Ana Blvd.	19.7	C	17.7	C
Lacy St. at Civic Center Dr.	20.3	C	33.2	D
Lacy St. at Santa Ana Blvd.	34.2	D	51.6	F
Lacy St. at 6th St.	7.2	A	7.9	A
Lacy St. at 1st St.	23.3	C	57.2	F
Santiago St. at Washington Ave.	17.1	B	26.9	D
Santiago St. at Civic Center Dr.	26.2	D	26.3	D
Mortimer St. at 5th St.	20.3	C	17.8	C
Mortimer St. At Santa Ana Blvd	9.0	A	21.4	C
Signalized Intersections (Caltrans, Using HCM)				
Penn Way at I-5 SB	22.2	C	23.5	C
Santa Ana Blvd at I-5 SB	27.2	C	28.3	C
17t St. at I-5 NB	33.3	C	40.7	D
Grand Ave at I-5 NB	21.2	C	50.2	D

4.3 Anticipated Project Buildout (2030) Without Project Roadway Segment Conditions

The roadway segment ADT analysis for 2030 Without Project conditions is included in Table 4-4. As indicated, a majority of the arterial roadways are operating at acceptable levels. The daily V/C ratio screening analysis indicates that the following locations are potentially experiencing capacity deficiencies under 2030 Without Project conditions:

- Main Street between 1st Street and Santa Ana Boulevard
- Santa Ana Boulevard West of I-5 SB Ramps
- Civic Center Drive between Lacy Street and Lincoln Avenue

The daily volume-to-capacity ratios provide a screening level analysis of daily traffic flows and potential operational problems within the study area. The peak hour analysis for intersections, presented in the previous table (Table 4-2 and Table 4-3), provides a more definitive analysis of the operation of the arterial roadways in the project area. Although a few roadway segments indicate deficiencies, the proposed mitigation should be based on the intersection analysis recommendations. All roadway segments should operate at acceptable level of services under City's General Plan circulation element designations with spot improvements at intersections proposed based on the intersection analysis.

Table 4-4 2030 Without Project Roadway Segment Daily Traffic Condition

Road	Segment	2030 Without Project ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
Flower Street	Santa Ana Blvd. to Civic Center Dr.	20,606	4D	37,500	A	
Flower Street	17th St. to Civic Center Dr.	19,312	4D	37,500	A	
Civic Center	West of Flower St.	20,065	4D	37,500	A	
Civic Center	Flower St. to Ross St.	18,993	4D	37,500	A	
Flower Street	Santa Ana Blvd. to 1st St.	20,739	4D	37,500	A	
Santa Ana Blvd.	West of Flower St.	11,075	4D	37,500	A	
Santa Ana Blvd.	Flower St. to Parton St.	13,704	4D	37,500	A	
Santa Ana Blvd.	Parton St. to Ross St.	13,704	4D	37,500	A	
Civic Center	Ross St. to Broadway	17,380	4D	37,500	A	
Santa Ana Blvd.	Ross St. to Broadway	13,704	3D	28,150	A	
Broadway	Civic Center Dr. to Santa Ana Blvd.	21,230	4D	37,500	A	
Broadway	Civic Center Dr. to Washington Ave.	27,580	4D	37,500	C	
Civic Center	Broadway to Sycamore St.	16,974	4D	37,500	A	
Broadway	Santa Ana Blvd. To 5th St.	18,029	4D	37,500	A	
Santa Ana Blvd.	Broadway to Sycamore St.	11,716	3D	28,150	A	
Broadway	5th St. to 4th St.	17,961	4D	37,500	A	
5th St.	Broadway to Ross St.	9,017	3D	28,150	A	
5th St.	Broadway to Main St.	9,017	3D	28,150	A	
Broadway	3rd St. to 4th St.	17,537	4U	25,000	C	
Broadway	3rd St. to 1st St.	17,799	4U	25,000	C	
Broadway	South of 1st St.	13,732	4U	25,000	A	
1st St.	Broadway to Ross St.	44,751	6D	56,300	C	

Road	Segment	2030 Without Project ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
1st St.	Main St. to Broadway	46,020	6D	56,300	D	
Civic Center	Sycamore St. to Main St.	16,142	4D	37,500	A	
Santa Ana Blvd.	Sycamore St. to Main St.	11,342	3D	28,150	A	
5th St.	Sycamore St. to Broadway	9,023	3D	28,150	A	
5th St.	Sycamore St. to Main St.	9,229	3D	28,150	A	
Main St.	Civic Center Dr. to Santa Ana Blvd.	35,475	4D	37,500	E	E ok
Main St.	Civic Center Dr. to Washington Ave	36,653	4D	37,500	E	E ok
Civic Center	Main St. to Bush St.	12,756	4D	37,500	A	
Main St.	Santa Ana Blvd. To 5th St.	37,204	4D	37,500	E	E ok
Santa Ana Blvd.	Main St. to Bush St.	11,378	3D	28,150	A	
Main St.	5th St. to 4th St.	37,179	4U	25,000	F	
5th St.	Main St. to Bush St.	6,729	3D	28,150	A	
Main St.	3rd St. to 4th St.	32,491	4U	25,000	F	
Main St.	1st St. to 3rd St.	32,491	4U	25,000	F	
Santa Ana Blvd.	Bush St. to Spurgeon St.	11,294	3D	28,150	A	
5th St.	Bush St. to French St.	6,538	3D	28,150	A	
1st St.	Spurgeon St. to Main St.	42,436	6D	56,300	C	
Santa Ana Blvd.	Lacy St. Standard Ave	16,188	4D	37,500	A	
Civic Center	French St to Lacy St	14,027	4D	37,500	A	
Santa Ana Blvd.	Lacy St. to French St.	16,199	2D	18,750	D	
4th St.	Lacy St. to French St.	13,171	2D	18,750	C	
1st St.	Lacy St. to Spurgeon St.	42,984	6D	56,300	C	
1st St.	Lacy St. to Standard Ave	42,984	6D	56,300	C	
Santiago St.	Washington Ave. to Civic Center Dr.	11,475	4D	37,500	A	
Santiago St.	Washington Ave. to 17th St	11,031	4D	37,500	A	
Santiago St.	Santa Ana Blvd to Civic Center Dr.	11,126	4D	37,500	A	
Civic Center	Santiago St to Lacy St	13,373	2U	12,500	F	
Civic Center	Lincoln Ave to Santiago St	13,320	2U	12,500	F	
Santiago St.	Santa Ana Blvd. to Brown St.	7,426	4D	37,500	A	
Santa Ana Blvd.	Santiago St. to Lacy St	16,429	4D	37,500	A	
Santa Ana Blvd.	Santiago St. to U-24	22,625	6D	56,300	A	
4th St.	Santiago St to Lacy St	19,389	4D	37,500	A	
Grand Ave.	4th St. to Santa Ana Blvd	41,729	6D	56,300	C	
Grand Ave.	Santa Ana Blvd to 17th St	36,191	6D	56,300	B	
Santa Ana Blvd.	East of Grand Ave.	8,908	4D	37,500	A	

Road	Segment	2030 Without Project ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
Grand Ave.	1st St. to 4th St.	35,290	6D	56,300	B	
4th St.	Grand Ave to Santiago St	19,769	4D	37,500	A	
4th St.	East of Grand Ave.	22,742	4D	37,500	B	
Grand Ave.	South of 1st St.	45,394	6D	56,300	D	
1st St.	Standard Ave to Grand Ave	44,898	6D	56,300	C	
1st St.	East of Grand Ave.	40,076	6D	56,300	C	
Penn Way	South of I-5 SB Ramps	9,489	2D	18,750	A	
Penn Way	North of I-5 SB Ramps	15,452	4D	37,500	A	
Santa Ana Blvd.	West of I-5 SB Ramps	40,061	4D	37,500	F	
Santa Ana Blvd.	East of I-5 SB Ramps	25,782	4D	37,500	B	
17th St.	West of I-5 NB Ramps	48,954	6D	56,300	D	
17th St.	East of I-5 NB Ramps	38,875	6D	56,300	B	
Grand Ave.	South of I-5 NB Ramps	50,241	6D	56,300	D	
Grand Ave.	North of I-5 NB Ramps	46,432	6D	56,300	D	

4.4 Without Project (2030) Peak Hour Freeway Ramp Conditions

2030 Without Project peak hour ramp analysis results are presented on Table 4-5. All ramps operate at LOS D or better during the AM and/or PM peak hour time periods except the northbound on ramp at the interchange of I-5 at Santa Ana Boulevard.

Table 4-5 2030 Without Project Peak Hour Freeway Ramp Analysis

INTER-CHANGE	RAMP	RAMP TYPE CODE[1]	LANES	PEAK HOUR CAPACITY	AM PEAK HOUR			PM PEAK HOUR		
					VOL	V/C	LOS	VOL	V/C	LOS
I-5 at 17th St.	SB On	4	2	1,800	729	0.41	A	790	0.44	A
	NB Loop On	4	2	1,800	255	0.14	A	398	0.22	A
	SB Off	5	1	1,500	469	0.31	A	432	0.29	A
	NB Off	5	1	1,500	788	0.53	A	910	0.61	A
I-5 at Santa Ana Blvd.	SB Direct On (HOV)	6	2	2,250	236	0.10	A	184	0.08	A
	SB Loop On	4	2	1,800	384	0.21	A	677	0.38	A
	NB Loop On	4	2	1,800	442	0.25	A	714	0.40	A
	SB Off	5	1	1,500	563	0.38	A	455	0.30	A
	NB Off	5	1	1,500	1010	0.67	B	1412	0.94	E

Note 1 : Reference to Freeway Ramp Capacity Assumptions Table

4 - Two-lane Metered On-Ramp, 2 Mixed Flow Lanes at Meter

5 - One-lane Unmetered Ramp

6 - Two-lane Unmetered On-Ramp, tapers to one merge lane at or beyond gore point

5. GENERAL PLAN (2035) WITHOUT PROJECT TRAFFIC CONDITIONS

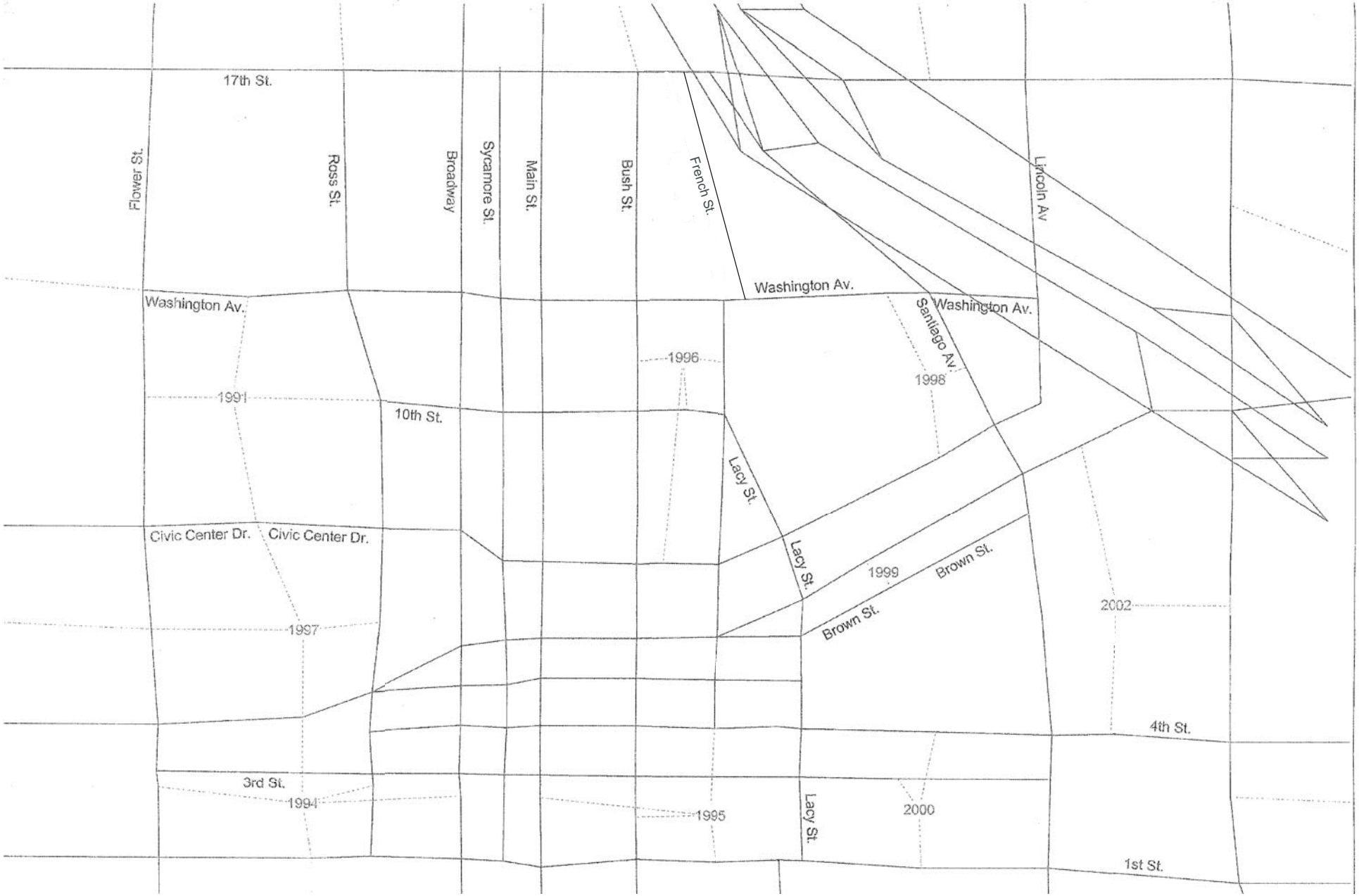
This section documents the General Plan Buildout (2035) traffic conditions without the addition of project-related traffic to the surrounding street system. It includes development of the buildout traffic conditions in the study area based on traffic growth projections provided by the OCTAM model applied to existing traffic patterns. The methodology of the OCTAM 3.2 and 3.3 traffic models was documented in Section 2.9 of this report. KOA Corporation worked closely with OCTA staff to refine the OCTAM model to assist the traffic study. Figure 5-1 illustrates the refined highway network in the traffic model. Appendix F includes the output link volumes for AM, PM, and ADT from the 2000 and 2030 traffic models, the existing traffic volumes and the resulted 2035 adjusted link volumes for AM, PM, and ADT. Appendix F includes the initial refined 2035 turning movement volumes for each intersection for both AM and PM peak hours based on the NCHRP-255 methodology. Those volumes are then compared with the 2030 Without Project conditions to ensure all cumulative projects being considered under the General Plan conditions. The final result is a set of AM and PM intersection volumes suitable to conduct the analysis for 2035 Without Project conditions.

5.1 General Plan (2035) Without Project Intersection Conditions

Figures 5-2a through Figure 5-2e illustrate the AM peak hour volumes for the 50 intersections while Figures 5-2f through Figure 5-2j illustrate the PM peak hour volumes for General Plan 2035 Without Project conditions. Tables 5-1 and 5-2 illustrate the future without project intersection level of service conditions. As shown in the table, the following intersections will operate at unacceptable levels of service during AM or PM peak hours under 2035 Without Project conditions. Appendix G includes all analysis worksheets for 2035 Without Project conditions.

- Flower Street at Civic Center Drive (Signalized)
- Main Street at 1st Street (Signalized)
- Grand Avenue at Santa Ana Boulevard (Signalized)
- Grand Avenue at I-5 NB Ramp (Signalized)
- 17th Street at I-5 NB Ramp (Signalized)
- Lacy Street at Civic Center Drive (Two-way stop control)
- Lacy Street at Santa Ana Boulevard (Two-way stop control)
- Lacy Street at 1st Street (Two-way stop control)
- Santiago Street at Washington Avenue (All-way stop control)
- Santiago Street at Civic Center Drive (All-way stop control)

Four intersections warrant signals under 2035 Without Project conditions (Lacy Street at 1st Street, Lacy Street at Santa Ana Boulevard, Santiago Street at Washington Avenue, and Santiago Street at Civic Center Drive). All signal warrant worksheets are included in Appendix C of this report.



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7/19/2007 by MZ
Viper Software by the Urban Analysis Group

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City of Santa Ana

Santa Ana Transit Zoning Code Traffic Study

Figure 5-1

Refined OCTAM 3.2 Highway Network

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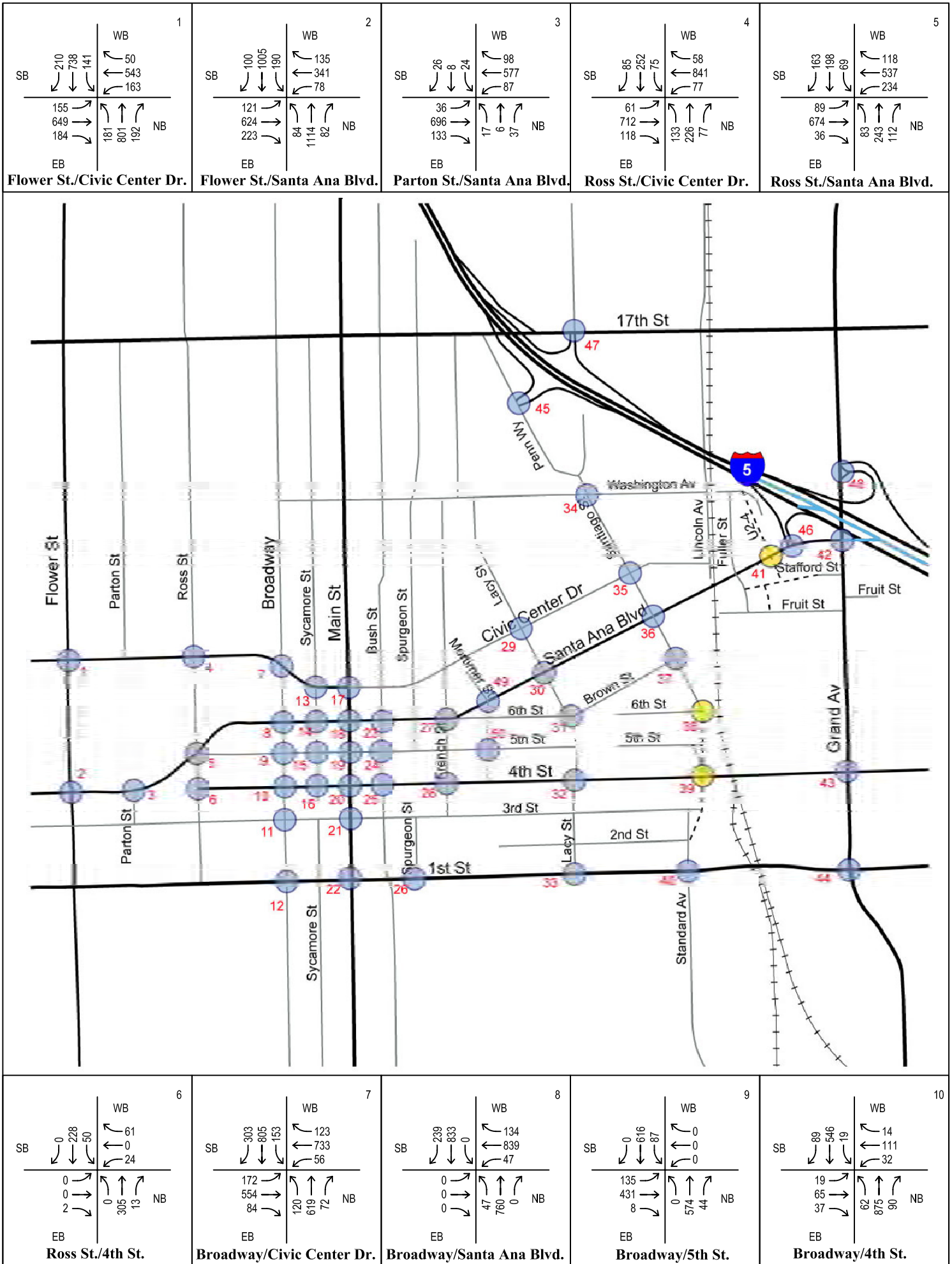

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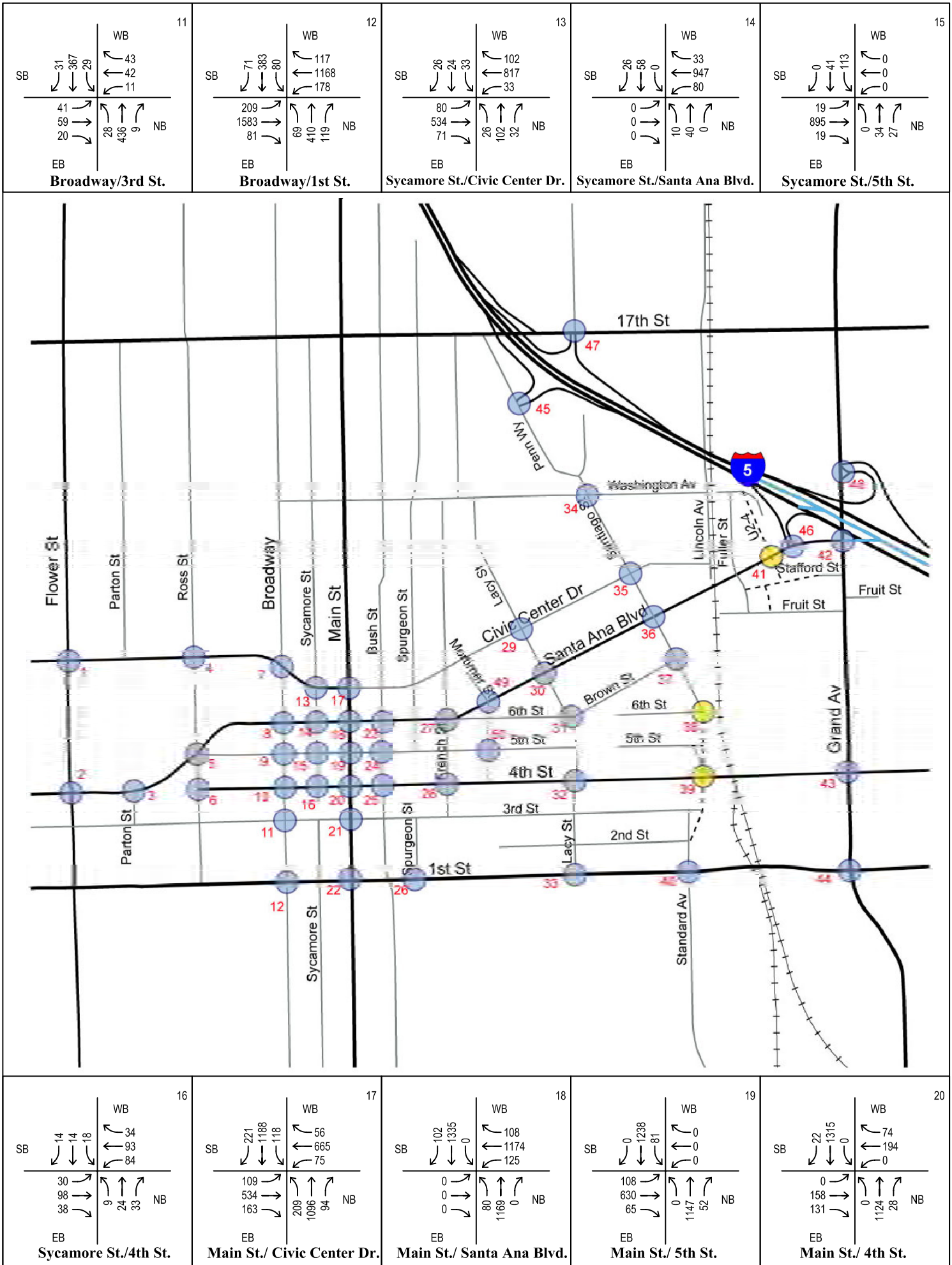
Figure 5-2a

Santa Ana Transit Zoning Code Traffic Study

2035 Without Project AM Peak Hour



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City of Santa Ana — Figure 5-2b

Santa Ana Transit Zoning Code Traffic Study — 2035 Without Project AM Peak Hour

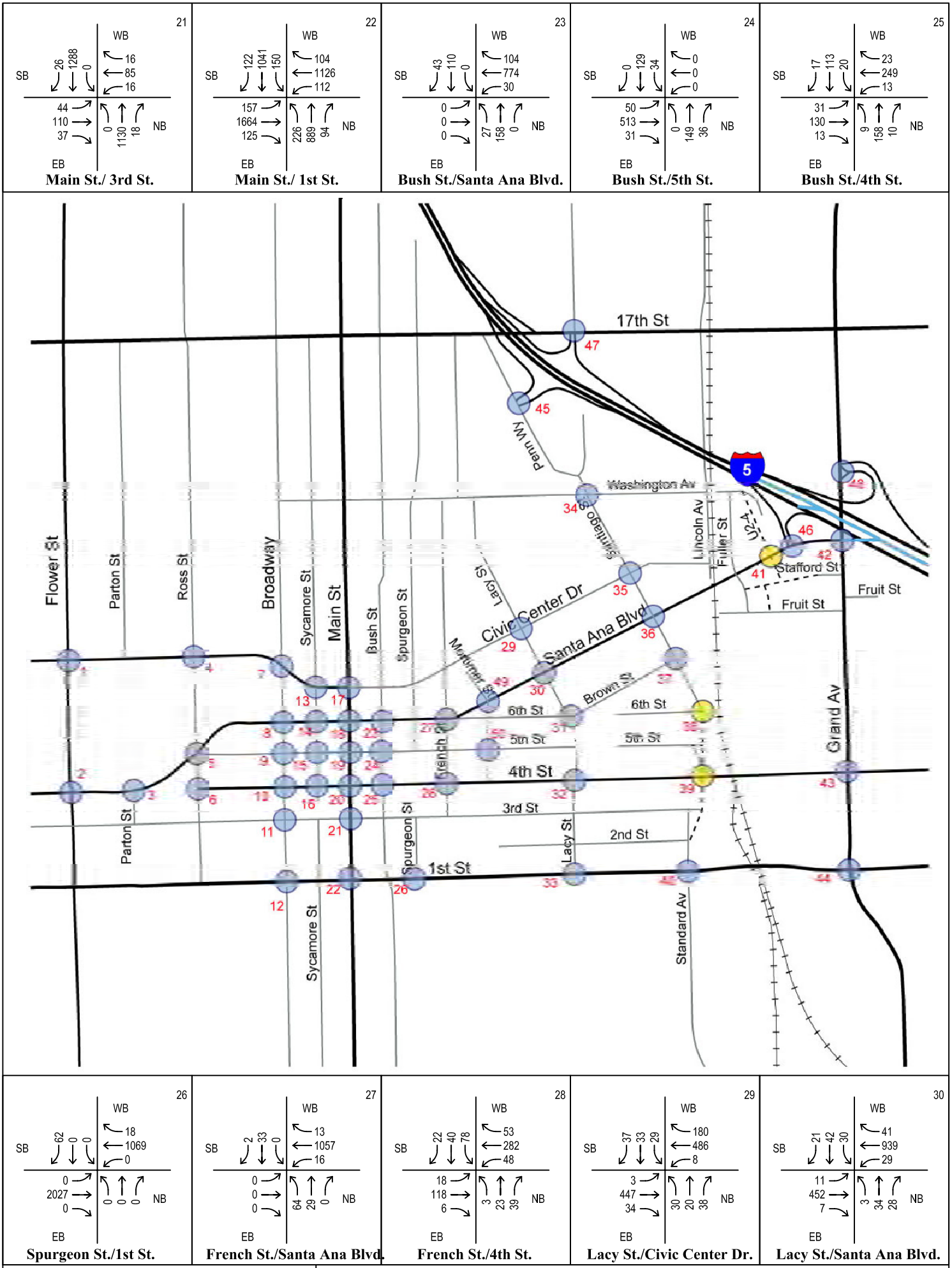

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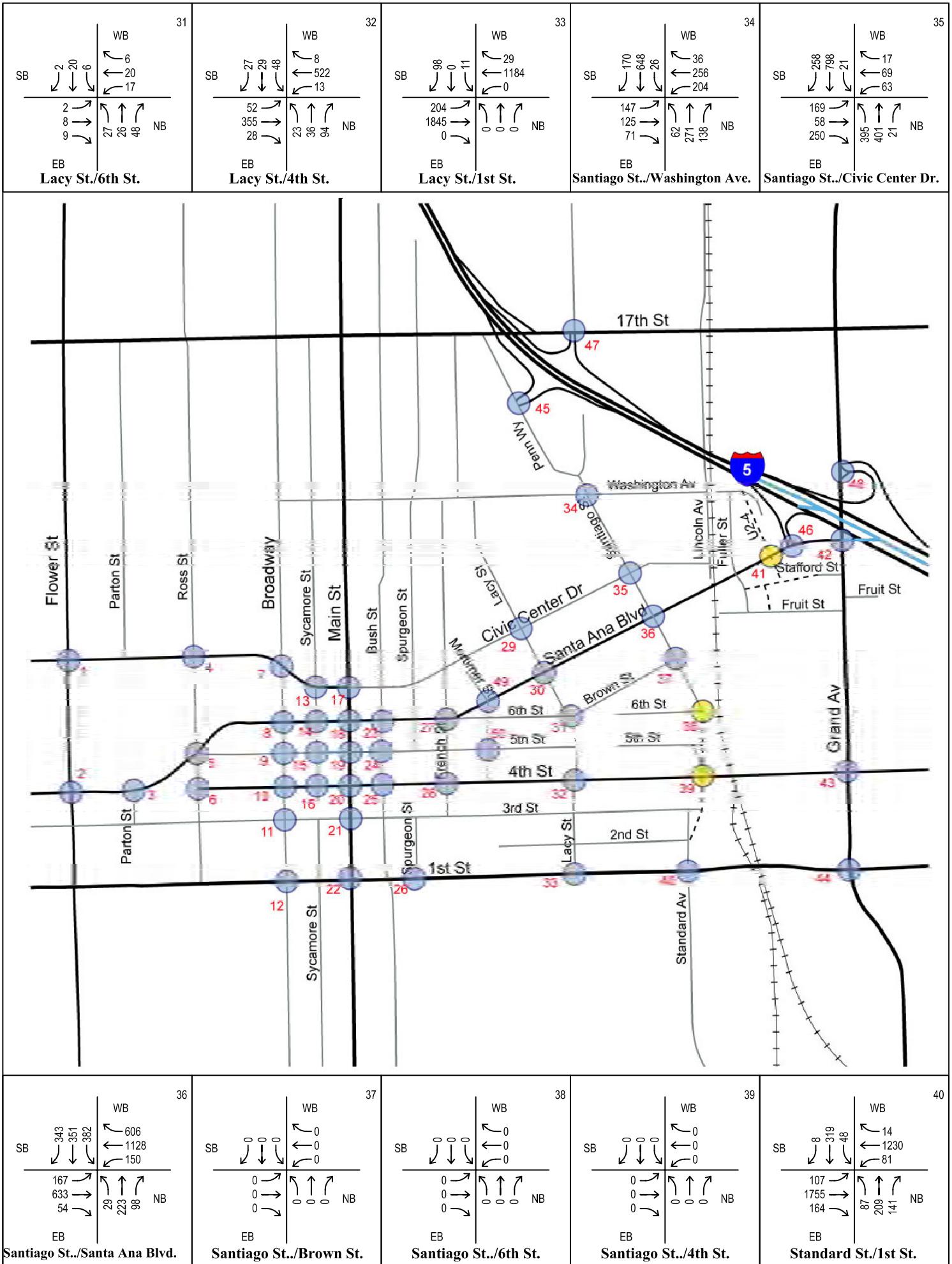
Figure 5-2c

Santa Ana Transit Zoning Code Traffic Study

2035 Without Project AM Peak Hour



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City of Santa Ana — Figure 5-2d

Santa Ana Transit Zoning Code Traffic Study — 2035 Without Project AM Peak Hour

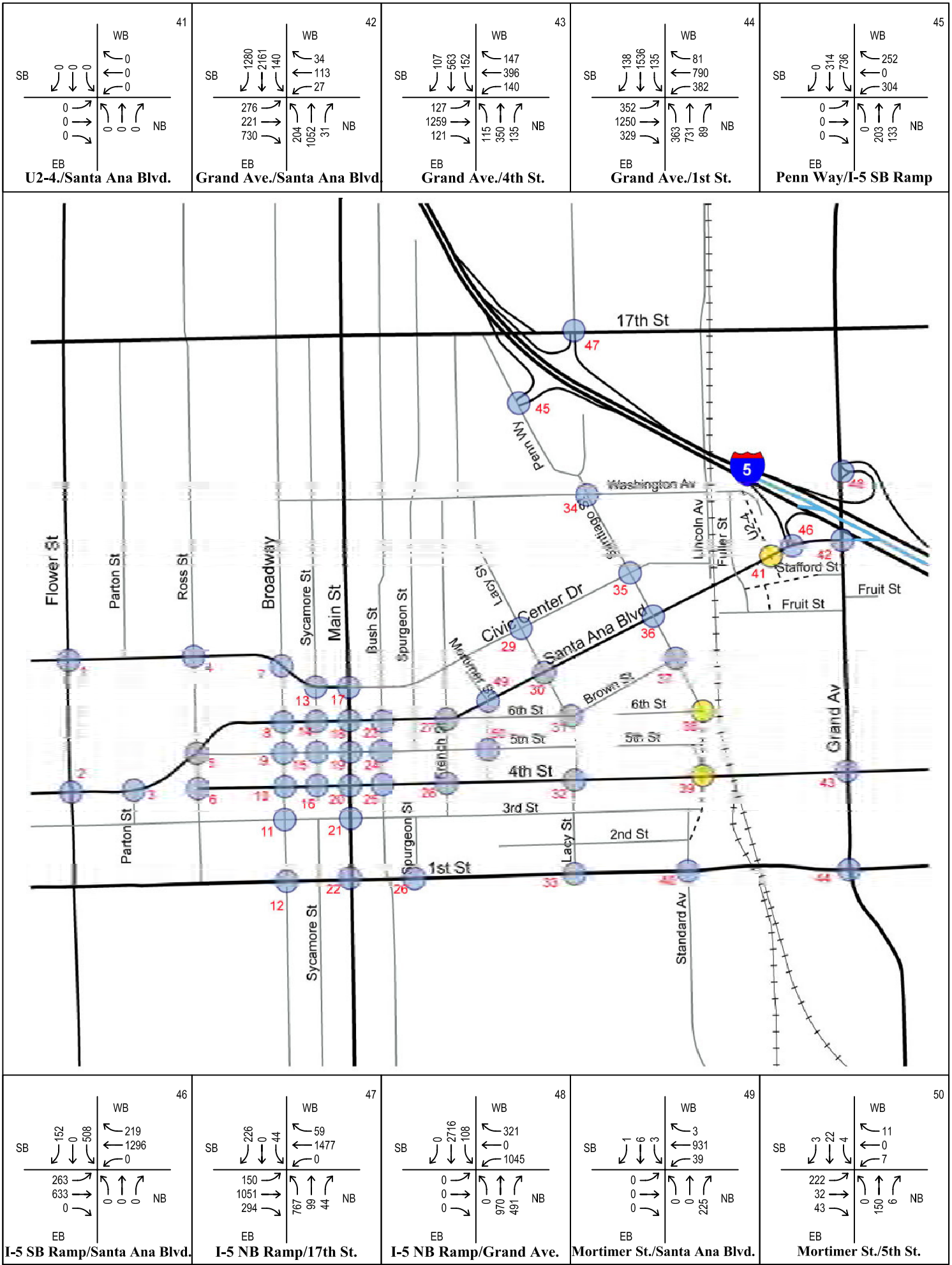

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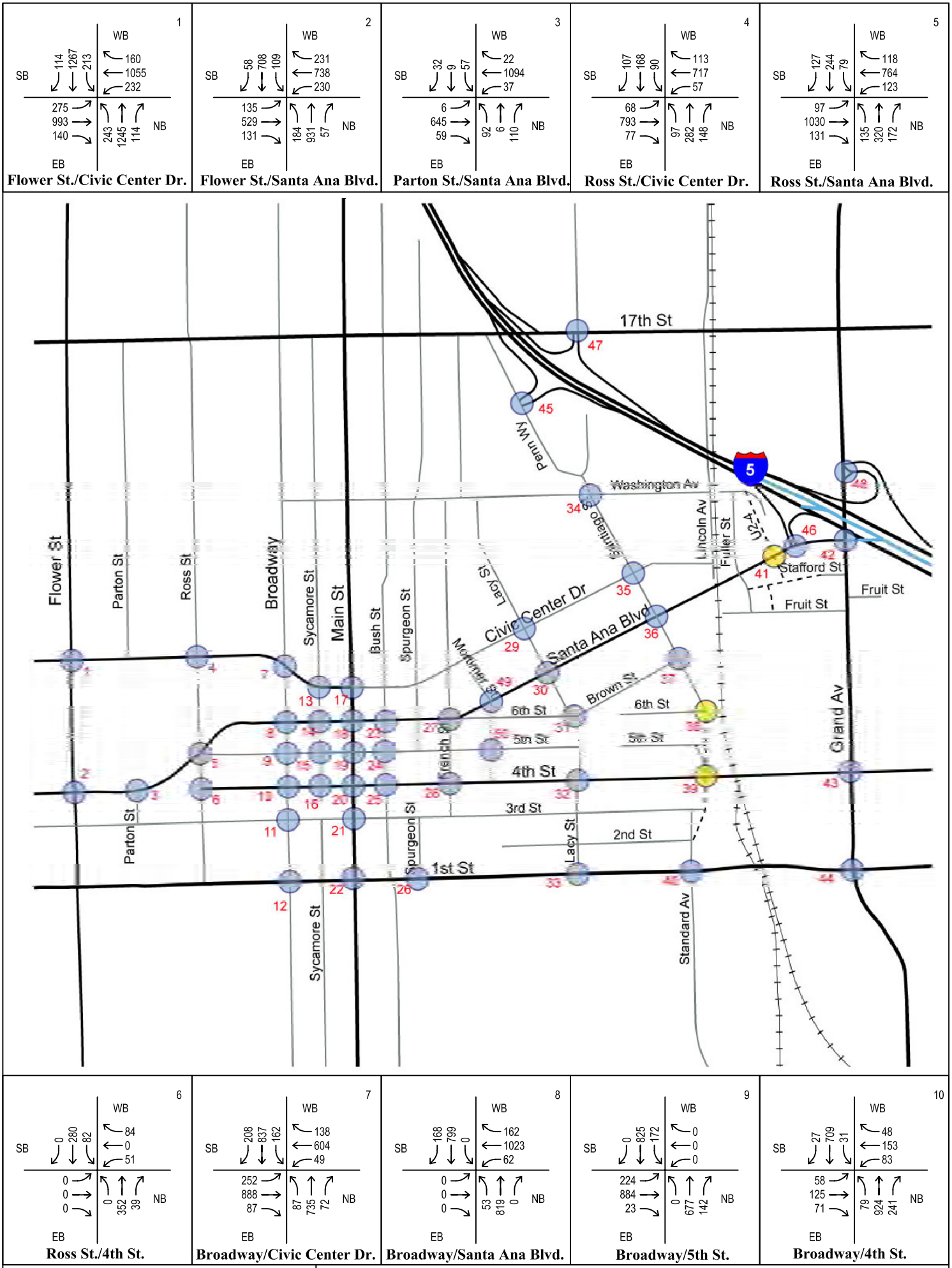
Figure 5-2e

Santa Ana Transit Zoning Code Traffic Study

2035 Without Project AM Peak Hour



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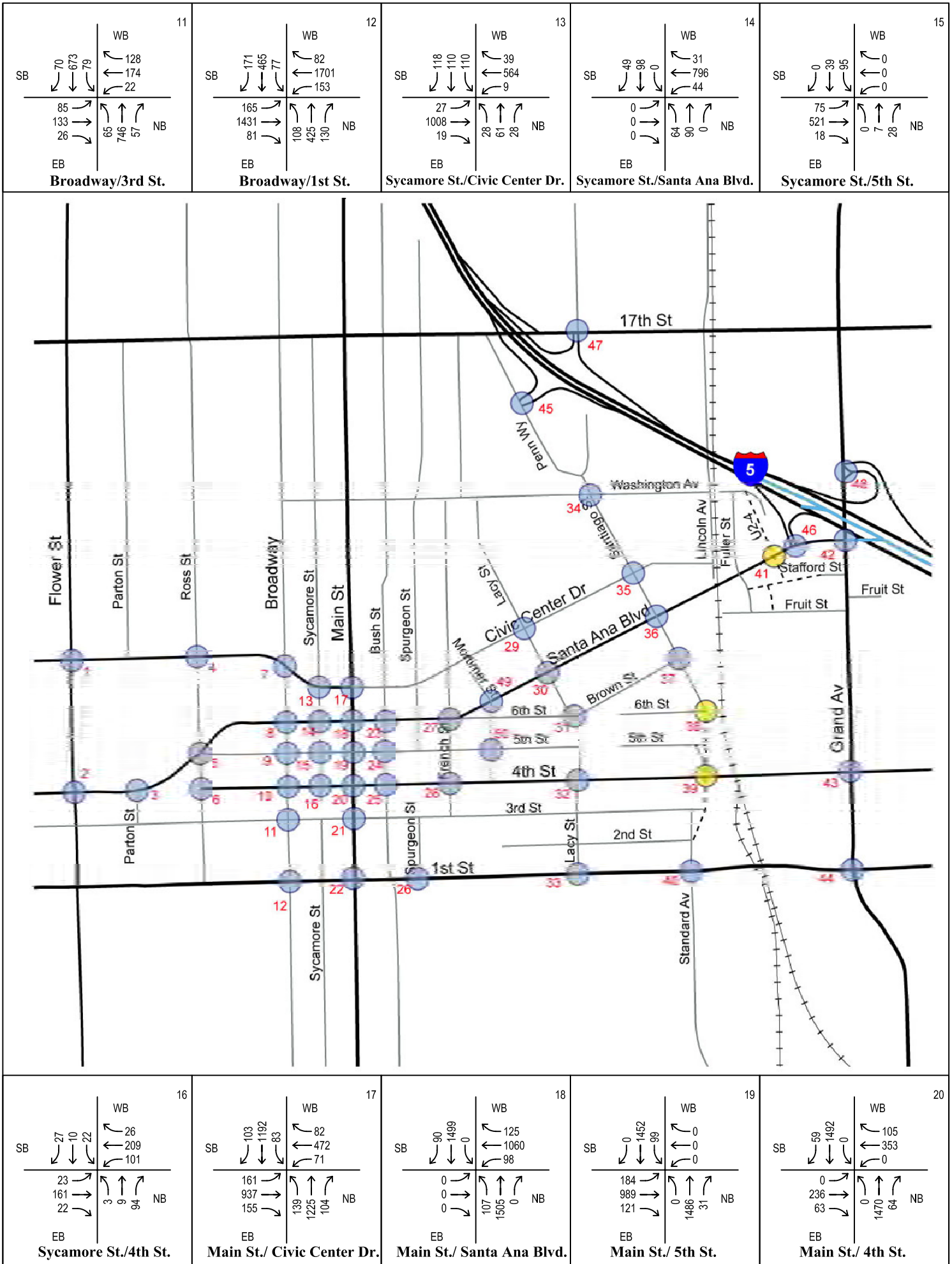
City of Santa Ana — Figure 5-2f

Santa Ana Transit Zoning Code Traffic Study — 2035 Without Project PM Peak Hour



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City of Santa Ana

Figure 5-2g

Santa Ana Transit Zoning Code Traffic Study

2035 Without Project PM Peak Hour

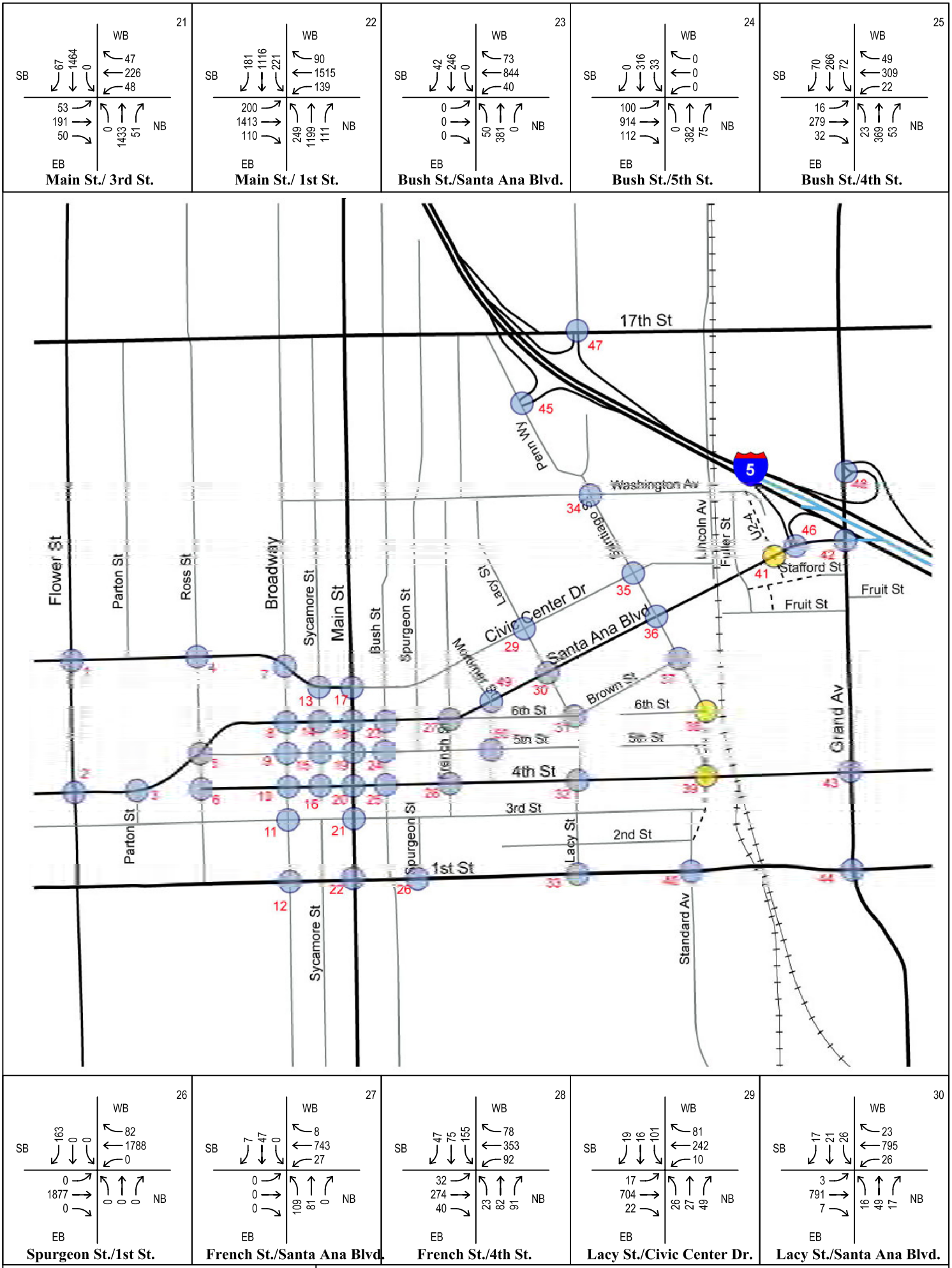

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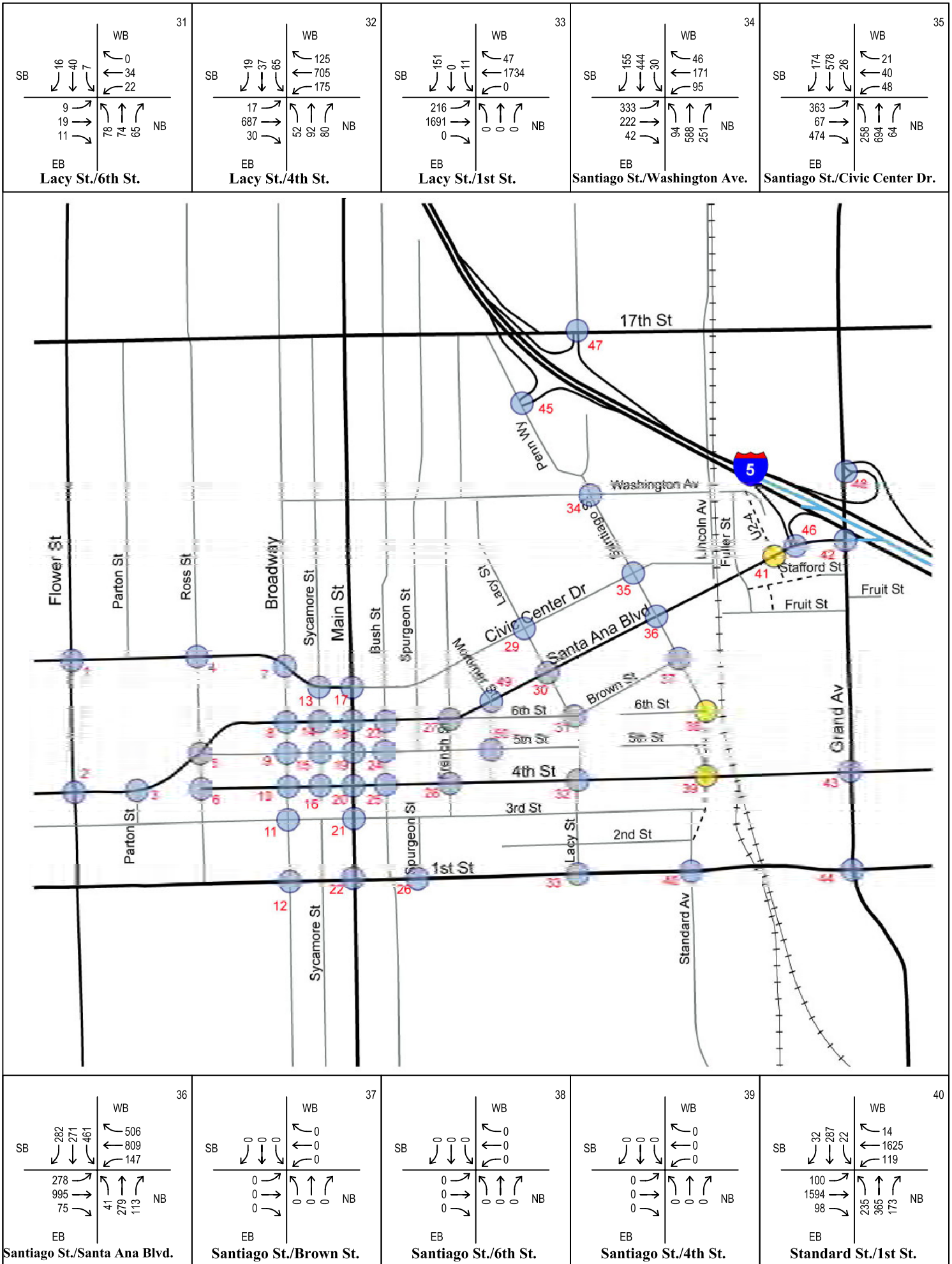
Figure 5-2h

Santa Ana Transit Zoning Code Traffic Study

2035 Without Project PM Peak Hour



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City of Santa Ana — Figure 5-2i

Santa Ana Transit Zoning Code Traffic Study — 2035 Without Project PM Peak Hour

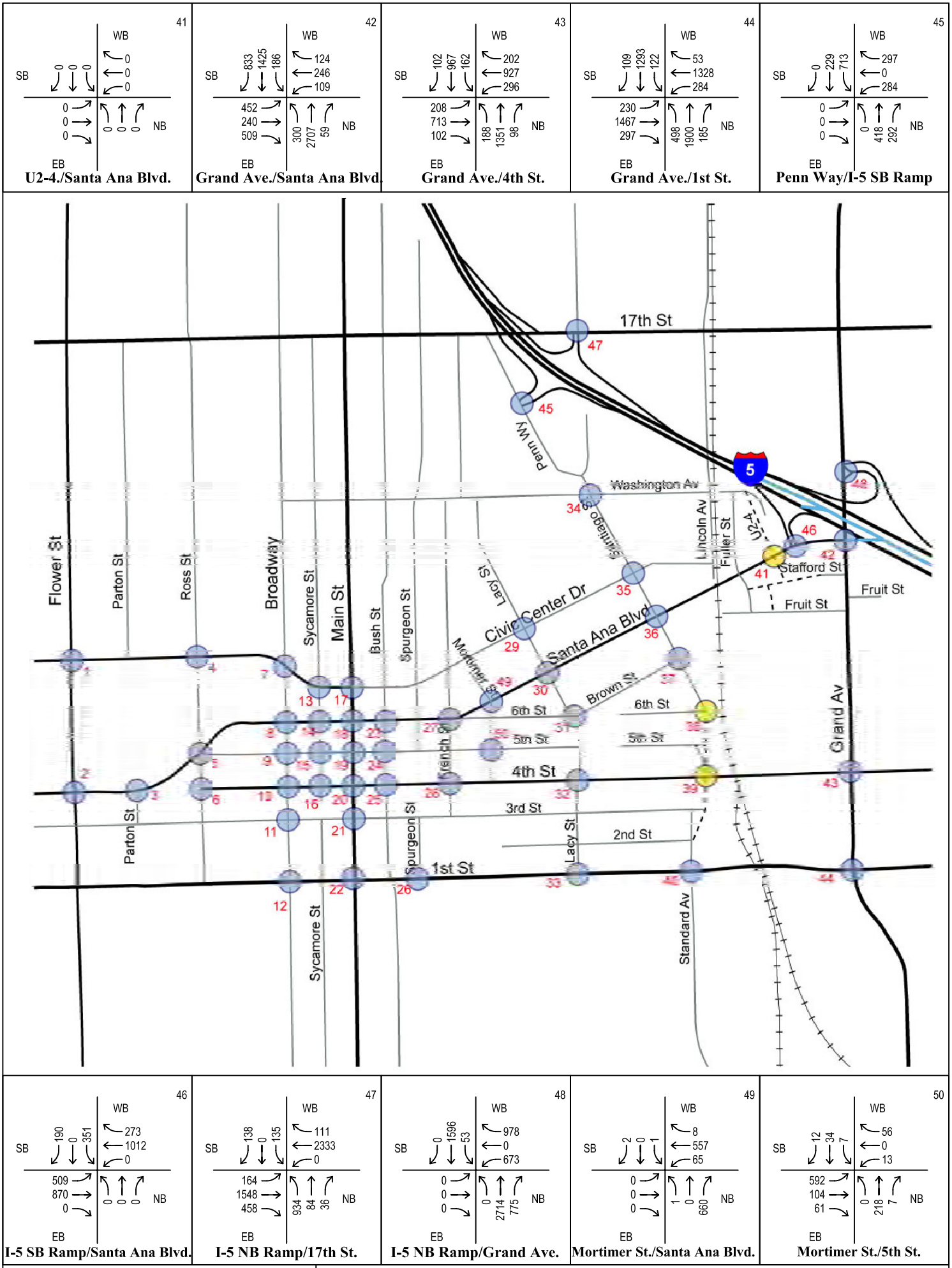

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Figure 5-2j

Santa Ana Transit Zoning Code Traffic Study

2035 Without Project PM Peak Hour

Table 5-1 2035 Without Project Peak Hour Intersection Conditions (ICU Method)

Intersection	AM Peak Hour		PM Peak Hour	
	ICU	Level of Service	ICU	Level of Service
Signalized Intersections (Using ICU Method)				
Flower St. at Civic Center Dr.	0.789	C	1.138	F
Flower St. at Santa Ana Blvd.	0.685	B	0.694	B
Parton St. at Santa Ana Blvd.	0.316	A	0.428	A
Ross St. at Civic Center Dr.	0.634	B	0.564	A
Ross St. at Santa Ana Blvd.	0.581	A	0.668	B
Broadway at Civic Center Dr.	0.721	C	0.743	C
Broadway at Santa Ana Blvd.	0.595	A	0.612	B
Broadway at 5th St.	0.399	A	0.620	B
Broadway at 4th St.	0.449	A	0.610	B
Broadway at 3rd St.	0.406	A	0.803	D
Broadway at 1st St.	0.779	C	0.844	D
Sycamore St. at Civic Center Dr.	0.484	A	0.573	A
Main St. at Civic Center Dr.	0.875	D	0.883	D
Main St. at Santa Ana Blvd.	0.799	C	0.836	D
Main St. at 5th St.	0.611	B	0.812	D
Main St. at 4th St.	0.613	B	0.776	C
Main St. at 3rd St.	0.533	A	0.694	B
Main St. at 1st St.	0.918	E	1.013	F
Bush St. at Santa Ana Blvd.	0.335	A	0.462	A
Bush St. at 5th St.	0.297	A	0.560	A
Bush St. at 4th St.	0.347	A	0.576	A
French St. at 4th St.	0.342	A	0.543	A
Lacy St. at 4th St.	0.508	A	0.751	C
Santiago St. at Santa Ana Blvd.	0.904	E	0.993	E
Standard St. at 1st St.	0.940	E	0.970	E
Grand Ave. at Santa Ana Blvd.	0.966	E	1.172	F
Grand Ave. at 4th St.	0.747	C	0.841	D
Grand Ave. at 1st St.	0.894	D	0.960	E

Table 5-2
2035 Without Project Peak Hour Intersection Conditions
(HCM Method)

Intersection	AM Peak Hour		PM Peak Hour	
	Average/Worst Case Delay	Level of Service	Average/Worst Case Delay	Level of Service
Unsignalized Intersections				
Ross St. at 4th St.	11.7	B	13.6	B
Sycamore St. at Santa Ana Blvd.	28.7	D	29.8	D
Sycamore St. at 5th St.	19.2	C	15.7	C
Sycamore St. at 4th St.	8.4	A	9.8	A
Spurgeon St. at 1st St.	11.3	B	18.7	C
French St. at Santa Ana Blvd.	24.5	C	24.0	C
Lacy St. at Civic Center Dr.	28.6	D	69.9	F
Lacy St. at Santa Ana Blvd.	122.1	F	179.1	F
Lacy St. at 6th St.	7.3	A	8.1	A
Lacy St. at 1st St.	45.3	E	410.8	F
Santiago St. at Washington Ave.	126.8	F	143.1	F
Santiago St. at Civic Center Dr.	280.0	F	221.7	F
Mortimer St. at 5th St.	9.5	A	33.5	D
Mortimer St. at Santa Ana Blvd.	23.1	A	23.0	C
Signalized Intersections (Caltrans, Using HCM)				
Penn Way at I-5 SB	25.1	C	28.5	C
Santa Ana Blvd. at I-5 SB	29.2	C	29.7	C
17t St. at I-5 NB	39.9	D	73.0	E
Grand Ave at I-5 NB	30.2	C	119.9	F

5.2 General Plan (2035) Without Project Roadway Segment Conditions

The roadway segment ADT analysis for 2035 is presented in Table 5-3. As indicated, a majority of the arterial roadways are operating at acceptable levels. The daily V/C ratio screening analysis indicates that the following locations are potentially experiencing capacity deficiencies under 2030 Without Project conditions:

- 1st Street between Standard Avenue and Grand Avenue
- Main Street between Washington Avenue and 4th Street
- Civic Center Drive between Santiago Street and Lincoln Avenue
- 17th Street at West of I-5 NB Ramps
- Grand Avenue South of 1st Street

- Grand Avenue South of I-5 NB Ramps
- Grand Avenue North of I-5 NB Ramps

The daily volume-to-capacity ratios provide a screening level analysis of daily traffic flows and potential operational problems within the study area. The peak hour analysis for intersections, presented in the previous section, provides a more definitive analysis of the operation of the arterial roadways in the project area. Although a few roadway segments indicate deficiencies, the proposed mitigation should be based on the intersection analysis recommendations. All roadway segments should operate at acceptable level of services under City's General Plan circulation element designations with spot improvements at intersections proposed based on the intersection analysis.

Table 5-3 2035 Without Project Roadway Segment Daily Traffic Condition

Road	Segment	2035 Without Project ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
Flower Street	Santa Ana Blvd to Civic Center Dr.	23,899	4D	37,500	B	
Flower Street	17th St to Civic Center	22,362	4D	37,500	A	
Civic Center Dr.	West of Flower St.	22,865	4D	37,500	B	
Civic Center Dr.	Flower St. to Ross St.	21,628	4D	37,500	A	
Flower Street	Santa Ana Blvd. to 1st St.	25,802	4D	37,500	B	
Santa Ana Blvd.	West of Flower St.	13,071	6D	56,300	A	
Santa Ana Blvd.	Flower St. to Parton St.	15,823	6D	56,300	A	
Santa Ana Blvd.	Parton St. to Ross St.	17,917	6D	56,300	A	
Civic Center Dr.	Ross St. to Broadway	19,769	4D	37,500	A	
Santa Ana Blvd.	Ross St. to Broadway	15,823	3D	28,150	A	
Broadway	Civic Center Dr. to Santa Ana Blvd.	23,770	4D	37,500	B	
Broadway	Civic Center Dr. to Washington Ave	30,191	4D	37,500	D	
Civic Center Dr.	Broadway to Sycamore St	19,827	4D	37,500	A	
Broadway	Santa Ana Blvd. To 5th St.	20,416	4D	37,500	A	
Santa Ana Blvd.	Broadway to Sycamore St	13,769	3D	28,150	A	
Broadway	5th St. to 4th St.	20,416	4D	37,500	A	
5th St	Broadway to Ross St.	10,424	3D	28,150	A	
5th St	Broadway to Main St.	13,844	3D	28,150	A	
Broadway	3rd St. to 4th St.	20,111	4D	37,500	A	

Road	Segment	2035 Without Project ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
Broadway	3rd St. to 1st St.	25,856	4D	37,500	B	
Broadway	South of 1st St.	14,281	4D	37,500	A	
1st St.	Broadway to Ross St.	49,198	6D	56,300	D	
1st St.	Main St. to Broadway	49,245	6D	56,300	D	
Civic Center Dr.	Sycamore St. to Main St.	18,639	4D	37,500	A	
Santa Ana Blvd.	Sycamore St. to Main St.	12,835	3D	28,150	A	
5th St.	Sycamore St. to Broadway	10,424	3D	28,150	A	
5th St	Sycamore St. to Main St.	10,424	3D	28,150	A	
Main St.	Civic Center Dr. to Santa Ana Blvd.	40,300	4D	37,500	F	
Main St.	Civic Center Dr. to Washington Ave	41,588	4D	37,500	F	
Civic Center Dr.	Main St. to Bush St.	14,658	4D	37,500	A	
Main St.	Santa Ana Blvd. To 5th St.	42,313	4D	37,500	F	
Santa Ana Blvd.	Main St. to Bush St.	13,859	3D	28,150	A	
Main St.	5th St. to 4th St.	42,313	4U	25,000	F	
5th St	Main St. to Bush St.	9,622	3D	28,150	A	
Main St.	3rd St. to 4th St.	36,873	4D	37,500	E	E ok
Main St.	1st St. to 3rd St.	36,873	4D	37,500	E	E ok
Santa Ana Blvd.	Bush St. to Spurgeon St.	12,885	3D	28,150	A	
5th St	Bush St. to French St.	7,507	3D	28,150	A	
1st St.	Spurgeon St. to Main St.	49,245	6D	56,300	D	
Santa Ana Blvd.	Lacy St. Standard Ave	18,785	4D	37,500	A	
Civic Center Dr.	French St to Lacy St	15,359	4D	37,500	A	
Santa Ana Blvd.	Lacy St. to French St.	18,798	4D	37,500	A	
4th St.	Lacy St. to French St.	15,285	4D	37,500	A	
1st St.	Lacy St. to Spurgeon St.	49,881	6D	56,300	D	
1st St.	Lacy St. to Standard Ave	49,881	6D	56,300	D	
Santiago St.	Washington Ave. to Civic Center Dr.	19,851	4D	37,500	A	
Santiago St.	Washington Ave. to 17th St	17,204	4D	37,500	A	
Santiago St.	Santa Ana Blvd to Civic Center Dr.	20,771	4D	37,500	A	
Civic Center Dr.	Santiago St to Lacy St	15,359	2U	12,500	F	
Civic Center Dr.	Lincoln Ave to Santiago St	14,658	2U	12,500	F	
Santiago St.	Santa Ana Blvd. to Brown St.	8,618	4D	37,500	A	
Santa Ana Blvd.	Santiago St. to Lacy St	24,852	4D	37,500	B	
Santa Ana Blvd.	Santiago St. to U-24	29,178	6D	56,300	A	

Road	Segment	2035 Without Project ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
4th St.	Santiago St. to Lacy St.	22,500	4D	37,500	A	
Grand Ave.	4th St. to Santa Ana Blvd	48,424	6D	56,300	D	
Grand Ave.	Santa Ana Blvd to 17th St	47,112	6D	56,300	D	
Santa Ana Blvd.	East of Grand Ave.	9,779	4D	37,500	A	
Grand Ave.	1st St. to 4th St.	40,071	6D	56,300	C	
4th St.	Grand Ave to Santiago St.	22,500	4D	37,500	A	
4th St.	East of Grand Ave.	25,510	4D	37,500	B	
Grand Ave.	South of 1st St.	53,061	6D	56,300	E	
1st St.	Standard Ave to Grand Ave	52,076	6D	56,300	E	
1st St.	East of Grand Ave.	46,456	6D	56,300	D	
Penn Way	South of I-5 SB Ramps	15,508	2D	18,750	D	
Penn Way	North of I-5 SB Ramps	17,871	4D	37,500	A	
Santa Ana Blvd.	West of I-5 SB Ramps	46,209	6D	56,300	C	
Santa Ana Blvd.	East of I-5 SB Ramps	29,984	4D	37,500	C	
17th St.	West of I-5 NB Ramps	56,809	6D	56,300	F	
17th St.	East of I-5 NB Ramps	45,113	6D	56,300	D	
Grand Ave.	South of I-5 NB Ramps	61,046	6D	56,300	F	
Grand Ave.	North of I-5 NB Ramps	57,596	6D	56,300	F	

5.3 General Plan (2035) Without Project Peak Hour Freeway Ramp Conditions

Without project peak hour ramp analysis results are presented on Table 5-4. All ramps operate at LOS D or better during the AM and/or PM peak hour time periods except the northbound on ramp at the interchange of I-5 at Santa Ana Boulevard.

Table 5-4 2035 Without Project Peak Hour Freeway Ramp Analysis

INTER-CHANGE	RAMP	RAMP TYPE CODE[1]	LANES	PEAK HOUR CAPACITY	AM PEAK HOUR			PM PEAK HOUR		
					VOL	V/C	LOS	VOL	V/C	LOS
I-5 at 17th St.	SB On	4	2	1,800	869	0.48	A	1,005	0.56	A
	NB Loop On	4	2	1,800	294	0.16	A	458	0.25	A
	SB Off	5	1	1,500	556	0.37	A	581	0.39	A
	NB Off	5	1	1,500	910	0.61	A	1,054	0.70	B
I-5 at Santa Ana Blvd.	SB Direct On (HOV)	6	2	2,250	392	0.17	A	485	0.22	A
	SB Loop On	4	2	1,800	482	0.27	A	782	0.43	A
	NB Loop On	4	2	1,800	599	0.33	A	828	0.46	A
	SB Off	5	1	1,500	660	0.44	A	541	0.36	A
	NB Off	5	1	1,500	1366	0.91	E	1,651	***1.10***	***F***

Note 1: Reference to Freeway Ramp Capacity Assumptions Table

4 - Two-lane Metered On-Ramp, 2 Mixed Flow Lanes at Meter

5 - One-lane Unmetered Ramp

6 - Two-lane Unmetered On-Ramp, tapers to one merge lane at or beyond gore point

6. PROJECT RELATED TRAFFIC

6.1 Project Trip Generation

As illustrated on Figure 6-1 for the proposed traffic analysis zone structure, the project site has been subdivided into 13 traffic analysis zones (TAZs). The TAZ structure was developed based on the Development Potential and Existing Diagram (with blocks) provided by Moule & Polyzoides as well as the roadway system in the vicinity area.

The trip generation for the project is based on the most recent Institute of Transportation Engineers (ITE) Trip Generation, 8th Edition. Table 6-1 presents the ITE trip generation rates used to calculate project trip generation. Table 6-2 summarizes the peak hour inbound and outbound project trips and the daily project trips for the entire project area. Table 6-3 indicates the detailed trip generation for each TAZ.

Table 6-1 Project Trip Generation Rates

Land Use	ITE Code	Unit	Daily	AM Peak Hour			PM Peak Hour		
				Total	In	Out	Total	In	Out
Single Family Housing	210	DU	9.57	0.75	0.19	0.56	1.01	0.64	0.37
Multi Family Housing	230	DU	5.81	0.44	0.07	0.37	0.52	0.35	0.17
High Rise Apartment	222	DU	4.20	0.30	0.08	0.22	0.35	0.21	0.14
Retail	820	TSF	42.94	1.00	0.61	0.39	3.73	1.83	1.90
Industrial	110	TSF	6.97	0.92	0.81	0.11	0.97	0.12	0.85
Commercial	710	TSF	11.01	1.55	1.36	0.19	1.49	0.25	1.24
Civic	730	TSF	68.93	5.88	4.94	0.94	1.21	0.38	0.83

Source: ITE Trip Generation, 8th Edition, 2008

Table 6-2 Project Trip Generation

Land Use	Quan-tity	ITE Code	Unit	Daily	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
Single Family Housing	383	210	DU	3665	287	73	214	387	245	142
Multi Family Housing	3,290	230	DU	19,115	1,448	230	1,217	1,711	1,152	559
High Rise Tower	402	222	DU	1,688	121	32	88	141	84	56
Residential Subtotal	4,075			24,469	1,855	335	1,520	2,238	1,481	757
Retail	387	820	TSF	16,618	387	236	151	1,444	708	735
Industrial	-938[1]	110	TSF	-6,538	-863	-760	-103	-910	-113	-797
Commercial	-124	710	TSF	-1,365	-192	-169	-24	-185	-31	-154
Civic	-21	730	TSF	-1,448	-123	-104	-20	-25	-8	-17
ALL TAZ PROJECT TOTAL				31,736	1,064	-461	1,525	2,562	2,038	524
5% mode choice deduction for all trips				-1,587	-53	23	-76	-128	-102	-26
20% residential internal capture				-4,894	-371	-67	-304	-448	-296	-151
FINAL NET PROJECT TRIPS				**25,255**	**640**	**-505**	**1,144**	**1,986**	**1,640**	**347**

Note 1: 938,000 s.f. in the study area; 990,000 s.f. total

Note: Totals may not add up to 100% due to rounding in calculations

Table 6-3 Project Trip Generation by Block

Land Use	Quan-tity	ITE Code	Unit	Daily	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
TAZ 1 (DOWNTOWN DISTRICT) TRIP GENERATION:										
Single Family Housing	0	210	DU	0	0	0	0	0	0	0
Multi Family Housing	91	230	DU	539	40	6	34	47	32	15
Retail	7	820	TSF	301	7	4	3	26	13	13
Industrial	0	110	TSF	0	0	0	0	0	0	0
Commercial	0	710	TSF	0	0	0	0	0	0	0
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 1 NET PROJECT TOTAL				**829**	**47**	**11**	**36**	**73**	**45**	**29**
5% mode choice deduction				-41	-3	-1	-2	-4	-2	-2
20% residential internal capture				-106	-8	-1	-7	-9	-6	-3
FINAL NET PROJECT TRIPS				**682**	**36**	**9**	**28**	**60**	**36**	**24**

Note: Totals may not add up to 100% due to rounding in calculations

Table 6-3 Project Trip Generation by Block (cont)

Land Use	Quan-tity	ITE Code	Unit	Daily	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
TAZ 2 (DOWNTOWN DISTRICT) TRIP GENERATION:										
Single Family Housing	0	210	DU	0	0	0	0	0	0	0
Multi Family Housing	105	230	DU	610	46	7	39	55	37	18
Retail	0	820	TSF	0	0	0	0	0	0	0
Industrial	0	110	TSF	0	0	0	0	0	0	0
Commercial	0	710	TSF	0	0	0	0	0	0	0
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 2 NET PROJECT TOTAL				**610**	**46**	**7**	**39**	**55**	**37**	**18**
5% mode choice deduction				-31	-2	0	-2	-3	-2	-1
20% residential internal capture				-122	-9	-1	-8	-11	-7	-4
FINAL NET PROJECT TRIPS				**458**	**35**	**6**	**29**	**41**	**28**	**13**
TAZ 3 (DOWNTOWN DISTRICT) TRIP GENERATION:										
Single Family Housing	0	210	DU	0	0	0	0	0	0	0
Multi Family Housing	190	230	DU	1,104	84	13	70	99	67	32
Retail	17	820	TSF	730	17	10	7	63	31	32
Industrial	0	110	TSF	0	0	0	0	0	0	0
Commercial	0	710	TSF	0	0	0	0	0	0	0
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 3 NET PROJECT TOTAL				**1,834**	**101**	**24**	**77**	**162**	**98**	**65**
5% mode choice deduction				-92	-5	-1	-4	-8	-5	-3
20% residential internal capture				-221	-17	-3	-14	-20	-13	-7
FINAL NET PROJECT TRIPS				**1,521**	**79**	**20**	**59**	**134**	**79**	**54**
TAZ 4 (DOWNTOWN DISTRICT) TRIP GENERATION:										
Single Family Housing	0	210	DU	0	0	0	0	0	0	0
Multi Family Housing	385	230	DU	2,237	169	27	142	200	135	65
Retail	106	820	TSF	4,552	106	65	41	395	194	201
Industrial	0	110	TSF	0	0	0	0	0	0	0
Commercial	-100	710	TSF	-1,101	-155	-136	-19	-149	-25	-124
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 4 NET PROJECT TOTAL				**5,687**	**120**	**-44**	**165**	**447**	**304**	**143**
5% mode choice deduction				-284	-6	2	-8	-22	-15	-7
20% residential internal capture				-447	-34	-5	-28	-40	-27	-13
FINAL NET PROJECT TRIPS				**4,956**	**81**	**-48**	**128**	**384**	**262**	**123**

Note: Totals may not add up to 100% due to rounding in calculations

Table 6-3 Project Trip Generation by Block (cont)

Land Use	Quan-tity	ITE Code	Unit	Daily	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
TAZ 5 (DOWNTOWN DISTRICT) TRIP GENERATION:										
Single Family Housing	0	210	DU	0	0	0	0	0	0	0
Multi Family Housing	160	230	DU	930	70	11	59	83	56	27
Retail	23	820	TSF	988	23	14	9	86	42	44
Industrial	0	110	TSF	0	0	0	0	0	0	0
Commercial	0	710	TSF	0	0	0	0	0	0	0
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 5 NET PROJECT TOTAL				**1,917**	**93**	**25**	**68**	**169**	**98**	**71**
5% mode choice deduction				-96	-5	-1	-3	-8	-5	-4
20% residential internal capture				-186	-14	-2	-12	-17	-11	-5
FINAL NET PROJECT TRIPS				**1,635**	**75**	**22**	**53**	**144**	**82**	**62**
TAZ 6 (LACY DISTRICT) TRIP GENERATION:										
Single Family Housing	15	210	DU	144	11	3	8	15	10	6
Multi Family Housing	85	230	DU	494	37	6	31	44	30	14
Retail	0	820	TSF	0	0	0	0	0	0	0
Industrial	0	110	TSF	0	0	0	0	0	0	0
Commercial	0	710	TSF	0	0	0	0	0	0	0
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 6 NET PROJECT TOTAL				**637**	**49**	**9**	**39**	**59**	**40**	**20**
5% mode choice deduction				-32	-2	0	-2	-3	-2	-1
20% residential internal capture				-127	-10	-2	-8	-12	-8	-4
FINAL NET PROJECT TRIPS				**478**	**37**	**7**	**29**	**45**	**30**	**15**
TAZ 7 (LACY DISTRICT) TRIP GENERATION:										
Single Family Housing	101	210	DU	967	76	19	57	102	65	37
Multi Family Housing	101	230	DU	587	44	7	37	53	35	17
Retail	5	820	TSF	215	5	3	2	19	9	10
Industrial	0	110	TSF	0	0	0	0	0	0	0
Commercial	0	710	TSF	0	0	0	0	0	0	0
Civic	3	730	TSF	207	18	15	3	4	1	2
TAZ 7 NET PROJECT TOTAL				**1,975**	**143**	**44**	**99**	**177**	**110**	**67**
5% mode choice deduction				-99	-8	-3	-5	-9	-6	-3
20% residential internal capture				-311	-24	-5	-19	-31	-20	-11
FINAL NET PROJECT TRIPS				**1,565**	**111**	**36**	**75**	**137**	**85**	**52**

Note: Totals may not add up to 100% due to rounding in calculations

Table 6-3 Project Trip Generation by Block (cont)

Land Use	Quan-tity	ITE Code	Unit	Daily	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
TAZ 8 (LOGAN DISTRICT) TRIP GENERATION:										
Single Family Housing	30	210	DU	287	23	6	17	30	19	11
Multi Family Housing	89	230	DU	517	39	6	33	46	31	15
Retail	0	820	TSF	0	0	0	0	0	0	0
Industrial	-131	110	TSF	-913	-121	-106	-14	-127	-16	-111
Commercial	0	710	TSF	0	0	0	0	0	0	0
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 8 NET PROJECT TOTAL				**-109**	**-59**	**-94**	**35**	**-50**	**35**	**-85**
5% mode choice deduction				5	3	5	-2	2	-2	4
20% residential internal capture				-161	-12	-2	-10	-15	-10	-5
FINAL NET PROJECT TRIPS				**-264**	**-68**	**-92**	**24**	**-64**	**23**	**-86**
TAZ 9 (LACY DISTRICT) TRIP GENERATION:										
Single Family Housing	72	210	DU	689	54	14	40	73	46	27
Multi Family Housing	406	230	DU	2,359	179	28	150	211	142	69
Retail	5	820	TSF	215	5	3	2	19	9	10
Industrial	-153	110	TSF	-1,066	-141	-124	-17	-148	-18	-130
Commercial	-17	710	TSF	-187	-26	-23	-3	-25	-4	-21
Civic	-24	730	TSF	-1,654	-141	-119	-23	-29	-9	-20
TAZ 9 NET PROJECT TOTAL				**355**	**-71**	**-220**	**150**	**100**	**166**	**-66**
5% mode choice deduction				-18	4	11	-7	-5	-8	3
20% residential internal capture				-610	-47	-8	-38	-57	-38	-19
FINAL NET PROJECT TRIPS				**-273**	**-114**	**-218**	**104**	**38**	**120**	**-82**
TAZ 10 (1ST STREET DISTRICT) TRIP GENERATION:										
Single Family Housing	30	210	DU	287	23	6	17	30	19	11
Multi Family	274	230	DU	1,592	121	19	101	142	96	47
Retail	62	820	TSF	2,662	62	38	24	231	113	118
Industrial	-168	110	TSF	-1,171	-155	-136	-18	-163	-20	-143
Commercial	0	710	TSF	0	0	0	0	0	0	0
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 10 NET PROJECT TOTAL				**3,370**	**51**	**-73**	**124**	**241**	**208**	**33**
5% mode choice deduction				-169	-3	4	-6	-12	-10	-2
20% residential internal capture				-376	-29	-5	-24	-35	-23	-12
FINAL NET PROJECT TRIPS				**2,826**	**19**	**-74**	**94**	**194**	**175**	**20**

Note: Totals may not add up to 100% due to rounding in calculations

Table 6-3 Project Trip Generation by Block (cont)

Land Use	Quan-tity	ITE Code	Unit	Daily	AM Peak Hour			PM Peak Hour		
					Total	In	Out	Total	In	Out
TAZ 11 (LOGAN DISTRICT) TRIP GENERATION:										
Single Family Housing	125	210	DU	1,196	94	24	70	126	80	46
Multi Family Housing	373	230	DU	2,167	164	26	138	194	131	63
Retail	35	820	TSF	1,503	35	21	14	131	64	67
Industrial	-145	110	TSF	-1,011	-133	-117	-16	-141	-17	-123
Commercial	0	710	TSF	0	0	0	0	0	0	0
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 11 NET PROJECT TOTAL				**3,856**	**159**	**-46**	**206**	**310**	**257**	**53**
5% mode choice deduction				-193	-8	2	-10	-16	-13	-3
20% residential internal capture				-673	-52	-10	-42	-64	-42	-22
FINAL NET PROJECT TRIPS				**2,990**	**100**	**-54**	**154**	**231**	**202**	**28**
TAZ 12 (RAILROAD DISTRICT) TRIP GENERATION:										
Single Family Housing	0	210	DU	0	0	0	0	0	0	0
Multi Family Housing	937	230	DU	5,444	412	66	347	487	328	159
High Rising Tower	402	222	DU	1,688	121	32	88	141	84	56
Retail	140	820	TSF	6,012	140	85	55	522	256	266
Industrial	-325	110	TSF	-2,265	-299	-263	-36	-315	-39	-276
Commercial	-7	710	TSF	-77	-11	-10	-1	-10	-2	-9
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 12 NET PROJECT TOTAL				**10,802**	**363**	**-90**	**453**	**824**	**628**	**197**
5% mode choice deduction				-540	-18	5	-23	-41	-31	-10
20% residential internal capture				-1,426	-107	-20	-87	-126	-83	-43
FINAL NET PROJECT TRIPS				**8,835**	**238**	**-104**	**343**	**658**	**513**	**144**
TAZ 13 (1ST STREET DISTRICT) TRIP GENERATION:										
Single Family	10	210	DU	96	8	2	6	10	6	4
Multi Family	94	230	DU	546	41	7	35	49	33	16
Retail	-13	820	TSF	-558	-13	-8	-5	-48	-24	-25
Industrial	-16	110	TSF	-112	-15	-13	-2	-16	-2	-14
Commercial	0	710	TSF	0	0	0	0	0	0	0
Civic	0	730	TSF	0	0	0	0	0	0	0
TAZ 13 NET PROJECT TOTAL				**-28**	**21**	**-12**	**34**	**-5**	**14**	**-19**
5% mode choice deduction				1	-1	1	-2	0	-1	1
20% residential internal capture				-129	-10	-2	-8	-12	-8	-4
FINAL NET PROJECT TRIPS				**-155**	**10**	**-13**	**24**	**-17**	**5**	**-22**

Note: Totals may not add up to 100% due to rounding in calculations

As indicated in Table 6-2, the final net project consists of a total of 383 single family dwelling units, 3,290 multi-family dwelling units, 402 high-rise tower dwelling units, and 387,000 square feet of retail uses. The project will also remove 990,000 square feet of industrial uses (938,000 square feet in the study area), 124,000 square feet of commercial uses, and 21,000 square feet of civic uses. The land use data reflects the net growth of the potential development, subtracting the existing land uses to be displaced.

The proportion of the residential units for single family housing and multi-family housing is split based on the data provided by Moule & Polyzoides as following:

District	Single-family	Multi-family	High-Rise Tower
Downtown District	0	100%	0%
Lacy District	15%	85%	0%
1st Street District	10%	90%	0%
Logan District	25%	75%	0%
Rail Station District	0%	70%	30%

As indicated in Table 6-2, the project is proposed to generate approximately 25,255 additional trip-ends per day with a net increase of 640 vehicles per hour during the AM peak hour and 1,986 vehicles per hour during the PM peak hour. The table also shows that during AM peak hour, there are a decrease of 505 vehicles traveling in and an increase of 1,144 vehicles traveling out of the Transit Zoning Code (SD 84A and SD 84B) area. During the PM peak hour, there is an increase of 1,640 vehicles entering and 347 vehicles leaving the area. The in and out travel characteristic is related to the fact that more residential units will replace the existing industrial and commercial uses for the proposed project. Residential trips tend to have the characteristic of traveling out in the AM peak hour and returning during the PM peak hour.

The Transit Zoning Code trip generation calculations account for Transit-Oriented Developments (TOD's) and internal trip capture. Transit-Oriented Developments have been shown to have lower vehicle trip-generation rates than non-transit-oriented developments. Typically such developments can be expected to have vehicle trip rates up to 20-25% less than other developments. Research conducted by KOA Corporation and based on information available from the Transportation Cooperative Research Program (TCRP, sponsored by the Federal Transit Administration), the Institute of Transportation Engineers (ITE), Caltrans, the Association of Bay Area Governments (ABAG) and other sources showed that TOD reductions for Southern California can be up to 20% - 25% depending on available transit options.

The Transit Zoning Code traffic study accounts for the lower trip generating characteristics of these developments by applying reduction factors to the trip generation for each respective land use category. The net trip generation includes an allowance for these trip-reduction factors. Net trip generation for the Transit Zoning Code traffic study is only reduced by 5% to account for transit-oriented

development, which is conservative by TCRP and ITE standards. The 5% TOD reduction is also consistent with the Regional Transportation Center Metrolink Extension Study.

As indicated in Table 6-2, the 5% mode choice reduction has been applied for the final trips. This is based on the previous discussion of the circulation changes in the City of Santa Ana and the review of the Regional Transportation Center Metrolink Extension Study. The project team agreed that the Transit Zoning Code (SD84 A and SD 84B) will benefit from the transit improvement plans for the long range conditions. The 5% reduction considers both local and regional transit modal split credit.

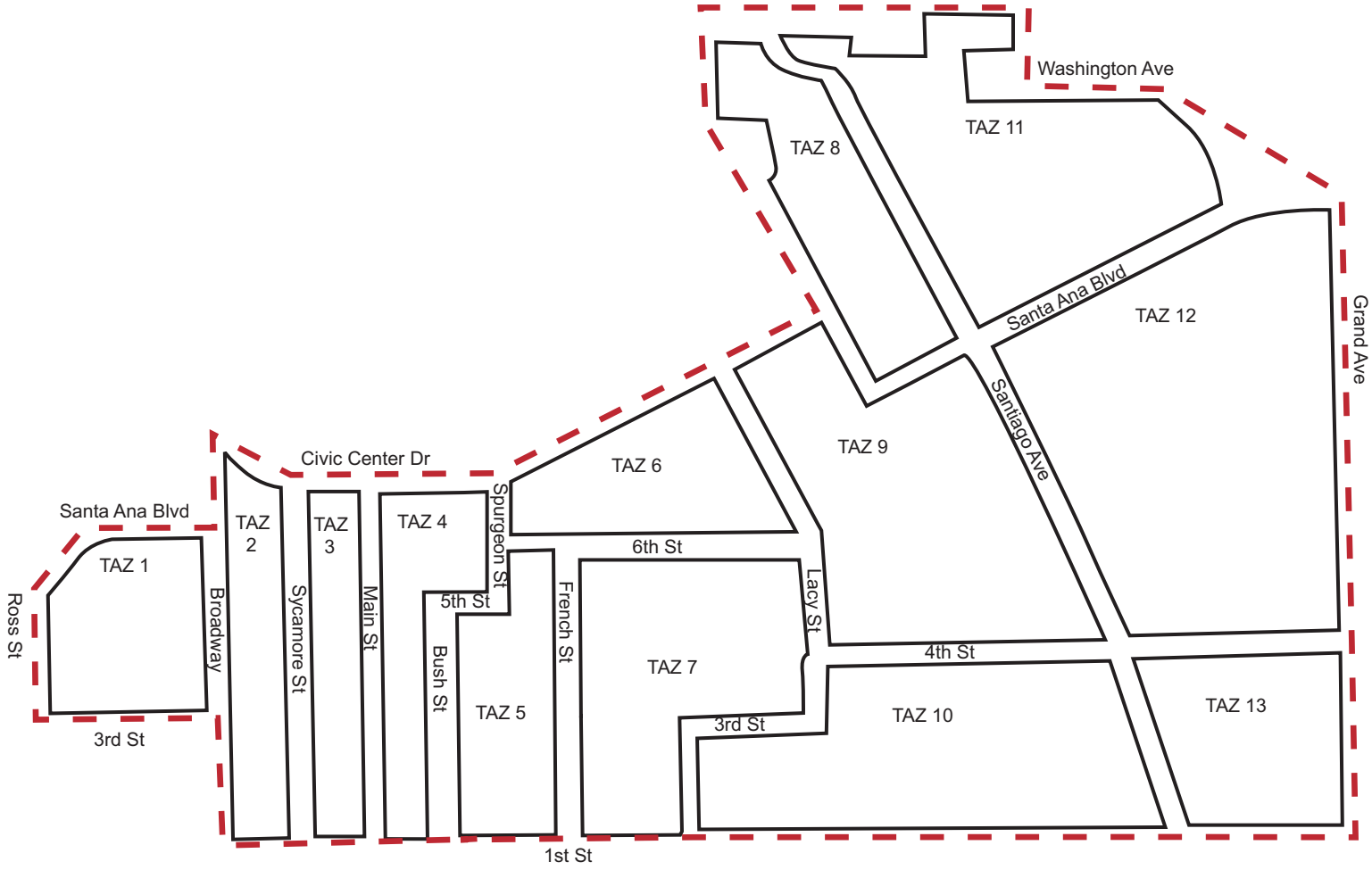
In addition, due to the mixed-use nature of the project, internal capture credit has been applied to the project trip generation. Internal trip capture are trips generated by a multi-use development that are attracted to other uses in the same development. For the purposes of computing internal trip capture, all of the Transit Zoning Code project zones are considered part of one multi-use development. Daily internal trip capture reductions of 20% were applied to the residential trip generation component of the project. Peak hour internal capture rates vary somewhat from daily rates. These rates are derived from ITE guidelines published in the ITE Trip Generation Handbook, 8th Edition. KOA considers 20% as a reasonable internal capture rate for residential trips based on our past experience with other studies and the size of this study area. The rates used for this project were applied by KOA Corporation in consultation with the City of Santa Ana. Table 6-2 includes the 20% internal capture reduction for the residential trips.

6.2 Project Trip Distribution and Traffic Volumes

The project trip distribution and assignment process represents the directional orientation of traffic to and from the project site. Trip distribution is heavily influenced by the geographical location of the site, the location of surrounding uses, and the proximity to the regional freeway system.

The Orange County Transportation Analysis Model (OCTAM 3.2) was used to evaluate the distribution and likely travel routes of the project traffic. A series of select link (trip distribution) analyses were performed using the OCTAM 3.2 model 2030 horizon year scenario. Figure 6-2a through Figure 6-2m present the project trip distribution patterns for each TAZ, respectively.

The project only traffic forecasts have been developed by applying the trip generation, distribution, and traffic assignment calculations. Figure 6-3a through Figure 6-3e present the project only AM peak hour project only trips, while Figure 6-3f through Figure 6-3j present the 2035 PM peak hour project only trips.

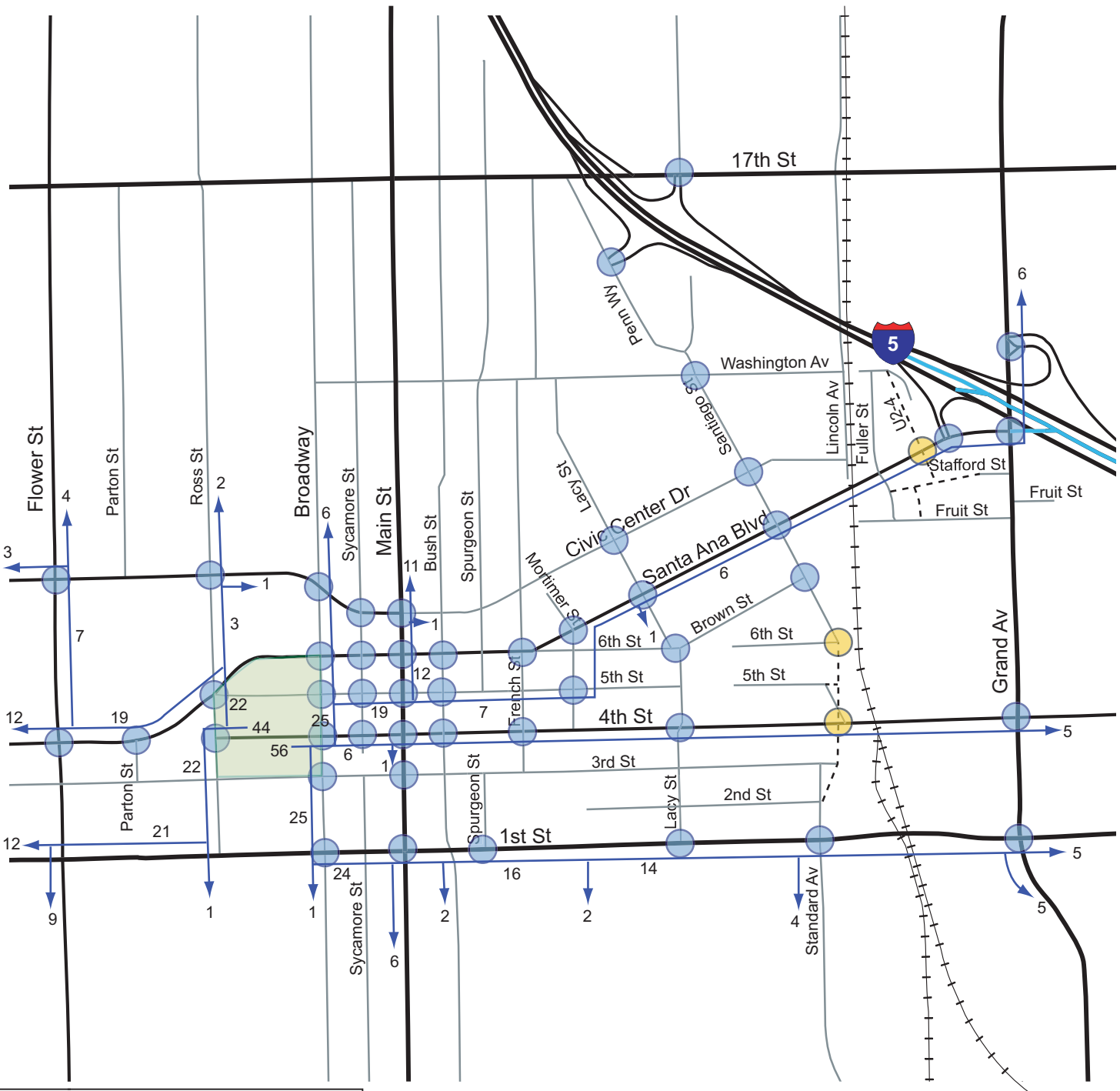


LEGEND

Study Area Boundary

TAZ Boundary

KOA CORPORATION PLANNING & ENGINEERING	City of Santa Ana	Figure 6-1
	Santa Ana Transit Zoning Code Traffic Study	Traffic Analysis Zone Structure



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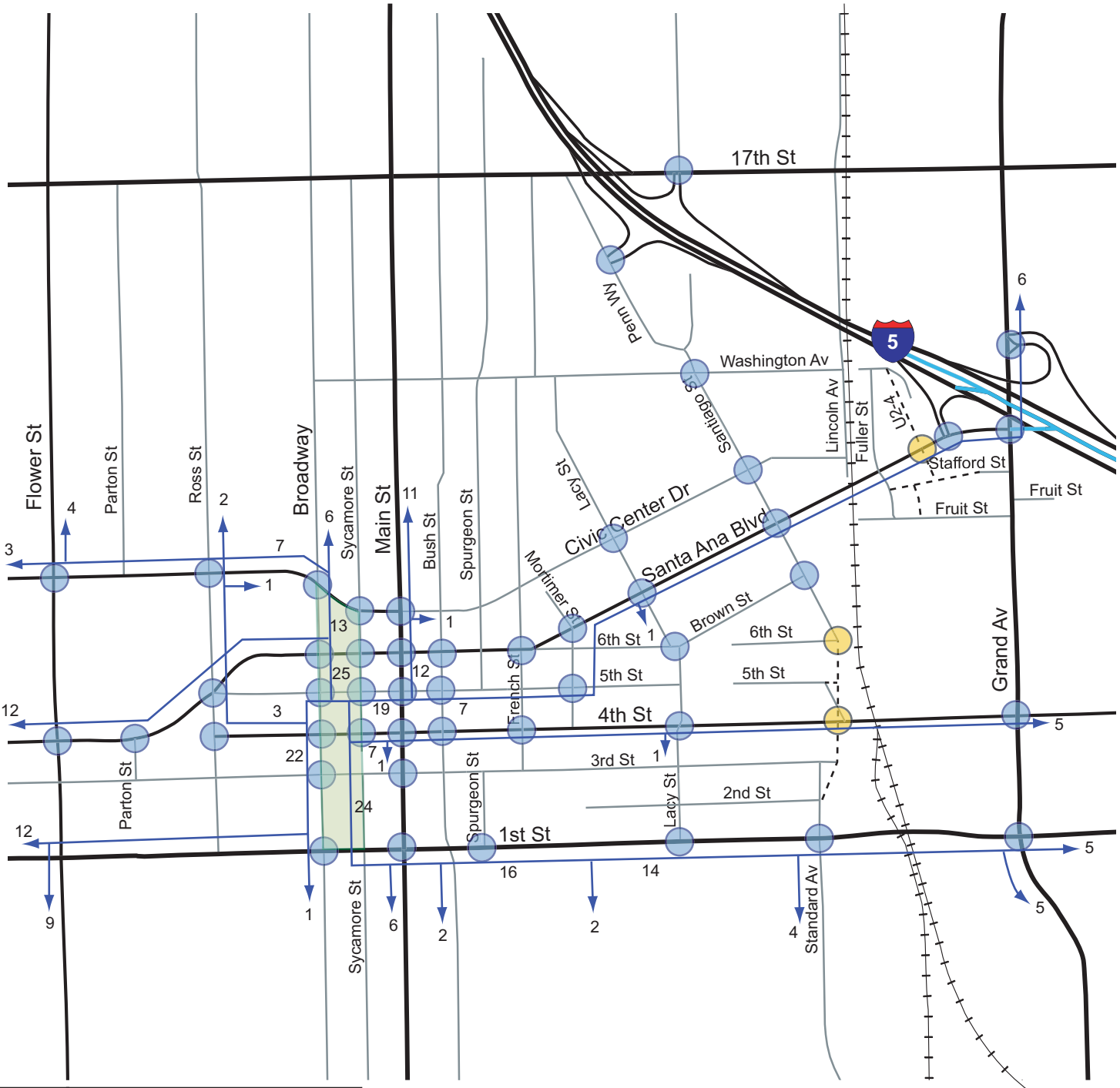
KOA CORPORATION
PLANNING & ENGINEERING

City of Santa Ana — Figure 6-2a

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 1



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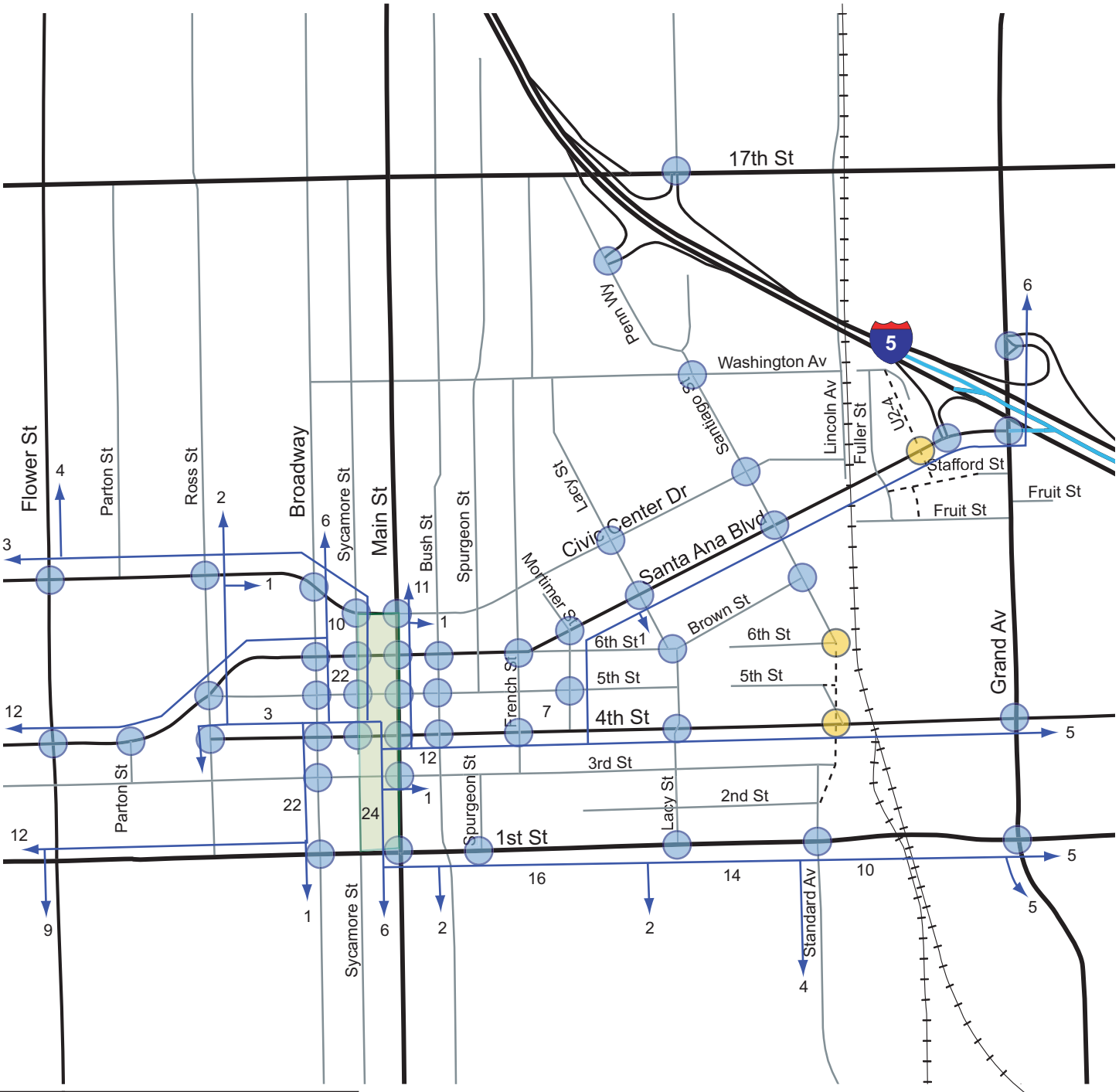
City of Santa Ana — Figure 6-2b

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 2



LEGEND

- Existing Intersection
- Future Intersection
- Future Roadway

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City of Santa Ana — Figure 6-2c

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 3

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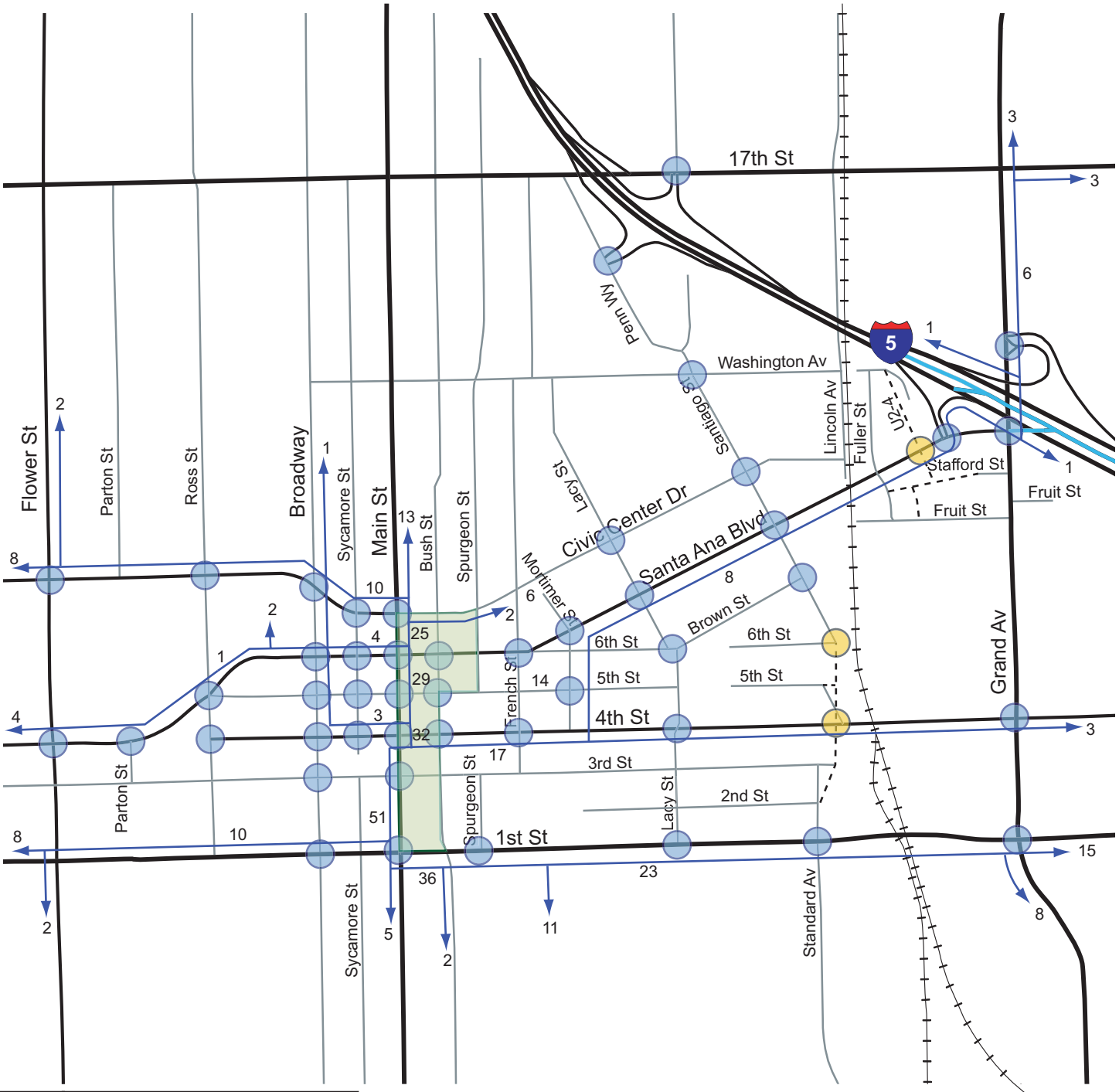

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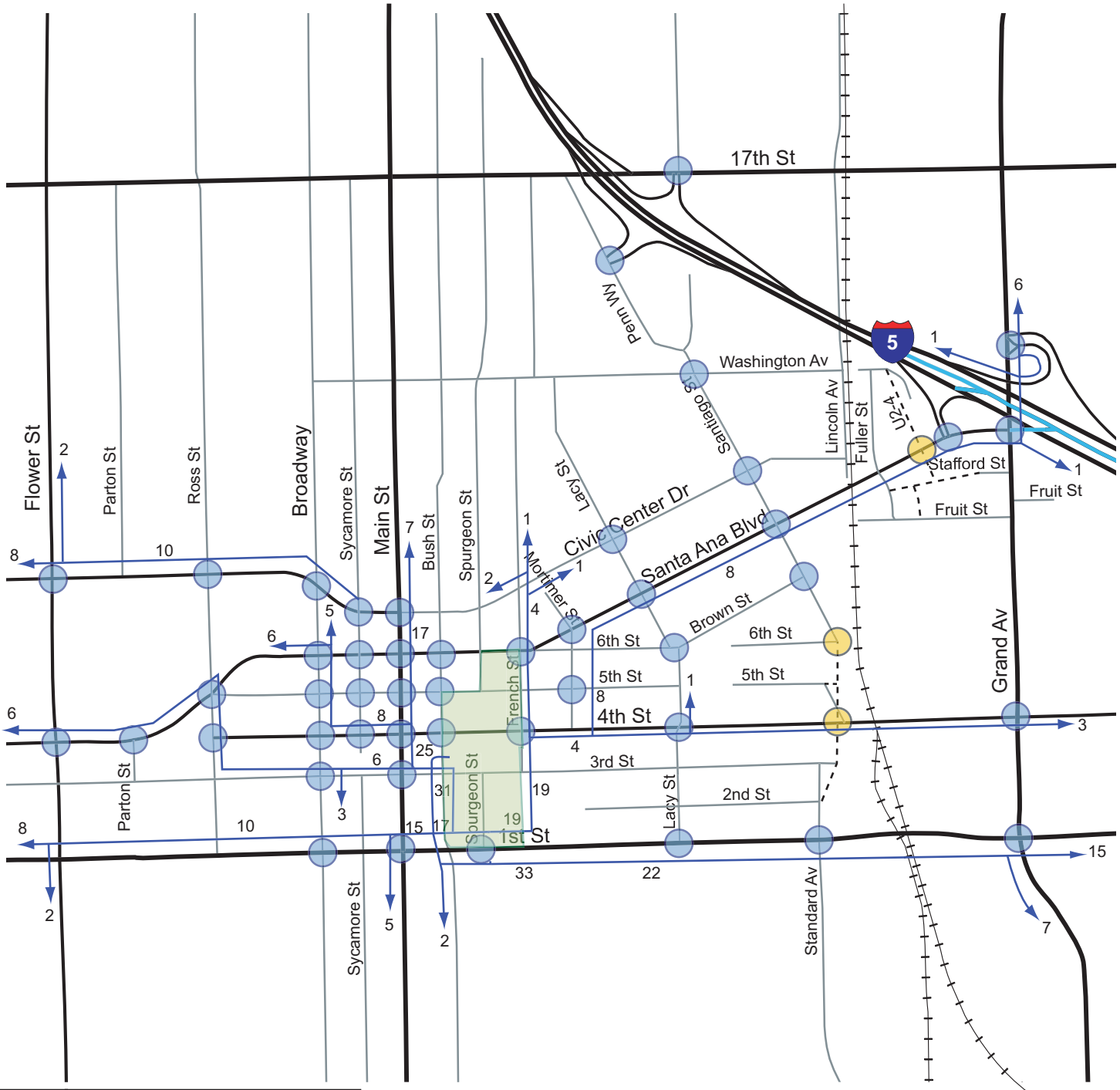
City of Santa Ana — Figure 6-2d

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 4



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City of Santa Ana — Figure 6-2e

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution-TAZ 5

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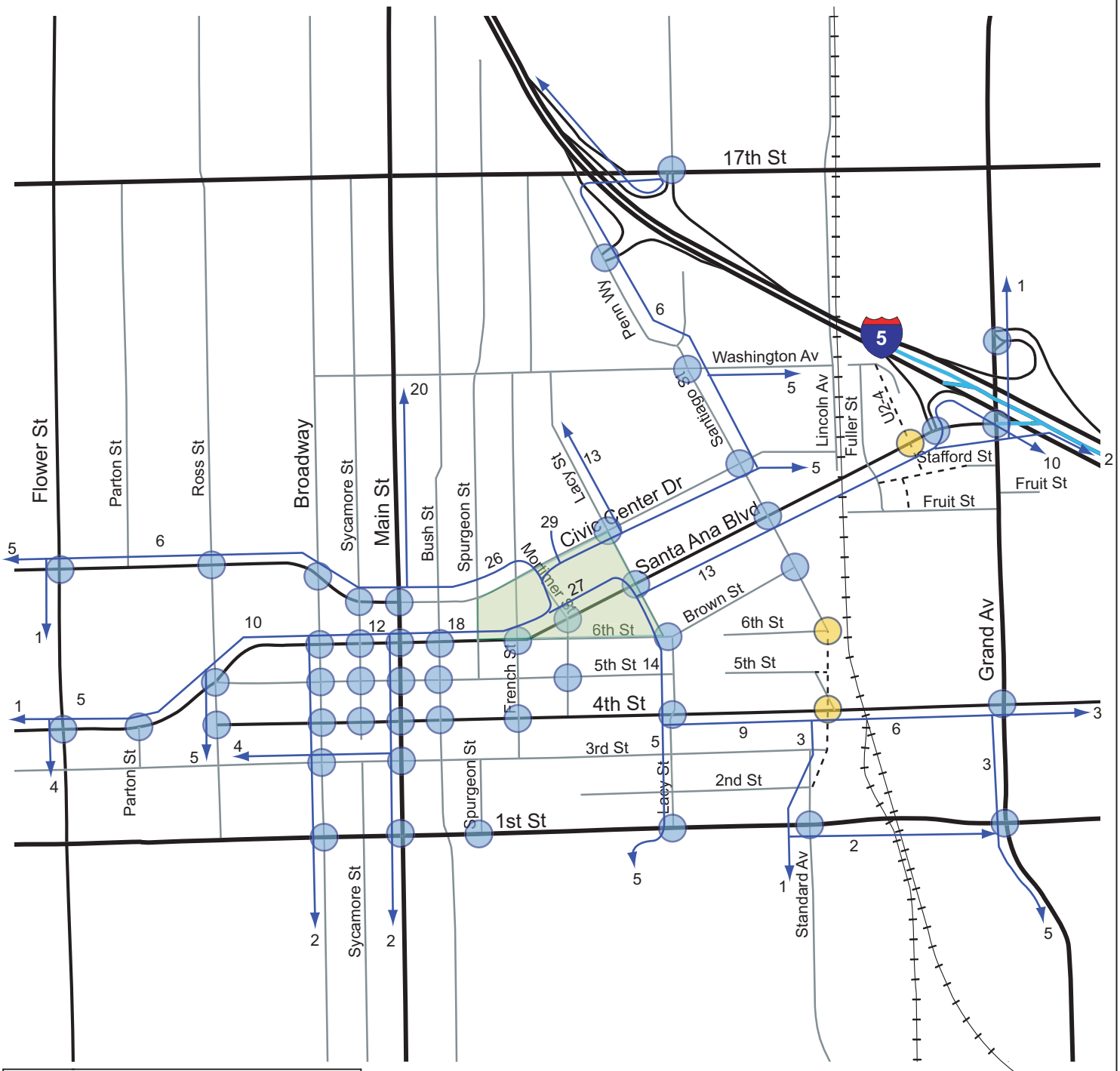

LEGEND

- Existing Intersection
- Future Intersection
- Future Roadway

KOA CORPORATION
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City of Santa Ana — Figure 6-2f

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 6

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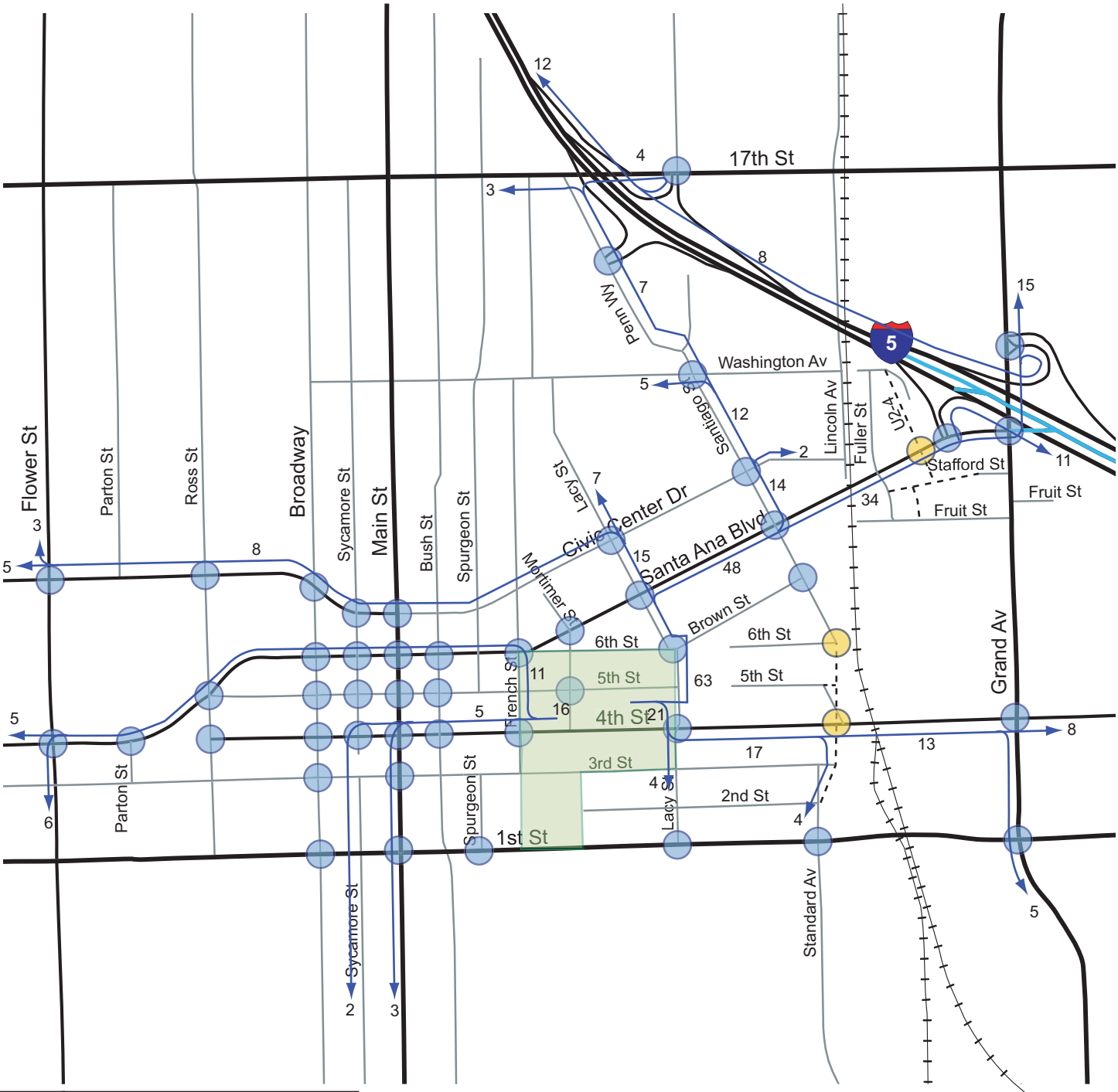

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KOA CORPORATION
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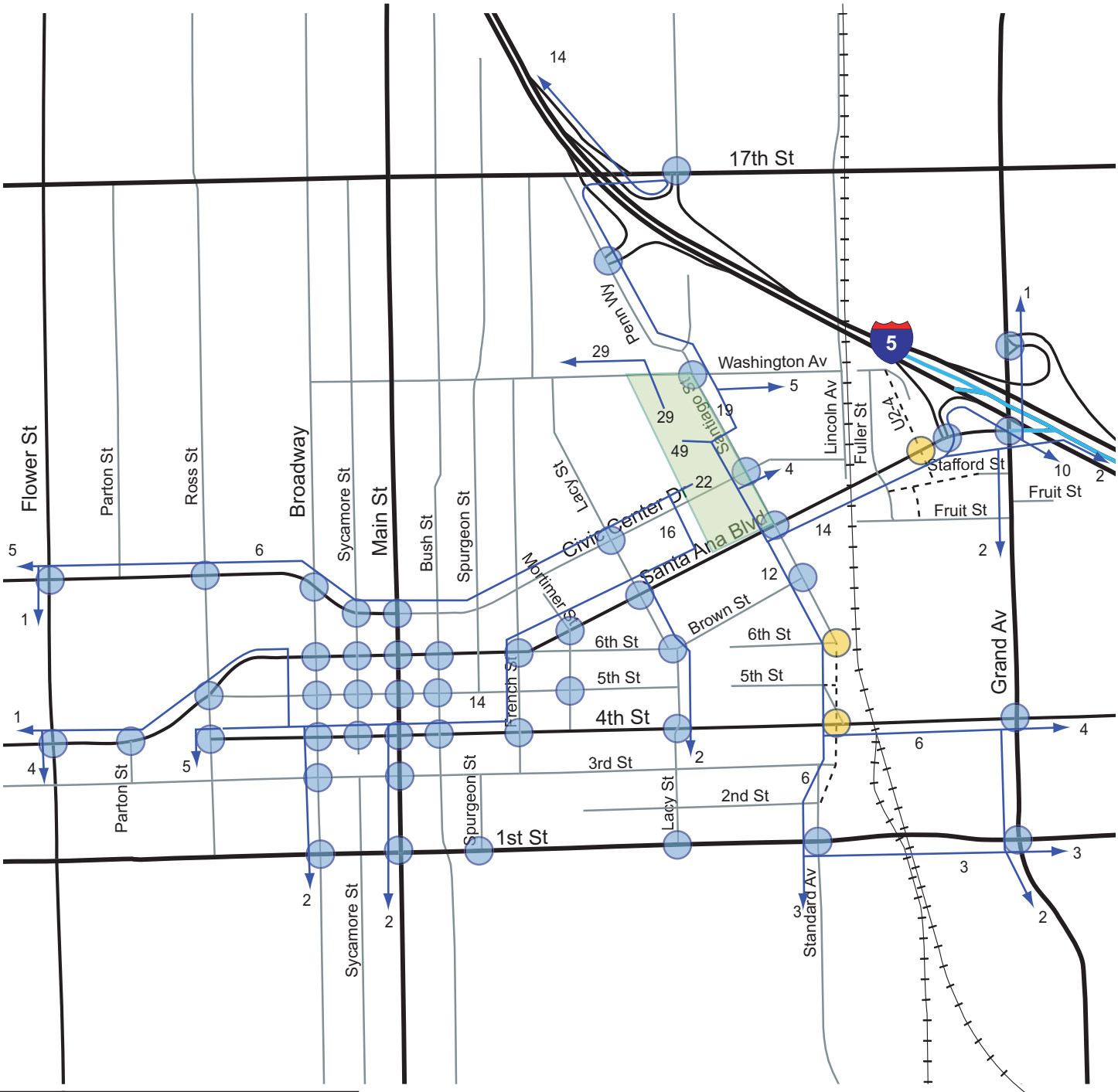
City of Santa Ana — Figure 6-2g

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 7



LEGEND

- Existing Intersection
- Future Intersection
- Future Roadway

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City of Santa Ana — Figure 6-2h

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 8

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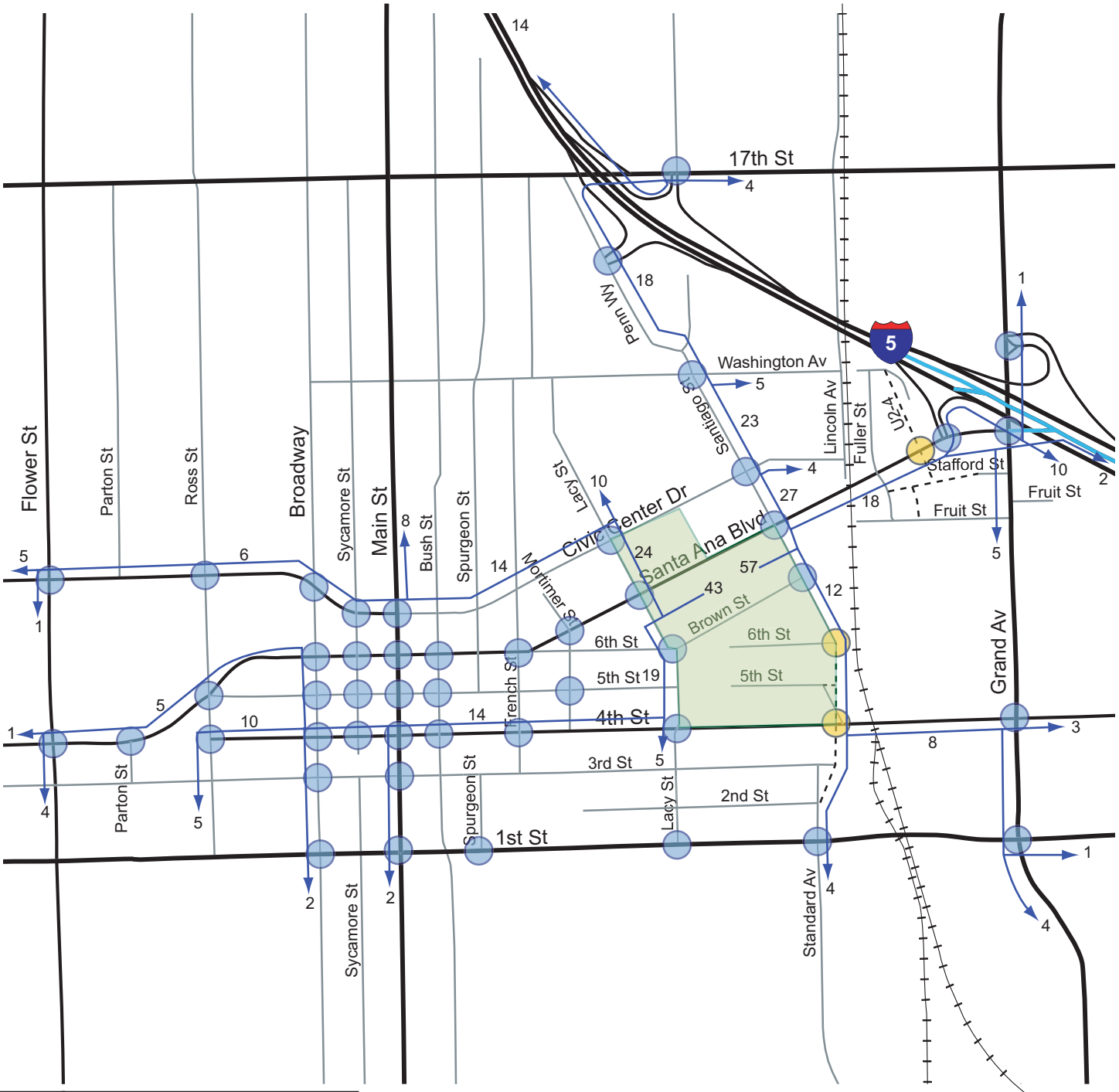

LEGEND

- Existing Intersection
- Future Intersection
- Future Roadway

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City of Santa Ana — Figure 6-2i

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 9

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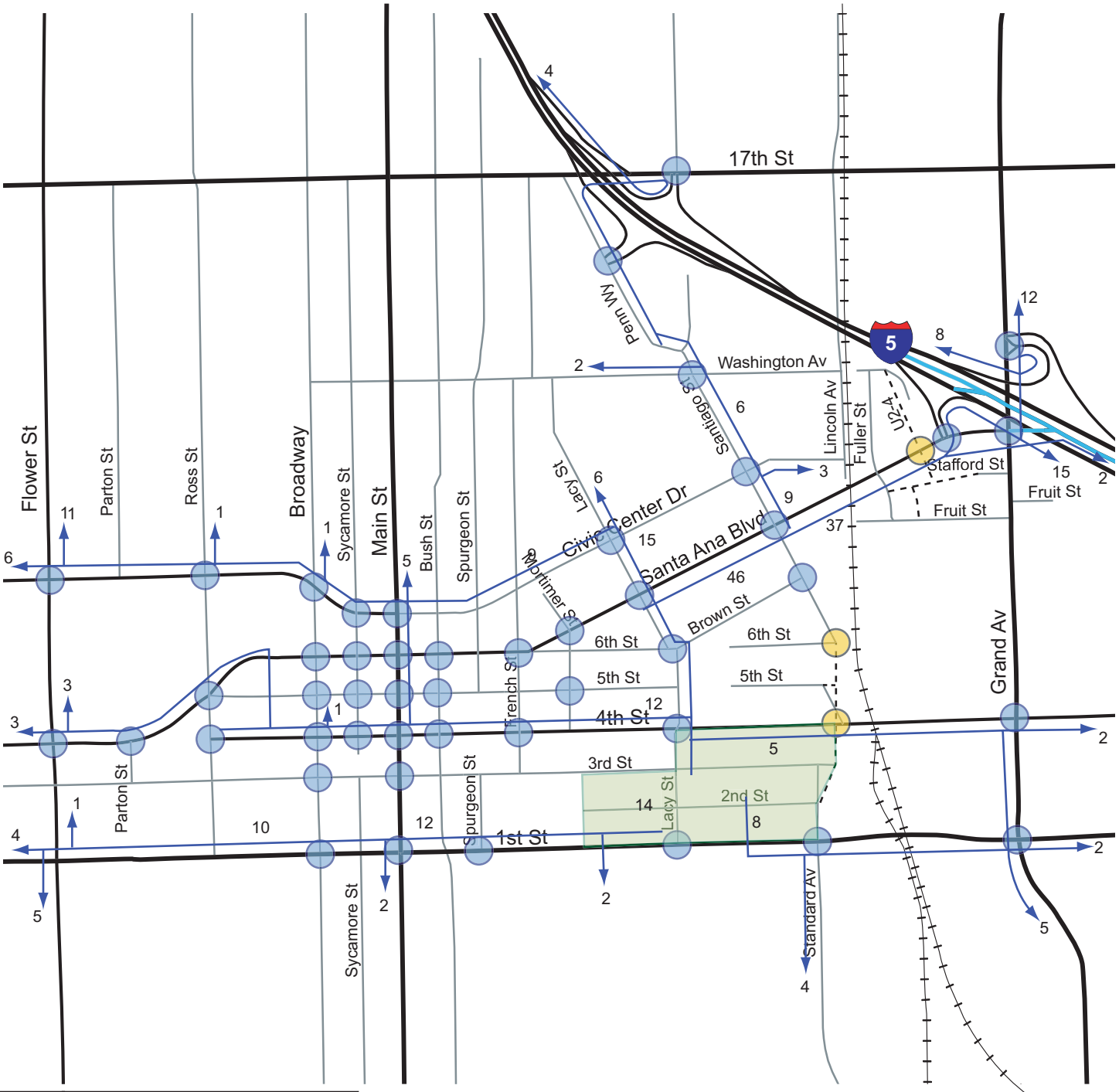

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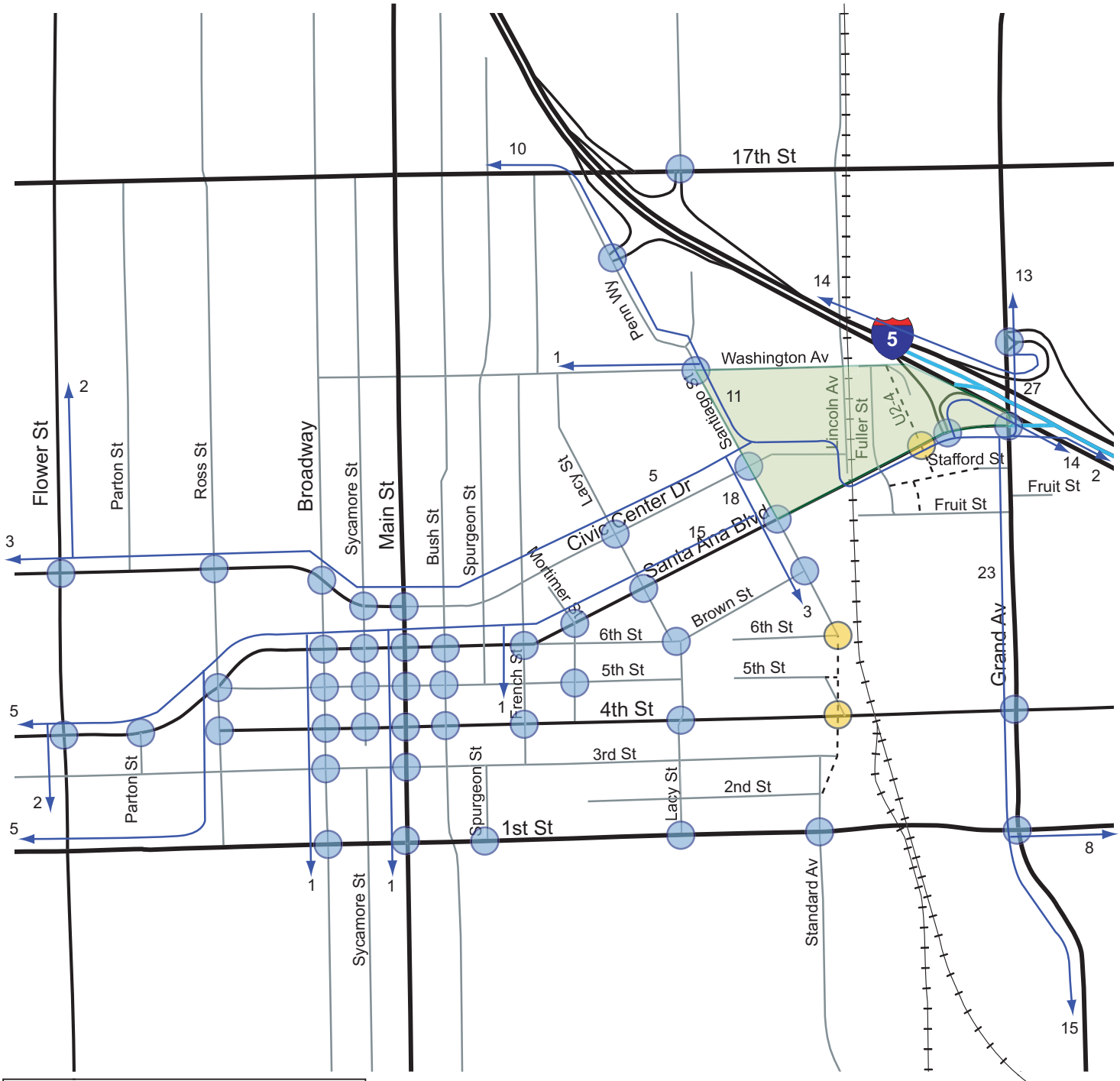
City of Santa Ana — Figure 6-2j

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 10



LEGEND

- Existing Intersection
- Future Intersection
- Future Roadway

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PLANNING & ENGINEERING

City of Santa Ana — Figure 6-2k

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 11

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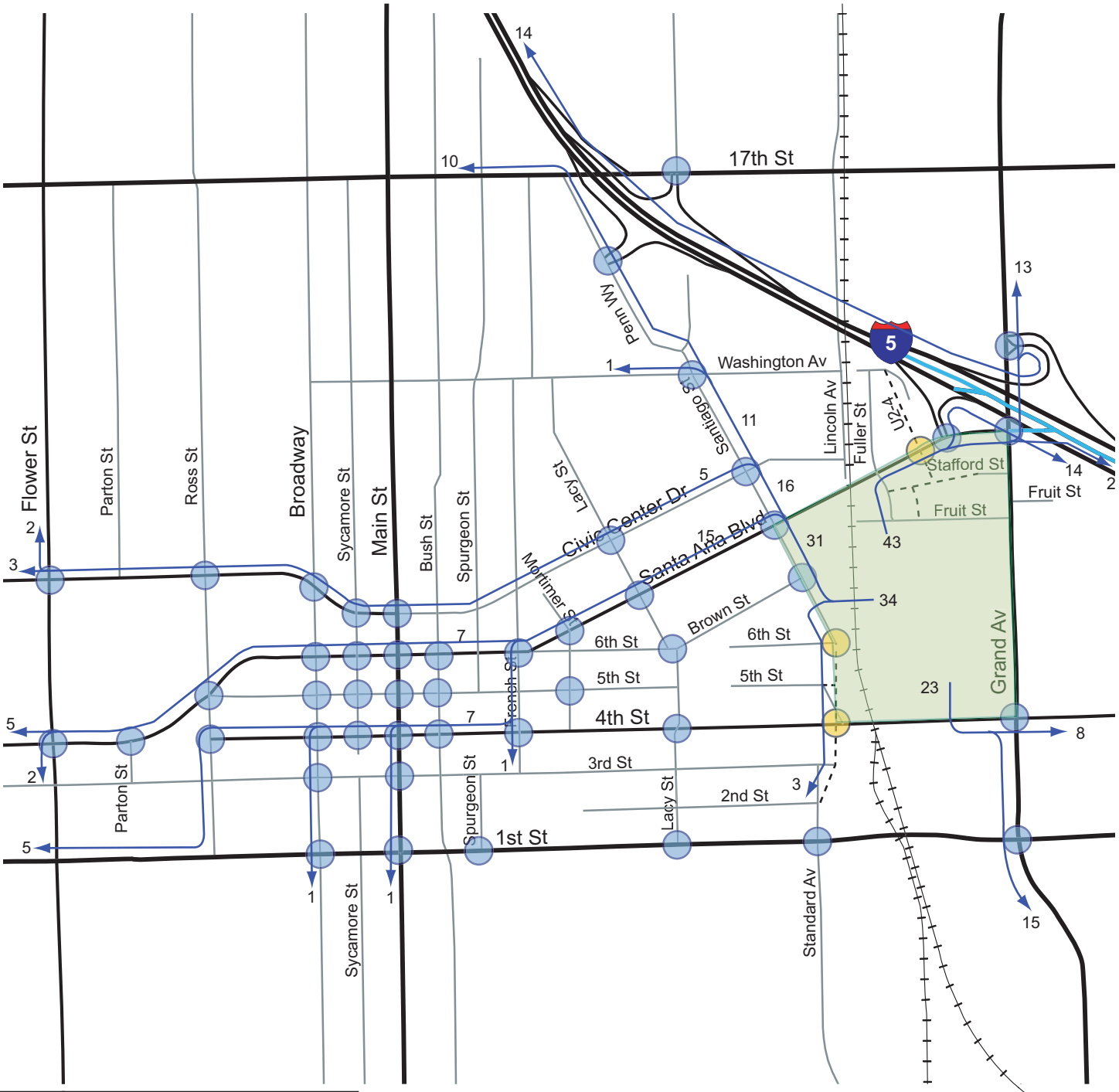

LEGEND

- Existing Intersection
- Future Intersection
- Future Roadway

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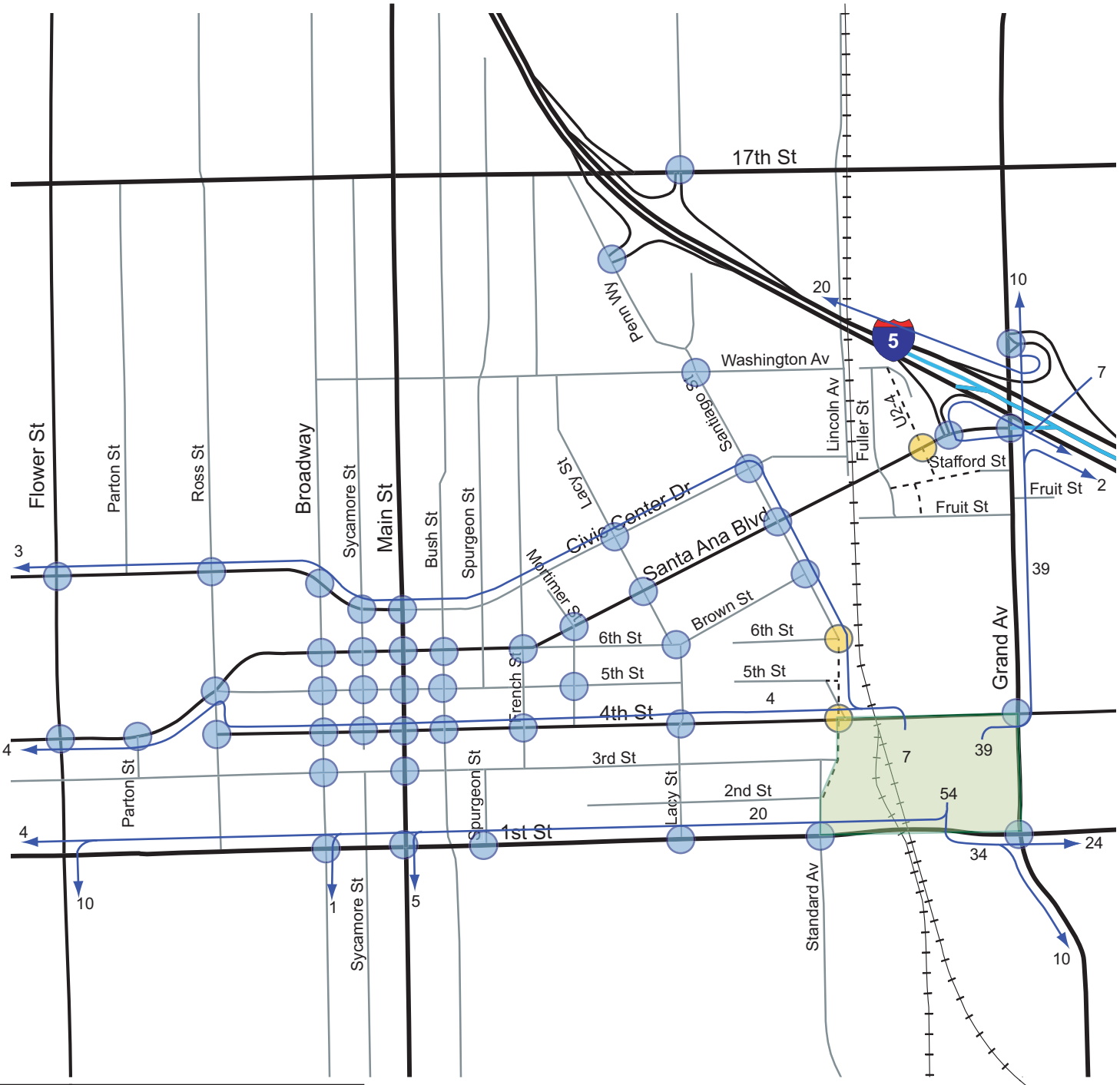
City of Santa Ana — Figure 6-2I

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 12



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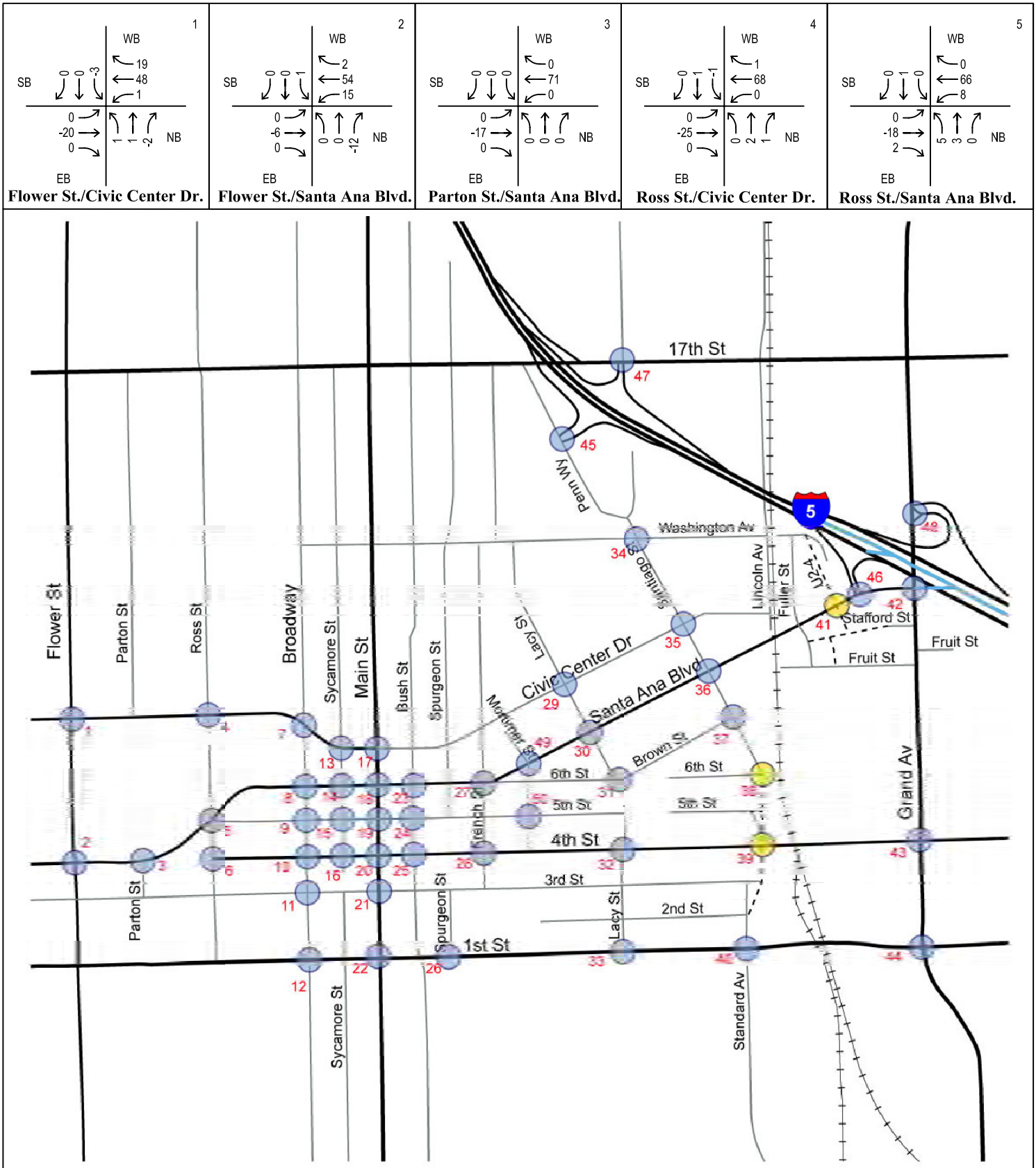
City of Santa Ana — Figure 6-2m

Santa Ana Transit Zoning Code Traffic Study — Project Trip Distribution TAZ 13



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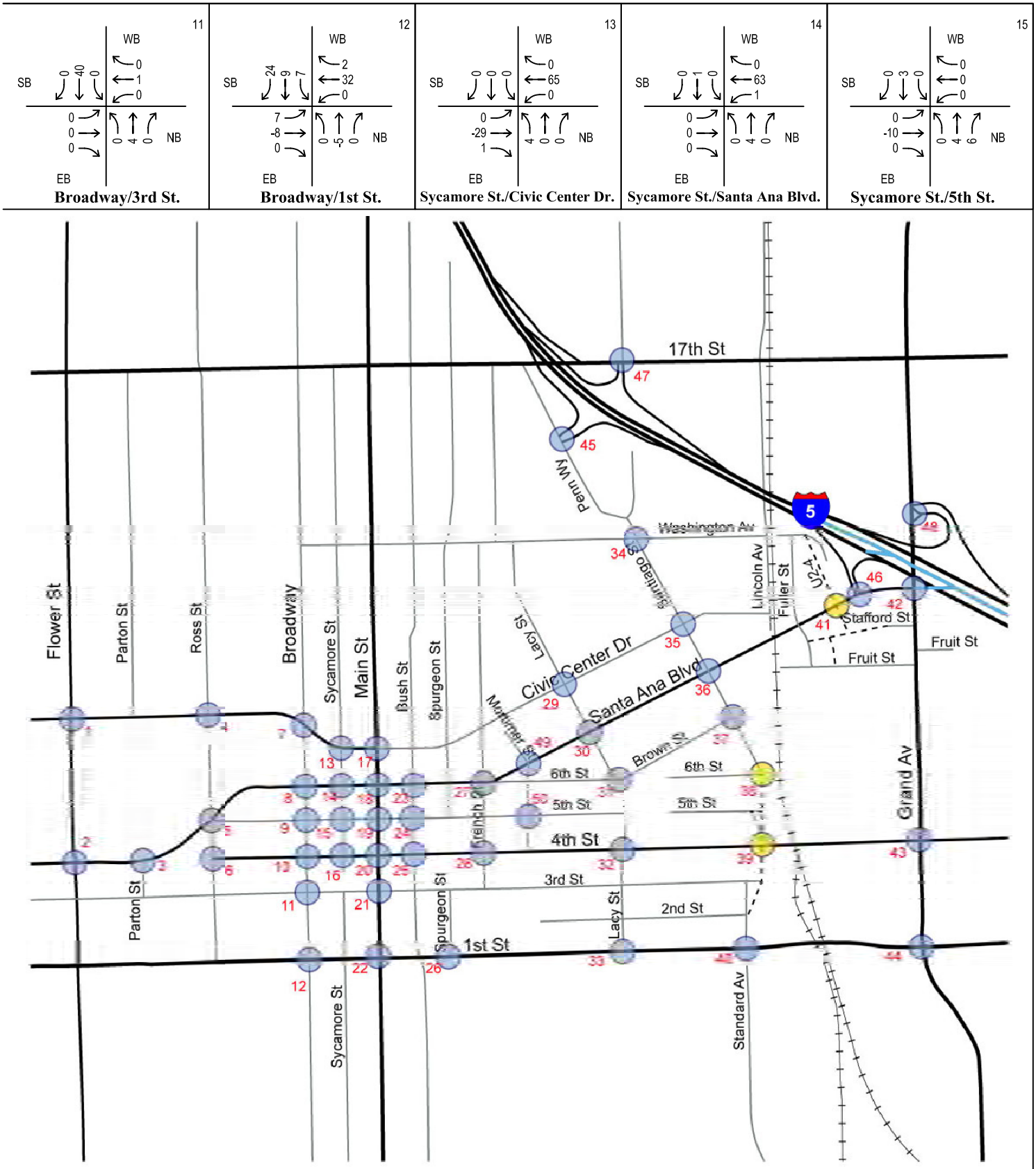
City of Santa Ana

Figure 6-3a

Santa Ana Transit Zoning Code Traffic Study

Project Only AM Peak Hour Volumes



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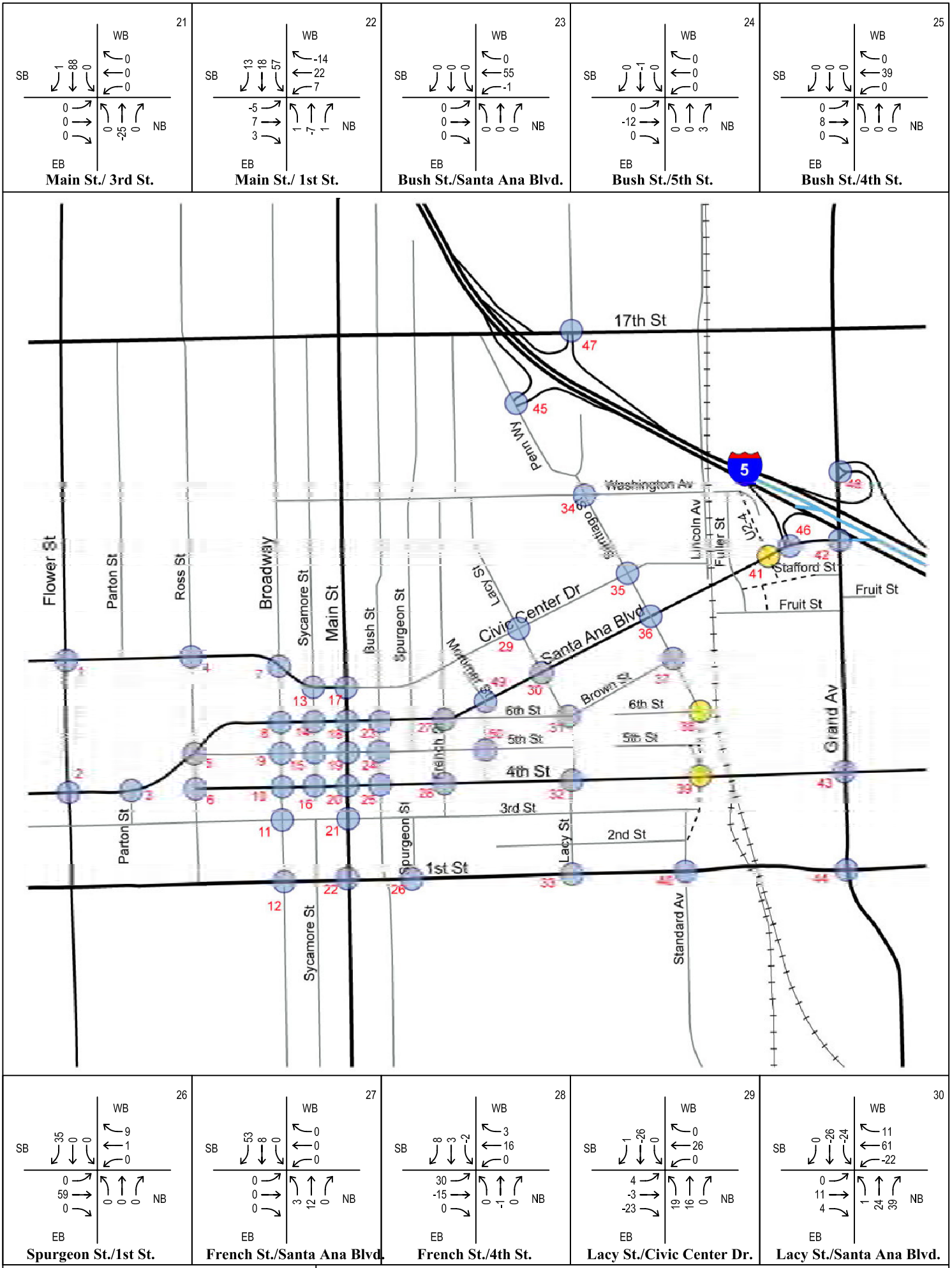
City of Santa Ana

Figure 6-3b

Santa Ana Transit Zoning Code Traffic Study

Project Only AM Peak Hour Volumes



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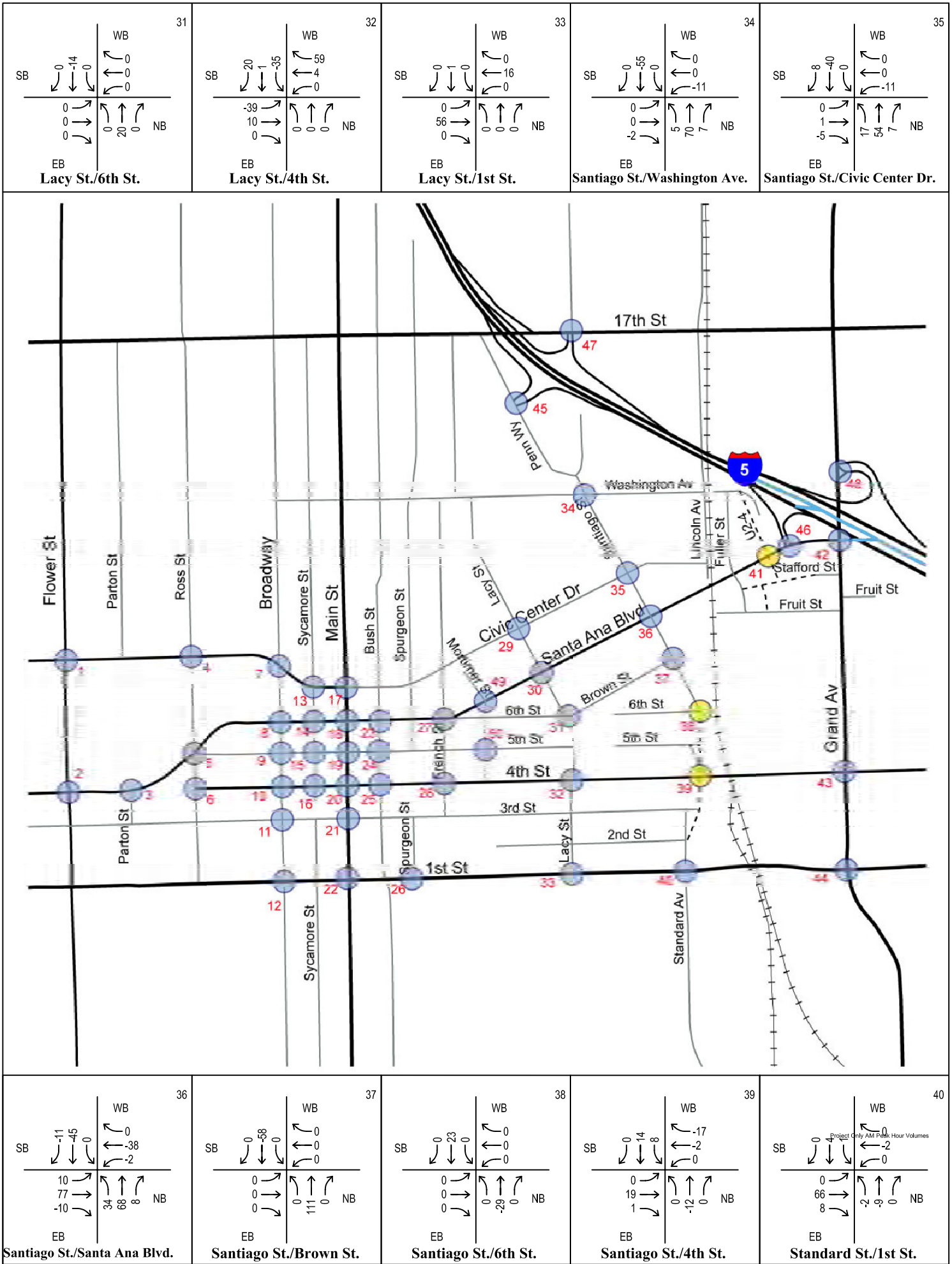
City of Santa Ana

Figure 6-3c

Santa Ana Transit Zoning Code Traffic Study

Project Only AM Peak Hour Volumes



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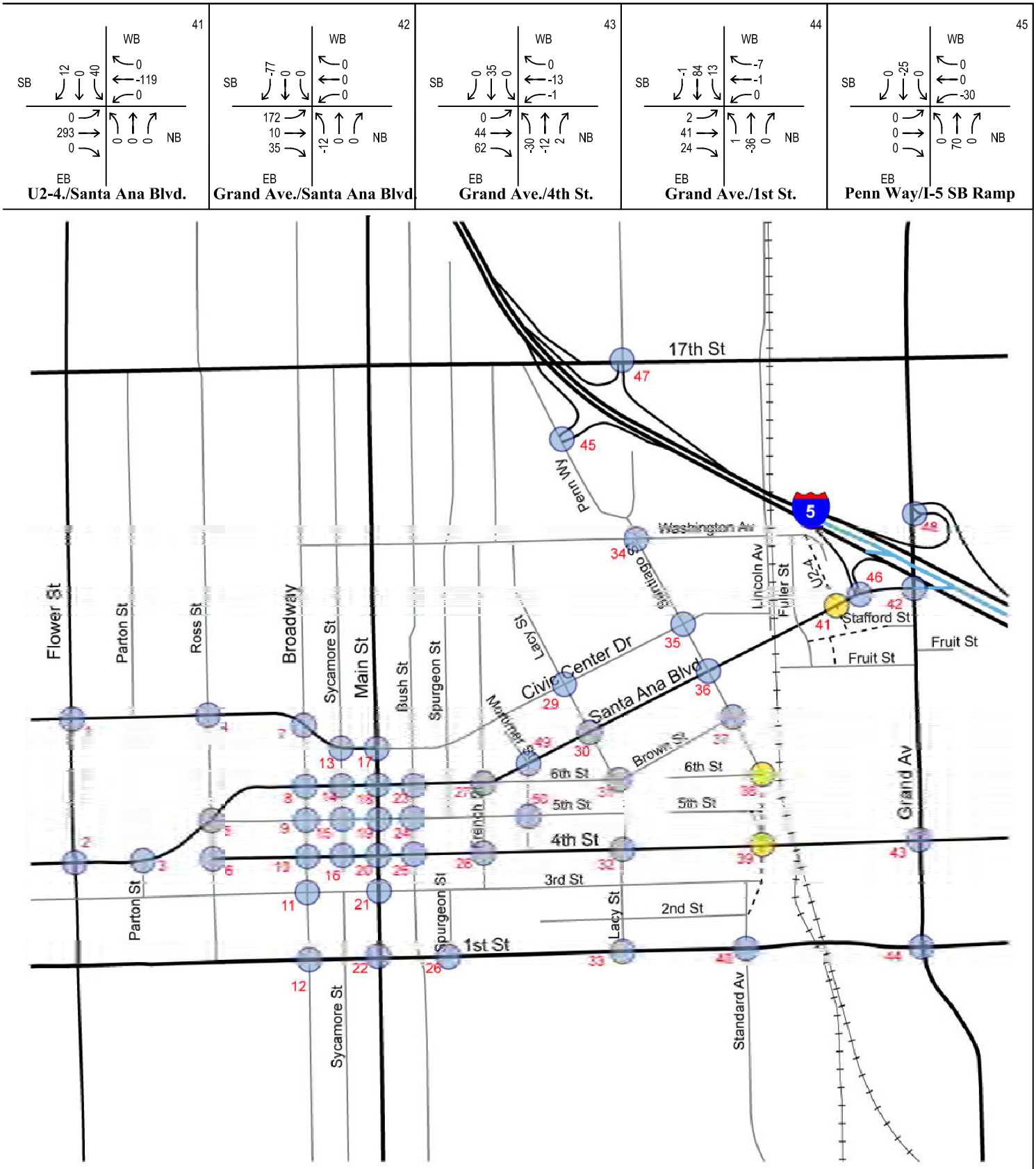
City of Santa Ana

Figure 6-3d

Santa Ana Transit Zoning Code Traffic Study

Project Only AM Peak Hour Volumes



City of Santa Ana — Figure 6-3e

Santa Ana Transit Zoning Code Traffic Study — Project Only AM Peak Hour Volumes

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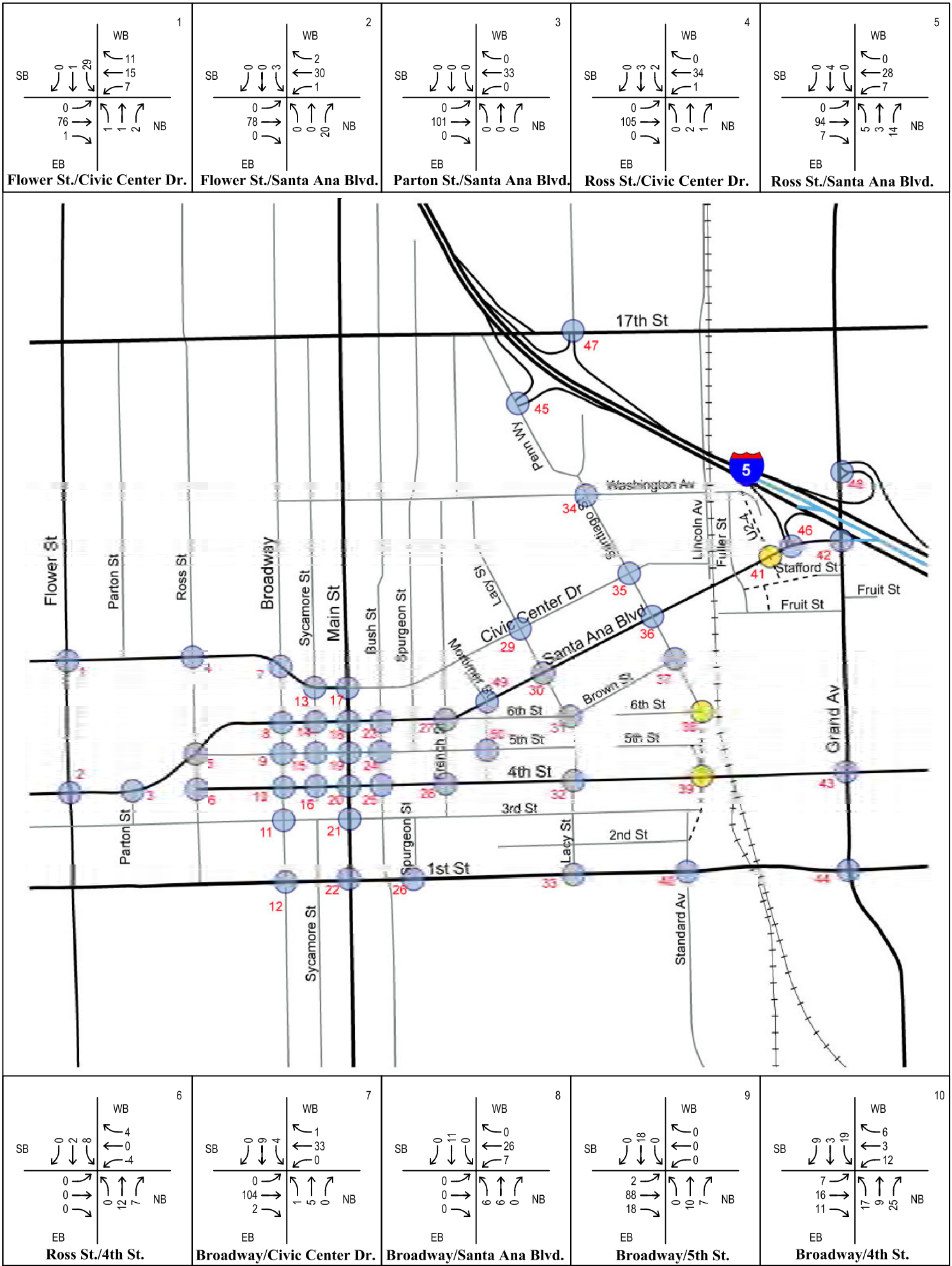

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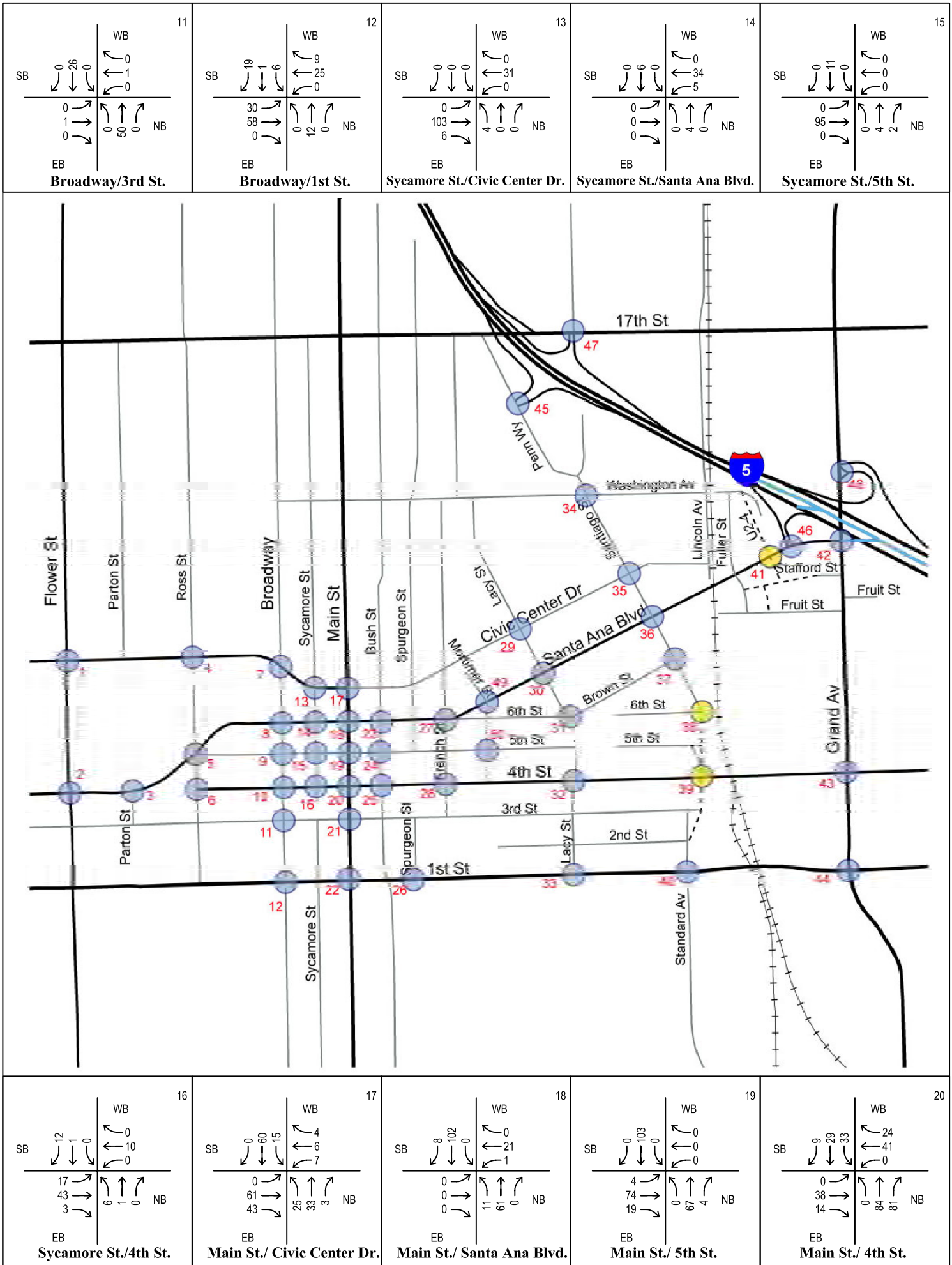
City of Santa Ana

Figure 6-3f

Santa Ana Transit Zoning Code Traffic Study

Project Only PM Peak Hour Volumes



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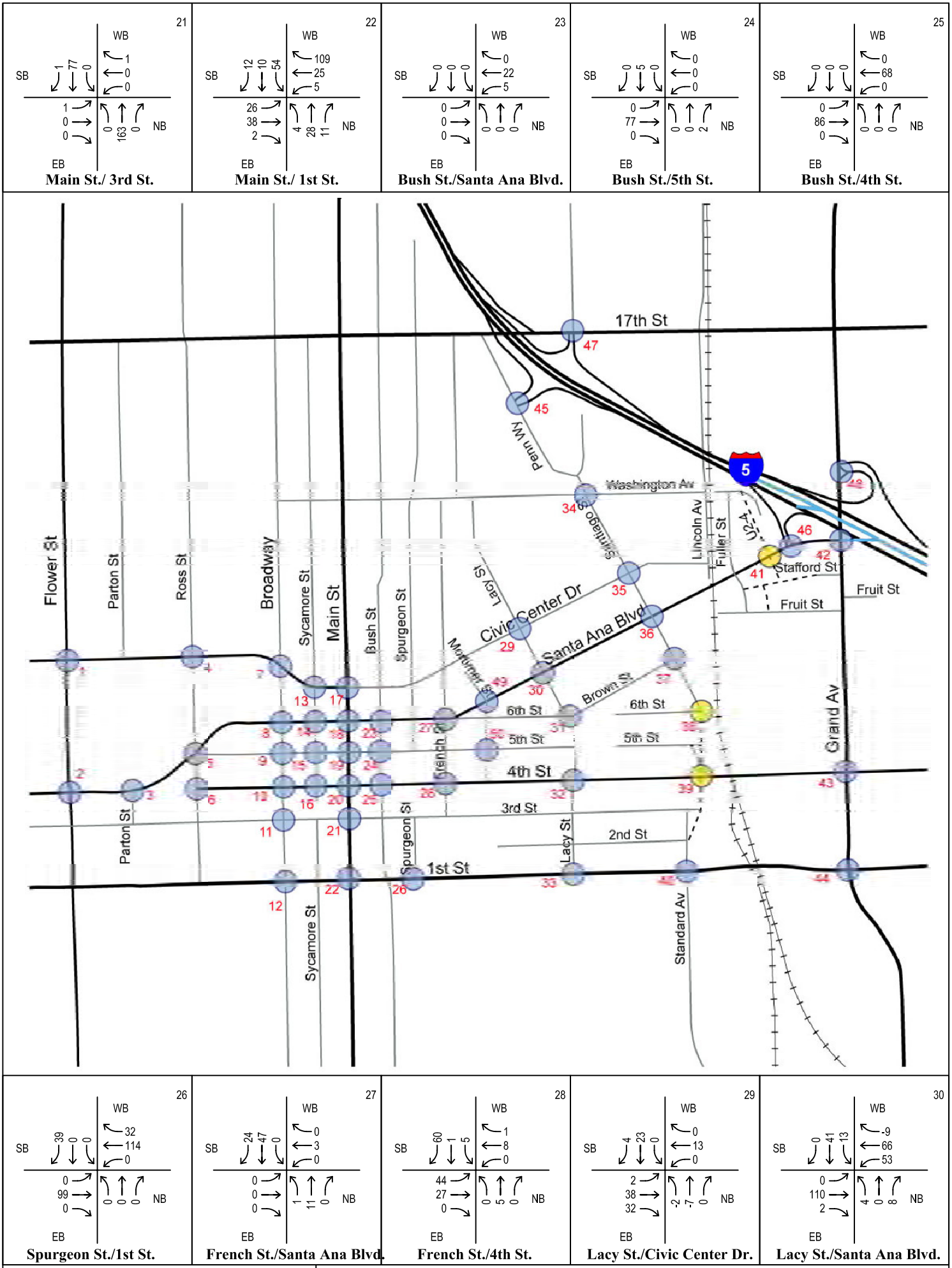
City of Santa Ana

Figure 6-3g

Santa Ana Transit Zoning Code Traffic Study

Project Only PM Peak Hour Volumes



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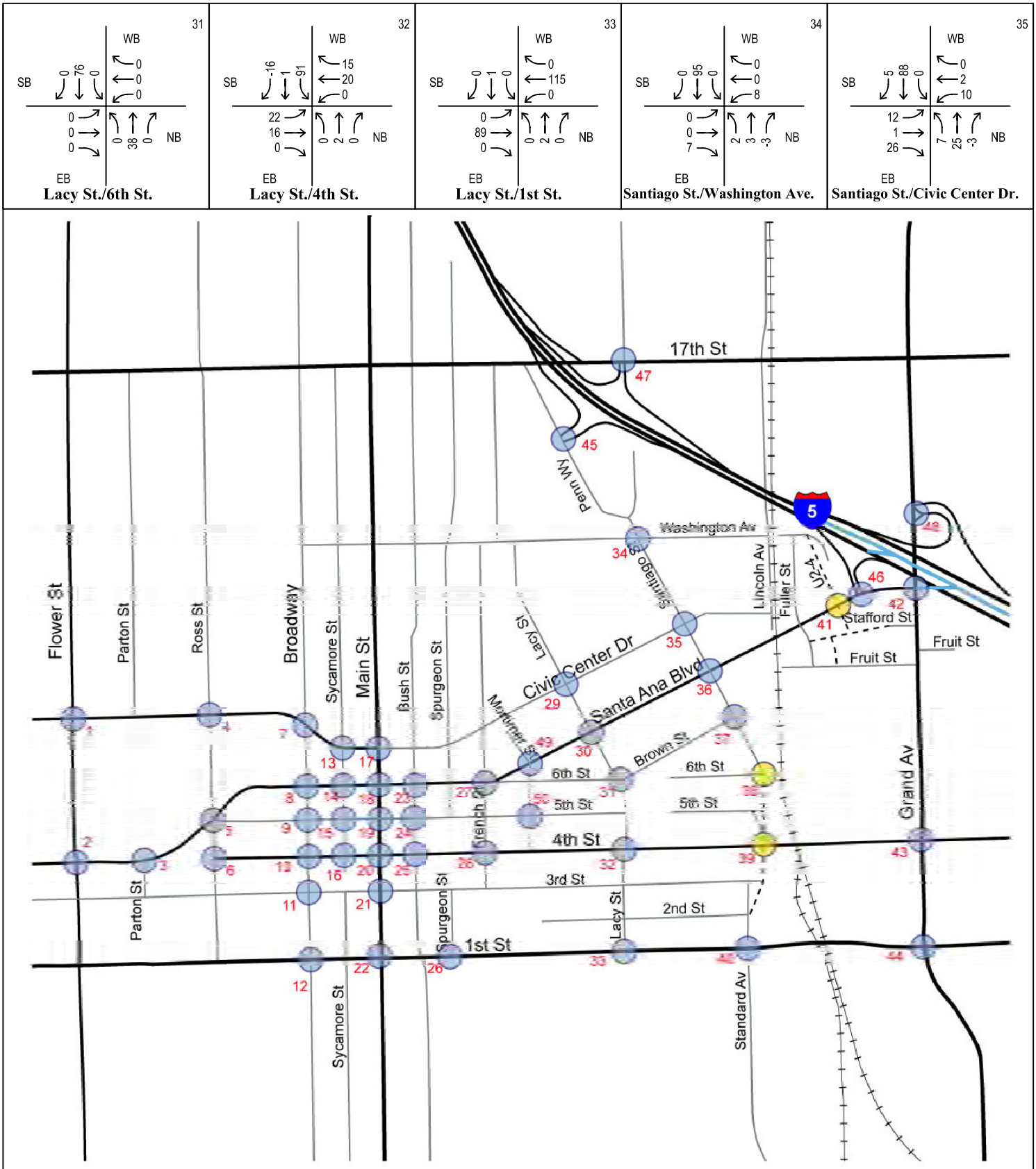
City of Santa Ana — Figure 6-3h

Santa Ana Transit Zoning Code Traffic Study — Project Only PM Peak Hour Volumes



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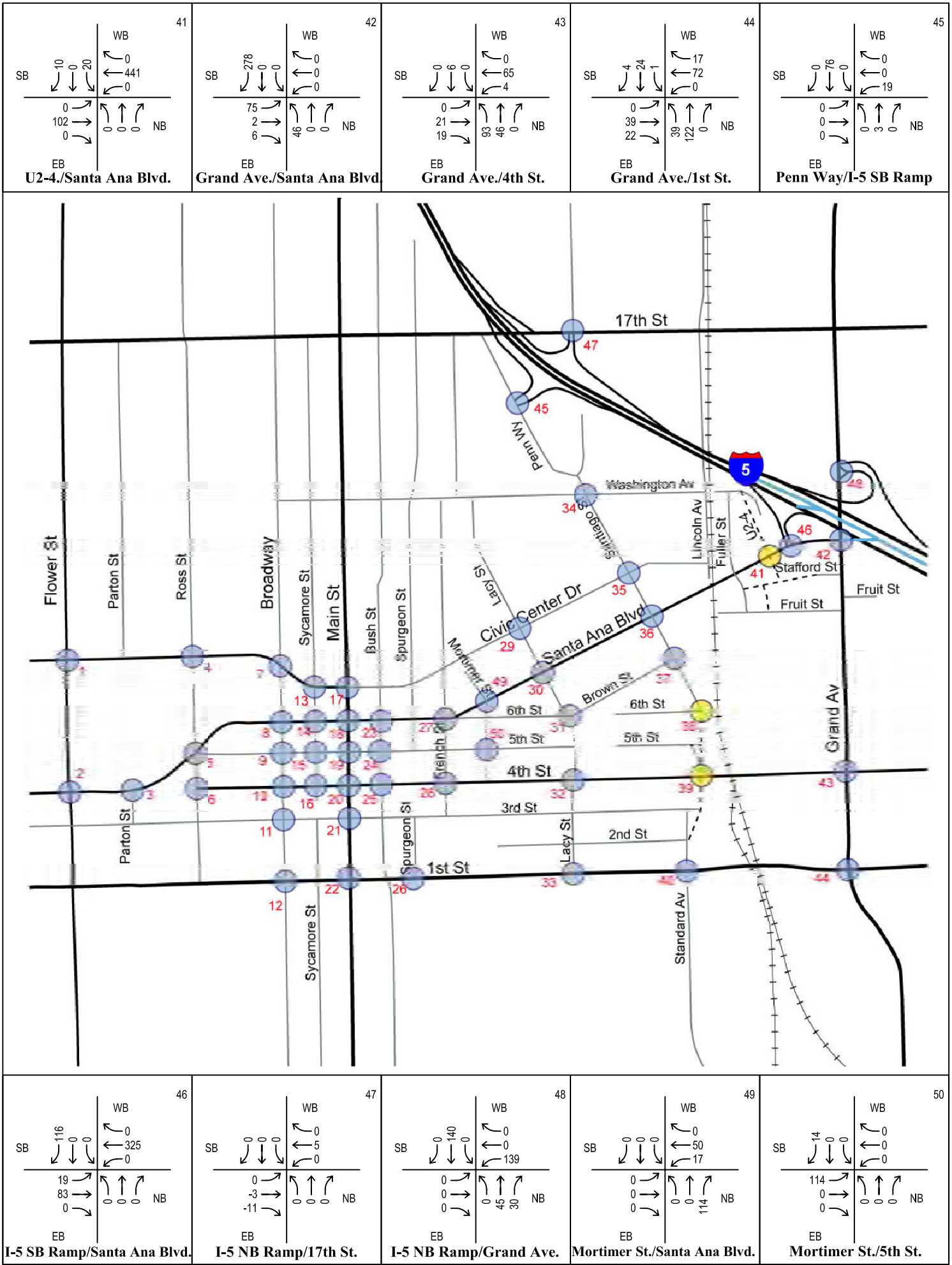
City of Santa Ana — Figure 6-3i

Santa Ana Transit Zoning Code Traffic Study — Project Only PM Peak Hour Volumes



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City of Santa Ana

Figure 6-3j

Santa Ana Transit Zoning Code Traffic Study

Project Only PM Peak Hour Volumes

7. ANTICIPATED PROJECT BUILDOUT (2030) WITH PROJECT CONDITIONS

This section documents the future (2030) traffic conditions with the addition of the Transit Zoning Code (SD 84A and SD 84B) project-related traffic to the surrounding street system. To forecast the anticipated project buildout traffic conditions for the year 2030, the 2030 Without Project peak hour background traffic volumes shown in Figures 4-2a through Figure 4-2j were increased by adding the project–related traffic volumes shown in Figure 6-2a through Figure 6-2j.

7.1 Anticipated Project Buildout (2030) With Project Intersection Conditions

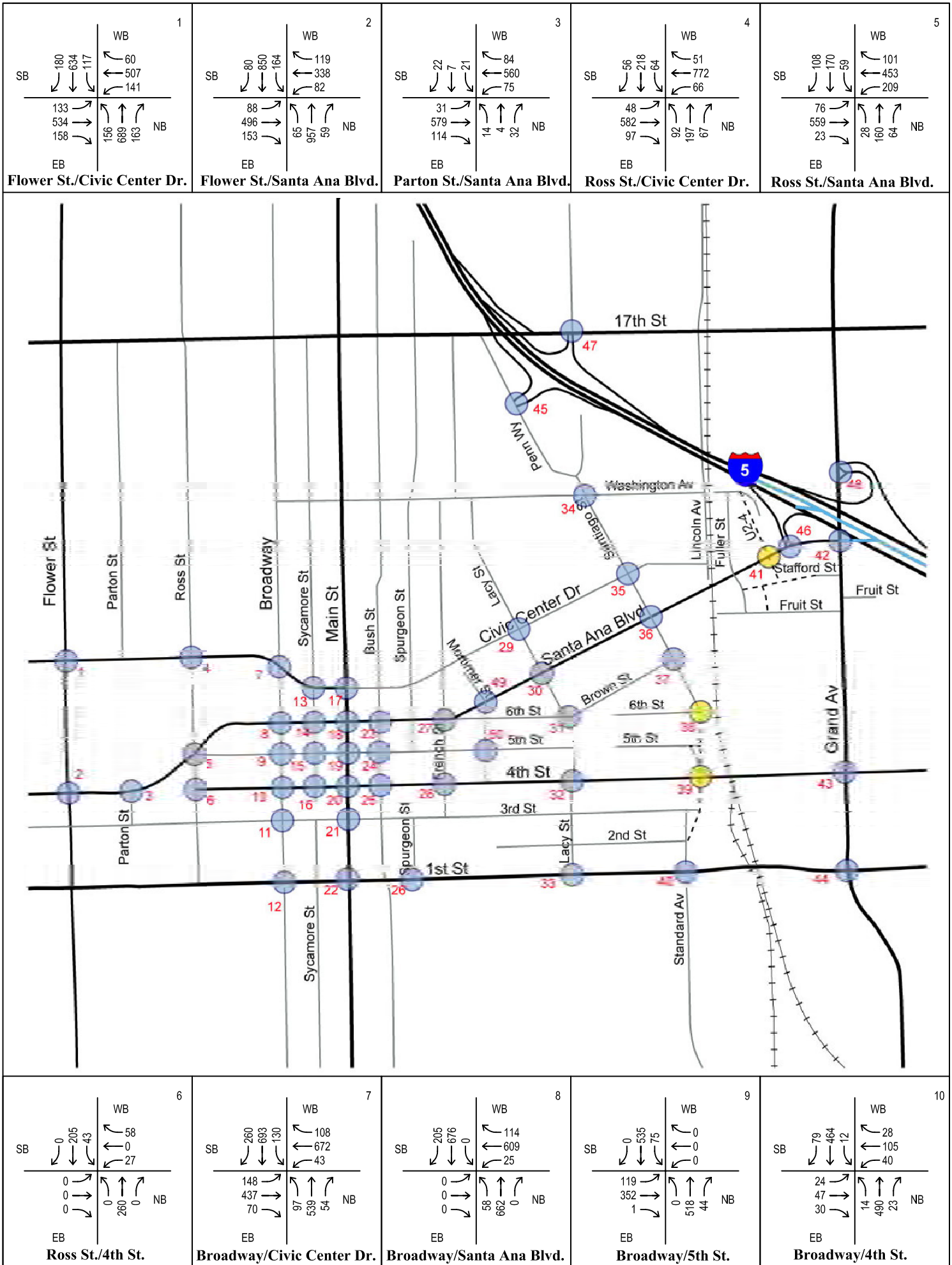
Figure 7-1a through Figure 7-1e illustrate the 2030 With Project AM peak hour traffic volumes while Figure 7-1f through Figure 7-1j illustrate the 2030 With Project PM peak hour traffic volumes for 2030 With Project conditions. Tables 7-1 and 7-2 illustrate the 2030 With Project intersection level of service conditions. As shown in the table, all intersections are expected to operate at Level of Service D or better under the 2030 With Project condition for the year 2030 except the following intersections. Appendix H includes the analysis worksheets for all intersections under 2030 With Project conditions.

- Main Street at 1st Street (Signalized)
- Grand Avenue at Santa Ana Boulevard (Signalized)
- Lacy Street at Civic Center Drive (Two-way stop control)
- Lacy Street at Santa Ana Boulevard (Two-way stop control)
- Lacy Street at 1st Street (Two-way stop control)
- Santiago Street at Civic Center Drive (Two-way stop control)
- Santiago Street at 4th Street (Two-way stop control)
- Mortimer Street at 5th Street (Two-way stop control)
- U2-4 Street at Santa Ana Boulevard (Two-way stop control)

Compared with 2030 Without Project conditions, six additional intersections operate at unacceptable levels of service:

- Main Street at 1st Street
- Lacy Street at Civic Center Drive
- U2-4 Street at Santa Ana Boulevard
- Santiago Street at Civic Center Drive
- Santiago Street at 4th Street
- Mortimer Street at 5th Street

Intersections warranting a signal under the future without project conditions include Lacy Street at Santa Ana Boulevard, Lacy Street at 1st Street, and Santiago Street at 4th Street.



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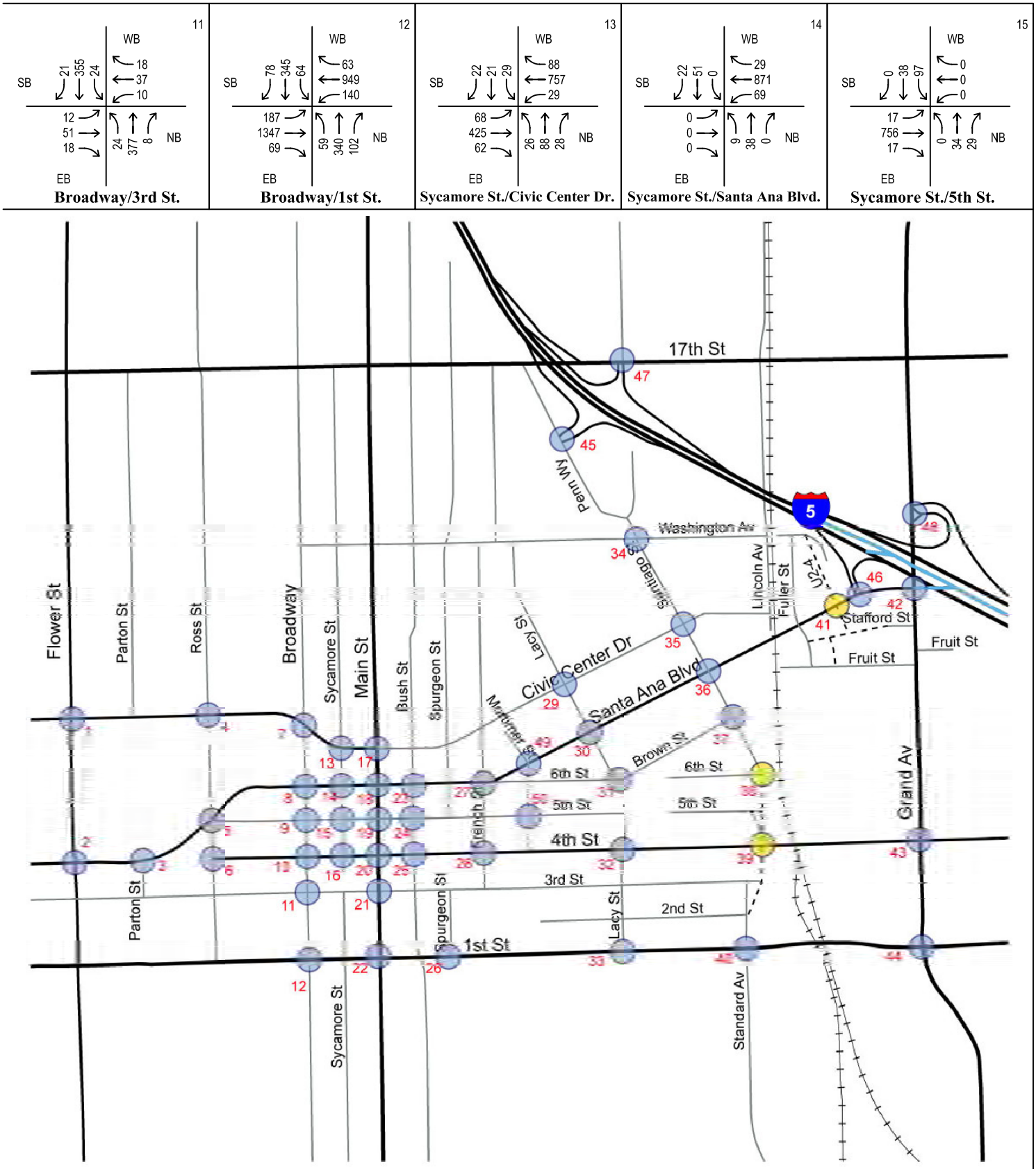
City of Santa Ana

Figure 7-1a

Santa Ana Transit Zoning Code Traffic Study

2030 With Project AM Peak Hour



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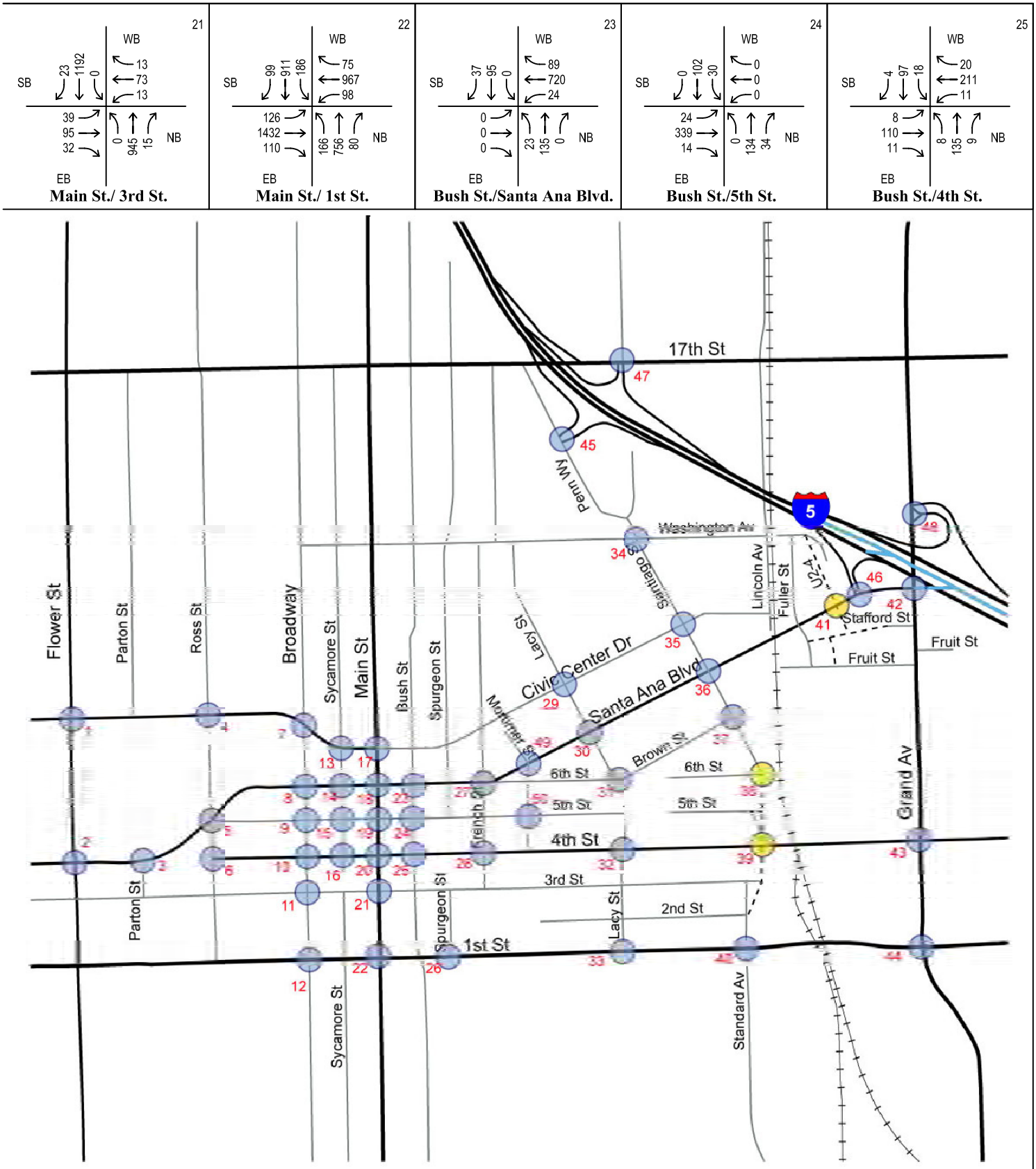
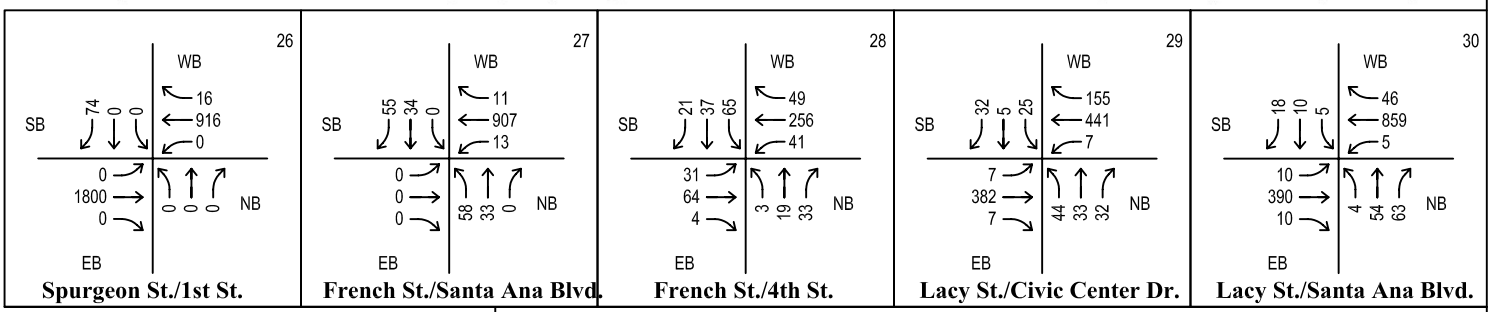
City of Santa Ana

Figure 7-1b

Santa Ana Transit Zoning Code Traffic Study

2030 With Project AM Peak Hour





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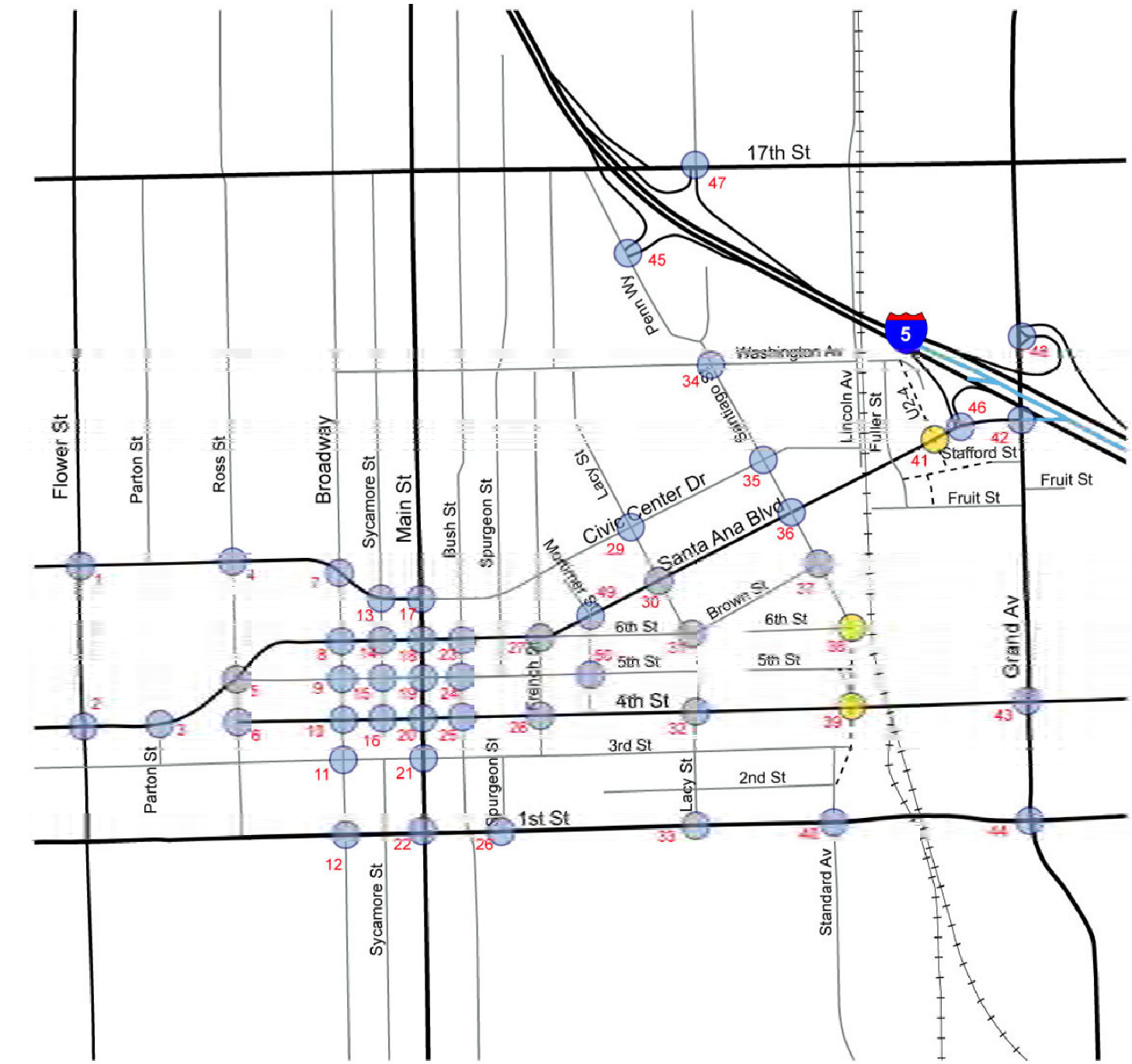
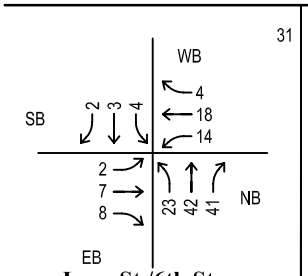
City of Santa Ana

Figure 7-1c

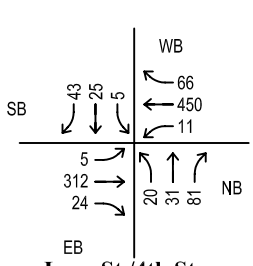
Santa Ana Transit Zoning Code Traffic Study

2030 With Project AM Peak Hour

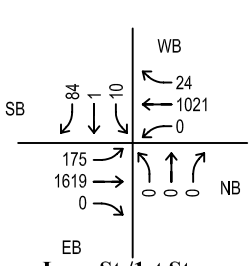




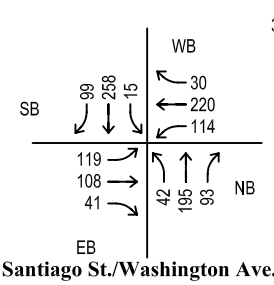
Lacy St./6th St.



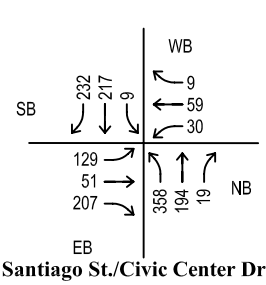
Lacy St./4th St.



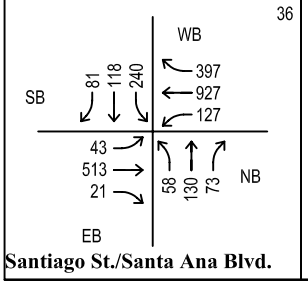
Lacy St./1st St.



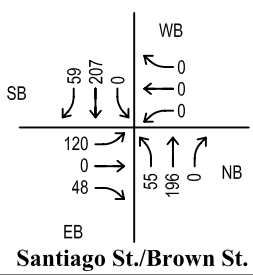
Santiago St./Washington Ave.



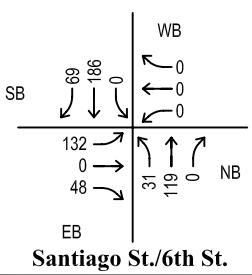
Santiago St./Civic Center Dr.



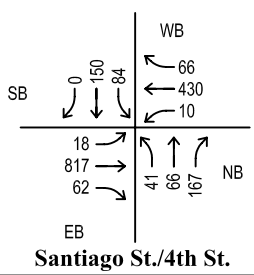
Santiago St./Santa Ana Blvd.



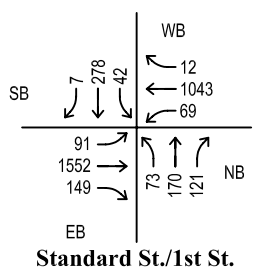
Santiago St./Brown St.



Santiago St./6th St.



Santiago St./4th St.



Standard St./1st St.

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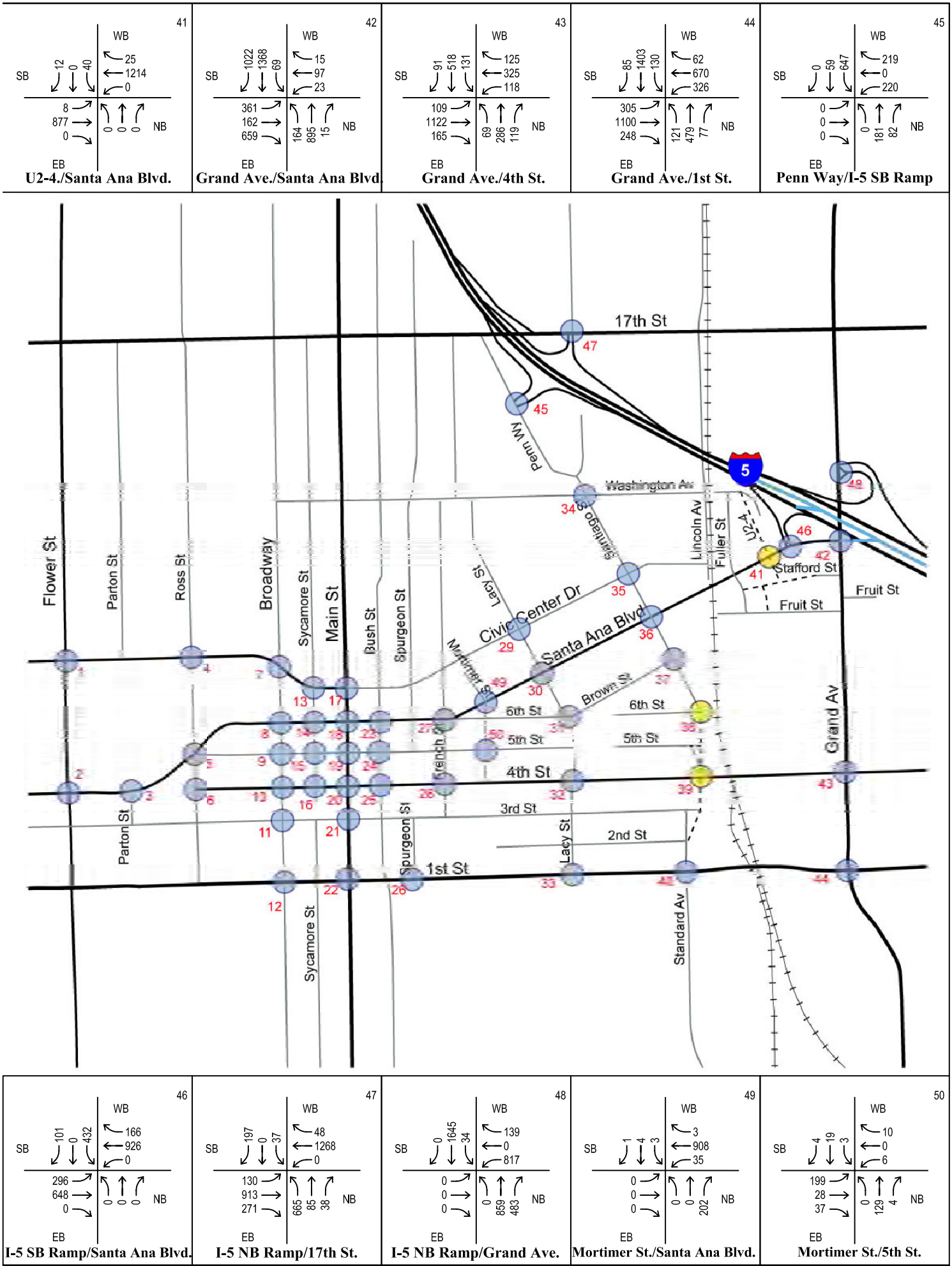
City of Santa Ana — Figure 7-1d

Santa Ana Transit Zoning Code Traffic Study — 2030 With Project AM Peak Hour



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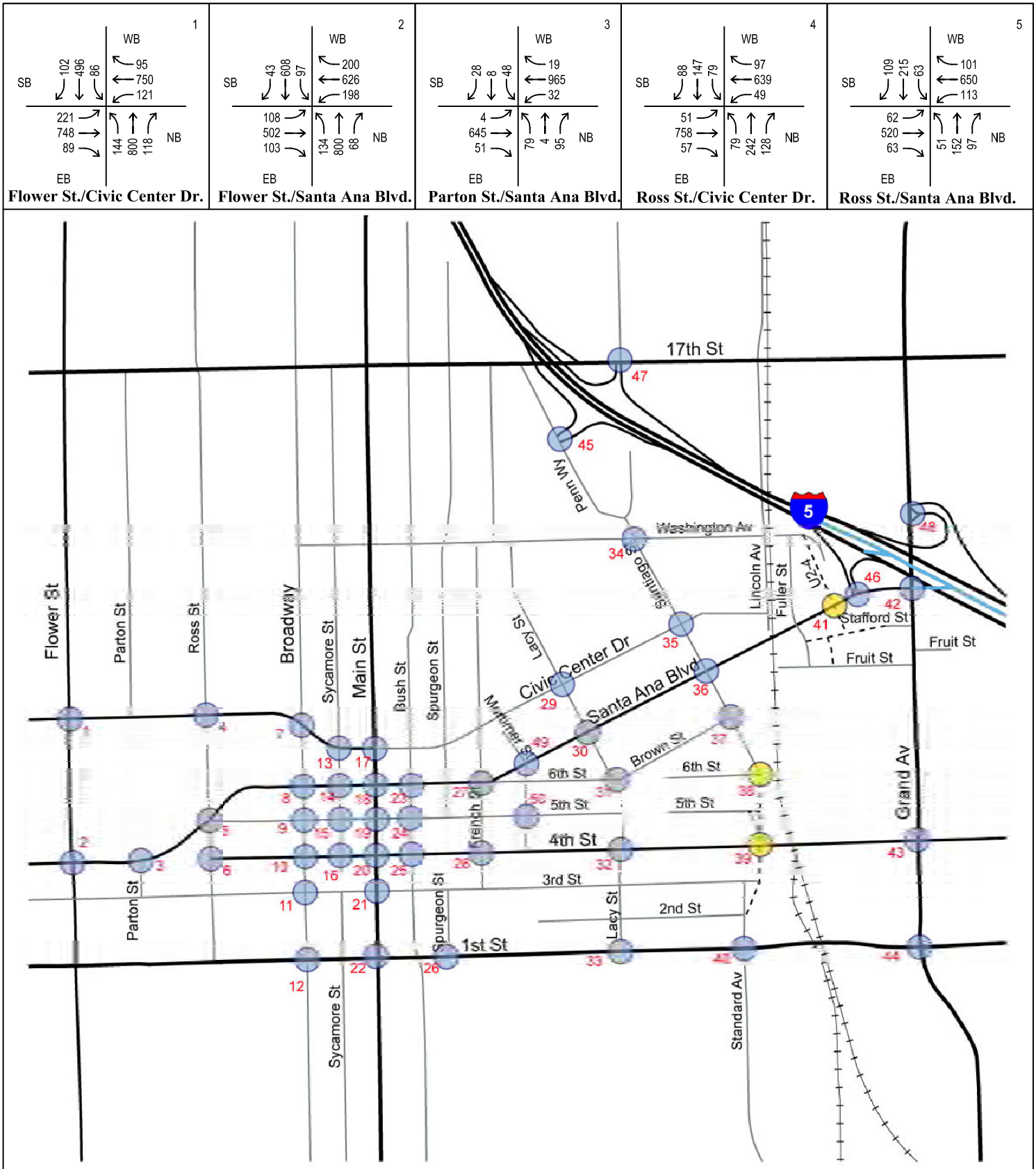
City of Santa Ana — Figure 7-1e

Santa Ana Transit Zoning Code Traffic Study — 2030 With Project AM Peak Hour



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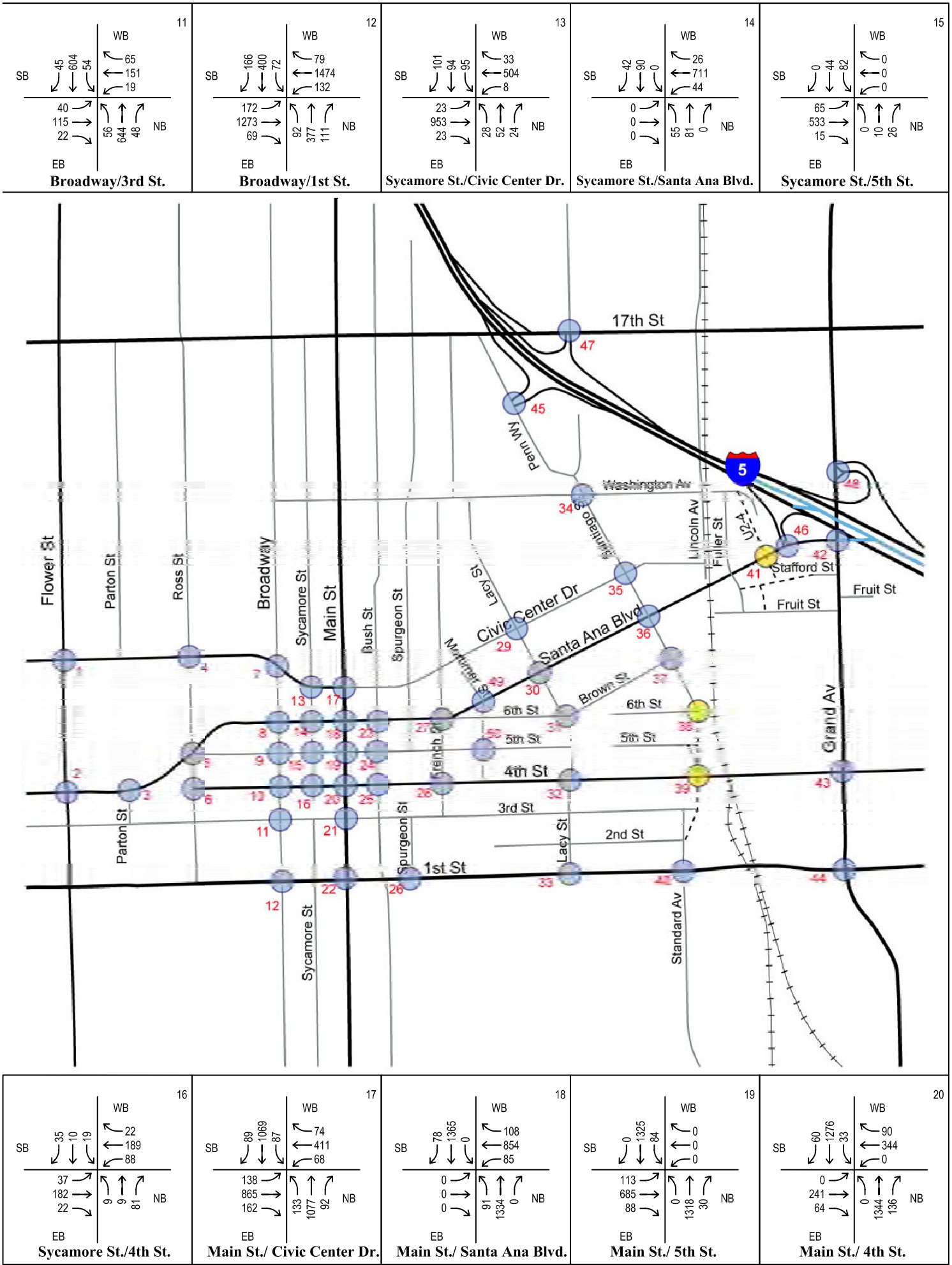
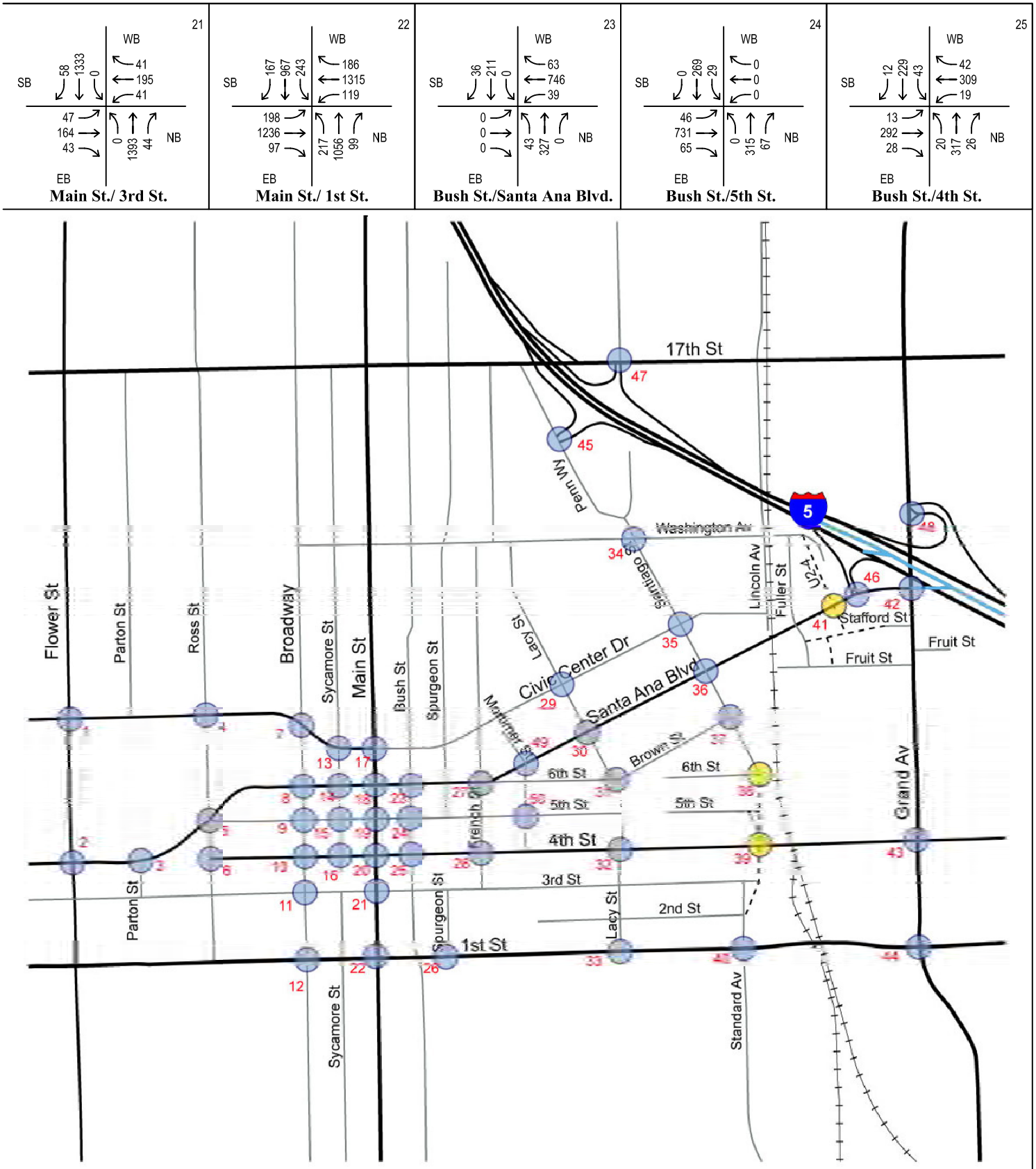
City of Santa Ana — Figure 7-1f

Santa Ana Transit Zoning Code Traffic Study — 2030 With Project PM Peak Hour


11
WB
SB
45 604 54
65 151 19
40 115 22
56 644 48
NB
EB
Broadway/3rd St.
12
WB
SB
166 400 72
79 1474 132
172 1273 69
92 377 111
NB
EB
Broadway/1st St.
13
WB
SB
101 94 95
33 504 8
23 953 23
28 52 24
NB
EB
Sycamore St./Civic Center Dr.
14
WB
SB
42 90 0
26 711 44
0 0 0
55 81 0
NB
EB
Sycamore St./Santa Ana Blvd.
15
WB
SB
0 44 82
0 0 0
65 533 15
0 10 26
NB
EB
Sycamore St./5th St.
17th St
Penn Wy
Washington Av
Santiago St
Lincoln Av
Fuller St
Stafford St
Fruit St
Civic Center Dr
Santa Ana Blvd
Brown St
6th St
5th St
4th St
3rd St
2nd St
1st St
Flower St
Parton St
Ross St
Broadway
Sycamore St
Main St
Bush St
Spurgeon St
Lacy St
French St
Grand Av
Standard Av
5
16
WB
SB
35 10 19
22 189 88
37 182 22
9 9 81
NB
EB
Sycamore St./4th St.
17
WB
SB
89 1069 87
74 411 68
138 865 162
133 1077 92
NB
EB
Main St./ Civic Center Dr.
18
WB
SB
78 1365 0
108 854 85
0 0 0
91 1334 0
NB
EB
Main St./ Santa Ana Blvd.
19
WB
SB
0 1325 84
0 0 0
113 685 88
0 1318 30
NB
EB
Main St./ 5th St.
20
WB
SB
60 1276 33
90 344 0
0 241 64
0 1344 136
NB
EB
Main St./ 4th St.



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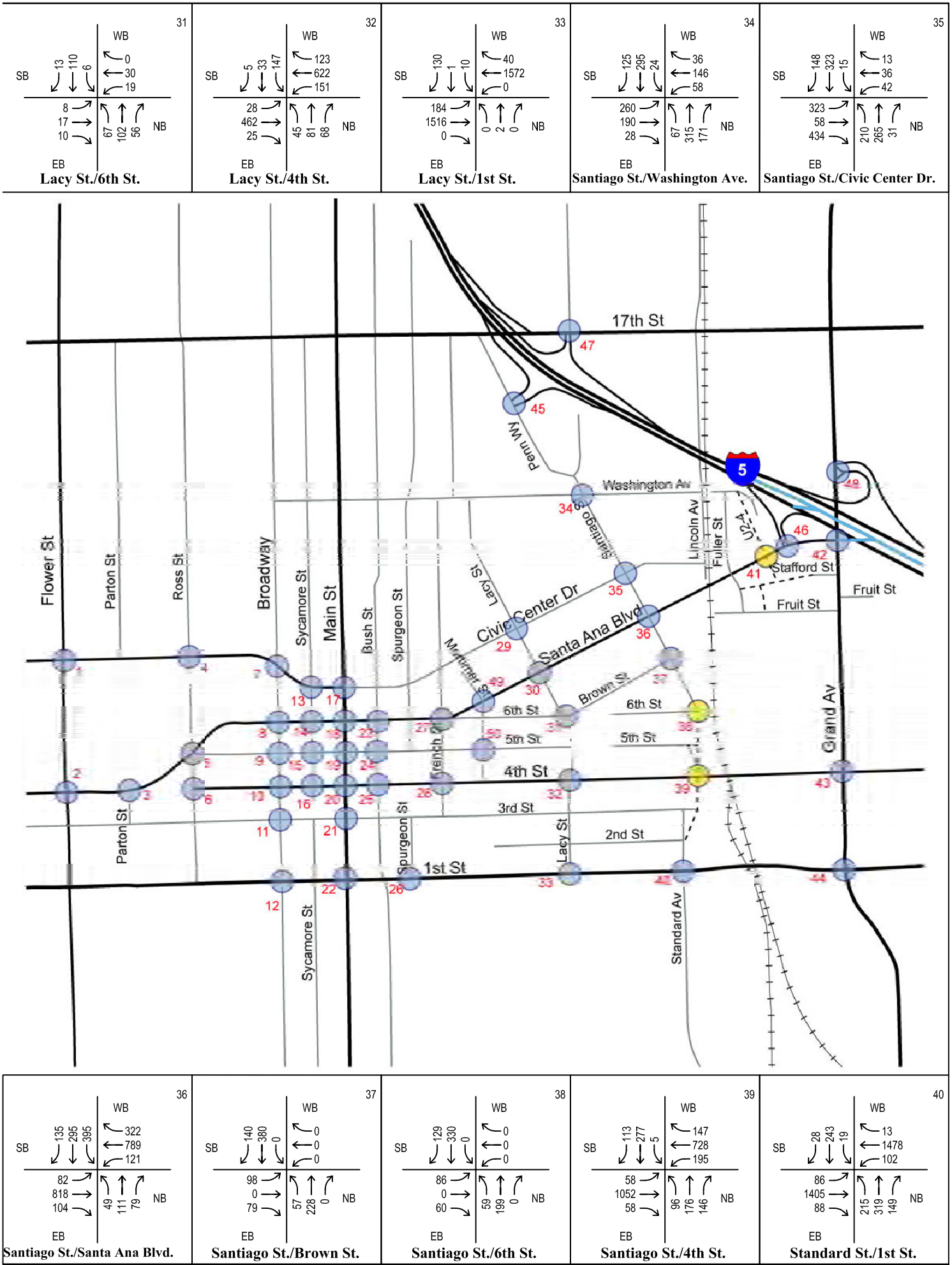
City of Santa Ana

Figure 7-1h

Santa Ana Transit Zoning Code Traffic Study

2030 With Project PM Peak Hour



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City of Santa Ana — Figure 7-1i

Santa Ana Transit Zoning Code Traffic Study — 2030 With Project PM Peak Hour

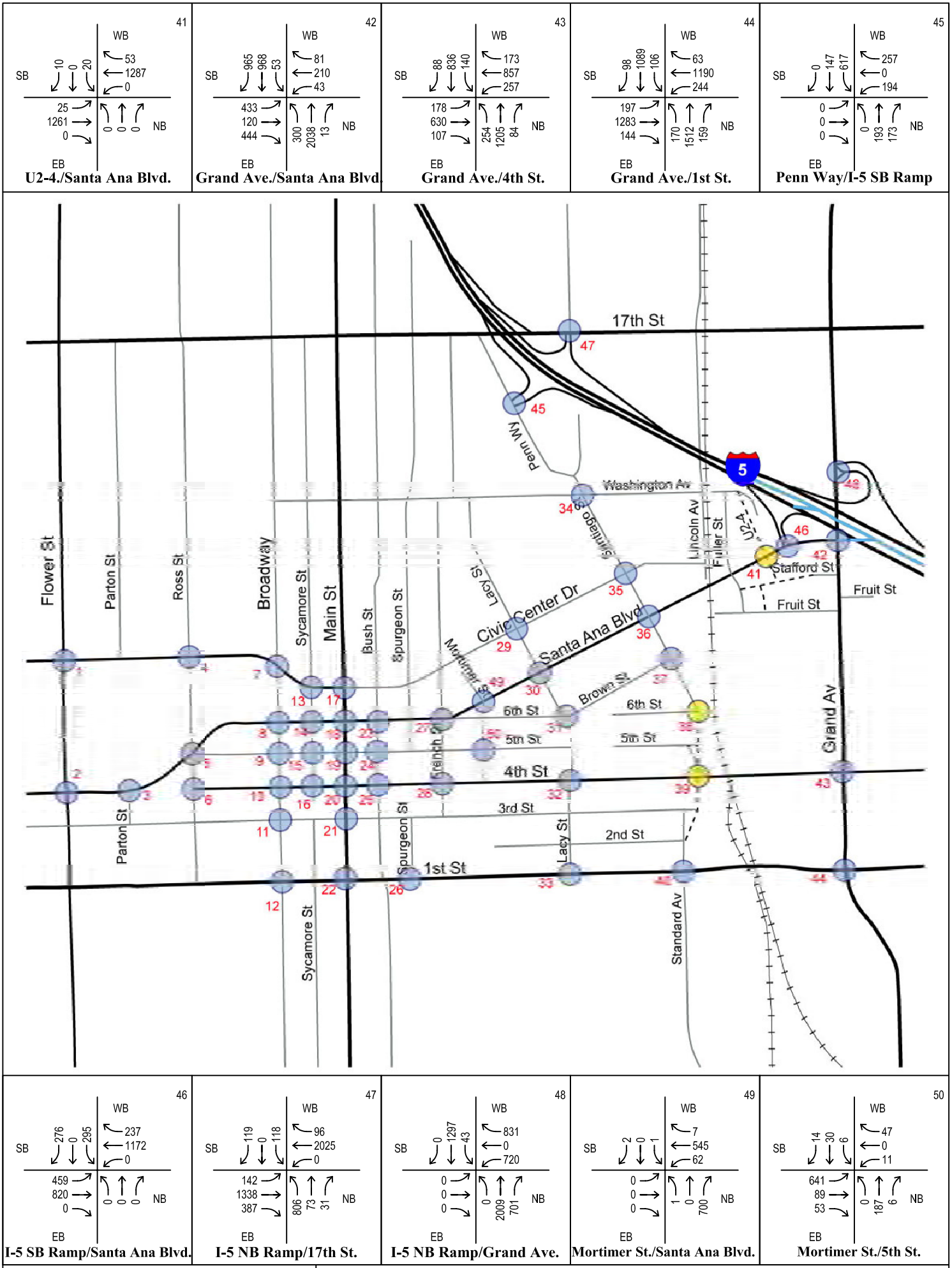

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Figure 7-1j

Santa Ana Transit Zoning Code Traffic Study

2030 With Project PM Peak Hour

Table 7-1
2030 With Project Peak Hour Intersection Conditions
(ICU Method)

Intersection	AM Peak Hour		PM Peak Hour	
	ICU	Level of Service	ICU	Level of Service
Signalized Intersections (Using ICU Method)				
Flower St. at Civic Center Dr.	0.679	B	0.761	C
Flower St. at Santa Ana Blvd.	0.589	A	0.598	A
Parton St. at Santa Ana Blvd.	0.275	A	0.378	A
Ross St. at Civic Center Dr.	0.541	A	0.508	A
Ross St. at Santa Ana Blvd.	0.476	A	0.432	A
Broadway at Civic Center Dr.	0.637	B	0.657	B
Broadway at Santa Ana Blvd.	0.492	A	0.535	A
Broadway at 5th St.	0.355	A	0.488	A
Broadway at 4th St.	0.334	A	0.437	A
Broadway at 3rd St.	0.338	A	0.643	B
Broadway at 1st St.	0.655	B	0.755	C
Sycamore St. at Civic Center Dr.	0.442	A	0.529	A
Main St. at Civic Center Dr.	0.781	C	0.818	D
Main St. at Santa Ana Blvd.	0.672	B	0.737	C
Main St. at 5th St.	0.518	A	0.673	B
Main St. at 4th St.	0.571	A	0.760	C
Main St. at 3rd St.	0.490	A	0.641	B
Main St. at 1st St.	0.776	C	0.960	E
Bush St. at Santa Ana Blvd.	0.305	A	0.409	A
Bush St. at 5th St.	0.242	A	0.458	A
Bush St. at 4th St.	0.293	A	0.504	A
French St. at 4th St.	0.316	A	0.499	A
Lacy St. at 4th St.	0.398	A	0.634	B
Santiago St. at Santa Ana Blvd.	0.545	A	0.694	B
Standard St. at 1st St.	0.832	D	0.858	D
Grand Ave. at Santa Ana Blvd.	0.794	C	0.991	E
Grand Ave. at 4th St.	0.665	B	0.768	C
Grand Ave. at 1st St.	0.729	C	0.822	D

Table 7-2
2030 With Project Peak Hour Intersection Conditions
(HCM Method)

Intersection	AM Peak Hour		PM Peak Hour	
	Average/Worst Case Delay	Level of Service	Average/Worst Case Delay	Level of Service
Unsignalized Intersections				
Ross St. at 4th St.	10.9	B	12.4	B
Sycamore St. at Santa Ana Blvd.	24.2	C	23.1	C
Sycamore St. at 5th St.	16.0	C	15.5	C
Sycamore St. at 4th St.	8.1	A	9.7	A
Spurgeon St. at 1st St.	10.9	B	17.1	C
French St. at Santa Ana Blvd.	19.9	C	20.8	C
Lacy St. at Civic Center Dr.	25.4	D	44.8	E
Lacy St. at Santa Ana Blvd.	31.9	D	412.6	F
Lacy St. at 6th St.	7.3	A	8.3	A
Lacy St. at 1st St.	33.6	D	OVRFL	F
Santiago St. at Washington Ave.	16.3	C	34.5	D
Santiago St. at Civic Center Dr.	23.5	C	42.6	E
Santiago St. at Brown St.	12.1	B	13.9	B
Santiago St. at 6th St.	11.3	B	13.0	B
Santiago St. at 4th St.	OVRFL	F	OVRFL	F
Mortimer St. at 5th St.	9.1	A	44.1	E
Mortimer St. at Santa Ana Blvd.	22.2	C	25.1	D
U2-4 at Santa Ana Blvd.	46.3	E	52.8	F
Signalized Intersections (Caltrans, Using HCM)				
Penn Way at I-5 SB	22.7	C	23.8	C
Santa Ana Blvd. at I-5 SB	28.7	C	31.5	C
17t St. at I-5 NB	33.2	C	40.9	D
Grand Ave at I-5 NB	20.6	C	50.8	D

Note 1: Level of Service for unsignalized intersections is for the worst-case approach.

7.2 Anticipated Project Buildout (2030) With Project Roadway Segment Conditions

The roadway segment ADT analysis for the 2030 With Project scenario is presented in Table 7-3. As indicated, a majority of the arterial roadways are operating at acceptable levels. The daily V/C ratio screening analysis indicates that the following locations are potentially experiencing capacity deficiencies under 2030 With Project conditions:

- Civic Center Drive between Lacy Street and Lincoln Avenue
- Main Street between 1st Street and Washington Avenue
- Santa Ana Boulevard between French Street and Lacy Street
- Santa Ana Boulevard west of I-5 SB Ramps
- Civic Center Drive between Santiago Street and Lincoln Avenue
- Grand Avenue South of I-5 NB Ramps

The daily volume-to-capacity ratios provide a screening level analysis of daily traffic flows and potential operational problems within the study area. The peak hour analysis for intersections, presented in the previous section, provides a more definitive analysis of the operation of the arterial roadways in the project area. Although a few roadway segments indicate deficiencies, the proposed mitigation should be based on the intersection analysis recommendations. All roadway segments should operate at acceptable level of services under City's General Plan circulation element designations with spot improvements at intersections proposed based on the intersection analysis.

Table 7-3 2030 With Project Roadway Segment Daily Traffic Conditions

Road	Segment	2030 WP ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
Flower Street	Santa Ana Blvd to Civic Center Dr.	20,656	4D	37,500	A	
Flower Street	17th St to Civic Center	19,840	4D	37,500	A	
Civic Center Dr.	West of Flower St.	21,297	4D	37,500	A	
Civic Center Dr.	Flower St. to Ross St.	20,707	4D	37,500	A	
Flower Street	Santa Ana Blvd. to 1st St.	20,983	4D	37,500	A	
Santa Ana Blvd.	West of Flower St.	12,438	4D	37,500	A	
Santa Ana Blvd.	Flower St. to Parton St.	15,359	4D	37,500	A	
Santa Ana Blvd.	Parton St. to Ross St.	15,359	4D	37,500	A	
Civic Center Dr.	Ross St. to Broadway	19,148	4D	37,500	A	
Santa Ana Blvd.	Ross St. to Broadway	15,502	3D	28,150	A	
Broadway	Civic Center Dr. to Santa Ana Blvd.	21,422	4D	37,500	A	
Broadway	Civic Center Dr. to Washington	27,818	4D	37,500	C	
Civic Center Dr.	Broadway to Sycamore St	18,762	4D	37,500	A	
Broadway	Santa Ana Blvd. To 5th St.	18,467	4D	37,500	A	
Santa Ana Blvd.	Broadway to Sycamore St	12,538	3D	28,150	A	
Broadway	5th St. to 4th St.	18,547	4D	37,500	A	
5th St	Broadway to Ross St.	9,917	3D	28,150	A	

Road	Segment	2030 WP ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
5th St	Broadway to Main St.	9,839	3D	28,150	A	
Broadway	3rd St. to 4th St.	18,409	4U	25,000	C	
Broadway	3rd St. to 1st St.	18,671	4U	25,000	C	
Broadway	South of 1st St.	13,880	4U	25,000	A	
1st St.	Broadway to Ross St.	46,366	6D	56,300	D	
1st St.	Main St. to Broadway	47,240	6D	56,300	D	
Civic Center Dr.	Sycamore St. to Main St.	17,824	4D	37,500	A	
Santa Ana Blvd.	Sycamore St. to Main St.	12,208	3D	28,150	A	
5th St.	Sycamore St. to Broadway	9,845	3D	28,150	A	
5th St	Sycamore St. to Main St.	10,095	3D	28,150	A	
Main St.	Civic Center Dr. to Santa Ana Blvd.	37,556	4D	37,500	F	
Main St.	Civic Center Dr. to Washington	38,556	4D	37,500	F	
Civic Center Dr.	Main St. to Bush St.	13,976	4D	37,500	A	
Main St.	Santa Ana Blvd. To 5th St.	39,427	4D	37,500	F	
Santa Ana Blvd.	Main St. to Bush St.	12,022	3D	28,150	A	
Main St.	5th St. to 4th St.	39,546	4U	25,000	F	
5th St	Main St. to Bush St.	7,373	3D	28,150	A	
Main St.	3rd St. to 4th St.	35,539	4U	25,000	F	
Main St.	1st St. to 3rd St.	35,506	4U	25,000	F	
Santa Ana Blvd.	Bush St. to Spurgeon St.	11,816	3D	28,150	A	
5th St	Bush St. to French St.	7,232	3D	28,150	A	
1st St.	Spurgeon St. to Main St.	45,304	6D	56,300	D	
Santa Ana Blvd.	Lacy St. Standard Ave	16,213	4D	37,500	A	
Civic Center Dr.	French St to Lacy St	15,137	4D	37,500	A	
Santa Ana Blvd.	Lacy St. to French St.	18,493	2D	18,750	E	
4th St.	Lacy St. to French St.	13,570	2D	18,750	C	
1st St.	Lacy St. to Spurgeon St.	45,504	6D	56,300	D	
1st St.	Lacy St. to Standard Ave	45,504	6D	56,300	D	
Santiago St.	Washington Ave. to Civic Center	13,005	4D	37,500	A	
Santiago St.	Washington Ave. to 17th St	12,193	4D	37,500	A	
Santiago St.	Santa Ana Blvd to Civic Center Dr.	12,970	4D	37,500	A	
Civic Center Dr.	Santiago St. to Lacy St	14,041	2U	12,500	F	
Civic Center Dr.	Lincoln Ave to Santiago St.	13,418	2U	12,500	F	
Santiago St.	Santa Ana Blvd. to Brown St.	9,774	4D	37,500	A	

Road	Segment	2030 WP ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
Santa Ana Blvd.	Santiago St. to Lacy St	19,709	4D	37,500	A	
Santa Ana Blvd.	Santiago St. to U-24	24,641	6D	56,300	A	
4th St.	Santiago St. to Lacy St	19,939	4D	37,500	A	
Grand Ave.	4th St. to Santa Ana Blvd	42,417	6D	56,300	C	
Grand Ave.	Santa Ana Blvd to 17th St	40,644	6D	56,300	C	
Santa Ana Blvd.	East of Grand Ave.	8,998	4D	37,500	A	
Grand Ave.	1st St. to 4th St.	37,502	6D	56,300	B	
4th St.	Grand Ave to Santiago St	22,315	4D	37,500	B	
4th St.	East of Grand Ave.	23,876	4D	37,500	B	
Grand Ave.	South of 1st St.	48,046	6D	56,300	D	
1st St.	Standard Ave to Grand Ave	47,039	6D	56,300	D	
1st St.	East of Grand Ave.	41,663	6D	56,300	C	
Penn Way	South of I-5 SB Ramps	10,651	2D	18,750	A	
Penn Way	North of I-5 SB Ramps	16,619	4D	37,500	A	
Santa Ana Blvd.	West of I-5 SB Ramps	47,144	4D	37,500	F	
Santa Ana Blvd.	East of I-5 SB Ramps	31,012	4D	37,500	D	
17th St.	West of I-5 NB Ramps	48,939	6D	56,300	D	
17th St.	East of I-5 NB Ramps	38,865	6D	56,300	C	
Grand Ave.	South of I-5 NB Ramps	54,695	6D	56,300	E	
Grand Ave.	North of I-5 NB Ramps	48,792	6D	56,300	D	

7.3 Anticipated Project Buildout (2030) With Project Peak Hour Freeway Ramp Conditions

Existing peak hour ramp analysis results are presented on Table 7-4. All ramps operate at LOS D or better during the AM and/or PM peak hour time periods except the northbound off ramp at the interchange of I-5 at Santa Ana Boulevard.

Table 7-4 2030 With Project Peak Hour Freeway Ramp Analysis

INTER-CHANGE	RAMP	RAMP TYPE CODE[1]	LANES	PEAK HOUR CAPACITY	AM PEAK HOUR			PM PEAK HOUR		
					VOL	V/C	LOS	VOL	V/C	LOS
I-5 at 17th St.	SB On	4	2	1,800	729	0.41	A	790	0.44	A
	NB Loop On	4	2	1,800	271	0.15	A	387	0.22	A
	SB Off	5	1	1,500	439	0.29	A	451	0.30	A
	NB Off	5	1	1,500	788	0.53	A	910	0.61	A
I-5 at Santa Ana Blvd.	SB Direct On (HOV)	6	2	2,250	246	0.11	A	186	0.08	A
	SB Loop On	4	2	1,800	462	0.26	A	696	0.39	A
	NB Loop On	4	2	1,800	517	0.29	A	744	0.41	A
	SB Off	5	1	1,500	533	0.36	A	571	0.38	A
	NB Off	5	1	1,500	956	0.64	B	1,551	***1.03***	***F***

Note 1: Reference to Freeway Ramp Capacity Assumptions Table

4 - Two-lane Metered On-Ramp, 2 Mixed Flow Lanes at Meter

5 - One-lane Unmetered Ramp

6 - Two-lane Unmetered On-Ramp, tapers to one merge lane at or beyond gore point

8. GENERAL PLAN (2035) TRAFFIC CONDITIONS WITH PROJECT

This section documents the future (2035) traffic conditions with the addition of the Transit Zoning Code (SD 84A and SD 84B) project-related traffic to the surrounding street system. To forecast the anticipated project buildout traffic conditions for the year 2035, the 2035 Without Project peak hour background traffic volumes shown in Figures 5-2a through Figure 5-2j were increased by adding the project–related traffic volumes shown in Figure 6-2a through Figure 6-2j.

8.1 General Plan (2035) With Project Intersection Conditions

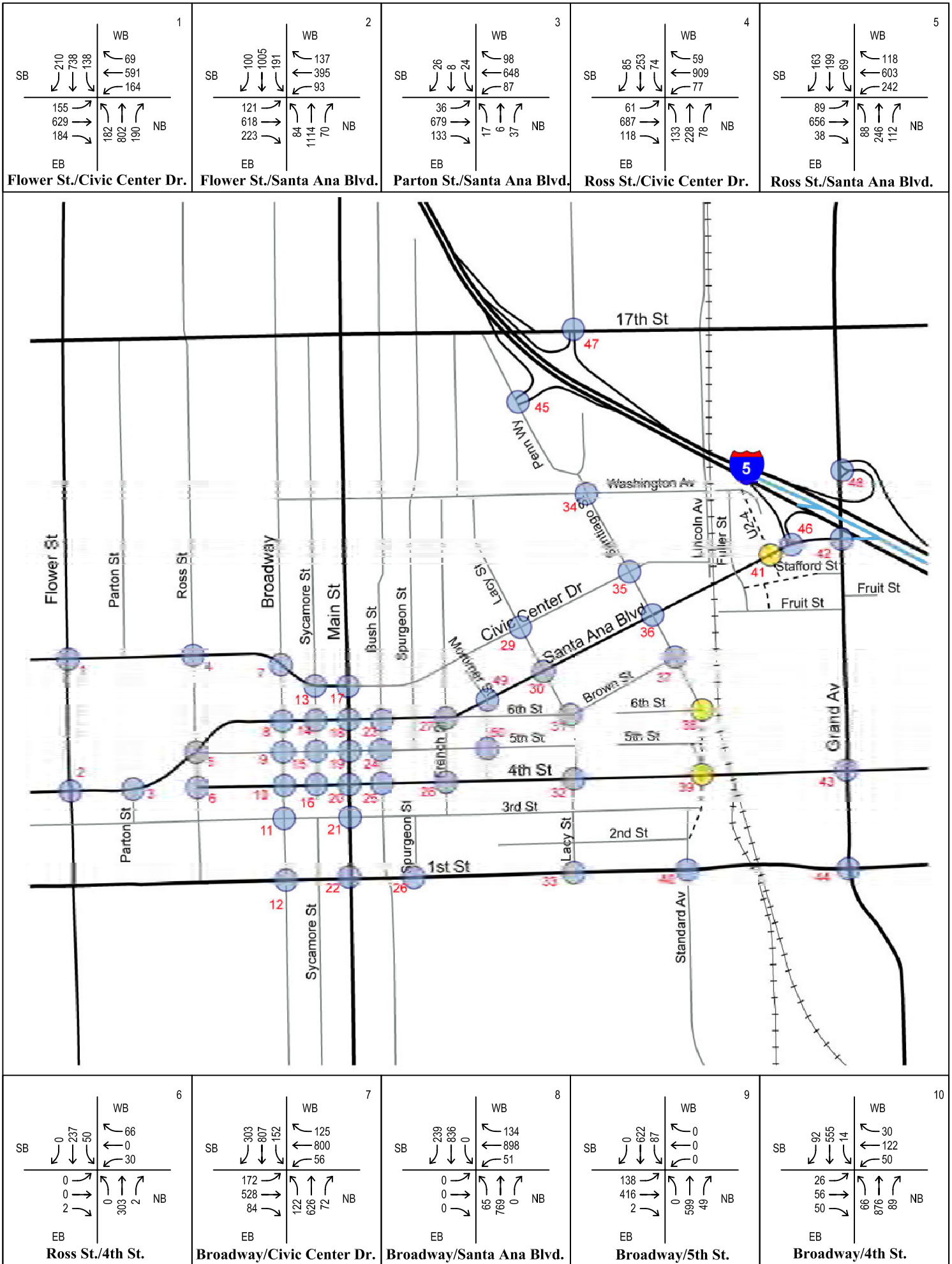
Figure 8-1a through Figure 8-1e illustrate the 2035 With Project AM peak hour traffic volumes while Figure 8-1f through Figure 8-1j illustrate the 2035 With Project PM peak hour traffic volumes for 2035 With Project conditions. Tables 8-1 and 8-2 illustrate the 2035 With Project intersection level of service conditions. As shown in the tables, all intersections are expected to operate at Level of Service D or better under the 2035 With Project conditions except the following intersections. Appendix I includes the analysis worksheet for all intersections under 2035 With Project conditions.

- Main Street at Civic Center Drive (Signalized)
- Main Street at 1st Street (Signalized)
- Santiago Street at Santa Ana Boulevard (Signalized)
- Standard Street (Santiago Street) at 1st Street (Signalized)
- Grand Avenue at Santa Ana Boulevard (Signalized)
- Grand Avenue at 1st Street (signalized)
- Grand Avenue at I-5 NB Ramp (Signalized)
- 17th Street at I-5 NB Ramp (signalized)
- Lacy Street at Civic Center Drive (Two-way stop control)
- Lacy Street at Santa Ana Boulevard (Two-way stop control)
- Lacy Street at 1st Street (Two-way stop control)
- Santiago Street at Washington Avenue (All-way stop control)
- Santiago Street at Civic Center Drive (All-way stop control)
- Santiago Street at 4th Street (All-way stop control)
- Mortimer Street at 5th Street (All-way stop control)
- Mortimer Street at Santa Ana Boulevard (All-way stop control)
- U2-4 at Santa Ana Boulevard (Two-way stop control)

Compared to 2035 Without Project conditions, the following additional intersections operate at unacceptable level of services under 2035 With Project conditions.

- Main Street at Civic Center Drive (Signalized)
- Santiago Street at Santa Ana Boulevard (Signalized)
- Standard Street (Santiago Street) at 1st Street (Signalized)
- Grand Avenue at 1st Street (Signalized)
- Santiago Street at 4th Street (All-way stop control)
- Mortimer Street at 5th Street (All-way stop control)
- Mortimer Street at Santa Ana Boulevard (All-way stop control)
- U2-4 at Santa Ana Boulevard (Two-way stop control)

In addition to the intersections indicated in the previous scenarios warranting a traffic signal, Santiago Street at Civic Center Drive warrants a traffic signal under 2035 With Project conditions.



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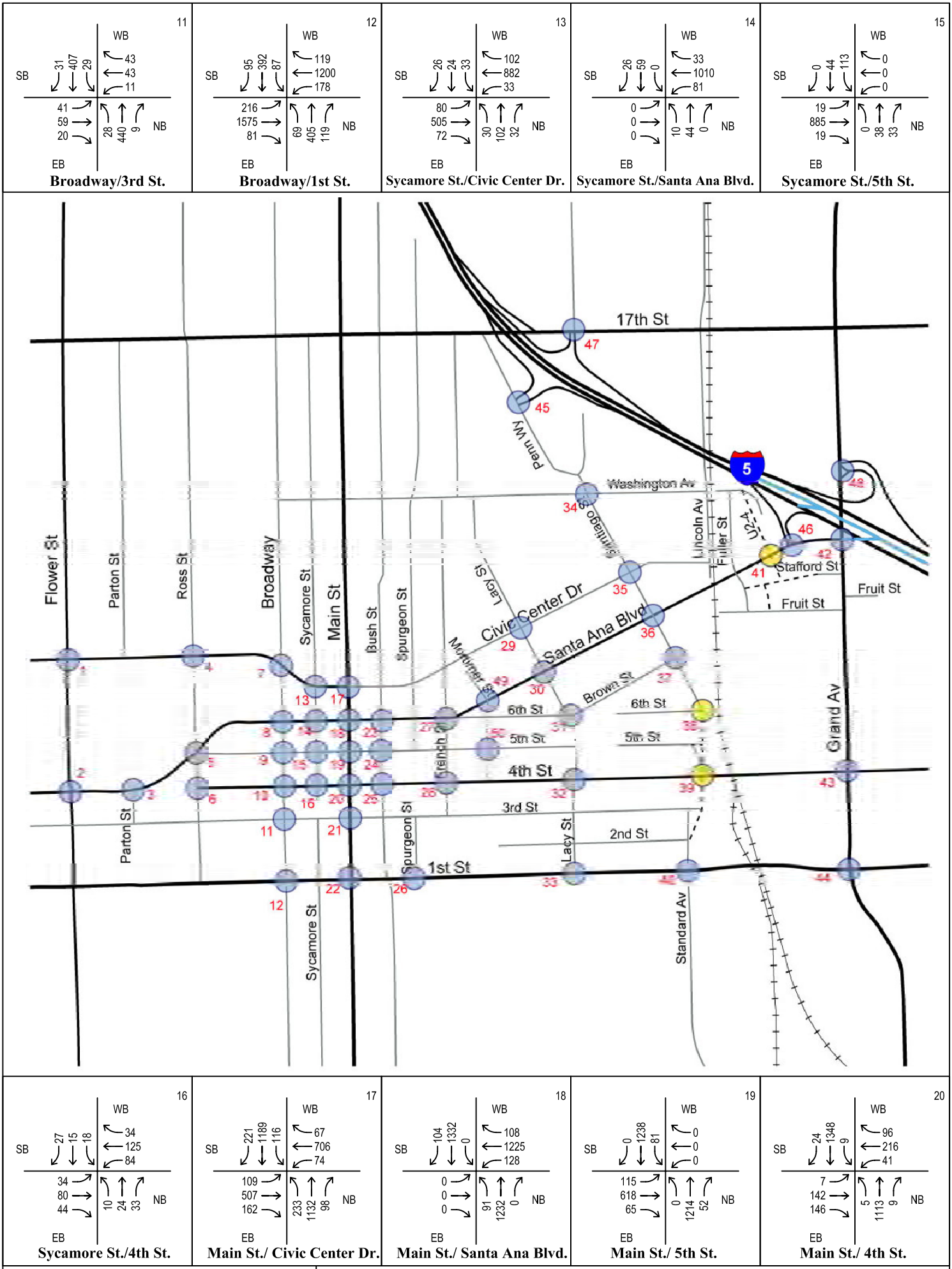
City of Santa Ana — Figure 8-1a

Santa Ana Transit Zoning Code Traffic Study — 2035 With Project AM Peak Hour



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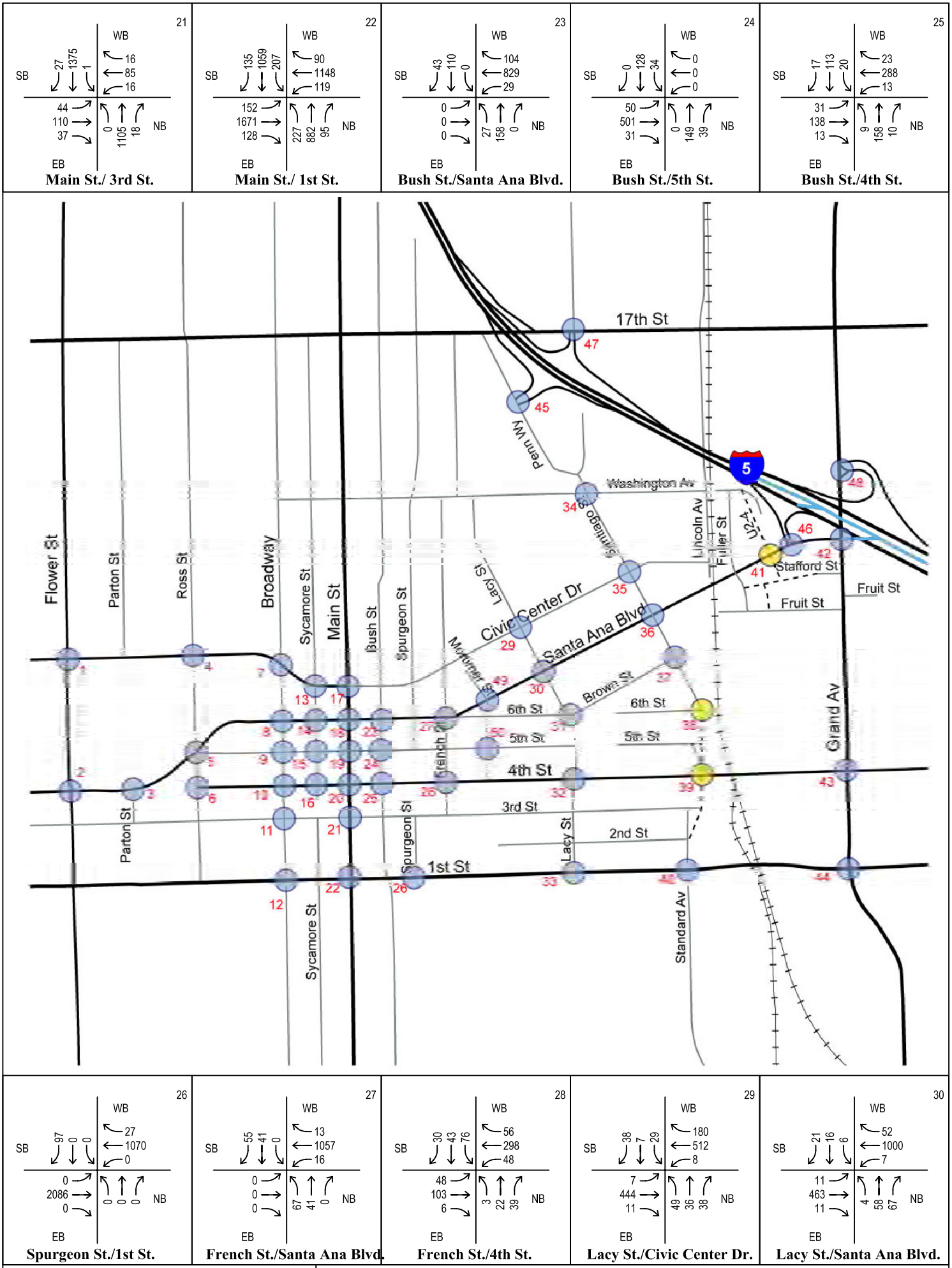
City of Santa Ana — Figure 8-1b

Santa Ana Transit Zoning Code Traffic Study — 2035 With Project AM Peak Hour



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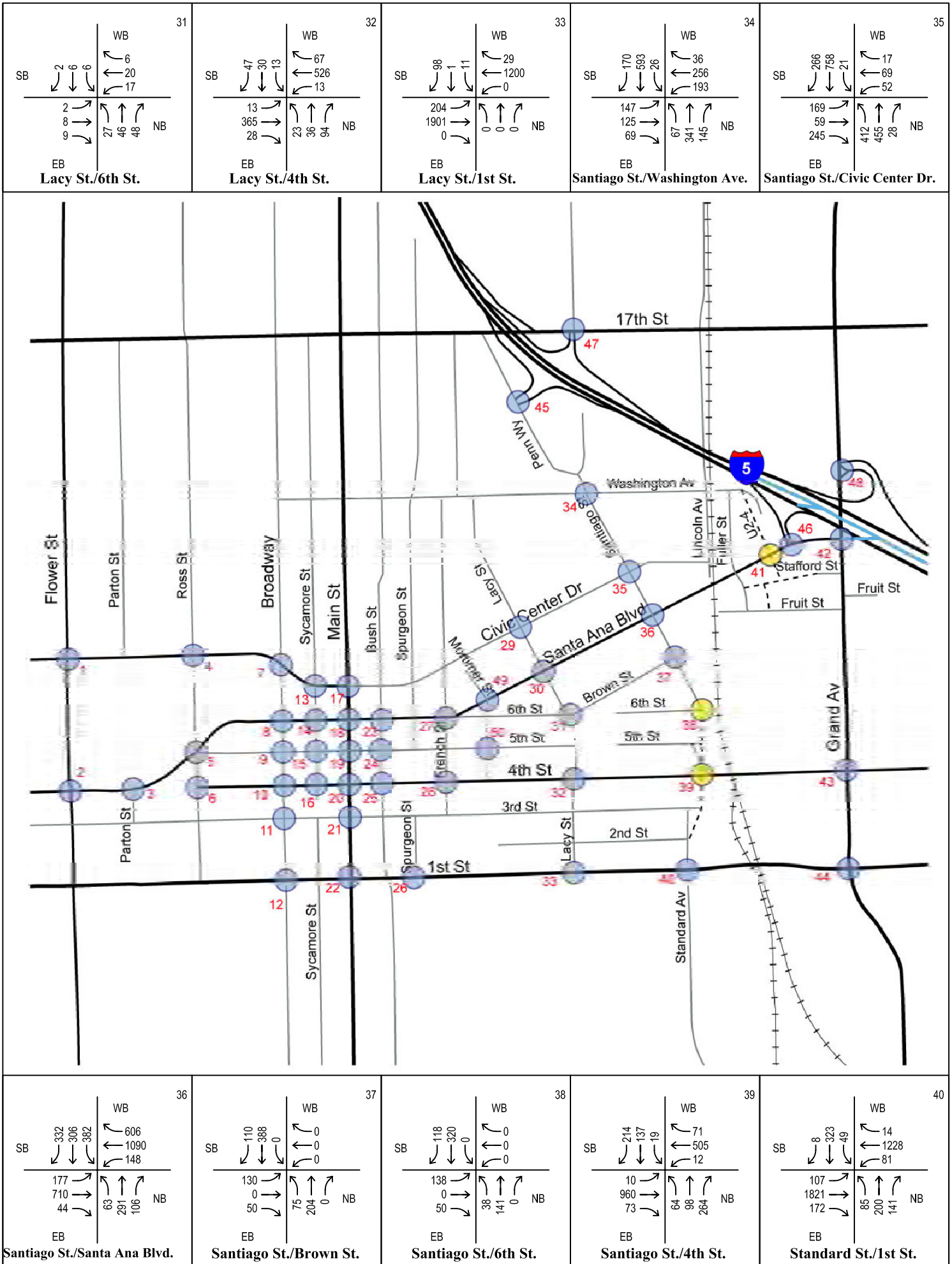
City of Santa Ana — Figure 8-1c

Santa Ana Transit Zoning Code Traffic Study — 2035 With Project AM Peak Hour



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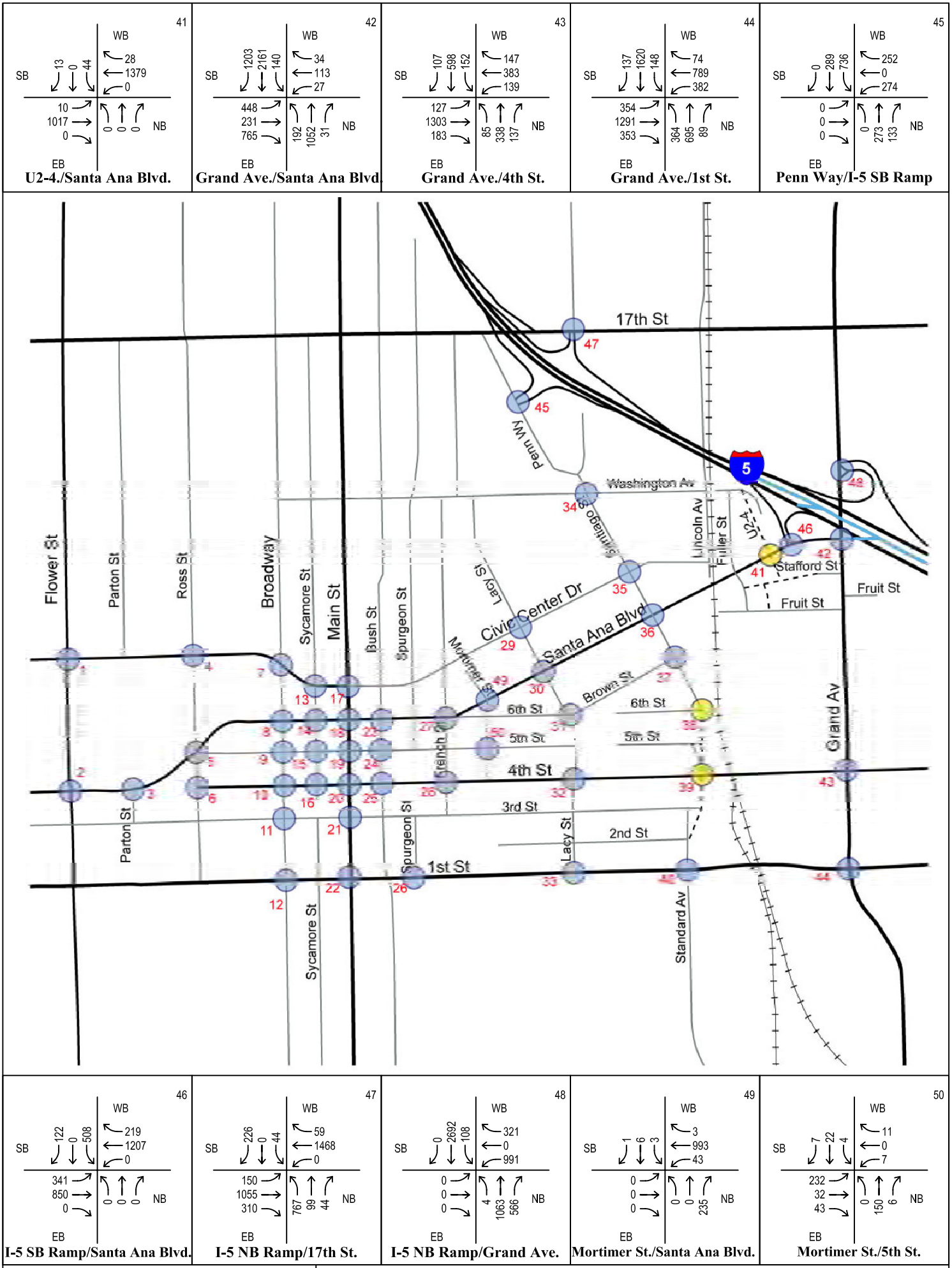
City of Santa Ana — Figure 8-1d

Santa Ana Transit Zoning Code Traffic Study — 2035 With Project AM Peak Hour



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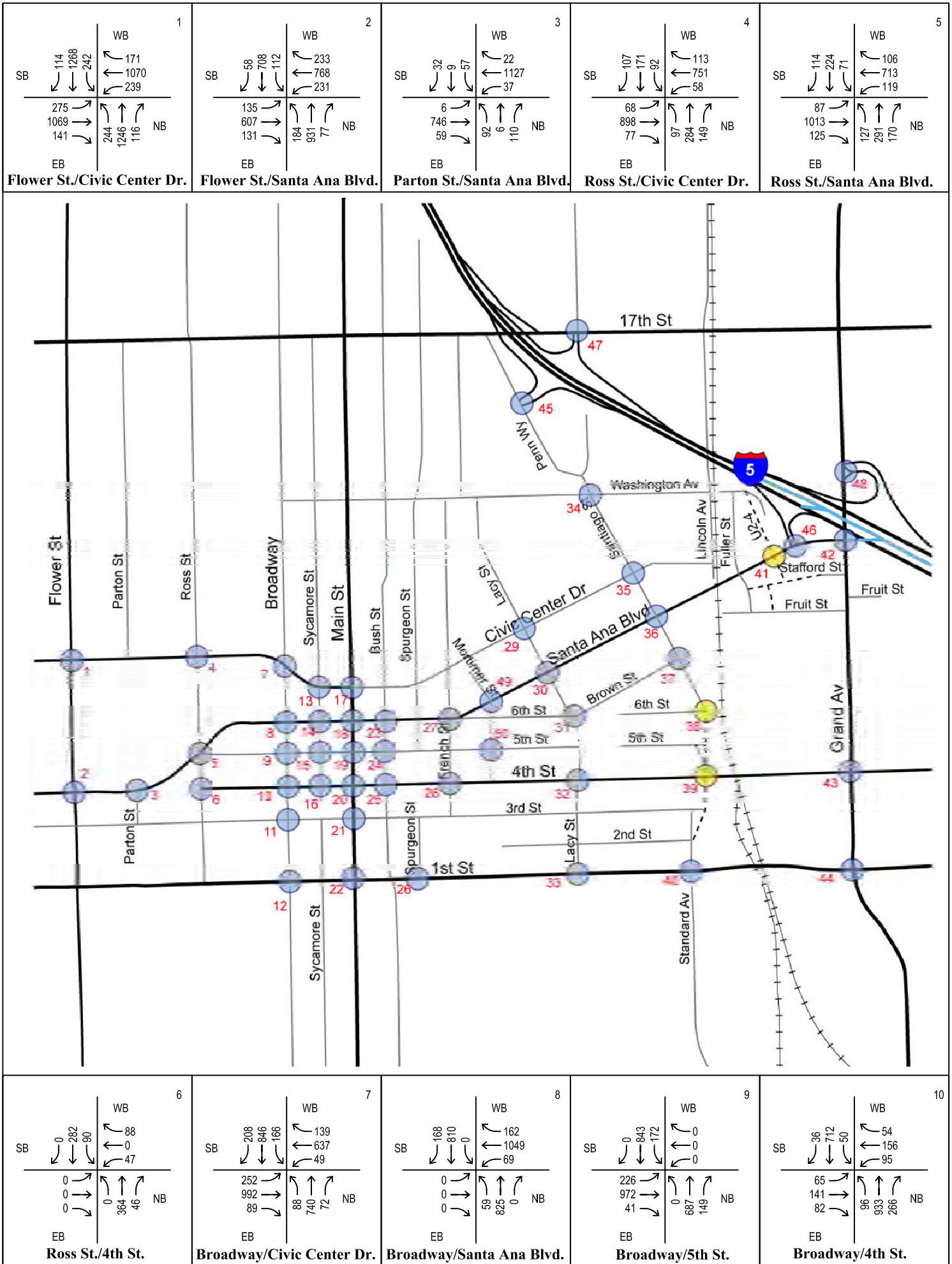
City of Santa Ana — Figure 8-1e

Santa Ana Transit Zoning Code Traffic Study — 2035 With Project AM Peak Hour



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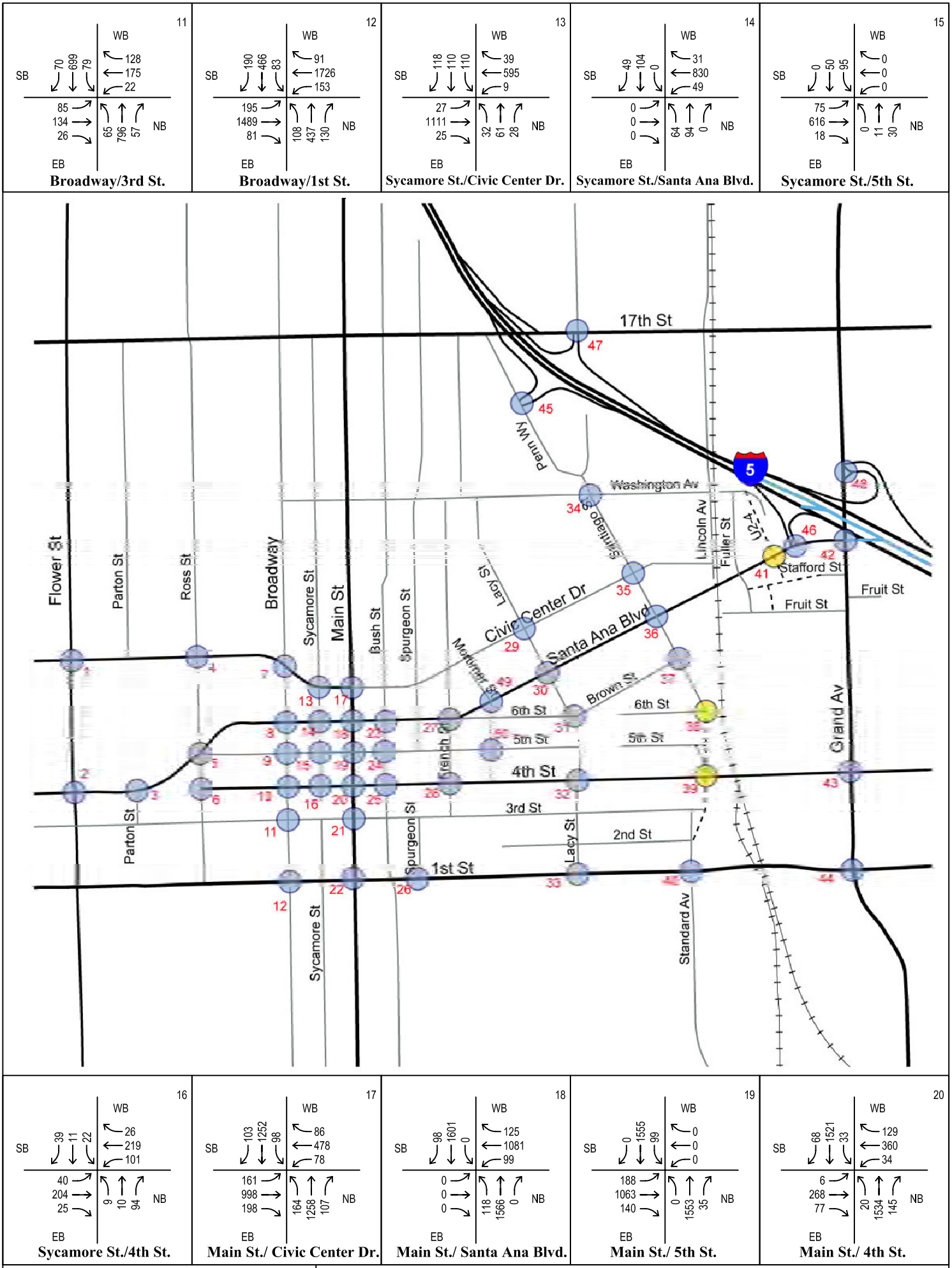
City of Santa Ana — Figure 8-1f

Santa Ana Transit Zoning Code Traffic Study — 2035 With Project PM Peak Hour



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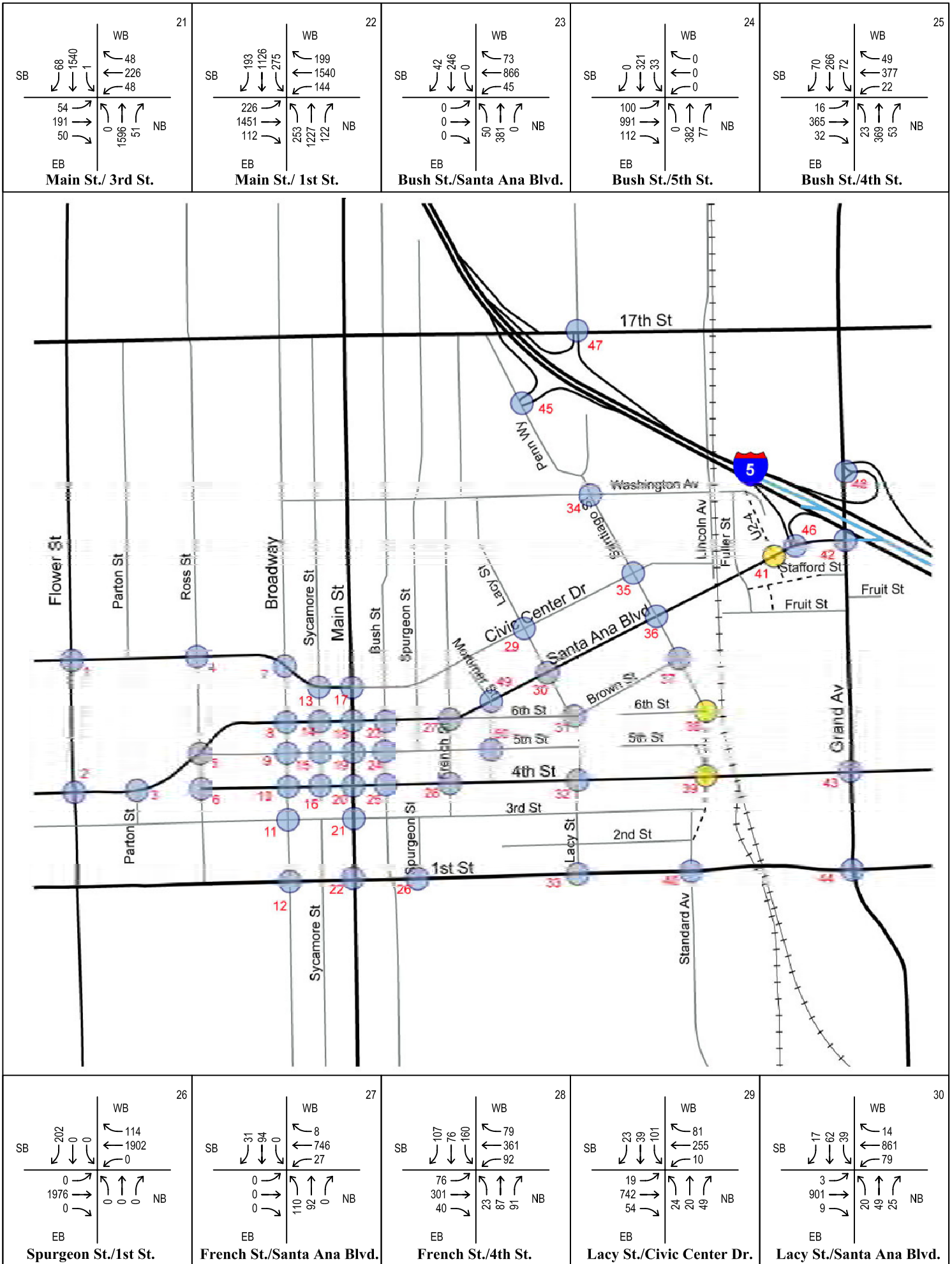
City of Santa Ana — Figure 8-1g

Santa Ana Transit Zoning Code Traffic Study — 2035 With Project PM Peak Hour



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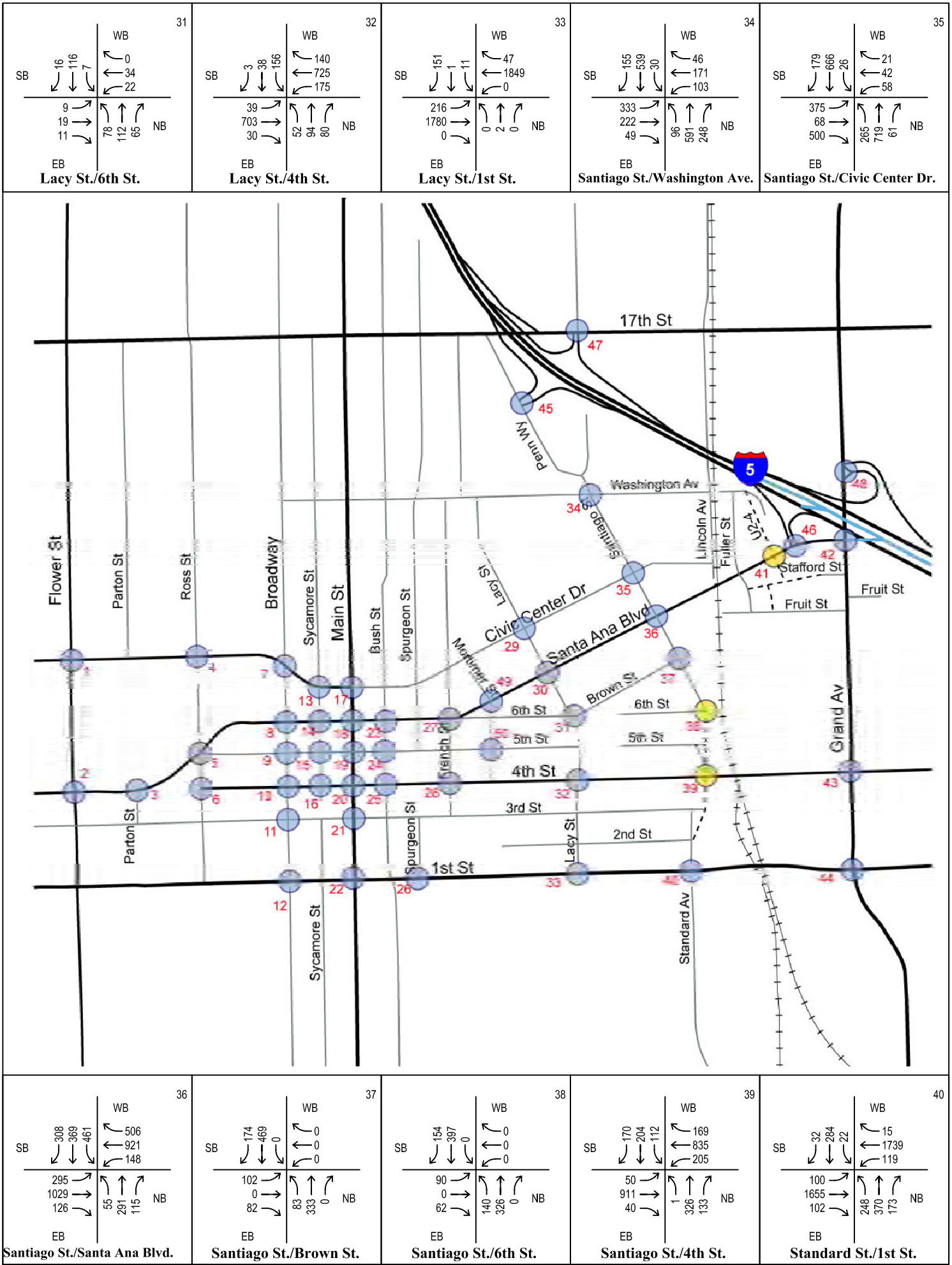
City of Santa Ana — Figure 8-1h

Santa Ana Transit Zoning Code Traffic Study — 2035 With Project PM Peak Hour



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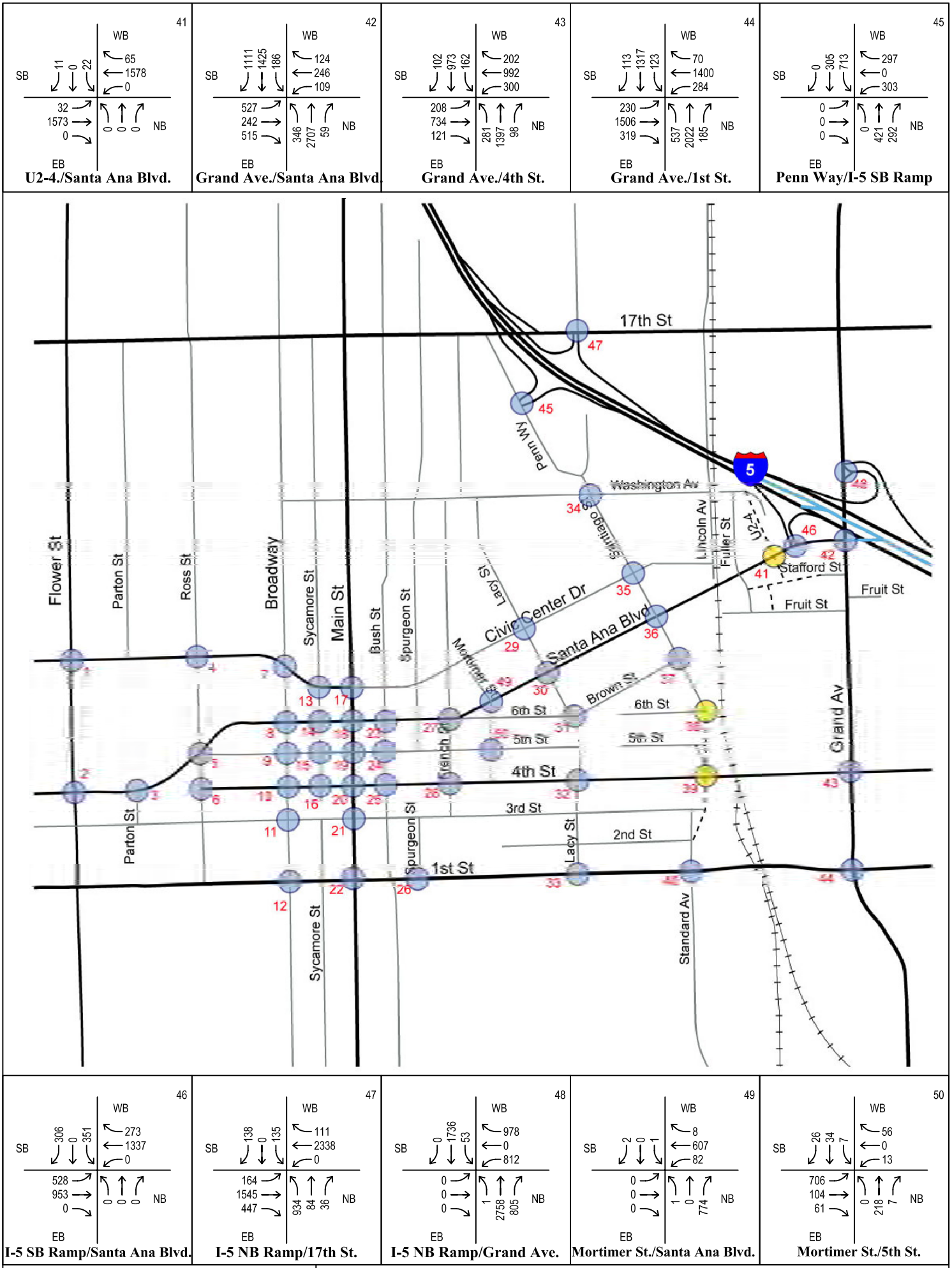
City of Santa Ana — Figure 8-1i

Santa Ana Transit Zoning Code Traffic Study — 2035 With Project PM Peak Hour



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City of Santa Ana

Figure 8-1j

Santa Ana Transit Zoning Code Traffic Study

2035 With Project PM Peak Hour

Table 8-1
2035 With Project Peak Hour Intersection Conditions
(ICU Method)

Intersection	AM Peak Hour		PM Peak Hour	
	ICU	Level of Service	ICU	Level of Service
Signalized Intersections (Using ICU Method)				
Flower St. at Civic Center Dr.	0.784	C	1.146	F
Flower St. at Santa Ana Blvd.	0.689	B	0.704	C
Parton St. at Santa Ana Blvd.	0.313	A	0.435	A
Ross St. at Civic Center Dr.	0.655	B	0.598	A
Ross St. at Santa Ana Blvd.	0.582	A	0.695	B
Broadway at Civic Center Dr.	0.743	C	0.757	C
Broadway at Santa Ana Blvd.	0.619	B	0.626	B
Broadway at 5th St.	0.404	A	0.646	B
Broadway at 4th St.	0.477	A	0.659	B
Broadway at 3rd St.	0.409	A	0.833	D
Broadway at 1st St.	0.779	C	0.870	D
Sycamore St. at Civic Center Dr.	0.505	A	0.607	B
Main St. at Civic Center Dr.	0.906	E	0.952	E
Main St. at Santa Ana Blvd.	0.816	D	0.879	D
Main St. at 5th St.	0.630	B	0.852	D
Main St. at 4th St.	0.671	B	0.880	D
Main St. at 3rd St.	0.559	A	0.730	C
Main St. at 1st St.	0.931	E	1.101	F
Bush St. at Santa Ana Blvd.	0.346	A	0.467	A
Bush St. at 5th St.	0.296	A	0.577	A
Bush St. at 4th St.	0.370	A	0.602	B
French St. at 4th St.	0.367	A	0.580	A
Lacy St. at 4th St.	0.465	A	0.815	D
Santiago St. at Santa Ana Blvd.	0.865	D	0.925	E
Standard St. at 1st St.	0.964	E	0.995	E
Grand Ave. at Santa Ana Blvd.	0.977	E	1.246	F
Grand Ave. at 4th St.	0.755	C	0.876	D
Grand Ave. at 1st St.	0.923	E	1.005	F

Table 8-2
2035 With Project Peak Hour Intersection Conditions
(HCM Method)

Intersection	AM Peak Hour		PM Peak Hour	
	Average/Worst Case Delay	Level of Service	Average/Worst Case Delay	Level of Service
Unsignalized Intersections				
Ross St. at 4th St.	11.9	B	13.8	B
Sycamore St. at Santa Ana Blvd.	32.7	D	35.0	D
Sycamore St. at 5th St.	19.7	C	18.2	C
Sycamore St. at 4th St.	8.6	A	10.5	B
Spurgeon St. at 1st St.	11.7	B	23.6	C
French St. at Santa Ana Blvd.	27.2	D	31.0	D
Lacy St. at Civic Center Dr.	37.9	E	113.5	F
Lacy St. at Santa Ana Blvd.	57.8	F	OVRFL	F
Lacy St. at 6th St.	7.4	A	8.6	A
Lacy St. at 1st St.	104.6	F	OVRFL	F
Santiago St. at Washington Ave.	112.3	F	164.9	F
Santiago St. at Civic Center Dr.	263.9	F	266.2	F
Santiago St. at Brown St.	16.7	C	17.9	C
Santiago St. at 6th St.	13.7	B	19.1	C
Santiago St. at 4th St.	OVRFL	F	OVRFL	F
Mortimer St. at 5th St.	9.6	A	69.7	F
Mortimer St. at Santa Ana Blvd.	25.3	D	39.8	E
U2-4 at Santa Ana Blvd.	80.8	F	136.5	F
Signalized Intersections (Caltrans, Using HCM)				
Penn Way at I-5 SB	25.0	C	29.0	C
Santa Ana Blvd. at I-5 SB	30.6	C	33.9	C
17t St. at I-5 NB	39.7	D	73.3	E
Grand Ave at I-5 NB	80.5	F	183.9	F

Note 1: Level of Service for unsignalized intersections is for the worst-case approach.

8.2 General Plan (2035) With Project Roadway Segment Conditions

The roadway segment ADT analysis for 2035 is presented in Table 8-3. As indicated, a majority of the arterial roadways are operating at acceptable levels. The daily V/C ratio screening analysis indicates that the following locations are potentially experiencing capacity deficiencies under 2035 With Project conditions:

- 1st Street from Main Street to Grand Avenue
- Main Street from Washington Avenue to 1st Street
- Civic Center Drive from Lacy Street to Lincoln Avenue
- Santa Ana Boulevard West of I-5 SB Ramps
- Santa Ana Boulevard East of I-5 SB Ramps
- Grand Avenue between Santa Ana Boulevard and 17th Street
- Grand Avenue South of 1st Street
- Grand Avenue South of I-5 NB Ramps
- Grand Avenue north of I-5 NB Ramps
- 17th Street west of I-5 NB Ramps

The daily volume-to-capacity ratios provide a screening level analysis of daily traffic flows and potential operational problems within the study area. The peak hour analysis for intersections, presented in the previous section, provides a more definitive analysis of the operation of the arterial roadways in the project area. Although a few roadway segments indicate deficiencies, the proposed mitigation should be based on the intersection analysis recommendations. All roadway segments should operate at acceptable level of services under City's General Plan circulation element designations with spot improvements at intersections proposed based on the intersection analysis.

Table 8-3 2035 With Project Roadway Segment Daily Traffic Condition

Road	Segment	2035 WP ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
Flower Street	Santa Ana Blvd to Civic Center Dr.	23,949	4D	37,500	B	
Flower Street	17th St to Civic Center	22,890	4D	37,500	B	
Civic Center Dr.	West of Flower St.	24,097	4D	37,500	B	
Civic Center Dr.	Flower St. to Ross St.	23,342	4D	37,500	B	
Flower Street	Santa Ana Blvd. to 1st St.	26,046	4D	37,500	C	
Santa Ana Blvd.	West of Flower St.	14,434	6D	56,300	A	
Santa Ana Blvd.	Flower St. to Parton St.	17,478	6D	56,300	A	
Santa Ana Blvd.	Parton St. to Ross St.	19,572	6D	56,300	A	

Road	Segment	2035 WP ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
Civic Center Dr.	Ross St. to Broadway	21,537	4D	37,500	A	
Santa Ana Blvd.	Ross St. to Broadway	17,621	3D	28,150	B	
Broadway	Civic Center Dr. to Santa Ana Blvd.	23,962	4D	37,500	B	
Broadway	Civic Center Dr. to Washington	30,429	4D	37,500	D	
Civic Center Dr.	Broadway to Sycamore St	21,615	4D	37,500	A	
Broadway	Santa Ana Blvd. To 5th St.	20,854	4D	37,500	A	
Santa Ana Blvd.	Broadway to Sycamore St	14,591	3D	28,150	A	
Broadway	5th St. to 4th St.	21,002	4D	37,500	A	
5th St	Broadway to Ross St.	11,324	3D	28,150	A	
5th St	Broadway to Sycamore St.	14,666	3D	28,150	A	
Broadway	3rd St. to 4th St.	20,983	4D	37,500	A	
Broadway	3rd St. to 1st St.	26,728	4D	37,500	C	
Broadway	South of 1st St.	14,429	4D	37,500	A	
1st St.	Broadway to Ross St.	50,813	6D	56,300	D	
1st St.	Main St. to Broadway	50,465	6D	56,300	D	
Civic Center Dr.	Sycamore St. to Main St.	20,321	4D	37,500	A	
Santa Ana Blvd.	Sycamore St. to Main St.	13,701	3D	28,150	A	
5th St.	Sycamore St. to Broadway	11,246	3D	28,150	A	
5th St	Sycamore St. to Main St.	11,290	3D	28,150	A	
Main St.	Civic Center Dr. to Santa Ana Blvd.	42,381	4D	37,500	F	
Main St.	Civic Center Dr. to Washington	42,955	4D	37,500	F	
Civic Center Dr.	Main St. to Bush St.	15,878	4D	37,500	A	
Main St.	Santa Ana Blvd. To 5th St.	44,536	4D	37,500	F	
Santa Ana Blvd.	Main St. to Bush St.	14,503	3D	28,150	A	
Main St.	5th St. to 4th St.	44,680	4U	25,000	F	
5th St	Main St. to Bush St.	10,266	3D	28,150	A	
Main St.	3rd St. to 4th St.	39,921	4D	37,500	F	
Main St.	1st St. to 3rd St.	39,888	4D	37,500	F	
Santa Ana Blvd.	Bush St. to Spurgeon St.	13,579	3D	28,150	A	
5th St	Bush St. to French St.	8,201	3D	28,150	A	
1st St.	Spurgeon St. to Main St.	52,113	6D	56,300	E	E ok
Santa Ana Blvd.	Lacy St. Standard Ave	18,810	4D	37,500	A	
Civic Center Dr.	French St to Lacy St	16,469	4D	37,500	A	
Santa Ana Blvd.	Lacy St. to French St.	21,092	4D	37,500	A	
4th St.	Lacy St. to French St.	15,684	4D	37,500	A	
1st St.	Lacy St. to Spurgeon St.	52,401	6D	56,300	E	

Road	Segment	2035 WP ADT	Number of Lanes	LOS E Capacity	LOS	LOS E OK
1st St.	Lacy St. to Standard Ave	52,401	6D	56,300	E	
Santiago St.	Washington Ave to Civic Center	21,381	4D	37,500	A	
Santiago St.	Washington Ave. to 17th St	18,366	4D	37,500	A	
Santiago St.	Santa Ana Blvd to Civic Center Dr.	22,615	4D	37,500	B	
Civic Center Dr.	Santiago St. to Lacy St	16,027	2U	12,500	F	
Civic Center Dr.	Lincoln Ave to Santiago St.	14,756	2U	12,500	F	
Santiago St.	Santa Ana Blvd. to Brown St.	10,966	4D	37,500	A	
Santa Ana Blvd.	Santiago St. to Lacy St	28,132	4D	37,500	C	
Santa Ana Blvd.	Santiago St. to U-24	31,194	6D	56,300	A	
4th St.	Lacy St. to Santiago St.	23,050	4D	37,500	B	
Grand Ave.	4th St. to Santa Ana Blvd	49,112	6D	56,300	D	
Grand Ave.	Santa Ana Blvd to 17th St	51,315	6D	56,300	E	
Santa Ana Blvd.	East of Grand Ave.	9,869	4D	37,500	A	
Grand Ave.	1st St. to 4th St.	42,283	6D	56,300	C	
4th St.	Grand Ave to Santiago St.	25,046	4D	37,500	B	
4th St.	East of Grand Ave.	26,644	4D	37,500	C	
Grand Ave.	South of 1st St.	55,713	6D	56,300	E	
1st St.	Standard Ave to Grand Ave	54,217	6D	56,300	E	
1st St.	East of Grand Ave.	48,043	6D	56,300	D	
Penn Way	South of I-5 SB Ramps	16,670	2D	18,750	D	
Penn Way	North of I-5 SB Ramps	19,038	4D	37,500	A	
Santa Ana Blvd.	West of I-5 SB Ramps	53,292	6D	56,300	E	
Santa Ana Blvd.	East of I-5 SB Ramps	35,214	4D	37,500	E	
17th St.	West of I-5 NB Ramps	56,794	6D	56,300	F	
17th St.	East of I-5 NB Ramps	45,103	6D	56,300	D	
Grand Ave.	South of I-5 NB Ramps	65,500	6D	56,300	F	
Grand Ave.	North of I-5 NB Ramps	59,956	6D	56,300	F	

8.3 General Plan (2035) With Project Peak Hour Freeway Ramp Conditions

The 2035 With Project peak hour ramp analysis results are presented on Table 8-4 All ramps operate at LOS D or better during the AM and/or PM peak hour time periods except the northbound off ramp at the interchange of I-5 at Santa Ana Boulevard.

Table 8-4 2035 With Project Peak Hour Freeway Ramp Analysis

INTER-CHANGE	RAMP	RAMP TYPE CODE[1]	LANES	PEAK HOUR CAPACITY	AM PEAK HOUR			PM PEAK HOUR		
					VOL	V/C	LOS	VOL	V/C	LOS
I-5 at 17th St.	SB On	4	2	1,800	869	0.48	A	1,005	0.56	A
	NB Loop On	4	2	1,800	310	0.17	A	447	0.25	A
	SB Off	5	1	1,500	526	0.35	A	600	0.40	A
	NB Off	5	1	1,500	910	0.61	A	1,054	0.70	B
I-5 at Santa Ana Blvd.	SB Direct On (HOV)	6	2	2,250	402	0.18	A	487	0.22	A
	SB Loop On	4	2	1,800	560	0.31	A	801	0.45	A
	NB Loop On	4	2	1,800	674	0.37	A	858	0.48	A
	SB Off	5	1	1,500	630	0.42	A	657	0.44	A
	NB Off	5	1	1,500	1,312	0.87	D	1,790	***1.19***	***F***

Note 1: Reference to Freeway Ramp Capacity Assumptions Table

4 - Two-lane Metered On-Ramp, 2 Mixed Flow Lanes at Meter

5 - One-lane Unmetered Ramp

6 - Two-lane Unmetered On-Ramp, tapers to one merge lane at or beyond gore point

9. DETERMINATION OF SIGNIFICANT IMPACT

Traffic impacts are identified if the proposed project will result in a significant change in traffic conditions on a roadway or at an intersection. A significant impact is normally defined when project related traffic would cause level of service to deteriorate to below the minimum acceptable level by a measurable amount. A cumulative impact may also be significant if the location is already below the minimum acceptable level or forecast without the project to be below the minimum acceptable level and project related traffic causes a further decline.

The City of Santa Ana considers LOS D as the threshold for an acceptable service level for intersections located outside of Major Development Areas (MDA). The City considers LOS E as the maximum threshold for acceptable service levels for intersections located within an MDA. If the project contribution to the volume/capacity ratio at the intersection is greater than .01 and if the location is at Level of Service D or poorer outside of an MDA or Level of Service E or poorer within an MDA, the impact is considered significant.

For those signalized intersections which may not contribute to 0.01 or greater ICU or V/C increases, the City may require a fair share contribution toward the expected cost of improvements at the subject intersection. The fair share is based upon the project's relative contribution toward the total future added traffic, which consists of traffic from the project, other cumulative project traffic, and growth of ambient background traffic.

Unsignalized intersection analysis follows the City's criteria to use the HCM unsignalized analysis methodology. HCM indicates that level of service for unsignalized intersection is based upon the control delay for the poorest movement of the intersection, which is assessed for those traffic movements that are stopped or must yield to through traffic. Some movements, including cross traffic on the minor street or left turns onto the major street, can be subject to long delays, however through traffic and right turns from the major street will not experience any delays at stopped intersections. When delay for cross traffic is severe (Level of Service E or F), the intersection should be evaluated further for possible improvement with traffic signals. In some cases, this analysis determines that the delay is being experienced by a very low number of vehicles and traffic signals are not warranted. In other cases, the number of stopped vehicles is substantial and traffic signals may be justified as a mitigation measure.

Table 9-1 through Table 9-5 indicate the comparison of With and Without Project conditions in order to determine the project impact. As indicated, the signalized intersections which may have unacceptable level of service and project impacts under 2030 conditions per ICU (V/C) calculations include the following (ICU difference > 0.01):

- Grand Avenue at Santa Ana Boulevard

For 2035 conditions, the following additional signalized intersections have potential project impacts (ICU difference > 0.01):

- Flower Street at Civic Center Drive
- Main Street at 1st Street
- Standard Street (Santiago Street) at 1st Street
- Grand Avenue at 1st Street

The intersection of Grand Avenue at I-5 NB Ramps will operate at LOS E or F under future conditions and will also have a project impact at this intersection.

For unsignalized intersections, the following two intersections warrant traffic signals under existing conditions and therefore traffic signals are assumed for future improvement scenarios:

- Santiago Street at Washington Avenue
- Santiago Street at Civic Center Drive

In addition, the following unsignalized intersections warrant signals under 2030 conditions. It is considered a cumulative impact.

- Lacy Street at 1st Street
- Lacy Street at Santa Ana Boulevard
- Santiago Street at 4th Street

The following unsignalized intersections do not warrant traffic signals but operate at LOS F for the worst movement, which is due to cross traffic on the minor street or left turns onto the major street subject to long delays. Through traffic and right turns from the major street will not experience any delays at stopped intersections, however.

- Lacy Street at Civic Center Drive
- Mortimer Street at 5th Street
- U2-4 at Santa Ana Boulevard (Future Intersection)

For the intersection of U2-4 at Santa Ana Boulevard, since it is a new intersection and closely spaced with the I-5 interchange, it is suggested to be designed as right-in and right-out access only. The configuration of this proposed intersection needs further evaluation depending upon the future configuration of the railroad grade crossing at Santa Ana Blvd (at grade or grade separated).

Table 9-1
Determination of Impacts
for 2030 Peak Hour (ICU)

Intersection	AM Peak Hour				PM Peak Hour			
	2030 NP (ICU[1] / Level of Service)	2030 WP (ICU[1] / Level of Service)	Increase / Decrease	Significant Impact	2030 NP (ICU[1] / Level of Service)	2030 WP (ICU[1] / Level of Service)	Increase / Decrease	Significant Impact
Signalized Intersections (Using ICU Method)								
Flower St. at Civic Center Dr.	0.683 / B	0.679 / B	-0.004	NO	0.734 / C	0.761 / C	0.027	NO
Flower St. at Santa Ana Blvd.	0.572 / A	0.589 / A	0.017	NO	0.587 / A	0.598 / A	0.011	NO
Parton St. at Santa Ana Blvd.	0.278 / A	0.275 / A	-0.003	NO	0.372 / A	0.378 / A	0.006	NO
Ross St. at Civic Center Dr.	0.517 / A	0.541 / A	0.024	NO	0.474 / A	0.508 / A	0.034	NO
Ross St. at Santa Ana Blvd.	0.475 / A	0.476 / A	0.001	NO	0.395 / A	0.432 / A	0.037	NO
Broadway at Civic Center Dr.	0.614 / B	0.637 / B	0.023	NO	0.643 / B	0.657 / B	0.014	NO
Broadway at Santa Ana Blvd.	0.468 / A	0.492 / A	0.024	NO	0.522 / A	0.535 / A	0.013	NO
Broadway at 5th St.	0.349 / A	0.355 / A	0.006	NO	0.462 / A	0.488 / A	0.026	NO
Broadway at 4th St.	0.298 / A	0.334 / A	0.036	NO	0.409 / A	0.437 / A	0.028	NO
Broadway at 3rd St.	0.336 / A	0.338 / A	0.002	NO	0.613 / B	0.643 / B	0.030	NO
Broadway at 1st St.	0.651 / B	0.655 / B	0.004	NO	0.729 / C	0.755 / C	0.026	NO
Sycamore St. at Civic Center Dr.	0.420 / A	0.442 / A	0.022	NO	0.495 / A	0.529 / A	0.034	NO
Main St. at Civic Center Dr.	0.751 / C	0.781 / C	0.030	NO	0.750 / C	0.818 / D	0.068	NO
Main St. at Santa Ana Blvd.	0.654 / B	0.672 / B	0.018	NO	0.693 / B	0.737 / C	0.044	NO
Main St. at 5th St.	0.499 / A	0.518 / A	0.019	NO	0.633 / B	0.673 / B	0.040	NO
Main St. at 4th St.	0.508 / A	0.571 / A	0.063	NO	0.654 / B	0.760 / C	0.106	NO
Main St. at 3rd St.	0.464 / A	0.490 / A	0.026	NO	0.603 / B	0.641 / B	0.038	NO
Main St. at 1st St.	0.773 / C	0.776 / C	0.003	NO	0.872 / D	0.960 / E	0.088	NO
Bush St. at Santa Ana Blvd.	0.295 / A	0.305 / A	0.010	NO	0.403 / A	0.409 / A	0.006	NO
Bush St. at 5th St.	0.242 / A	0.242 / A	0.000	NO	0.442 / A	0.458 / A	0.016	NO
Bush St. at 4th St.	0.270 / A	0.293 / A	0.023	NO	0.464 / A	0.504 / A	0.040	NO
French St. at 4th St.	0.291 / A	0.316 / A	0.025	NO	0.462 / A	0.499 / A	0.037	NO
Lacy St. at 4th St.	0.407 / A	0.398 / A	-0.009	NO	0.567 / A	0.634 / B	0.067	NO

Intersection	AM Peak Hour				PM Peak Hour			
	2030 NP (ICU[1] / Level of Service)	**2030 WP (ICU[1] / Level of Service)**	**Increase / Decrease**	**Significant Impact**	**2030 NP (ICU[1] / Level of Service)**	**2030 WP (ICU[1] / Level of Service)**	**Increase / Decrease**	**Significant Impact**
Signalized Intersections (Using ICU Method)								
Santiago St. at Santa Ana Blvd.	0.541 / A	0.545 / A	0.004	NO	0.677 / B	0.694 / B	0.017	NO
Standard St. at 1st St.	0.808 / D	0.832 / D	0.024	NO	0.833 / D	0.858 / D	0.025	NO
Grand Ave. at Santa Ana Blvd.	0.807 / D	0.794 / C	-0.013	NO	0.902 / E	0.991 / E	0.089	**YES**
Grand Ave. at 4th St.	0.646 / B	0.665 / B	0.019	NO	0.728 / C	0.768 / C	0.040	NO
Grand Ave. at 1st St.	0.700 / C	0.729 / C	0.029	NO	0.777 / C	0.822 / D	0.045	NO

Note 1: ICU=Intersection Capacity Utilization

Table 9-2
Determination of Impacts
for 2030 Peak Hour (HCM)

Intersection	AM Peak Hour			PM Peak Hour		
	2030 NP (Average/Worst Case Delay[1]) / LOS[2]	2030 WP (Average/Worst Case Delay[1]) / LOS[2]	Significant Impact	2030 NP (Average/Worst Case Delay[1]) / LOS[2]	2030 WP (Average/Worst Case Delay[1]) / LOS[2]	Significant Impact
Unsignalized Intersections						
Ross St. at 4th St.	10.8 / B	10.9 / B	NO	12.3 / B	12.4 / B	NO
Sycamore St. at Santa Ana Blvd.	21.8 / C	24.2 / C	NO	20.8 / B	23.1 / C	NO
Sycamore St. at 5th St.	15.7 / C	16.0 / C	NO	13.7 / B	15.5 / C	NO
Sycamore St. at 4th St.	7.9 / A	8.1 / A	NO	9.1 / A	9.7 / A	NO
Spurgeon St. at 1st St.	10.5 / B	10.9 / B	NO	14.6 / B	17.1 / C	NO
French St. at Santa Ana Blvd.	19.7 / C	19.9 / C	NO	17.7 / C	20.8 / C	NO
Lacy St. at Civic Center Dr.	20.3 / C	25.4 / D	NO	33.2 / D	44.8 / E	NEED EVAL
Lacy St. at Santa Ana Blvd.	34.2 / D	31.9 / D	NO	51.6 / F	412.6 / F	NEED EVAL
Lacy St. at 6th St.	7.2 / A	7.3 / A	NO	7.9 / A	8.3 / A	NO
Lacy St. at 1st St.	23.3 / C	33.6 / D	NO	57.2 / F	OVRFL / F	NEED EVAL
Santiago St. at Washington Ave.	17.1 / B	16.3 / C	NO	26.9 / D	34.5 / D	NO
Santiago St. at Civic Center Dr.	26.2 / D	23.5 / C	NO	26.3 / D	42.6 / E	NEED EVAL
Santiago St. at Brown St.	N/A	12.1 / B	NO	N/A	13.9 / B	NO
Santiago St. at 6th St.	N/A	11.3 / B	NO	N/A	13.0 / B	NO
Santiago St. at 4th St.	N/A	OVRFL / F	NEED EVAL	N/A	OVRFL / F	NEED EVAL
Mortimer St. at 5th St	20.3 / C	9.1 / A	NO	17.8 / C	44.1 / E	NEED EVAL
Mortimer St. at Santa Ana Blvd.	9.0 / A	22.2 / C	NO	21.4 / C	25.1 / C	NO
U2-4 at Santa Ana Blvd.	N/A	46.3 / E	NEED EVAL	N/A	51.2 / F	NEED EVAL
Signalized Intersections (Caltrans, Using HCM)						
Penn Way at I-5 SB	0.462 / C	0.439 / C	NO	0.458 / C	0.473 / C	NO
Santa Ana Blvd. at I-5 SB	0.499 / C	0.527 / C	NO	0.520 / C	0.690 / C	NO
17t St. at I-5 NB	0.782 / C	0.780 / C	NO	0.958 / D	0.960 / D	NO
Grand Ave at I-5 NB	0.648 / C	0.626 / C	NO	1.042 / D	1.052 / D	NO

Note 1: Delay = Seconds per vehicle average, poorest movement
Note 2: LOS=Level of Service
Need Eval = Need evaluation to determine if the intersection warrants a traffic signal

Table 9-3
Determination of Impacts
for 2035 Peak Hour (ICU)

Intersection	AM Peak Hour				PM Peak Hour			
	2035 NP (ICU[1] / Level of Service)	2035 WP (ICU[1] / Level of Service)	Increase / Decrease	Significant Impact	2035 NP (ICU[1] / Level of Service)	2035 WP (ICU[1] / Level of Service)	Increase / Decrease	Significant Impact
Signalized Intersections (Using ICU Method)								
Flower St. at Civic Center Dr.	0.789 / C	0.784 / C	-0.005	NO	1.138 / F	1.146 / F	0.008	NO
Flower St. at Santa Ana Blvd.	0.685 / B	0.689 / B	0.004	NO	0.694 / B	0.704 / C	0.010	NO
Parton St. at Santa Ana Blvd.	0.316 / A	0.313 / A	-0.003	NO	0.428 / A	0.435 / A	0.007	NO
Ross St. at Civic Center Dr.	0.634 / B	0.655 / B	0.021	NO	0.564 / A	0.598 / A	0.034	NO
Ross St. at Santa Ana Blvd.	0.581 / A	0.582 / A	0.001	NO	0.668 / B	0.695 / B	0.027	NO
Broadway at Civic Center Dr.	0.721 / C	0.743 / C	0.022	NO	0.743 / C	0.757 / C	0.014	NO
Broadway at Santa Ana Blvd.	0.595 / A	0.619 / B	0.024	NO	0.612 / B	0.626 / B	0.014	NO
Broadway at 5th St.	0.399 / A	0.404 / A	0.005	NO	0.620 / B	0.646 / B	0.026	NO
Broadway at 4th St.	0.449 / A	0.477 / A	0.028	NO	0.610 / B	0.659 / B	0.049	NO
Broadway at 3rd St.	0.406 / A	0.409 / A	0.003	NO	0.803 / D	0.833 / D	0.030	NO
Broadway at 1st St.	0.779 / C	0.779 / C	0.000	NO	0.844 / D	0.870 / D	0.026	NO
Sycamore St. at Civic Center Dr.	0.484 / A	0.505 / A	0.021	NO	0.573 / A	0.607 / B	0.034	NO
Main St. at Civic Center Dr.	0.875 / D	0.906 / E	0.031	NO	0.883 / D	0.952 / E	0.069	NO
Main St. at Santa Ana Blvd.	0.799 / C	0.816 / D	0.017	NO	0.836 / D	0.879 / D	0.043	NO
Main St. at 5th St.	0.611 / B	0.630 / B	0.019	NO	0.812 / D	0.852 / D	0.040	NO
Main St. at 4th St.	0.613 / B	0.671 / B	0.058	NO	0.776 / C	0.880 / D	0.104	NO
Main St. at 3rd St.	0.533 / A	0.559 / A	0.026	NO	0.694 / B	0.730 / C	0.036	NO
Main St. at 1st St.	0.918 / E	0.931 / E	0.013	NO	1.013 / F	1.101 / F	0.088	**YES**
Bush St. at Santa Ana Blvd.	0.335 / A	0.346 / A	0.011	NO	0.462 / A	0.467 / A	0.005	NO
Bush St. at 5th St.	0.297 / A	0.296 / A	-0.001	NO	0.560 / A	0.577 / A	0.017	NO
Bush St. at 4th St.	0.347 / A	0.370 / A	0.023	NO	0.576 / A	0.616 / B	0.040	NO
French St. at 4th St.	0.342 / A	0.367 / A	0.025	NO	0.543 / A	0.580 / A	0.037	NO
Lacy St. at 4th St.	0.508 / A	0.465 / A	-0.043	NO	0.751 / C	0.815 / D	0.064	NO

Intersection	AM Peak Hour				PM Peak Hour			
	2035 NP (ICU[1] / Level of Service)	**2035 WP (ICU[1] / Level of Service)**	**Increase / Decrease**	**Significant Impact**	**2035 NP (ICU[1] / Level of Service)**	**2035 WP (ICU[1] / Level of Service)**	**Increase / Decrease**	**Significant Impact**
Signalized Intersections (Using ICU Method)								
Santiago St. at Santa Ana Blvd.	0.904 / E	0.865 / D	-0.039	NO	0.993 / E	0.925 / E	-0.068	NO
Standard St. at 1st St.	0.940 / E	0.964 / E	0.024	**YES**	0.970 / E	0.995 / E	0.025	**YES**
Grand Ave. at Santa Ana Blvd.	0.966 / E	0.977 / E	0.011	**YES**	1.172 / F	1.246 / F	0.074	**YES**
Grand Ave. at 4th St.	0.747 / C	0.755 / C	0.008	NO	0.841 / D	0.876 / D	0.035	NO
Grand Ave. at 1st St.	0.894 / D	0.923 / E	0.029	**YES**	0.960 / E	1.005 / F	0.045	**YES**

Note 1: ICU=Intersection Capacity Utilization

Table 9-4
Determination of Impacts
for 2035 Peak Hour (HCM)

Intersection	AM Peak Hour			PM Peak Hour		
	2035 NP (Average/Worst Case Delay[1]) / LOS[2]	**2035 WP (Average/Worst Case Delay[1]) / LOS[2]**	**Significant Impact**	**2035 NP (Average/Worst Case Delay[1]) / LOS[2]**	**2035 WP (Average/Worst Case Delay[1]) / LOS[2]**	**Significant Impact**
Unsignalized Intersections						
Ross St. at 4th St.	11.7 / B	11.9 / B	NO	13.6 / B	13.8 / B	NO
Sycamore St. at Santa Ana Blvd.	28.7 / D	32.7 / D	NO	29.8 / D	35.0 / D	NO
Sycamore St. at 5th St.	19.2 / C	19.7 / C	NO	15.7 / C	18.2 / C	NO
Sycamore St. at 4th St.	8.4 / A	8.6 / A	NO	9.8 / A	10.5 / B	NO
Spurgeon St. at 1st St.	11.3 / B	11.7 / B	NO	18.7 / C	23.6 / C	NO
French St. at Santa Ana Blvd.	24.5 / C	27.2 / D	NO	24.0 / C	31.0 / D	NO
Lacy St. at Civic Center Dr.	28.6 / D	37.9 / E	NEED EVAL	69.9 / F	113.5 / F	NEED EVAL
Lacy St. at Santa Ana Blvd.	122.1 / F	57.8 / F	NEED EVAL	179.1 / F	OVRFL / F	NEED EVAL
Lacy St. at 6th St.	7.3 / A	7.4 / A	NO	8.1 / A	8.6 / A	NO
Lacy St. at 1st St.	45.3 / E	104.6 / F	NEED EVAL	410.8 / F	OVRFL / F	NEED EVAL
Santiago St. at Washington Ave.	126.8 / F	112.3 / F	NEED EVAL	143.1 / F	164.9 / F	NEED EVAL
Santiago St. at Civic Center Dr.	280.0 / F	263.9 / F	NEED EVAL	221.7 / F	266.2 / F	NEED EVAL
Santiago St. at Brown St.	N/A	16.7 / C	NO	N/A	17.9 / C	NO
Santiago St. at 6th St.	N/A	13.7 / B	NO	N/A	19.1 / C	NO
Santiago St. at 4th St.	N/A	OVRFL / F	NEED EVAL	N/A	OVRFL / F	NEED EVAL
Mortimer St. at 5th St	9.5 / A	9.6 / A	NO	33.5 / D	69.7 / F	NEED EVAL
Mortimer St. at Santa Ana Blvd.	23.1 / A	25.3 / D	NO	23.0 / C	39.8 / E	NEED EVAL
U2-4 at Santa Ana Blvd.	N/A	80.8 / F	NEED EVAL	N/A	136.5 / F	NEED EVAL
Signalized Intersections (Caltrans, Using HCM)						
Penn Way at I-5 SB	0.569 / C	0.546 / C	NO	0.658 / C	0.672 / C	NO
Santa Ana Blvd. at I-5 SB	0.643 / C	0.671 / C	NO	0.615 / C	0.786 / C	NO
17t St. at I-5 NB	0.903 / D	0.901 / D	NO	1.108 / E	1.110 / E	NO
Grand Ave at I-5 NB	0.934 / C	1.145 / F	**YES**	1.316 / F	1.673 / F	**YES**

Note 1: Delay = Seconds per vehicle average, poorest movement
Note 2: LOS=Level of Service
Need Eval = Need evaluation to determine if the intersection warrants a traffic signal

For freeway ramp conditions, the analysis indicates that the I-5 Freeway Northbound Off Ramp at Grand Avenue will operate at an unacceptable level of service under Year 2030 and Year 2035 conditions. Table 9-5 indicates the comparison of With and Without Project conditions to determine the project impact. As indicated, this ramp will be significantly impacted by the project.

Table 9-5
Determination of Impacts
for I-5 NB Off Ramp at Grand Ave

Existing (PM)	2030 Without Project (PM)	2030 With Project (PM)	Increase / Decrease	Significant Impact
ICU[1] / Level of Service				
1.119 / F	1.042 / F	1.052 / F	0.010	YES
Existing (PM)	**2035 Without Project (PM)**	**2035 With Project (PM)**	**Increase / Decrease**	**Significant Impact**
ICU[1] / Level of Service				
1.119 / F	1.316 / F	1.673 / F	0.357	YES

Note 1: ICU=Intersection Capacity Utilization

10. SPECIAL ISSUES

Per the City's request, special issues including neighborhood traffic impacts, traffic calming measures, and parking requirements have been discussed and evaluated in the following sections.

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10.1 Neighborhood Traffic Impact

Neighborhood traffic impacts may occur when traffic related to new developments uses inappropriate streets and/or drives in an inappropriate manner on sensitive streets. Streets susceptible to traffic impacts are primarily local residential streets, often with single family homes fronting on the street. The intended use for this type of street is to provide access to adjacent properties or properties in very close proximity to the street. They are not intended for through traffic. Excessive traffic, cut through traffic, and speeding are generally unwelcome on this type of street. These problems are often found to be directly related to the traffic volume on the street and prevailing speeds on the street.

Cut-through or inappropriate traffic can sometimes occur on residential streets due to congested traffic conditions on the arterial highway system that causes motorists to seek alternate routes by cutting through neighborhoods. In some cases, the through vehicles may drive through the neighborhood at speeds that are higher than average, higher than the posted speed limit, or higher than the speeds that residents may drive at. At other times, local residential streets may be found to be the shortest or most direct route between a driver's origin and destination due to the physical layout of the street system. In either case, unwelcome traffic can be found to be highly objectionable to residents. If this type of traffic is expected to increase significantly due to new developments, a significant impact may occur.

Some streets can become very controversial when they serve a dual function of providing access to local residences and being an important part of the City's arterial highway system. Streets within the study area, such as Santa Ana Boulevard or Civic Center Drive east of the downtown area can have these characteristics.

Evaluation of the neighborhood traffic impacts and the traffic calming measures that are implemented for this project follow the *City of Santa Ana Procedure for Neighborhood Traffic Management Plans* and other similar type of studies within City of Santa Ana. In the following sections, three existing neighborhoods traffic conditions and the existing diversion measures throughout the neighborhood are discussed. The characteristics of the project traffic, as it passes through the neighborhood are described. The recommendations to mitigate project traffic diversion are described.

Existing Neighborhood Traffic Conditions

Neighborhood traffic problems have been diagnosed, studied, and treated in three neighborhoods that are located near the study area. These are:

- French Court Neighborhood, bounded approximately by Washington Avenue, Bush Street, 17th Street, I-5, and Lincoln Street

- French Park Neighborhood, located generally south of French Court and north of Civic Center Drive

- Logan Neighborhood, located generally along Washington Avenue and Lincoln Street

Other street within the project area are not known to have significant existing neighborhood traffic issues, as represented by significant or regular indications to the City that local traffic conditions are unacceptable. However traffic levels on some streets in the area are approaching the range where residents may express concern if asked about local traffic conditions. Figure 10-1 shows the existing roadway network within the 3 neighborhoods. As indicated, the current local residential roadways include Spurgeon Street, French Street, Minter Street, Lacy Street, Garfield Street, Poinsettia Street, Logan Street, Lincoln Street, and Washington Avenue.

Figure 10-2 and Figure 10-3 show the existing AM and PM peak hour traffic volume (conducted in 2006) for the neighborhood intersections, respectively. The existing traffic volumes within the neighborhoods are relatively low, compared with traffic levels on the arterial road system, however traffic volumes on many of these streets are at levels that residents would consider undesirable. The highest volume occurs along Washington Avenue with a maximum of 321 westbound through vehicles during the AM peak hour and 393 eastbound through vehicles during PM peak hour. Other roadways carry less than 100 vehicles during peak hours. The roadways which carry significant through traffic volumes are Main Street, Santiago Street, 17th Street, Civic Center Drive and Santa Ana Boulevard.

Historically, the residents' concerns are in regard to the through traffic along Spurgeon Street and French Street within the neighborhood. Concerns also include speeding along Lacy Street.

The existing diversion measures throughout the French Court neighborhood include:

- Raised median on Seventeenth Street across Bush Street and French Street
- Cul-de-sac on Fifteenth Street at Penn Way

The most viable bypass route through the French Park neighborhood is Tenth Street/Minter Street. There are three all-way stop controlled intersections along the Tenth Street/Minter Street route, but there are no other existing diversion measures in the French Park neighborhood and Logan neighborhood.

Potential Project Impacts

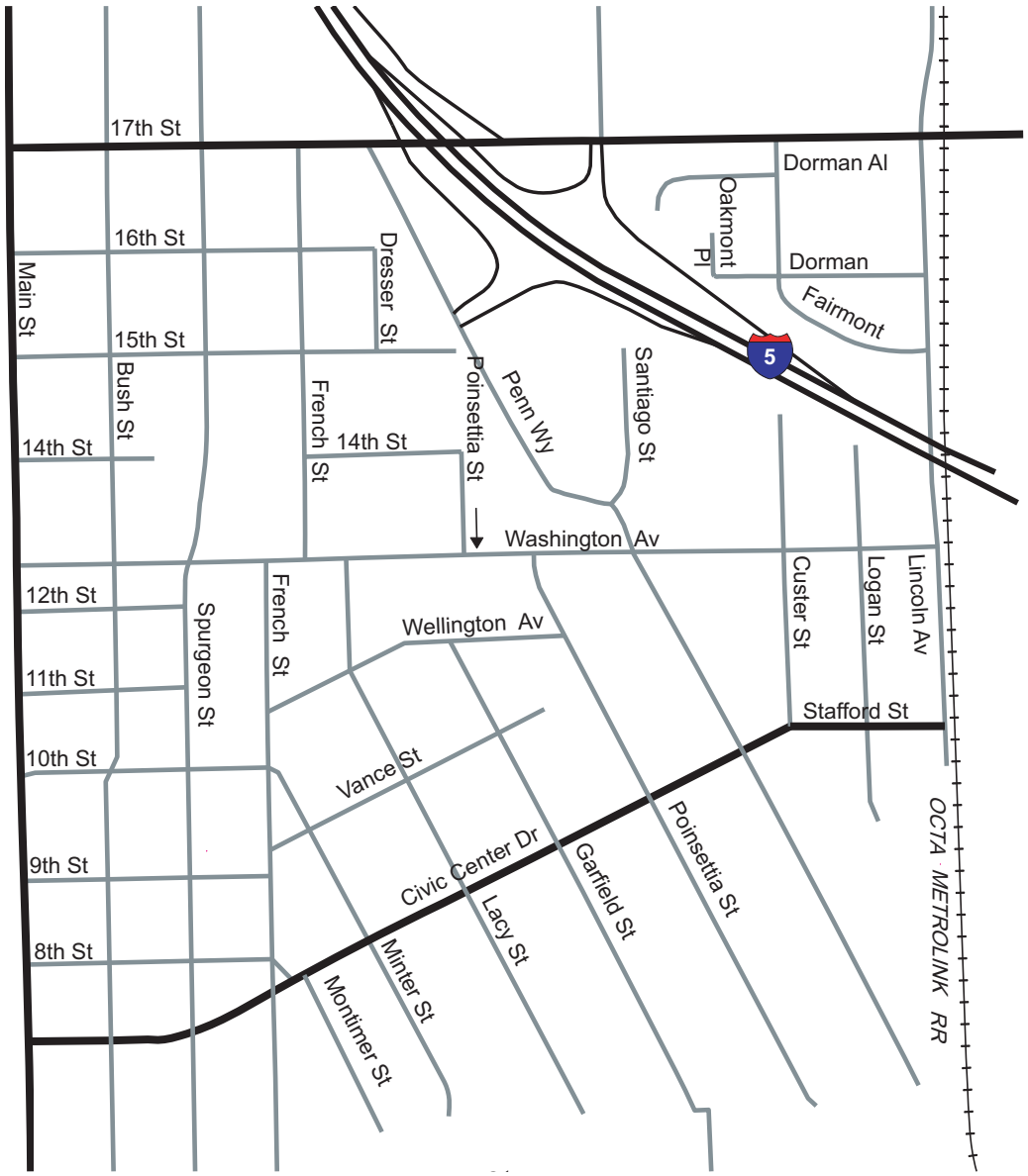
The project area is currently urban and developed with a wide range of civic, commercial, industrial and residential land uses. The proposed changes for the existing neighborhoods or districts include replacing most of the industrial and commercial uses with residential and some mixed-use developments.

Table 6-3 presented previously in Chapter 6 indicates the trip generation by each TAZ. As indicated, minimum trip generation increases are projected for most of the neighborhood area. In fact, TAZ 8, TAZ 9, and TAZ13 show negative ADT increase for the project trips due to the removal of existing industrial and commercial uses.

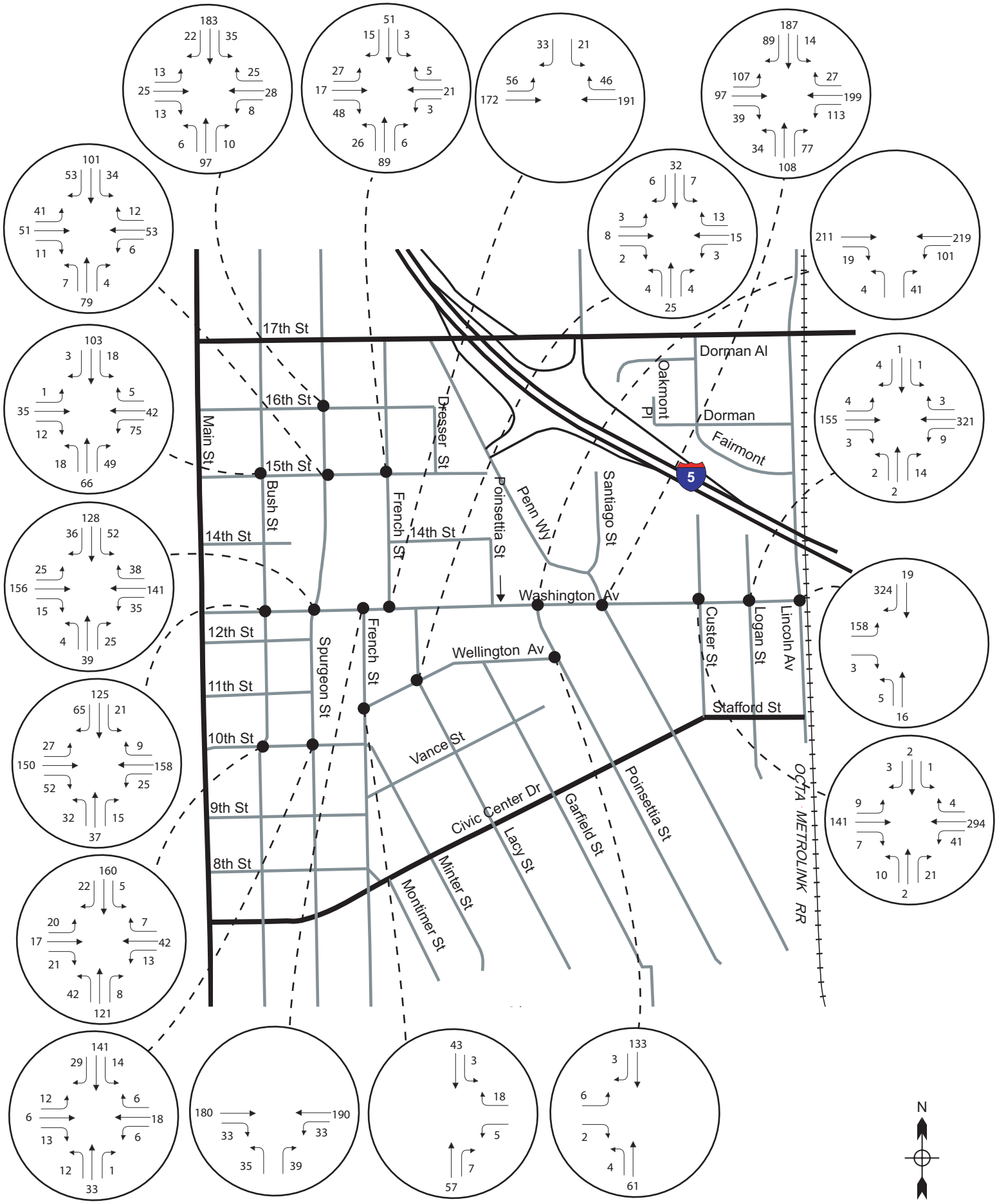
Generally the traffic analysis forecasts minimal traffic increases on the local residential streets listed above. The distribution of land uses and their principle access routes is not conducive to through traffic use of the streets indicated above. Also, the amount of employment in the larger city center area is reduced slightly by the plan, which should result in an incremental decrease in traffic pressure upon the arterial street system, thus reducing the inducement to cut into neighborhoods.

Due to the nature and location of the project, no significant negative impact is expected. However the science of forecasting neighborhood traffic is not precise. For example, a diversion level of say 0.5% cannot be reliably predicted, yet a new project could result in 1-2 additional vehicles use of an undesirable route. This level of increase may be very difficult to measure or confirm however, since normal daily variation in use by residents can greatly exceed the volume of through traffic increase that may occur due to a project. For this reason, there is a potential for an incremental impact resulting from trace increases in usage of impacted streets.

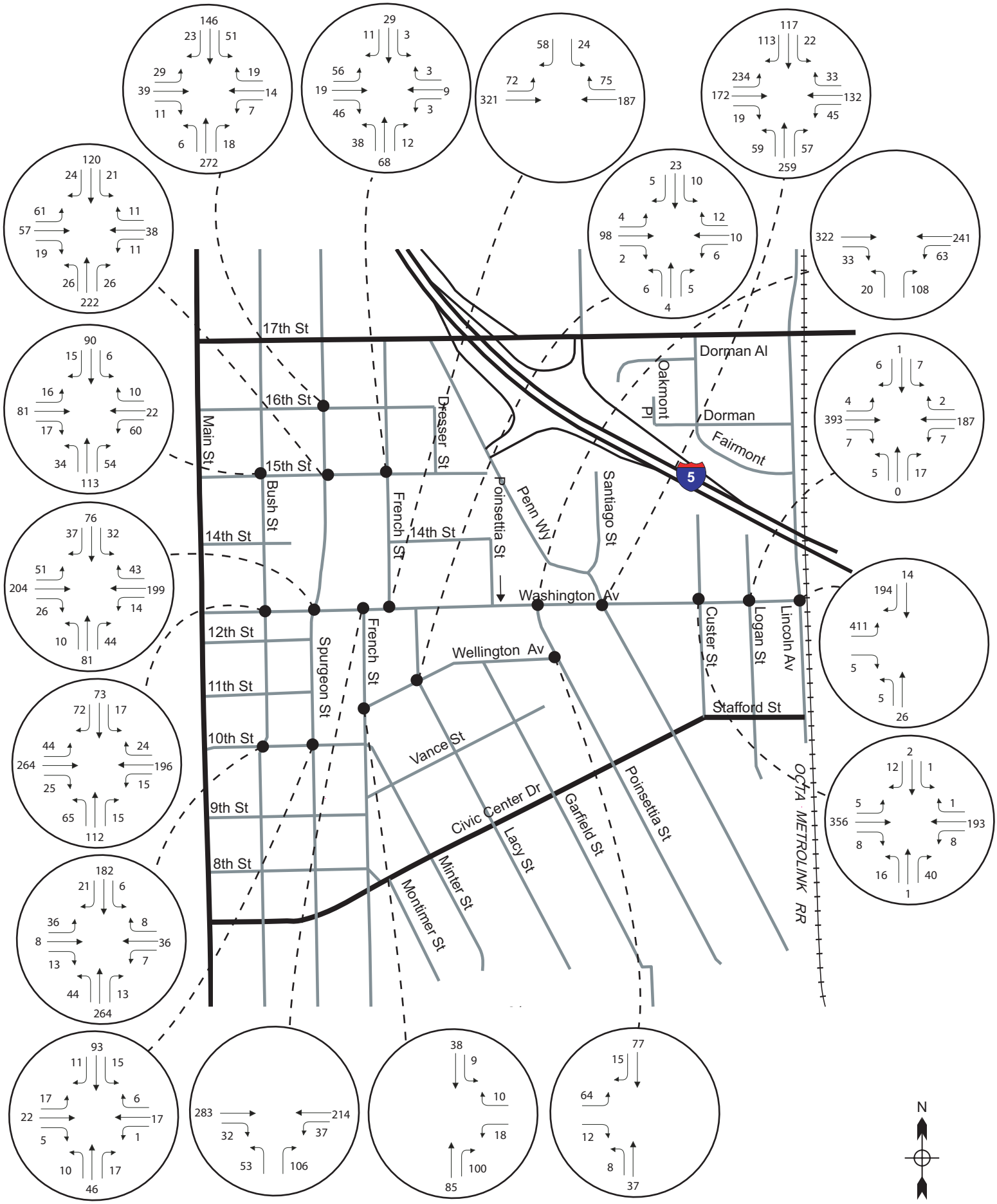
Positive neighborhood impact can be expected from the project due to roadway improvements proposed by the project. As part of this project and the City's General Plan Circulation Element, Santiago Street will be improved as a secondary Arterial and connect with Standard Avenue. This will increase the traffic connectivity between north and south and ease the traffic along Main Street and north-south local residential roadways. The industrial uses along Santiago Street will be replaced by residential development. Brown Street, 6th Street and 5th Street will connect to Santiago Street as local roadways. New residential roadways are also proposed east of Lincoln Street to serve the proposed residential development in the area.



KOA CORPORATION PLANNING & ENGINEERING	City of Santa Ana	Figure 10-1
	Santa Ana Transit Zoning Code Traffic Study	Existing Neighborhood Roadway Network



KOA CORPORATION PLANNING & ENGINEERING	City of Santa Ana	Figure 10-2
	Santa Ana Transit Zoning Code Traffic Study	Existing Neighborhood Int. AM Turning Volume


17th St
16th St
15th St
14th St
12th St
11th St
10th St
9th St
8th St
Main St
Bush St
Spurgeon St
French St
Dresser St
Poinsettia St
Penn Wy
Santiago St
Washington Av
Wellington Av
Vance St
Civic Center Dr
Stafford St
Custer St
Logan St
Lincoln Av
Dorman Al
Oakmont Pl
Dorman
Fairmont
Minter St
Montimer St
Lacy St
Garfield St
Poinsettia St
OCTA METROLINK RR
5
N

Potential Mitigation Measures

The project is expected to increase traffic volumes on some of the internal roadways within the project area. Although the increase may not be significant there may be opportunities to mitigate the negative effects of increased traffic through incorporation of measures into the design of the local street system. Features that are regularly incorporated in the neighborhood traffic calming programs may be appropriate for systematic inclusion into the proposed project. This could include systematic uses of traffic calming treatments such as curb extensions at local intersections, short medians at entries to wide streets, or traffic circles at oversized intersections. These measures can be further enhanced with landscaping, monuments, neighborhood identity features or other elements. When used properly these features can reduce traffic speeds to acceptable ranges and can discourage some of the cut though traffic due to convenience and speed reduction.

Many of the streets in the study area appear to have severely distressed pavement, potentially requiring complete reconstruction of the pavement. The cost of implementing traffic calming measures as noted above can be quite nominal when done in conjunction with needed street reconstruction.

It is suggested that systematic application of traffic calming features be considered particularly in conjunction with street reconstruction, improvements adjacent to properties that change use, or at locations where traffic problems become evident in the future.

It is also suggested that funds need to be reserved for implementing traffic calming for the neighborhood roadways. If residents find concern over traffic increase that are related to the project, the city process of developing and implementing neighborhood traffic management plans can be applied.

10.2 Parking Issues

Parking usage varies from light to heavy throughout the existing specific area. While some residential areas show heavy on-street parking, most areas with heavy parking demand appear to have commercial uses with inadequate off street parking nearby.

With the proposed project, conversion from industrial to residential uses should reduce the source of existing on-street parking demand. Residential parking demand for new uses can be managed by maintaining parking development standards such as those found in the city's municipal code. Shared parking for the mixed-use development should also be applied based on *Shared Parking*, second edition, published by the Urban Land Institute (ULI).

In general, the provision for on-street parking and off-street parking will be consistent with the City's general policy, goal and plan. It is suggested that on street parking will be reduced by application of appropriate off street parking supplies for new developments.

11. MITIGATION AND COST ESTIMATES

Based upon intersection level of service analysis, several study intersections will be significantly impacted by project related traffic in Anticipated Project Buildout Year (2030) and Long Range Horizon Year (2035). The following are the recommended mitigation measures:

Grand Avenue at Santa Ana Boulevard
The recommended improvement for this intersection is to install an eastbound right-turn overlap signal phasing.

Main Street at 1st Street
The recommended improvement for this intersection is to construct second northbound and southbound left turn lanes and a dedicated northbound right turn lane for 2030 and 2035 conditions.

Standard Street at 1st Street
The recommended improvement for this intersection is to construct third eastbound and westbound shared through-right lanes for 2035 conditions. The improvement is only needed for 2035 conditions.

Grand Avenue at 1st Street
The recommended improvement for this intersection is to construct a third eastbound shared through/right turn lane, a third westbound shared through/right turn lane, and a third northbound through lane with dedicated northbound right-turn lane for 2035 conditions. The improvement is only needed for 2035 conditions.

Lacy Street at Santa Ana Boulevard
The recommended improvement for this intersection is to install a traffic signal and provide exclusive left turn lane for both northbound and southbound directions for both 2030 and 2035 conditions.

Lacy Street at 1st Street
The recommended improvement for this intersection is to install a traffic signal for both 2030 and 2035 conditions.

Santiago Street at Washington Avenue
The recommended improvement for this intersection is to install a traffic signal and provide one exclusive left turn lane for both eastbound and westbound traffic for 2035 conditions only.

Santiago Street at Civic Center Drive
The recommended improvement for this intersection is to install a traffic signal and provide: one exclusive left turn lane, one through lane, and one shared through and right turn lane on northbound

and southbound approaches; and one exclusive left turn lane and one shared through and right lane on eastbound and westbound approaches. The improvement is only needed for 2035 conditions.

Santiago Street at 4th Street

The recommended improvement for this intersection is to install a traffic signal. The lane configuration for the signal is recommended as 1 Left, 1 Through, 1 Through+Right for all approaches.

Grand Avenue at 1-5 Northbound Ramps

The recommended improvement for this intersection is to construct a second westbound right turn lane for the I-5 northbound off ramp under both 2030 and 2035 conditions.

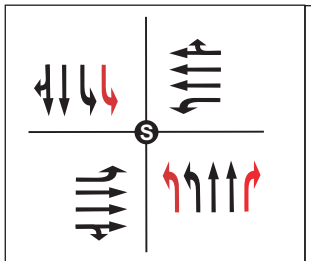
The following 3 unsignalized intersections do not warrant traffic signals and will operate at LOS F for the worst movement due to cross traffic on the minor street or left turns onto the major street subject to long delays:

- Lacy Street at Civic Center Drive
- Mortimer Street at 5th Street
- U2-4 at Santa Ana Boulevard

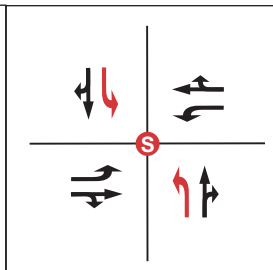
For the intersection of U2-4, or Fuller Street, at Santa Ana Boulevard, since it is a new intersection for the project access, closely spaced with the I-5 interchange, it is suggested to be designed as right-in and right-out only access, which will operate at LOS B or better for all scenarios. The configuration of this proposed intersection needs further evaluation depending upon the future configuration of the railroad grade crossing at Santa Ana Blvd (at grade or grade separated). For the other two unsignalized intersections (Lacy Street at Civic Center Drive, and Mortimer Street at 5th Street), KOA Corporation recommends providing roundabout traffic controls or monitoring the traffic volumes and installing a traffic signal when it is warranted.

The intersection improvements described above are illustrated on Figure 11-1. The ICU and Level of Service calculation for the mitigation improvements for summarized in Table 11-1 through Table 11-4. The analysis worksheets for mitigations are included in Appendix J.

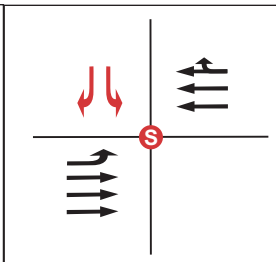
For the I-5 at Santa Ana Boulevard Northbound Off ramp, it is recommended to re-stripe the westbound off-ramp approach (east leg of the "T" intersection) to one left-turn lane, one shared left-right turn lane, and one dedicated right-turn lane in order to mitigate the project impact. With two ramp lanes for each movement, the ramp will operate at LOS C or better for all scenarios.



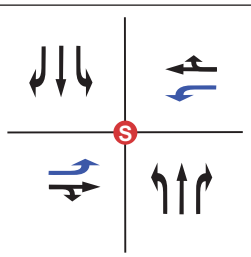
22. Main & 1st



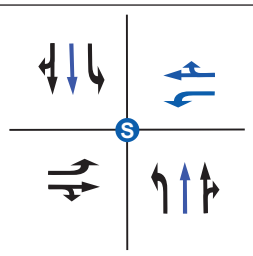
30. Lacy & Santa Ana



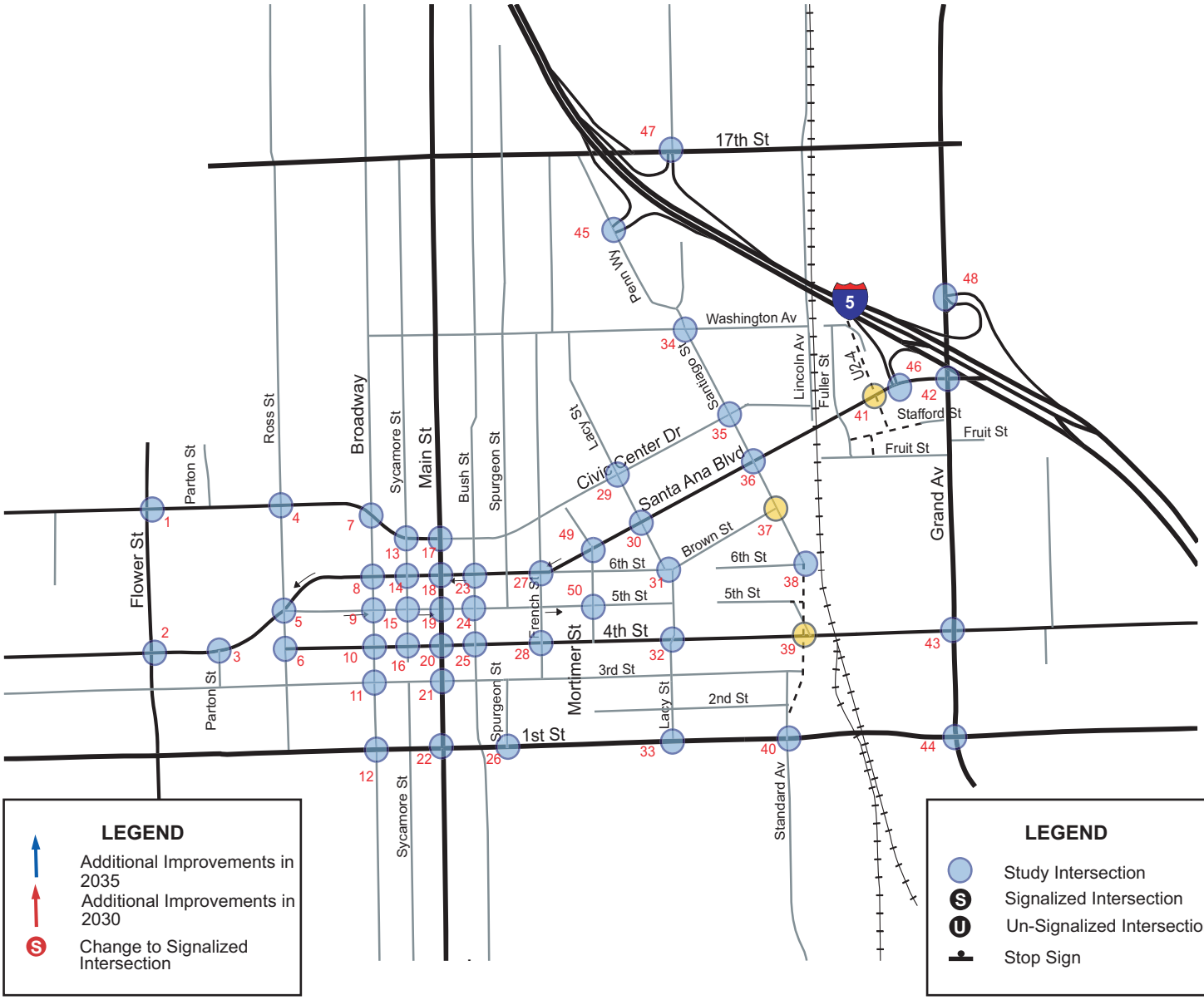
33. Lacy & 1st



34. Santigo & Washington



35. Santigo & Civic Ctr Dr

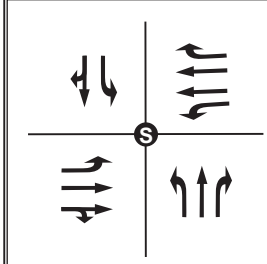


LEGEND

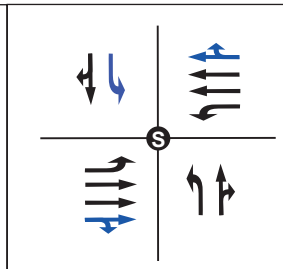
- Additional Improvements in 2035
- Additional Improvements in 2030
- S — Change to Signalized Intersection

LEGEND

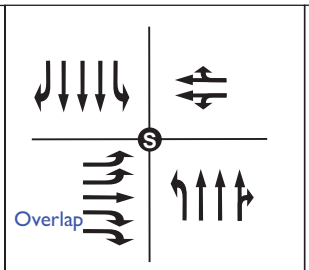
- Study Intersection
- S — Signalized Intersection
- U — Un-Signalized Intersection
- Stop Sign



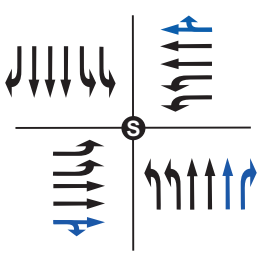
36. Santiago & Santa Ana



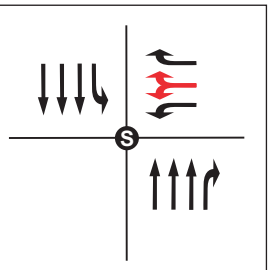
40. Standard & 1st



42. Grand & Santa Ana



44. Grand & 1st



48. Grand & I-5

KOA CORPORATION
PLANNING & ENGINEERING

City of Santa Ana — Figure 11-1

Santa Ana Transit Zoning Code Traffic Study — Intersection Mitigation Measure

Table 11-1 - Level of Service Analysis of Mitigation for 2030 AM Peak Hour Conditions

Intersection	Existing	2030 without Project	2030 with Project	Mitigation with Project	Significant Impact?
	ICU (Delay)/LOS	ICU (Delay)/LOS	ICU (Delay)/LOS	ICU (Delay)/LOS	
Grand Avenue at Santa Ana Boulevard	0.792/C	0.807/D	0.794/C	0.625/B	No

Note: Delay shown in seconds (") for unsignalized intersections and Caltrans' intersections;

Table 11-2 - Level of Service Analysis of Mitigation for 2030 PM Peak Hour Conditions

Intersection	Existing	2030 without Project	2030 with Project	Mitigation with Project	Significant Impact?
	ICU (Delay)/LOS	ICU (Delay)/LOS	ICU (Delay)/LOS	ICU (Delay)/LOS	
Grand Avenue at Santa Ana Boulevard	0.888/D	0.902/E	0.991/E	0.773/C	No

Note: Delay shown in seconds (") for unsignalized intersections and Caltrans' intersections;

Table 11-3 - Level of Service Analysis of Mitigation for 2035 AM Peak Hour Conditions

Intersection	Existing	2035 without Project	2035 with Project	Mitigation with Project	Significant Impact?
	ICU (Delay)/LOS	ICU (Delay)/LOS	ICU (Delay)/LOS	ICU (Delay)/LOS	
Grand Avenue at Santa Ana Boulevard	0.792/C	.966/E	.977/E	0.785/C	No
Main Street at 1st Street	.693/B	.918/E	.931/E	0.860/D	No
Standard Street (Santiago Street) at 1st Street	.723/C	.940/E	.964/E	0.768/C	No
Grand Avenue at 1st Street	.764/C	.894/D	.923/E	0.843/D	No
Grand Avenue at I-5 NB Ramps	(19.8)/B	(30.2)/C	(80.5)/F	(25.5)/C	No
Unsignalized Intersections, to be Signalized					
Santiago Street at Washington Avenue	(12.7)/B	(126.8)/F	(112.3)/F	0.705/C	No
Santiago Street at Civic Center Drive	(14.5)/B	(280.0)/F	(263.9)/F	0.788/C	No
Santiago St at 4th St	N/A	N/A	OVRFL/F	0.538/A	No
Lacy Street at Santa Ana Boulevard	(25.3)/D	(122.1)/F	(57.8)/F	0.753/C	No
Lacy St at 1st St	(16.6)C	(45.3)/E	(104.6)/F	0.483/A	No

Note: Delay shown in seconds (") for unsignalized intersections and Caltrans' intersections;

Table 11-4 - Level of Service Analysis of Mitigation for 2035 PM Peak Hour Conditions

Intersection	Existing	2035 without Project	2035 with Project	Mitigation with Project	Significant Impact?
	ICU (Delay)/LOS	ICU (Delay)/LOS	ICU (Delay)/LOS	ICU (Delay)/LOS	
Grand Avenue at Santa Ana Boulevard	0.888/D	1.172/F	1.246/F	1.015/F	No
Main Street at 1st Street	0.765/C	1.013/F	1.101/F	0.979/E	No
Standard Street (Santiago Street) at 1st Street	0.719/C	0.970/E	0.995/E	0.823/D	No
Grand Avenue at 1st Street	0.808/D	0.960/E	1.005/F	0.842/D	No
Grand Avenue at I-5 NB Ramps	(62.3)/E	(119.9)/F	(183.9)/F	(35.0)/C	No
Unsignalized Intersections, to be Signalized					
Santiago Street at Washington Avenue	(18.1)/C	(143.1)/F	(164.9)/F	0.763/C	No
Santiago Street at Civic Center Drive	(17.4)/C	(221.7)/F	(266.2)/F	0.798/C	No
Santiago St at 4th St	N/A	N/A	Overflow/F	0.663/B	No
Lacy Street at Santa Ana Boulevard	(33.4)/D	(179.1)/F	Overflow/F	0.694/B	No
Lacy St at 1st St	(23.2)/C	(410.8)/F	Overflow/F	0.653/B	No

Note 2: Delay shown in seconds (") for unsignalized intersections;

Improvements which will eliminate all anticipated roadway operational deficiencies throughout the study area have been identified for 2030 and 2035 traffic conditions. The approximate costs for the improvements have been estimated to provide a rough order of magnitude of the cost for the improvements. As indicated on Table 11-5, the total cost for the ultimate improvements is $6,150,000.

Table 11-5 – Mitigation Cost Estimates

INTERSECTION	2030 With Project With Improvements	2035 With Project With Improvements	Total Costs
Main St. at First St.	Add 2nd SB Left Turn Lane Add 2nd NB Left Turn Lane Add NB Right Turn Lane		$1,700,000
Lacy St. at Santa Ana Bl.	Add 1st SB Left Turn Lane Add 1st NB Left Turn Lane Signalize Intersection	None	$250,000
Lacy St. at 1st St.	Signalize Intersection	None	$250,000
Santiago St. at Washington St.		Add 1st EB Left Turn Lane Add 1st WB Left Turn Lane Signalize Intersection	$250,000
Santiago St. at Civic Center Dr.	None	Signalize Intersection Add 1st WB Left Turn Lane Add 1st EB Through+Right Turn Ln Add Through+Right NB & SB	$250,000 $100,000 $100,000 $200,000
Standard Ave at First St.	None	Add EB & WB Shared Through+Rt	$500,000
Grand Ave at Santa Ana Bl.	None	Eastbound Right Turn Overlap	$50,000*
Grand Ave at First St.	None	Add 3rd WB and EB Shared Through + Right Lanes Add 3rd NB Through Lane & Rt Ln	$500,000* $250,000
Grand Ave at Interstate 5	Add 2nd WB Right Turn Lane NB + SB Permitted Phasing	None	$400,000 $50,000
Total			**$4,850,000**

* Cost for improvements in excess of City's Grand Avenue Improvement Project